

TQL101 · TECHNICAL SPECIFICATION

TQ-LENS Dark Liquidity Aggregation Service

ISSUE 1.1 · 04 MARCH 2011

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1 Introduction

TQ-LENS, Turquoise's liquidity aggregation service parses incoming orders and distributes them according to a series of sophisticated algorithms to otherwise inaccessible, fragmented liquidity sources. As such, it mediates access to the multiple liquidity partners via a single, independent connection.

The Financial Information Exchange (FIX) protocol enables access to Turquoise using a messaging standard developed for real-time electronic exchange of security transactions.

This specification describes a conceptual overview of the FIX protocol as well as providing technical guidance on adopting FIX 4.2 or FIX 4.4 to connect to the Turquoise TQ-LENS service.

FIX specification: <http://www.fixprotocol.org>

1.1 Purpose

The purpose of this document is to provide a technical description of the TQ-LENS gateway available at Turquoise.

1.2 Readership

This document outlines how to connect to the TQ-LENS trading gateway via FIX and the detailed message types and fields used.

When read in conjunction with the other technical specifications, it is intended that these documents provide all of the details directly connected Turquoise participants require to develop to the trading services.

This document is particularly relevant to technical staff within the MTF's member firms.

1.3 Document History

This document has been through the follow iterations:

Issue	Date	Description
1.0	17 Feb 2011	First issue of this document published.
1.1	04 Mar 2011	Inclusion of Execlnst(18)=2 as mandatory for New Order Single and Order Cancel/Replace Request messages.

1.4 Enquiries

Contact Technical Account Management at Turquoise for any functional queries regarding the services outlined in this document. Technical Account Management can be contacted Monday to Friday between 07:15UK and 17:45UK:

- Telephone: +44 (0)20 7382 7699

1 Introduction

The TQ LENS aggregation service provides a single point of access to non-displayed block liquidity residing within brokers and at trading facilities providing non-displayed execution services.

TQ LENS acts as a broker with SOR (Smart Order Routing) functionality to route client orders to the Turquoise MTF (Multilateral Trading Facility) Midpoint Dark orderbook and/or other partner liquidity pools.

As of Q1 2011, current partner liquidity venue pools include:

Bank of America
Merrill Lynch

CHEUVREUX
CRÉDIT AGRICOLE GROUP

CITADEL

citi

CREDIT SUISSE

Deutsche Bank

INSTINET

NOMURA

Turquoise
London Stock Exchange Group

- All trades netted, considered on MTF for clearing & settlement
- Single point of access via London Stock Exchange SAP or co-location
- Connectivity via either FIX 4.2 or FIX 4.4
- Improved quality of execution with guaranteed price improvement
- Choice of liquidity strategy types as well and bespoke implementation
- Anonymity minimising information leakage

2 Service Description

2.1 Strategies

The TQ-LENS service provides three liquidity routing strategies:

- **Strategy 1:** Post to Turquoise and then distribute to partner liquidity venues.
- **Strategy 2:** IOC to Turquoise and then distribute to partner liquidity venues.
- **Strategy 3:** Post to all liquidity venues simultaneously.

Orders are pegged inside the spread at liquidity partners (LPs); orders are pegged to the dark midpoint of the PBBO at Turquoise MTF.

Turquoise is able to implement bespoke strategy routing requirements or provide a private routing network between participants.

2.1.1 Strategy 1

Post to Turquoise and then distribute to partner liquidity venues.

Turquoise MTF takes precedence and receives the entire order with an expiration time; any remaining order quantity is then distributed among all participating liquidity partners (LPs) including Turquoise MTF.

2.1.2 Strategy 2

IOC to Turquoise and then distribute to partner liquidity venues.

Turquoise MTF takes precedence and receives the entire order as an IOC; an IOC is first sent to the Turquoise Dark Midpoint orderbook and any remaining quantity is sent as an IOC to the Turquoise Integrated orderbook; any remaining order quantity is then distributed as a passive/resident order among all participating liquidity partners (LPs).

2.1.3 Strategy 3

Post to all liquidity venues simultaneously.

The order is distributed equally among all participating liquidity partners (LPs) including Turquoise MTF; all orders are specified with a time in force.

2.2 Order Types

All orders submitted by clients are required to be specified as dark midpoint PBBO pegged.

Depending on the strategy specified by clients, TQ-LENS automatically performs an IOC on initial/subsequent iterations.

2.2.1 Flow Orders

A Flow order is defined as any order specifying the Flow tariff in the client order. The order will only be distributed to liquidity venues accepting the corresponding Flow order rebate. Flow orders are not value restricted.

A Flow order is specified via FIX tag TQExecMethod(9012) = 100

2.2.2 Block Orders

A Block order is defined as any order specifying the Block tariff in the client order. The order satisfies the rebate requirement for all liquidity venues and therefore is valid for accessing all liquidity venues.

Block orders must satisfy a minimum value check on order entry which is a percentage of Large in Scale (LIS). A Block order may be distributed in child orders that are smaller than the minimum value. Initially, the minimum value to qualify as Block is 10% of Large in Scale (LIS) criteria.

A Flow order is specified via FIX tag TQExecMethod(9012) = 200

2.2.3 Peg Cap Price

A price via FIX tag Price(44) can be optionally specified on orders and is inferred as a peg cap price. Peg offsets are unsupported.

2.2.4 MaxQty

FIX tag TQLMaxQty(9014) allows a participant to specify a limit on the order quantity distributed to each liquidity venue on each iteration. TQLMaxQty(9014) can either be null or set to a value that is equal to or less than the order quantity; i.e. $TQLMaxQty(9014) \leq OrderQty(38)$

TQLMaxQty(9014) is only optionally available on the [Strategy 3](#) routing algorithm.

2.2.5 MAQ

Orders may optionally have a Minimum Acceptable Quantity (MAQ) specified via FIX tag MinQty(110). The MAQ is an explicit quantity that is less than or equal to the order quantity; i.e. MinQty(110) <= OrderQty(38)

An order with MAQ must only be matched subject to, at a minimum, fulfilling its MAQ constraint with one or multiple orders but within the same execution cycle. If an order with an MAQ of 1,000 shares is sent to a liquidity venue, the liquidity venue can execute 100, 500, and 400 shares against multiple orders as long as these executions are within the same execution cycle.

2.2.6 Exclude-Self

If a participant is both a client and a liquidity partner of the TQ-LENS service, the participant can optionally specify that their orders are not routed to their liquidity venue via FIX tag Execlnst(18) = 2 X (Exclude-Self).

2.3 Strategy Message Formats

Strategy	FIX Message
1	[FIX 4.2] [FIX 4.4] Symbol(55) or [SecurityID(48) and Currency(15) and SecurityExchange(207)] Execlnst(18) = 2 X (Exclude-Self) OrderType(40) = P (Pegged) MaxShow(210) = 0 (Dark) OrderQty(38) MinQty(110) Price(44) TQLStrategy(9007) = 1 TQLExecMethod(9012) = 100 200 TQLTimestamp(9008) [FIX 4.4] PegScope(840) = 3 (PBBO)

<p style="text-align: center;">2</p>	<p>[FIX 4.2] [FIX 4.4] Symbol(55) or [SecurityID(48) and Currency(15) and SecurityExchange(207)] ExecInst(18) = 2 X (Exclude-Self) OrderType(40) = P (Pegged) MaxShow(210) = 0 (Dark) OrderQty(38) MinQty(110) Price(44) TQLStrategy(9007) = 2 TQLExecMethod(9012) = 100 200</p> <p>[FIX 4.4] PegScope(840) = 3 (PBBO)</p>
<p style="text-align: center;">3</p>	<p>[FIX 4.2] [FIX 4.4] Symbol(55) or [SecurityID(48) and Currency(15) and SecurityExchange(207)] ExecInst(18) = 2 X (Exclude-Self) OrderType(40) = P (Pegged) MaxShow(210) = 0 (Dark) OrderQty(38) MinQty(110) Price(44) TQLStrategy(9007) = 3 TQLExecMethod(9012) = 100 200 TQLMaxQty(9014)</p> <p>[FIX 4.4] PegScope(840) = 3 (PBBO)</p>

3 Extranex Connectivity

Participants may connect to the TQ-LENS service using either the FIX 4.2 or FIX 4.4 protocol.

Participants connect via London Stock Exchange Extranex registered addressing for standard SAP or co-location configurations.

3.1 Test CDS

Service	Protocol	Turquoise TQ-LENS IP Address	Port
TQ-TEST-FGW01	FIX 4.2 / FIX 4.4	194.169.9.147	~
TQ-TEST-FGW02	FIX 4.2 / FIX 4.4	194.169.9.148	~

~ Turquoise assigns participants with a unique port per FIX session.

3.2 Live Production

Service	Protocol	Turquoise TQ-LENS IP Address	Port
TQ-SPES-FGW01	FIX 4.2 / FIX 4.4	194.169.9.16	~
TQ-SPES-FGW02	FIX 4.2 / FIX 4.4	194.169.9.17	~
TQ-SPES-FGW03	FIX 4.2 / FIX 4.4	194.169.9.18	~
TQ-SPES-FGW04	FIX 4.2 / FIX 4.4	194.169.9.19	~

~ Turquoise assigns participants with a unique port per FIX session.

4 Message Formats

4.1 Message Header and Trailer

4.1.1 Message Header

Tag	Field Name	Req	Description
8	BeginString	Y	FIX.4.2 or FIX.4.4
9	BodyLength	Y	Number of characters after this field up to and including the delimiter immediately preceding the CheckSum.
35	MsgType	Y	Message type.
49	SenderCompID	Y	CompID of the party sending the message.
56	TargetCompID	Y	CompID of the party the message is sent to. Value Meaning TTS Turquoise Trading System
34	MsgSeqNum	Y	Sequence number of the message.
43	PossDupFlag	N	Whether the message was previously transmitted under the same MsgSeqNum (34). Absence of this field is interpreted as Original Transmission (N). Value Meaning Y Possible Duplicate N Original Transmission
97	PossResend	N	Whether the message was previously transmitted under a different MsgSeqNum (34). Absence of this field is interpreted as Original Transmission (N). Value Meaning Y Possible Resend N Original Transmission
52	SendingTime	N	Time the message was transmitted. Not required for incoming messages sent by the clients (even if sent by a client, no validation will be done). Required for outgoing messages sent by the server.

122	OrigSendingTime	N	Time the message was originally transmitted. If the original time is not available, this should be the same value as SendingTime (52). Required if PossDupFlag (43) is Possible Duplicate (Y).
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4.1.2 Message Trailer

Tag	Field Name	Req	Description
10	Checksum	Y	

4.2 Administrative Messages

4.2.1 Logon

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	A = Logon
Message Body			
98	EncryptMethod	Y	Method of encryption. Value Meaning _____
			0 None
108	HeartBtInt	Y	Indicates the heartbeat interval in seconds.
141	ResetSeqNum Flag	N	Indicates whether the client and server should reset sequence numbers. Absence of this field is interpreted as Do Not Reset Sequence Numbers (N). Value Meaning _____
			Y Reset Sequence Numbers
			N Do Not Reset Sequence Numbers
Standard Trailer			

4.2.2 Logout

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	5 = Logout
Message Body			
58	Text	N	
Standard Trailer			

4.2.3 Heartbeat

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	0 = Heartbeat
Message Body			
112	TestReqID	N	Required if the heartbeat is a response to a Test Request. The value in this field should echo the TestReqID (112) received in the Test Request.
Standard Trailer			

4.2.4 Test Request

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	1 = Test Request
Message Body			
112	TestReqID	Y	Identifier for the request.
Standard Trailer			

4.2.5 Resend Request

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	2 = Resend Request
Message Body			
7	BeginSeqNo	Y	Sequence number of first message in range.
16	EndSeqNo	Y	Sequence number of last message in range.
Standard Trailer			

4.2.6 Reject

Tag	Field Name	Req	Description
<u>Standard Header</u>			
35	MsgType	Y	3 = Reject
Message Body			
45	RefSeqNum	Y	MsgSeqNum (34) of the rejected message.
372	RefMsgType	N	MsgType (35) of the rejected message.
371	RefTagID	N	If a message is rejected due to an issue with a particular field its tag number will be indicated.
373	SessionReject Reason	N	
58	Text	N	Text specifying the reason for the rejection.
<u>Standard Trailer</u>			

4.3.7 Sequence Reset

Tag	Field Name	Req	Description						
<u>Standard Header</u>									
35	MsgType	Y	4 = Sequence Reset						
Message Body									
36	NewSeqNo	Y	Sequence number of the next message to be transmitted.						
123	GapFillFlag	N	Mode in which the message is being used. Absence of this field is interpreted as Sequence Reset (N). <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>Gap Fill</td> </tr> <tr> <td>N</td> <td>Sequence Reset</td> </tr> </tbody> </table>	Value	Meaning	Y	Gap Fill	N	Sequence Reset
Value	Meaning								
Y	Gap Fill								
N	Sequence Reset								
<u>Standard Trailer</u>									

4.3 Application Messages: Order Handling

4.3.1 New Order Single

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	D = New Order Single
Message Body			
11	ClOrdID	Y	Client specified identifier of the order.
1	Account	N	Client reference information.
55	Symbol	N	MTF Common Symbol. Not required if 15, 48, 22 and 207 are specified.
48	SecurityID	N	Identifier of the instrument. Not required if 55 is specified
22	SecurityIDSource	N	Identifier of the source of the SecurityID (48) value. Value Meaning <hr/> 4 ISIN
15	Currency	N	Currency Code as per ISO 4217 Currency Code List Not required if 55 is specified
207	SecurityExchange	N	Market Identifier Code as per ISO 10383 Not required if 55 is specified
18	ExecInst	Y	Value Meaning <hr/> 2 Work (Mandatory) <hr/> X Exclude-Self (Optional) This ensures that participants do not cross with their own liquidity venue should they be both a client and liquidity partner of the TQ-LENS service.
40	OrdType	Y	Type of the order. Value Meaning <hr/> P Pegged
126	ExpireTime	N	Time the order expires which must be a time during the current trading day.

59	TimeInForce	N	Time qualifier of the order. Absence of this field is interpreted as DAY (0). Value Meaning 0 Day
54	Side	Y	Side of the order. Value Meaning 1 Buy 2 Sell
38	OrderQty	Y	Total order quantity.
210	MaxShow	Y	Value Meaning 0 Dark Order
110	MinQty	N	Minimum size (MAQ) of an order to be executed.
44	Price	N	Optionally specified on orders and is inferred as a peg cap price.
[FIX4.4] 528	OrderCapacity	Y	Capacity of the order. Value Meaning A Agency P Principal Default value is A if the tag is not specified.
[FIX4.2] 47	OrderCapacity	N	Capacity of the order. Value Meaning A Agency P Principal Default value is A if the tag is not specified.
58	Text	N	Pass through text field. Supports up to 60 characters. The value will be echoed back on the Execution Report except when ExecType(150) = 4, 8, C, D or H.
60	TransactTime	Y	Time the order was created.
100	ExDestination	Y	Value Meaning TQL Turquoise TQ-LENS

9007	TQLStrategy	Y	Value Meaning
			1 Post to Turquoise and then distribute to partner liquidity venues.
			2 IOC to Turquoise and then distribute to partner liquidity venues.
			3 Post to all liquidity venues simultaneously.
			4 Bespoke Strategy
9008	TQLTimestamp	N	<p>Used to indicate the amount of time the order should reside at Turquoise before being routed to partner liquidity venues.</p> <p>The TQLTimestamp is expressed using the UTC timestamp.</p> <p>TQLTimestamp is mandatory when Strategy 1 is selected and not supported for Strategy 2 or 3.</p> <p>Note: Tag TQLTimestamp(9008) should be less than the tag ExpireTime(126).</p>
9010	TQLCustomised Strategy	N	This field is mandatory if Strategy 4 is specified as tag 9007 and indicates a user specific strategy as agreed and implemented between Turquoise and the participant.
9011	TQLGrouping	N	Optional and can be used only if Strategy 1, 2 or 3 is selected using tag 9007. TQLGrouping is used when TQ-LENS and one or many liquidity venues agree to group one or many liquidity providers into one distribution group.
9012	TQLExecMethod	Y	TQLExecMethod indicates the type of the execution method a participant can specify for the order to be executed by TQ-LENS.
			Value Meaning
			100 Flow Order.
			200 Block Order.

9014	TQLMaxQty	N	Allows a participant to specify a limit on the number of shares distributed to each dark pool liquidity venue during each iteration. TQLMaxQty can either be null or set to a value that is equal or less than the OrderQty(38).
Standard Trailer			

4.3.2 Order Cancel Request

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	F = Order Cancel Request
Message Body			
11	ClOrdID	Y	Client specified identifier of the cancel request.
41	OrigClOrdID	N	ClOrdID (11) of the order being cancelled. Required if OrderID (37) is not specified.
37	OrderID	N	Server specified identifier of the order being cancelled. Required if OrigClOrdID (41) is not specified.
55	Symbol	N	MTF Common Symbol. Not required if 15, 48, 22 and 207 are specified.
48	SecurityID	N	Identifier of the instrument. Not required if 55 is specified
22	SecurityIDSource	N	Identifier of the source of the SecurityID (48) value. Value Meaning <hr/> 4 ISIN
15	Currency	N	Currency Code as per ISO 4217 Currency Code List Not required if 55 is specified
207	SecurityExchange	N	Market Identifier Code as per ISO 10383 Not required if 55 is specified
54	Side	Y	Must match the value in the order.
60	TransactTime	Y	Time the order cancel request was created.
Standard Trailer			

4.3.3 Order Cancel/Replace Request

Tag	Field Name	Req	Description
<u>Standard Header</u>			
35	MsgType	Y	G = Order Cancel/Replace Request
Message Body			
11	ClOrdID	Y	ClOrdID (11) of the order being amended. Required if OrderID (37) is not specified.
41	OrigClOrdID	N	ClOrdID (11) of the order being amended. Required if OrderID (37) is not specified.
37	OrderID	N	Server specified identifier of the order being amended. Required if OrigClOrdID (41) is not specified.
1	Account	N	Client reference information.
55	Symbol	N	MTF Common Symbol. Not required if 15, 48, 22 and 207 are specified.
48	SecurityID	N	Identifier of the instrument. Not required if 55 is specified
22	SecurityIDSource	N	Identifier of the source of the SecurityID (48) value. Value Meaning <hr/> 4 ISIN
15	Currency	N	Currency Code as per ISO 4217 Currency Code List Not required if 55 is specified
207	SecurityExchange	N	Market Identifier Code as per ISO 10383 Not required if 55 is specified
18	ExecInst	Y	Value Meaning <hr/> 2 Work (Mandatory) <hr/> X Exclude-Self (Optional) This ensures that participants do not cross with their own liquidity venue should they be both a client and liquidity partner of the TQ-LENS service.

40	OrdType	Y	Type of the order. Value Meaning <hr/> P Pegged
126	ExpireTime	N	Time the order expires which must be a time during the current trading day.
54	Side	Y	Must match the value in the order.
38	OrderQty	Y	Total order quantity.
210	MaxShow	Y	Value Meaning <hr/> 0 Dark Order
110	MinQty	N	Minimum size (MAQ) of an order to be executed.
44	Price	N	Optionally specified on orders and is inferred as a peg cap price.
60	TransactTime	Y	Time the cancel/replace request was created.
100	ExDestination	Y	Value Meaning <hr/> TQL Turquoise TQ-LENS
9007	TQLStrategy	Y	Value Meaning <hr/> 1 Post to Turquoise and then distribute to partner liquidity venues. <hr/> 2 IOC to Turquoise and then distribute to partner liquidity venues. <hr/> 3 Post to all liquidity venues simultaneously. <hr/> 4 Bespoke Strategy
9008	TQLTimestamp	N	Used to indicate the amount of time the order should reside at Turquoise before being routed to partner liquidity venues. The TQLTimestamp is expressed using the UTC timestamp. TQLTimestamp is mandatory when Strategy 1 is selected and not supported for Strategy 2 or 3. Note: Tag TQLTimestamp(9008) should be less than the tag ExpireTime(126).

9010	TQLCustomised Strategy	N	This field is mandatory if Strategy 4 is specified as tag 9007 and indicates a user specific strategy as agreed and implemented between Turquoise and the participant.						
9011	TQLGrouping	N	Optional and can be used only if Strategy 1, 2 or 3 is selected using tag 9007. TQLGrouping is used when TQ-LENS and one or many liquidity venues agree to group one or many liquidity providers into one distribution group.						
9012	TQLExecMethod	Y	TQLExecMethod indicates the type of the execution method a participant can specify for the order to be executed by TQ-LENS. <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>Flow Order.</td> </tr> <tr> <td>200</td> <td>Block Order.</td> </tr> </tbody> </table>	Value	Meaning	100	Flow Order.	200	Block Order.
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9014	TQLMaxQty	N	Allows a participant to specify a limit on the number of shares distributed to each dark pool liquidity venue during each iteration. TQLMaxQty can either be null or set to a value that is equal or less than the OrderQty(38).						
Standard Trailer									

4.3.4 Execution Report

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	8 = Execution Report
Message Body			
17	ExecID	Y	Server specified identifier of the message.
11	ClOrdID	Y	Client specified identifier of the order.
41	OrigClOrdID	N	OrigClOrdID (41), if any, which was submitted with the order cancel or cancel/replace request.
37	OrderID	Y	Turquoise TQ-LENS specified identifier of the order.

<p>[FIX4.2] 150</p>	<p>ExecType</p>	<p>Y</p>	<p>Reason the execution report was generated.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr><td>0</td><td>New</td></tr> <tr><td>1</td><td>Partial Fill</td></tr> <tr><td>2</td><td>Fill</td></tr> <tr><td>4</td><td>Cancel</td></tr> <tr><td>5</td><td>Replaced</td></tr> <tr><td>6</td><td>Pending Cancel</td></tr> <tr><td>8</td><td>Rejected</td></tr> <tr><td>C</td><td>Expired</td></tr> <tr><td>D</td><td>Restated</td></tr> <tr><td>E</td><td>Pending Replace</td></tr> </tbody> </table>	Value	Meaning	0	New	1	Partial Fill	2	Fill	4	Cancel	5	Replaced	6	Pending Cancel	8	Rejected	C	Expired	D	Restated	E	Pending Replace
Value	Meaning																								
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<p>[FIX4.4] 150</p>	<p>ExecType</p>	<p>Y</p>	<p>Reason the execution report was generated.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr><td>0</td><td>New</td></tr> <tr><td>4</td><td>Cancelled</td></tr> <tr><td>5</td><td>Replaced</td></tr> <tr><td>8</td><td>Rejected</td></tr> <tr><td>C</td><td>Expired</td></tr> <tr><td>D</td><td>Restated</td></tr> <tr><td>F</td><td>Trade</td></tr> </tbody> </table>	Value	Meaning	0	New	4	Cancelled	5	Replaced	8	Rejected	C	Expired	D	Restated	F	Trade						
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<p>378</p>	<p>Exec Restatement Reason</p>	<p>N</p>	<p>Reason the order was restated.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr><td>3</td><td>Repricing of an order</td></tr> </tbody> </table>	Value	Meaning	3	Repricing of an order																		
Value	Meaning																								
3	Repricing of an order																								

[FIX4.2] 39	OrdStatus	Y	Current status of the order. Value Meaning <hr/> 0 New <hr/> 1 Partially Filled <hr/> 2 Filled <hr/> 4 Cancelled <hr/> 5 Replaced <hr/> 6 Pending Cancel <hr/> C Expired <hr/> E Pending Replace <hr/> 8 Rejected
[FIX4.4] 39	OrdStatus	Y	Current status of the order. Value Meaning <hr/> 0 New <hr/> 1 Partially Filled <hr/> 2 Filled <hr/> 4 Cancelled <hr/> 6 Pending Cancel <hr/> C Expired <hr/> E Pending Replace <hr/> 8 Rejected
103	OrdRejReason	N	
58	Text	N	
32	LastQty	N	Quantity executed in this fill.
31	LastPx	N	Price of this fill.
151	LeavesQty	Y	Quantity available for further execution.
14	CumQty	Y	Total cumulative quantity filled.
55	Symbol	N	MTF Common Symbol.
48	SecurityID	N	Identifier of the instrument.

22	SecurityIDSource	N	Identifier of the source of the SecurityID (48) value. Value Meaning 4 ISIN
15	Currency	N	Currency Code as per ISO 4217 Currency Code List
207	SecurityExchange	N	Market Identifier Code as per ISO 10383
18	ExecInst	Y	Value Meaning 2 Work (Mandatory) X Exclude-Self (Optional) This ensures that participants do not cross with their own liquidity venue should they be both a client and liquidity partner of the TQ-LENS service.
1	Account	N	Value submitted with the order.
40	OrdType	Y	Value submitted with the order.
59	TimeInForce	N	Value submitted with the order.
126	ExpireTime	N	Value submitted with the order.
54	Side	Y	Value submitted with the order.
38	OrderQty	Y	Value submitted with the order.
210	MaxShow	Y	Value submitted with the order.
110	MinQty	N	Value submitted with the order.
44	Price	N	Value submitted with the order.
[FIX4.4] 528	OrderCapacity	Y	Capacity of the order. Value Meaning A Agency P Principal
[FIX4.2] 47	OrderCapacity	Y	Capacity of the order. Value Meaning A Agency P Principal
60	TransactTime	Y	Time the transaction represented by the Execution Report occurred.

30	LastMkt	Y	Liquidity venue where the execution took place. Value Meaning TQL TQ-LENS Liquidity Partner TRQX Turquoise MTF
9007	TQLStrategy	Y	Value submitted with the order.
9009	TQLSelfCrossed	N	An indicator sent on an Execution Report to highlight whether an execution from a TQ-LENS order is a result of a self-cross. Value Meaning 0 False 1 True Note: If this tag is not present then value 0 will be the default. Also set t 0 if ExecInst(18) = 2 X (Exclude-Self) was specified on the client order.
9010	TQLCustomised Strategy	N	Value submitted with the order.
9011	TQLGrouping	N	Value submitted with the order.
9012	TQLExecMethod	Y	Value submitted with the order.
9013	TQLExecFee	Y	Indicates the fee applied for each execution.
9014	TQLMaxQty	N	Value submitted with the order.
Standard Trailer			

4.3.5 Order Cancel Reject

Tag	Field Name	Req	Description
Standard Header			
35	MsgType	Y	9 = Order Cancel Reject
Message Body			
11	ClOrdID	Y	ClOrdID (11) that was submitted with the order cancel or cancel/replace request being rejected.
41	OrigClOrdID	N	OrigClOrdID (41), if any, which was submitted with the order cancel or cancel/replace request being rejected.

37	OrderID	Y	Tuquoise TQ-LENS specified identifier of the order for which the cancel or cancel/replace was submitted.																		
[FIX4.2] 39	OrdStatus	Y	Current status of the order. Value Meaning <table border="1"> <tr><td>0</td><td>New</td></tr> <tr><td>1</td><td>Partially Filled</td></tr> <tr><td>2</td><td>Filled</td></tr> <tr><td>4</td><td>Cancelled</td></tr> <tr><td>5</td><td>Replaced</td></tr> <tr><td>6</td><td>Pending Cancel</td></tr> <tr><td>C</td><td>Expired</td></tr> <tr><td>E</td><td>Pending Replace</td></tr> <tr><td>8</td><td>Rejected</td></tr> </table>	0	New	1	Partially Filled	2	Filled	4	Cancelled	5	Replaced	6	Pending Cancel	C	Expired	E	Pending Replace	8	Rejected
0	New																				
1	Partially Filled																				
2	Filled																				
4	Cancelled																				
5	Replaced																				
6	Pending Cancel																				
C	Expired																				
E	Pending Replace																				
8	Rejected																				
[FIX4.4] 39	OrdStatus	Y	Current status of the order. Value Meaning <table border="1"> <tr><td>0</td><td>New</td></tr> <tr><td>1</td><td>Partially Filled</td></tr> <tr><td>2</td><td>Filled</td></tr> <tr><td>4</td><td>Cancelled</td></tr> <tr><td>6</td><td>Pending Cancel</td></tr> <tr><td>C</td><td>Expired</td></tr> <tr><td>E</td><td>Pending Replace</td></tr> <tr><td>8</td><td>Rejected</td></tr> </table>	0	New	1	Partially Filled	2	Filled	4	Cancelled	6	Pending Cancel	C	Expired	E	Pending Replace	8	Rejected		
0	New																				
1	Partially Filled																				
2	Filled																				
4	Cancelled																				
6	Pending Cancel																				
C	Expired																				
E	Pending Replace																				
8	Rejected																				
434	CxlRej ResponseTo	Y	Type of request being rejected. Value Meaning <table border="1"> <tr><td>1</td><td>Order Cancel Request</td></tr> <tr><td>2</td><td>Order Cancel/Replace Request</td></tr> </table>	1	Order Cancel Request	2	Order Cancel/Replace Request														
1	Order Cancel Request																				
2	Order Cancel/Replace Request																				
102	CxlRejReason	Y																			
58	Text	N	Text specifying the reason for the rejection.																		
<u>Standard Trailer</u>																					

4.4 Application Messages: Others

4.4.1 Business Message Reject

Tag	Field Name	Req	Description
<u>Standard Header</u>			
35	MsgType	Y	j = Business Message Reject
Message Body			
379	BusinessReject RefID	N	Client specified identifier (e.g. ClOrdID) of the rejected message if it is available.
45	RefSeqNum	Y	MsgSeqNum (34) of the rejected message.
372	RefMsgType	Y	MsgType (35) of the rejected message.
371	RefTagID	N	If a message is rejected due to an issue with a particular field its tag number will be indicated.
380	BusinessReject Reason	Y	
58	Text	N	Text specifying the reason for the rejection.
<u>Standard Trailer</u>			

Appendix A - Examples

A Block order is entered with Strategy 3	
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= UCGm • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) = 200 	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial fill for 20,000 from TQ-MTF <ul style="list-style-type: none"> o leaves qty = 80,000 o last market = TQL 3. Partial fill for 20,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 60,000 o last market = TQL 4. Partial fill for 20,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 40,000 o last market = TQL 5. Partial fill for 20,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 20,000 o last market = TQL 6. Fill for 20,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 0 o last market = TQL
A Flow order is entered with Strategy 3	
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= UCGm • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) = 100 	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial fill for 25,000 from TQ-MTF <ul style="list-style-type: none"> o leaves qty = 75,000 o last market = TQL 3. Partial fill for 25,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 50,000 last market = TQL 4. Partial fill for 25,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 25,000 last market = TQL 5. Fill for 25,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 0 last market = TQL
<p>Invalid ExecMethod condition: A Block order is entered with a quantity below the minimum size requirement.</p>	

<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= NOK1Vh / SEK • Side(54)= Buy • Quantity(38) = 10 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) = 200 	<p>Order is rejected by TQ-LENS stating order size is below minimum order size for a Block order.</p>
<p>A Block or Flow order is entered without specifying a strategy.</p>	
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= UCGm • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 • TQLStrategy(9007) = <blank> • TQLExecMethod(9012) = 100 or 200 	<p>Strategy defaults to 2; participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Fill for 100,000 from Turquoise MTF <ul style="list-style-type: none"> o leaves qty = 0 o last market = TRQX
<p>An existing Block or Flow order is cancelled. Cancel an existing order following validation of a Cancel Request.</p>	
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= BMWd or OMVv • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) = 100 or 200 	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement. 2. Periodical partial fills.
<p>Participant submits a Cancel Request to TQ-LENS referencing orderID of previous new order.</p>	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. Pending Cancel 2. Cancel <p>All resting child orders from original new order have been cancelled from dark pools.</p>
<p>A Block or Flow order is entered specifying the maximum amount to route to each dark pool venue. Participant submits order specifying maximum routable quantity. TQ-LENS will calculate on initial and subsequent iterations whether quantity being routed to available dark pools is above or below the maximum routable quantity and issue child orders to liquidity venues accordingly.</p>	

Participant submits the following order to TQ-LENS:

- Symbol(55)= BARCL
- Side(54)= Buy
- Quantity(38) = 100,000
- ExecInst(18) = 2
- TQLStrategy(9007) = 3
- TQLExecMethod(9012) = 100 or 200
- DPMaxQty = 15,000

Flow

If there are four dark pools available to this flow order and TQ-LENS will calculate how best to distribute the order to each:

- 100,000 / 4 LPs = Partial fills of 15,000 per LP
- Additional 15,000 partial fill from TQ-MTF
- Remaining 25,000 rebalanced providing the following partial fills of 10,000 total quantity: 3334, 2222, 1482, 1481, 1481
- Remaining 15,000 quantity.

Block

If there are four dark pools available to this flow order and TQ-LENS will calculate how best to distribute the order to each:

- 2x15,000 partial fill from TQ-LENS
- Remaining 55,000 rebalanced providing 4 partial fills of 13,750
- Remaining 15,000 quantity.

Strategy 2 Flow or Block order received by TQ-LENS sent to Turquoise MTF where there are no executions. The order is then distributed automatically to all dark pools according to Strategy 3

<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= FTEp • Side(54)= Buy • Quantity(38) = 25,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 2 • TQLExecMethod(9012) = 100 or 200 	<p>Flow</p> <p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial Fill for 6,250 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 18,750 o last market = TQL 3. Partial Fill for 6,250 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 12,500 last market = TQL 4. Partial Fill for 6,250 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 6,250 last market = TQL 5. Fill for 6,250 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 0 last market = TQL <p>Block</p> <p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial Fill for 5,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 20,000 last market = TQL 3. Partial Fill for 5,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 15,000 last market = TQL 4. Partial Fill for 5,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty =10,000 last market = TQL 5. Partial Fill for 5,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty =5,000 last market = TQL 6. Fill for 5,000 from TQ-LENS <ul style="list-style-type: none"> leaves qty = 0 last market = TQL
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Enter a Strategy 3 Flow or Block order that is continuously partial filled for over five minutes with a GTT of 4 minutes. The order will be expired after this time, with remaining quantity.

<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= RIBHv • Side(54)= Buy • Quantity(38) = 980,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) = 100 or 200 • ExpireTime(126) = <120 seconds later than send time for Flow; 30 seconds later than send time for Block 	<p>Order will receive partial fills for the first 4 minutes every 30 seconds, and then the participant will receive a Pending Cancel and then Cancel for the order, stating it has been expired at the time specified on the GTT.</p>
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Cancel/Replace Request

<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= PAH3d • Side(54)= Buy • Quantity(38) = 50,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) = 100 or 200 	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement
<p>Participant modifies the quantity of the order to 100,000</p>	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. Pending Replace. 2. Replaced.
<p>Strategy 1 order is entered with a TQLTimestamp set to expire 2 minutes into the future.</p>	
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= PCPm • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 1 • TQLExecMethod(9012) = 100 or 200 • TQLTimestamp(9008) = <set to 120 seconds into the future> 	<p>Flow</p> <p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial Fill for 10,000 from TQ-MTF <ul style="list-style-type: none"> o leaves qty = 90,000 o last market = TQL 3. Partial Fill for 50,000 from TQ-MTF <ul style="list-style-type: none"> o leaves qty = 40,000 o last market = TQL 4. Partial Fill for 10,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 30,000 o last market = TQL 5. Partial Fill for 10,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 20,000 o last market = TQL 5. Partial Fill for 10,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 10,000 o last market = TQL 6. Fill for 10,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 0 o last market = TQL <p>Block</p> <p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial Fill for 10,000 from TQ-MTF <ul style="list-style-type: none"> o leaves qty = 90,000 o last market = TQL 3. Partial Fill for 50,000 from TQ-MTF <ul style="list-style-type: none"> o leaves qty = 40,000 o last market = TQL 4. Partial Fill for 8,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 32,000 o last market = TQL 5. Partial Fill for 8,000 from TQ-LENS <ul style="list-style-type: none"> o leaves qty = 24,000 o last market = TQL

	<p>5. Partial Fill for 8,000 from TQ-LENS o leaves qty = 16,000 o last market = TQL</p> <p>5. Partial Fill for 8,000 from TQ-LENS o leaves qty = 8,000 o last market = TQL</p> <p>6. Fill for 8,000 from TQ-LENS o leaves qty = 0 o last market = TQL</p>
A Block or Flow order is entered; exclude-self is specified.	
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= UCGm • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 X • TQLStrategy(9007) = 3 • TQLExecMethod(9012) =100 or 200 	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial fills from venues apart from self. <p>All partial fill Execution Reports have 9009=0 to denote no self-cross.</p>
<p>Participant submits the following order to TQ-LENS:</p> <ul style="list-style-type: none"> • Symbol(55)= UCGm • Side(54)= Buy • Quantity(38) = 100,000 • ExecInst(18) = 2 • TQLStrategy(9007) = 3 • TQLExecMethod(9012) =100 or 200 	<p>Participant receives the following messages from TQ-LENS:</p> <ol style="list-style-type: none"> 1. New order acknowledgement 2. Partial fills from venues including from self. <p>All partial fill Execution Reports have 9009=0 except ones with 9009=1 to denote a self-cross if the participant is also a liquidity partner of the TQ-LENS service.</p>

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