Rules of Engagement

EMBER FIX PROTOCOL

EPAM Execution Server

EPAM Real Time Computing Lab

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INTRODUCTION

This document is intended for clients who would like to send orders into Deltix trading servers via FIX protocol.

RULES OF ENGAGEMENT

FIX Versions

Deltix FIX Gateway uses FIX 4.4 protocol.

Network Options

Deltix FIX Gateway uses TCP protocol and supports connections via Internet/VPN/LAN.

Clients who need encryption should use VPN or third-party SSL termination proxy tools like STUNNEL.

Start of Day / End of Day Procedures

Deltix FIX Gateway can use daily or weekly FIX Sessions. Exact Session Schedule is determined based on business need of each specific deployment.

Separately for clients who need non-stop 24/7 sessions FIX Gateway provides an ability to perform periodic in-session sequence number reset.

Counterparty Identification

Deltix FIX Gateway supports multiple FIX clients. Each client is identified via tag SenderCompID(49). In addition, clients can use tag SenderSubID(50) to identify a trader performing trading actions.

Sender and Target Comp IDs (tags 49 and 56) must follow ALPHANUMERIC(10) format (ASCII char sequence of at most 10 chars in range 0x20..0x5F (punctuation chars, upper case letters, and digits).

Order Identification

Internally Deltix identifies orders based on pair {ClientID, ClientOrderID}:

- Client ID corresponds to tag SenderCompID(49) of inbound messages. This tag is checked on each message to prevent one client from misrepresenting another.
- Client Order ID is limited to 32 characters[1]. Deltix *recommends* using only alphanumeric characters to identify orders. Each Client Order ID must be unique.

Client Order ID uniqueness

It is the responsibility of a client to prevent duplicate Client Order identifiers. Deltix side performs limited checking for duplicates. For each client Deltix keeps track of all active and the last N orders which will be used for a duplicate check (N is sufficiently large number, for example 5000). Older completed orders are discarded from Deltix OMS cache. To prevent accidental re-submission of a large batch of orders Deltix side also checks timestamps of inbound order requests. Requests that are older than 15 seconds[2] are rejected.

Typically client order ID is passed in tag ClOrdId(11) with a few exceptions described below.

Order Identity in Cancel Replace Chains

Each time a client replaces an active order, a new order identifier is passed in tag ClOrdId(11) and the replacement (original) order is identified using tag OrigClOrd(41).

Deltix side uses identity of the last accepted order entry/modification request to identify an active order in Deltix messages (tag 11). Messages that report changes related to cancel replace also include tag 41 from the related Cancel Replace Request.

If a particular Cancel Replace Request is rejected, then active order's identity remains unchanged.

Described behavior corresponds to standard FIX 4.4 Protocol. For more information, please refer to Volume 4 of the protocol. In particular, the section "Order State Change Matrices" is a good source of additional knowledge about this subject.

Correlation Order ID

[1] Custom deployments can support larger size of order identifier.

[2] This internal and N are configurable at Deltix OMS server deployment time.

To simplify order identity tracking Deltix messages include FIX tag CorrelationClOrdD(9717). This custom tag always reports Client Order ID of the first order in the cancel replace chain.

Cancellation Workflow and Order Identity

Each Order Cancel Request also has an identifier passed in tag ClOrdId(11). Just like with Cancel Replace Request active order is identified via tag OrigClOrdId(41). Normally cancel-related messages from the Deltix side will use the same tags to identify cancel request (11) and active order (41). However, there is one exception. In case of unsolicited cancellation, tag 41 will be missing and order will be identified using tag 11. Unsolicited cancellation may be a result of order time in force condition (IOC / DAY / DATE) or action of exchange administrator (For example, to prevent client self-trading attempt).

Sometimes cancellation requires several attempts (for instance, some exchanges do not allow to cancel unacknowledged orders; or connection to destination venue breaks while cancel request is in transit). Cancel Request identifier must be unique in scope of each single order.

Order Routing

Order routing depends on the way your Deltix system is configured. This section describes general idea.

A specific system deployment may opt for either fully automated routing (no FIX tags are used to determine order destination) or fully controllable (where FIX clients determine order destination using FIX message tags described below).

FIX orders can be routed according to the value of tag ExecBroker(76). This tag may specify any destination that is configured on target server:

- External Exchange or Trading Broker (e.g. "CME"), or
- Internal Matching Engine (e.g. "NIAGARA"), or
- Trading simulator (e.g. "SIMULATOR"), or
- Auto-certification bot (“AUTOCERT”), or
- Execution algorithm (e.g. "TWAP").

In addition tag ExDestination(100) identifies final destination (exchange) when order is routed to some broker or multi-exchange simulator.

For example, imagine that Deltix side has connector to NewEdge broker identified as "NEWEDGE". Let's say we want to send order to CME exchange via NewEdge connector. In this case NewOrderSingle(D) message should contain tags ExBroker(76)=NEWEDGE and ExDestination(100)= CME.

Supported Products

Deltix FIX Gateway supports multiple asset classes: Equities, Futures, Options, Bonds, Spot Currency Pairs (FX and Crypto), Exchange Traded Synthetics.

Symbology

Deltix FIX Gateway uses symbology defined in Deltix Security Metadata[3]. Tag Symbol(55) identifies the order instrument. Tag SecurityType(167) can be skipped but if provided must match the security type of the order instrument.

FIX tags IDSource(22), SecurityID(48), MaturityMonthYear(200), MaturityDay(205), PutOrCall(201), StrikePrice(202), etc. are ignored.

Order Enrichment

[3] See QuantServer or TimeBase documentation to learn how Deltix maintains Security Metadata.

Deltix OMS performs enrichment of trading requests and trading events.

For inbound trading requests Deltix OMS uses Security Metadata stream as a default source of some of the order attributes. For example: order currency, security type, tick size, etc.

In addition, order cancellation and modification request may omit some of the attributes specified on the original order. OMS will automatically add missing attribute if the downstream venue requires it.

For outbound trading events (e.g. order acknowledgement or fill notification) OMS uses cached order information to enrich trading events from execution venue. For example, if the execution venue does not supply order Side with each Fill event then OMS will use order Side from the order itself when publishing fill events upstream.

Order State Tracking

Current version of Deltix FIX Gateway implements *transient* FIX Sessions. In case of connection loss in the middle of trading day clients should not rely on FIX Resend mechanism to catch up on missing messages. Instead clients should use OrderStatusRequest(H) to query the state of last known active orders. FIX Gateway also supports cancel-on-disconnect functionality which automatically cancels all remaining client orders in case of connection problem.

Custom FIX Tags

Deltix reserves custom tag range 9000-9999 for internal use. These tags are used by built-in Algo orders and custom FIX messages circulating between Strategy Server and Execution Server.

Clients can use FIX tags 6000--8999 as custom FIX tags.

Market Data Throttling

High-frequency data sources (like matching engine, or aggregated order book with a lot of levels) server will throttle messages broadcasted to FIX subscribers. For example, by default the system maintains 50 millisecond intervals between two consecutive broadcasts for a single client.

Corrections/Busts handling

FIX corrections and busts that happen on execution side will be reported according to FIX 4.4 protocol.

Slow clients

System maintains a queue of outbound messages for each client. Client will be disconnected if this queue becomes overloaded. System does not keep messages for disconnected clients.

Test Environment

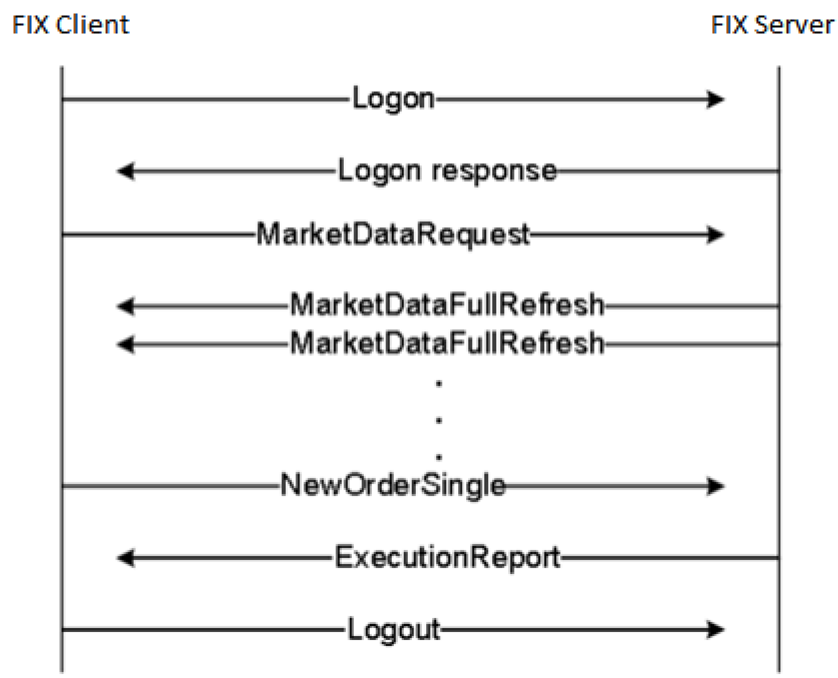
Deltix provides access to test FIX Gateway environment. Simulated Exchange destinations can be configured on user request. Also, Deltix provides AutoCert destination that executes orders according to user-provided script. See "FIX Gateway Conformance Test" document for more information.

MESSAGES PROTOCOL

FIX Gateway uses FIX 4.4. Field data types and other information omitted from this document can be found at http://www.fixprotocol.org.

Workflows

The following diagram illustrates the message flow of a typical FIX session with FIX Gateway:



Message Conventions

Note the following conventions:

=> This symbol is used to indicate fields that can hold repeating groups of data.

The values under the “Req'd” (Required) column indicate one of the following:

- ‘Y’ – field is mandatory and must be sent or received as a part of the message.
- ‘N’ – non-required field that can be omitted.
- ‘C’ – field is required if the condition in the associated comment box is met

Standard Header

Standard Header: The standard header format used in every FIX message.

Tag	Field name	Req'd	Comments
8	BeginString	Y	Message start. Handled by FIX engine. Must be set to " FIX.4.4".
9	BodyLength	Y	Message length. Handled by FIX engine.
34	MsgSeqNum	Y	Message sequence number. Handled by FIX engine.
35	MsgType	Y	Type of FIX Message. Refer to individual message types described later in this document.
49	SenderCompID	Y	Session identifier assigned to FIX client by mutual agreement with Deltix.
50	SenderSubID	C	Conditionally used for Order Entry sessions shared by multiple traders. Identifies a trader performing order request.
52	SendingTime	Y	The GMT timestamp on the message. Handled by FIX engine

56	TargetCompID	Y	Session identifier assigned by Deltix. Usually "DELTIX".

Standard Footer

Tag	Field name	Req'd	Comments
10	CheckSum	Y	A value calculated by the FIX engine from the message data and transferred with the data. If the data received does not match the CheckSum value, the data was corrupted in transit.

ADMINISTRATIVE MESSAGES

This chapter briefly describes supported administrative messages of FIX protocol. Please refer to FIX 4.4 specification for additional information.

LOGON(A)

Tag	Field name	Req'd	Comments
35	MsgType	Y	A = Logon
108	HeartBeatInt	Y	Defines heartbeat interval for new session (in seconds). Default is 30 seconds
141	ResetSeqNumFlag	Y	resets both the incoming and outgoing sequence numbers to 1. This value must be "Y" for Market Data **and for Order Entry sessions.**
554	Password	C	Logon password. Required if FIX Gateway has User Access Control enabled.
10001	CancelOnDisconnect	N	This optional boolean tag can be used by Order Entry session. When set to "Y" all active orders that belong to this session will be automatically cancelled every time session is disconnected (normally or abnormally). Default is “N” (leave active orders open when client connection drops).

HEARTBEAT(0)

Default heartbeat interval is 30 seconds.

RESEND(2)

FIX Gateway accepts Resend requests. However, the gateway will respond with a Gap Fill.

REJECT(3)

FIX Gateway will process Session-level rejects.

APPLICATION MESSAGES: MARKET DATA

This section describes application messages for Market Data session.

Messages from client to server

MarketDataRequest(V)

Subscribe to market data for a specific instrument. Please note:

- Your subscription set is lost on each disconnect.
- You can subscribe to each symbol only once.
- Tag MDReqID(262) can be used as a user-defined cookie that will be broadcasted back with market data for each symbol.

Tag	Field name	Req'd	Type	Comments
35	MsgType	Y	String	V = Market Data Request
146	NoRelatedSym	Y	Int	Must be set to 1. Each contract requires a separate subscription request.
55	Symbol	Y	String	Instrument to broadcast market data for.
167	SecurityType	N	String	Optional tag that identifies instrument type: CS=Common Stock OPT=Option FUT=Future FOR=Currency pair (including Crypto-currencies) BOND=Bonds (*) ETF = Exchange Traded Funds (*) SYNT = Exchange Traded Synthetic (e.g. Spread, Pack, or Bundle) (*)
262	MDReqID	Y	String	The customer-assigned unique ID for the market data request. Deltix will reject requests with duplicate IDs in scope of single FIX session. Provided value is broadcasted back in market data messages from Deltix. The value is also used in MarketDataReject(Y) messages.
263	SubscriptionReqType	Y	char	Supported values: 1 = Subscribe for updates 2 = Unsubscribe
264	MarketDepth	Y	Int	Depth of market for book snapshot. Current version of Deltix supports only: 0 = Full book Please note that for some applications Deltix FIX Gateway may limit the depth of broadcasted order book to N levels.
265	MDUpdateType	Y	Int	Type of market data updates. Current version of Deltix platform supports only: 0 = Full Refresh (Order Book Snapshot) ~~1 = Incremental Update~~ (not supported in current version)
267	NoMDEntryTypes	Y	Int	Start of repeating group. Number of MD Entry Types to follow. For example, 3.
=>269	MDEntryType	Y	Int	Type of market data entries to subscribe to: 0 = Bid

				1 = Offer 2 = Trade Supported combinations are: Trade Bid+Offer Bid+Offer+Trade

Messages from server to client

Market Data Snapshot/Full Refresh (W)

Market Data messages flow to clients in response to MarketDataRequest(V) messages and broadcast 2-sided book of orders, quotes, and other prices for requested instruments.

Tag	Field name	Req'd	Type	Comments
35	MsgType	Y	String	W = Market Data Snapshot / Full Refresh
55	Symbol	Y	String	Instrument described by this market message.
60	TransactTime	C	UTC Timestamp	When enabled this field communicates upstream timestamp of this market data event. Enabled by default.
167	SecurityType	Y	String	Instrument type: CS=Common Stock OPT=Option FUT=Future FOR=Currency pair BOND=Bonds (*) ETF = Exchange Traded Funds (*) SYNT = Exchange Traded Synthetic (e.g. Spread, Pack, or Bundle) (*)
262	MDReqID	Y	String	The customer-assigned unique ID from the originating market data request.
The following shaded rows are a repeating group of fields that represent one instrument. The value of the NoMDEntries (#268) field indicates the number of groups and thus the number of price entries.				
268	NoMDEntries	Y	int	Number of entries in market data message. Each bid and offer represent one market data entry. If three bid/offer dealing prices are included, the value of the NoMDEntries (#268) field is 6. Can be zero (when signals empty book). In this case tags 269,270,271 will not be present.
=>269	MDEntryType	Y	char	Type of this market data entry: 0 = Bid 1 = Offer 2 = Trade NOTE: Current version of FIX Market Data gateway sends Trades and Order Book in separate messages.
=>270	MDEntryPx	Y	Price	Price of this entry.
=>271	MDEntrySize	Y	Qty	Size of this entry.

=>278	MDEntryID	C	String	Unique identifier of market data entry
=>282	MDEntryOriginator	C	String	Originator of a Market Data Entry. Can be enabled for Level3 market data broadcasts.
=>290	MDEntryPositionNo	C	Int	Display position of a bid or offer, numbered from most competitive to least competitive, per market side, beginning with 1. This tag is skipped for trades.
=>5797	AggressorSide	C	Int	Provided for Trade entries, when upstream trade feed has this information. 1 = BUY 2 = SELL
End of repeating group				

MarketDataReject(Y)

Market Data Request Reject is used when Deltix platform cannot honor MarketDataRequest(V) due to business or technical reasons.

Tag	Field name	Req'd	Type	Comments
35	MsgType	Y	String	Y = Market Data Reject
262	MDReqID	Y	String	The customer-assigned unique ID from the originating market data request.
281	MDRejectReason	N	char	Reason for rejection: 0 = Unknown symbol 4 = Unsupported SubscriptionRequestType(263) 5 = Unsupported MarketDepth(264) 6 = Unsupported MDUpdateType(265) 8 = Unsupported MDEntryType(269)
58	Text	N	String	Textual explanation for actual rejection cause

Samples

Here are a few samples of market data messages. You can use online FIX log viewer to display them in human-readable format.

Market Data Request

```
8=FIX.4.4|9=129|35=V|34=2|49=DCLIENT1|56=DELTIX|52=20180814-
02:19:11.141|262=1|146=1|55=XBTUSD|263=1|167=FOR|264=0|265=0|267=3|269=1|269=0|269=2|
10=224|
```

Market Data Request Reject

```
8=FIX.4.4|9=0069|35=Y|49=DELTIX|56=DCLIENT1|52=20180814-02:19:11.189|34=2|58=Unknown
symbol|262=1|281=0|10=125|
```

Market Data Snapshot

```
8=FIX.4.4|9=3985|35=W|49=DELTIX|56=DCLIENT1|52=20180814-
02:27:08.963|34=16|262=1|55=BTCUSD|167=FOR|268=2|269=0|270=1.29781|271=38|290=1|269=0
|270=1.29413|271=76|290=2|10=005|
```

APPLICATION MESSAGES: ORDER ENTRY

This section describes application messages for Order Entry session.

Messages from client to server

New Order Single(D)

Tag	Field name	Req'd	Comments
35	MsgType	Y	D = NewOrderSingle
1	Account	N	Trading account.
11	ClOrdId	Y	Client-side order identifier for the new order. See "Order Identification" section above for more information.
15	Currency	N	Order currency (ISO code).
38	OrderQty	Y	Order quantity. Fractional order sizes are supported when downstream execution venue supports them.
40	OrdType	Y	Generally the gateway supports the following order types: '1'=Market '2'=Limit '3'=Stop '4'=Limit Stop 'P'=Pegged (relies on ExecInst(18) to convey peg type) 'X'=Custom Order type (SOR, TWAP, VWAP, etc.) Note that specific order destination may support a subset of order types above.
18	ExecInst	C	Required for Pegged (40=P) and Post Only orders. Ignored for other order types. 'P' = Peg to market 'R' = Peg to primary 'M' = Peg to midpoint '6' = Participate Do Not Initiate (Post Only orders)
44	Price	C	Limit Price. Required for Limit, Limit-Stop.
54	Side	Y	'1'=Buy '2'=Sell '5'=Sell Short '6'=Sell Short Exempt
55	Symbol	Y	Order Symbol. See "Symbology" section in the first part of this document.
59	TimeInForce	Y	Specifies how long order remains in effect. '0' = Day '1' = Good Till Cancel (GTC) '2' = At the Opening (OPG) '3' = Immediate or Cancel (IOC) '4' = Fill or Kill (FOK) '5' = Good Till Crossing (GTX) '6' = Good Till Date – See tag ExpireTime(126) '7' = At the Close

60	TransactTime	Y	Order submission time expressed in the UTC time zone. FIX Gateway will reject orders that spend too much time in transmission. By default maximum transmission latency is 15 seconds.
76	ExecBroker	N	Identifies order destination. See “Order Routing” section earlier in this document.
99	StopPx	C	Stop Price for Stop and Limit-Stop orders.
100	ExDestination	C	Destination exchange, if required. Client is flexible to use any naming convention. Deltix recommends using Market Participant ID. Default exchange can be defined for each instrument in Securities metadata stream.
110	MinQty	N	Minimum quantity of order to be executed.
111	MaxFloor	N	Maximum number of shares within an order to be shown on the exchange floor at any given time.
126	ExpireTime	C	Required for Good-Till-Date (59=’6’) orders. Deltix sends both calendar date and time of day in this field, even if the destination exchange supports day-only or time-of-day only part.
167	SecurityType	N	Instrument type: CS=Common Stock OPT=Option FUT=Future FOR=Currency pair BOND=Bonds (*) ETF = Exchange Traded Funds (*) SYNT = Exchange Traded Synthetic (e.g. Spread, Pack, or Bundle) (*)
1028	ManualOrderIndicator	N	For destinations that require ATM indicators (e.g. CME) this tag marks manual vs. automatic orders. ‘Y’ = manual order (initiated by human command, such as manual order entry via blotter). ‘N’ = automatic order (initiated by auto-trading strategy)
9221	ModuleKey	N	Used by QuantOffice to identify trading strategy that sent the order. Other clients may use this field for order tagging. Content of this field will be echoed back in ExecutionReport events.
9223	PortfolioKey	N	Used by QuantOffice to identify trading portfolio this order belongs to. Other clients may use this field for order tagging. Content of this field will be echoed back in ExecutionReport events.
9999	UserData	N	Optional user-provided order value that will be echoed back in ExecutionReport events describing this order. Can be used as a ‘cookie’ to associate custom information with each order. For example, order reason. Maximum length is 64 characters.

Order Cancel Replace (G)

Order Cancel/Replace request allows to amend previously transmitted order. Deltix recommends providing full set of order attributes with each replacement request.

Deltix OMS does not support replacement request that reduces size to currently executed portion (with intent to cancel it). Such replacement request will be rejected. Use OrderCancelRequest(F) instead.

Please be aware that each order destination may have additional restrictions on which order attributes can be amended. For example, some exchanges only allow order size and price modification.

Message format of Cancel/Replace message is very similar to NewOrderSingle(D) message. Differences are:

Tag	Field name	Req’d	Comments
35	MsgType	Y	G = CancelReplaceRequest

11	ClOrdId	Y	Identifies replacement order. See “Order Identification” section above for more information.
41	OrigClOrdID	Y	Identifies original order (order to be replaced). See “Order Identification” section above for more information.
60	TransactTime	Y	Request time expressed in the UTC time zone. FIX Server will reject orders that spend too much time in transmission. By default, maximum transmission latency is 15 seconds.
<the rest of the tags are the same as for NewOrderSingle(D) message>			

NOTE: Deltix OMS will reject a Replacement Request of partially filled order if replacement quantity is less than (or equal) to already executed portion of the order. Use Cancel Request if you want to cancel the order instead.

Order Cancel Request (F)

This request allows user to cancel previously transmitted order.

Tag	Field name	Req’d	Comments
35	MsgType	Y	F = OrderCancelRequest
11	ClOrdID	Y	Identifies cancellation request. Must be unique text value.
41	OrigClOrdID	Y	Identifies order to be cancelled.
60	TransactTime	Y	Cancel request time expressed in the UTC time zone. FIX Server will reject request that spend too much time in transmission. By default, maximum transmission latency is 15 seconds.
58	Text	N	Optional cancellation reason
1028	ManualOrderIndicator	N	For destinations that require ATM indicators (e.g. CME) this tag marks manual vs. automatic orders. ‘Y’ = manual order (initiated by human command, such as manual order entry via blotter). ‘N’ = automatic order (initiated by auto-trading strategy)

Order Status Request (H)

Status request allows user to fetch status of an order. Status will be reported via ExecutionReport(8).

NOTE: Order status request issued for already replaced order will return status of the replaced order (rather than the status of most active order on the replacement chain).

Tag	Field name	Req’d	Comments
35	MsgType	Y	H = OrderStatusRequest
11	ClOrdID	Y	Identifies order to query.

Order Mass Status Request (AF)

Status request allows the user to fetch status of all active orders. Status of **active** orders will be reported via ExecutionReport(8).

Tag	Field name	Req’d	Comments
35	MsgType	Y	AF = MassOrderStatusRequest
584	MassStatusRequestID	N	Ignored.
585	MassStatusRequestType	N	If provided, must be equal to 7 = ‘Status for all orders’ (all active orders).
1	Account	N	If provided serves as filter: only active orders for given account will be returned.
50	SenderSubID	N	If provided serves as filter: only active orders for given trader will be returned.

55	Symbol	N	If provided serves as filter: only active orders for given symbol will be returned.
100	Destination	N	If provided serves as filter: only active orders for given destination exchange will be returned.

Don’t Know Trade (DK)

Deltix OMS doesn’t support Don’t Know Trade (DK) messages. No action will be performed on such messages (other than logging DK details in the error log).

Messages from server to client

Execution Report (8)

Execution Report communicates order status updates and fills back to the client.

Please note that as far as mandatory FIX tags are concerned there is **one special case** – Execution Report that is sent in response to Order Status Request to signal “unknown order” situation. The table below describes “normal” execution reports, this document will describe “unknown order” message immediately after.

Execution Report – Normal case

Tag	Field name	Req’d	Comments
35	MsgType	Y	8 = ExecutionReport
37	OrderID	C	ID assigned to the order by Execution venue. Otherwise, it will be missing.
11	ClOrdID	Y	Client order identifier. See “Order Identification” section for more information. NOTE: In context of cancel confirmation message this tag identifies cancel request rather than cancelled order.
41	OrigClOrdID	C	Identifies cancelled order in context of message sent in response to CancelRequest(F) and CancelReplaceRequest(G). NOTE: For unsolicited cancel messages this tag is omitted, order will be identified via tag ClOrdID(11).
76	ExecBroker	Y	Identifies execution venue (e.g. “CME” or “SMART”).
17	ExecID	Y	For execution report that describe a fill this tag contains execution id specified by the exchange/broker. For other reports this value is driven by a simple numeric sequence. The value is unique at least in the context of single order and symbol.
19	ExecRefID	N	Populated when Trade Corrections and Trade Busts (see tag 150).
150	ExecType	Y	Describes the type or purpose of execution report (while tag 99 describes the current order status): 0 = New 3 = Done for Day 4 = Cancelled 5 = Replace 6 = Pending Cancel 8 = Rejected A = Pending New C = Expired D = Restated E = Pending Replace F = Trade (complete fill or partial fill) G = Trade Correction H = Trade Cancel

			I = Order Status (response to Order status request) Refer to FIX 4.4 specification for detailed description of these codes.
39	OrdStatus	Y	Describes the current state of a CHAIN of orders, same scope as OrderQty, CumQty, LeavesQty, and AvgPx. 0 = New 1 = Partially Filled 2 = Completely Filled 3 = Done for Day 4 = Cancelled 6 = Pending Cancel 8 = Rejected A = Pending New C = Expired E = Pending Replace
58	Text	C	This field is provided in events that communicate order rejection or cancellation and provides reason for these events.
103	OrdRejReason	C	Provided with events that communicate order rejection.
1	Account	N	Trading account.
55	Symbol	Y	Contract Symbol. In case of fills that correspond to individual legs of multi-legged contracts this will contain leg symbol.
442	MultiLeg ReportingType	C	Fills that correspond to individual legs of multi-legged security will be marked with value ‘2’.
167	SecurityType	N	Instrument Type: CS=Common Stock OPT=Option FUT=Future FOR=Currency pair BOND=Bonds (*) ETF = Exchange Traded Funds (*) SYNT = Exchange Traded Synthetic (e.g. Spread, Pack, or Bundle) (*)
100	ExDestination	N	Destination exchange.
21	HandlInst	Y	Always set to “1”: Automated Execution / Private Order.
54	Side	C	Order side: ‘1’=Buy ‘2’=Sell ‘5’=Sell Short ‘6’=Sell Short Exempt
38	OrderQty	Y	Order quantity.
40	OrdType	Y	Order type (as it was specified on the order request): ‘1’=Market ‘2’=Limit ‘3’=Stop ‘4’=Limit Stop

			‘P’=Pegged ‘X’=Custom order type (reserved for algo orders)
44	Price	C	Defined for Limit, LimitStop, and may be defined for Pegged orders.
15	Currency	C	Order currency. This flag is set when original order specifies a currency or server has default currency configured
99	StopPx	C	Stop Price for Stop and LimitStop orders.
59	TimeInForce	Y	Specifies how long order remains in effect. ‘0’ = Day ‘1’ = Good Till Cancel (GTC) ‘2’ = At the Opening (OPG) ‘3’ = Immediate or Cancel (IOC) ‘4’ = Fill or Kill (FOK) ‘5’ = Good Till Crossing (GTX) ‘6’ = Good Till Date ‘7’ = At the Close
32	LastShares	C	Quantity of shares bought/sold on this fill event. This tag will be present on reports that communicate a fill.
31	LastPx	C	Fill Price of shares bought/sold on this fill event. This tag will be present on reports that communicate a fill.
14	CumQty	Y	Total executed order size. If order is associated with a chain of replacement requests, this field will contain the fill size of the entire chain.
151	LeavesQty	Y	Quantity which is open for further execution. If the OrdStatus (39) is Canceled, DoneForTheDay, Expired, Calculated, or Rejected (in which case the order is no longer active) then LeavesQty (151) could be 0, otherwise LeavesQty (151) = OrderQty (38) – CumQty (14).
6	AvgPx	Y	Calculated average price of all fills for this order. If order is associated with a chain of replacement requests, this field will contain the average fill price of the entire chain.
12	Commission	C	Trade commission, when provided by the execution venue.
13	CommType	C	This tag is set when Commission(12) is provided. At the moment only ‘absolute’ commission type is supported/provided: ‘3’ = Absolute monetary value
479	CommCurrency	C	Commission currency (when provided)
60	TransactTime	Y	Event time (as reported by broker).
912	LastRptRequested	C	Provided for execution reports generated by MassOrderStatus(AF) request handler. Value ‘Y’ marks the last such report.
1057	AggressorIndicator	C	Identify whether the order initiator is an aggressor or not in the trade: ‘Y’ = Order initiator is aggressor side ‘N’ = Order initiator is passive side
1115	OrderCategory	C	This tag is reported for trades issued by execution venues like Deltix Exchange Simulator and Matching Engine. ‘1’ = Order: it means that you’ve got filled (partially or completely) because of trading activity (matched with someone else’s Market extracted from historical trade). ‘2’ = Quote: it means that you’ve got filled (partially or completely) because of book crossing (matched with Limit from the opposite side of the book).
9221	ModuleKey	C	Used by QuantOffice to identify trading strategy that sent the order. This field will be provided on execution report if original order request had this field defined.
9223	PortfolioKey	C	Used by QuantOffice to identify trading portfolio this order belongs to. This field will be provided on execution report if original order request had this field defined.

9717	CorrelationClOrdD	C	Correlation Order ID. Identifies the first order in the cancel replace chain. See "Order Identification" section for more information.
9998	UpstreamSeqNum	C	This tag communicates message sequence number in upstream order event. Used for QuantOffice deployments to assist in state recovery. This tag can be enabled using "sendEmberSequence" option in ember settings.
9999	UserData	N	Cookie provided with the order (see NewOrderSingle(D) message).

Execution Report – Unknown Order

This table describes exceptional case – Execution Report that signals "unknown order" response to Order Status Request.

Tag	Field name	Req'd	Comments
35	MsgType	Y	8 = ExecutionReport
37	OrderID	Y	This tag will contain surrogate value "NONE".
11	ClOrdID	Y	Order identifier provided in tag ClOrdID(11) of Order Status Request.
76	ExecBroker	C	Will be copied from corresponding tag of Order Status Request.
17	ExecID	Y	This tag will contain surrogate value "0".
150	ExecType	Y	I = Order Status (response to Order status request)
39	OrdStatus	Y	8 = Rejected
58	Text	Y	"Unknown order"
1	Account	C	Will be copied from corresponding tag of Order Status Request.
55	Symbol	C	Will be copied from corresponding tag of Order Status Request.
167	SecurityType	C	Will be copied from corresponding tag of Order Status Request.
21	HandlInst	Y	Always set to "1": Automated Execution / Private Order.
54	Side	C	Will be copied from corresponding tag of Order Status Request.
38	OrderQty	Y	This tag will contain surrogate value "0".
14	CumQty	Y	This tag will contain surrogate value "0".
151	LeavesQty	Y	This tag will contain surrogate value "0".
6	AvgPx	Y	This tag will contain surrogate value "0".
60	TransactTime	Y	Event time (as reported by broker).
912	LastRptRequested	Y	This tag will contain surrogate value "Y".

Cancel Reject (9)

Deltix FIX Server responds with this message if it cannot process OrderCancelRequest(F) or OrderCancelReplaceRequest(G).

Tag	Field name	Req'd	Comments
35	MsgType	Y	9 = CancelReject
11	ClOrdId	Y	ID of order assigned by client to Cancel or CancelReplace request that has been rejected.
41	OrigClOrdID	Y	ClOrdId(11) of order that cannot be cancelled.
39	OrdStatus	Y	Order status after this cancel reject is applied. If CxlRejReason(102)='Unknown order' this value is set to 'Rejected'.
37	OrderID	Y	Exchange/broker provided order ID (if known). Value set to 'NONE' if order is unknown.

434	CxlRejResponseTo	Y	'1' = Response to CancelRequest(F) '2' = Response to CancelReplaceRequest(G)
102	CxlRejReason	Y	Code to identify reasons for cancel rejection. OMS send the following codes: '1' = 'Unknown Order' '99' = 'Other'
58	Text	N	Optional field that explains rejection.
60	TransactTime	Y	Request processing time expressed in the UTC time zone.

Business Reject (j)

FIX Server protocol communication layer may respond with Business Reject messages in cases when inbound messages do not follow FIX 4.4 specification. For example, when an inbound message is missing a required field, or filled value format is invalid.

Tag	Field name	Req'd	Comments
35	MsgType	Y	j = Business Reject
45	RefSeqNum	Y	MsgSeqNum(34) of rejected message.
372	RefMsgType	Y	MsgType(35) of the FIX message being referenced.
380	BusinessRejectReason	Y	Code to identify reason of business reject message: '3' = Unsupported message type '5' = Conditionally required field is missing '6' = Incorrect data format '0' = Other
58	Text	N	Optional field that explains rejection.

News(B)

Deltix OMS Uses News messages to notify clients about various OMS

Tag	Field name	Req'd	Comments
35	MsgType	Y	B = News
148	Headline	Y	Type of news: 'Connector Status' – broker/exchange connection status changed 'Trading Status' – trading halted/resumed in OMS
33	LinesOfText	Y	Always set to "1"
58	Text	Y	Event explanation
42	OrigTime	Y	Event time
7218	TradingIsHalted	C	'Y' if trading has been halted, 'N' if trading has been resumed
7219	ConnectorStatus	C	Possible values: 'Connected', 'Disconnected', or 'Unknown'.
7220	ConnectorId	C	Identifies connector that experienced status change

Samples

New Order Request:

```
8=FIX.4.4|9=169|35=D|34=3|49=TCLIENT12|56=DELTIX|52=20180814-
02:38:28.694|40=2|44=1.40164|1=ACCOUNT|11=1ckr4p0dr:2|38=92|54=2|55=BTCUSD|167=FOR|59
```

```
=0|60=20180814-02:38:28.694|76=NIAGARA|10=107|
```

Order Acknowledgement:

```
8=FIX.4.4|9=0223|35=8|49=DELTIX|56=TCLIENT1|52=20180814-
02:37:50.880|34=6|1=ACCOUNT|6=0|11=1ckr4nmqg:5|14=0|17=1534214209675|21=1|37=D5|38=96
|39=0|40=2|44=1.33378|54=2|55=BTCUSD|59=0|60=20180814-
02:37:50.876|76=NIAGARA|150=0|151=96|167=FOR|10=106|
```

Reject event:

```
8=FIX.4.4|9=0278|35=8|49=DELTIX|56=TCLIENT1|52=20180814-
02:37:08.416|34=10|1=ACCOUNT|6=0|11=1ckr4m99h:9|14=0|17=1534214209670|21=1|38=34|39=8
|40=2|44=1.19469|54=1|55=BADSYM|58=Order symbol is not defined in Security Metadata
database|59=0|60=20180814-02:37:08.414|76=NIAGARA|150=8|151=0|167=FOR|10=140|
```

Partial fill:

```
8=FIX.4.4|9=0235|35=8|49=DELTIX|56=TCLIENT8|52=20180814-
02:38:28.614|34=3|1=ACCOUNT|6=1.19373|11=1ckr4p0dr:1|14=39|17=1|21=1|31=1.19373|32=39
|37=D8|38=75|39=1|40=2|44=1.19373|54=1|55=BTCUSD|59=0|60=20180814-
02:38:28.602|76=NIAGARA|150=F|151=36|167=FOR|10=082|
```

News

BINANCE trading connector confirms that connection is established:

```
8=FIX.4.4|9=105|35=B|33=1|42=20130206-19:35:54.475|58=BINANCE:Connected|148=Connector
Status|7219=Connected|7220=BINANCE|10=212|
```

POSITIONS (DRAFT)

Deltix FIX server may provide current snapshot of client's positions. This section describes how standard FIX messages PositionRequest(AN) and PositionResponse(AP) are somewhat unconventionally used to implement this functionality..

Position Request (AN)

Tag	Field name	Req'd	Comments
35	MsgType	Y	AN = Position Request
710	PosReqID	Y	Position Request ID
724	PosReqType	N	Type of position request. Only Value '0' is supported.

Positions Filtering

Deltix Execution Server supports multiple position *projections*. For example, positions may be calculated for each FIX client, and for individual client account. Further on, positions also can be grouped by trader, exchange, currency, trader, and intermediate execution broker. Projections can be nested, for example, for each FIX client we may keep track their per-exchange position.

Position Request may specify projection using custom tag 9056. In addition, filters can be defined to reduce result set to positions of specific trader, account, exchange, etc.

Position Request continued			
9056	DeltixProjection	N	If provided, specifies position projection path (separated by slashes). See Execution Server Risk and Positions documentation for more information. If this tag is omitted, then projection "Source/Symbol" is used by default. Exact set of projections that can be requested depends on server configuration. Below are some examples: Source/Symbol = total positions in each instrument for current FIX session Source/Currency = total positions in each currency for current FIX session

			Source/Account/Symbol = positions of current FIX session grouped by account Source/UserData/Symbol = the same but per strategy (UserData tag) Source/Account/Exchange/Currency Note that projection must use Source. This simple measure prevents sharing positions between different FIX clients.
55	Symbol	N	If provided, the response will contain positions only for given symbol.
167	SecurityType	N	Will be ignored.
1	Account	N	If provided, the response will contain positions for given account only.
50	Trader	C	If provided, the response will contain positions for given trader only.
100	Exchange	C	If provided, the response will contain positions for given exchange only.
9041	Destination	N	If provided, the response will contain positions for given destination only.
9221	ModuleKey	N	If provided, the response will contain positions for given module only (QuantOffice).
9223	PortflioKey	N	If provided, the response will contain positions for given portfolio only (QuantOffice).
9999	UserData	N	If provided, the response will contain positions grouped for given UserData tag only.

Warning! Please be aware that each filter can be used only if client request compatible projection. For example, you can filter by Account(1) *only if* tag DeltixProjection(7056) contains Account key.

Position Response (AP)

Deltix uses FIX Position Response as a container of {Size, Cost, P&L, etc} associated with single position described by requested projection.

Each position request results in one or many response messages described below. The last message is marked using tag 912. Make sure you check tag 728 when processing the first message.

Tag	Field name	Req'd	Comments
35	MsgType	Y	AP = Position Response
710	PosReqID	Y	Correlates response with RequestForPositions (AN)
724	PosReqType	Y	Always set to "0" (Positions)
728	PosRequestResult	Y	'0' – Valid request, message will contain position data '2' – No position data found to match criteria
55	Symbol	Y	Position instrument symbol
1	Account	C	Filled when positions are grouped by Account (according to requested projection)
57	Trader	C	Filled when positions are grouped by Trader (according to requested projection)
100	Exchange	C	Filled when positions are grouped by Exchange (according to requested projection)
9040	Source	C	Filled when positions are grouped by Source
9041	Destination	C	Filled when positions are grouped by Destination
9221	ModuleKey	C	Filled when positions are grouped by ModuleKey (QuantOffice)
9223	PortflioKey	C	Filled when positions are grouped by PortfolioKey (QuantOffice)
9999	UserData	C	Filled when positions are grouped by UserData order tag.
~~167~~	~~SecurityType~~	~~Y~~	~~Position instrument type~~

60	OrigTime	Y	Server timestamp of position report
9050	PositionSize	C	Size of position
9055	PositionAvgCost	C	Average cost of this position
~~9051~~	~~PostionCost~~	~~C~~	~~Cost of this position~~
9052	PositionMarketValue	C	Market value of this position
9053	PositionRealizedPnL	C	Realized P&L of this position
9054	PositionUnrealizedPnL	C	Unrealized P&L of this position
~~115~~	~~OnBehalfOfCompID~~	~~C~~	~~Module key (strategy ID) of this position~~
~~116~~	~~OnBehalfOfSubID~~	~~C~~	~~Portfolio key of this position~~
912	LastRptRequested	Y	‘Y’ marks the last response message.
9056	DeltixProjection	Y	Projection requested

REVISIONS

6/12/2012	Original version
1/07/2013	Position and Order Status Reports
9/25/2013	Added information about “News” message and described Exchange Trade Synthetic instrument type handling.
3/21/2014	Changed the source of tag OrderID(37). Documented tag ExchangeOrderID(7000). Each ExecutionReport now contains the tag ExecID(17) .
12/10/2014	Documented FIX tags for built-in algo orders (Execution Server)
11/15/2015	Added section illustrating built-in algo orders (TWAP, VWAP) available in Java version of Execution Server
4/28/2016	Added the following fields to the description of ExecutionReport(8): Text(58), OrderRejReason(103), HandlInst(21), Currency(15).
5/9/2016	Added Market Data section
10/20/2017	Updated for Execution Server 5.X
03/25/2018	Major cleanup: Removed support for Pegged orders NewOrderSingle(D): No longer process ExecInst(18), HandlInst(21), PegDifference(211), DiscretionInst(388), DiscretionOffset(389) ExecutionReport(8): No longer contains PegDifference(211), DiscretionInst(388), DiscretionOffset(389) MarketDataRequest(V): now requires NoRelatedSym(146). Tag SecurityType(167) now optional.
4/19/2018	Removed section describing old Execution Algorithms. Polished content.
6/24/2018	Added an ability to control cancel-on-disconnect via custom tag of LOGON(A) message.
8/20/2018	Added CorrelationOrderID(9717) to the Execution Report message. Allowed custom tag ranges.
9/5/2018	Pegged orders were added back. This affects tag OrdType(40) and ExecInst(18).
10/11/2018	Documented usage of tags ClOrdId(11) , OrigClOrdId(41) and CorrelationClOrdID(9717).
11/25/2018	Added back request/response API to retrieve positions.
1/16/2019	Added AggressorSide(5797) to market data feed entries that represent trades.
1/17/2019	Added MassOrderStatusRequest(AF) message and tag LastRptRequested(912) to ExecutionReport(8) message.
1/22/2019	Added tag UpstreamSeqNum(9998) to Execution Report messages
7/5/2019	Added conditional MDEntryID(278) to market data snapshot message
10/21/2019	Added Commission(12), CommType(13), and CommCurrency(479) fields to trade reports.
2/20/2020	Updated with EPAM logo and Copyright
3/19/2020	Changed tag CorrelationOrderID(9717) from Required to Conditional
3/22/2020	Converted document to EPAM style.
4/1/2020	Added optional TransactTime(60) to Market Data Snapshot (W) message.
5/15/2020	Added special section to describe “Unknown Order” response to Order Status Request
9/16/2020	Reversed meaning of tag AutomatedSystemIndicator(1028) to match CME specification. Unfortunately, earlier versions reversed version of this tag.
9/22/2020	Added ModuleKey(9221) and PortfolioKey(9223) to OrderNewSingle(35=D) and ExecutionReport(35=8), as well as PositionRequest and PositionResponse messages.
11/16/2020	Added optional MDEntryOriginator(282) tag to Market Data Snapshot message (Level3 mode).

<table>
<tr><td>12/16/2020</td><td>Updated description for tag ExecInst(18) – mentioned Post Only orders.</td></tr>
<tr><td>1/8/2021</td><td>Cleaned up rarely position request/response to use tags outside of user-defined tag range:
<table>
<tr><th>Tag</th><th>Old value</th><th>New value</th></tr>
<tr><td>TAG_POSITION_SOURCE</td><td>7040</td><td>9040</td></tr>
<tr><td>TAG_POSITION_DESTINATION</td><td>7041</td><td>9041</td></tr>
<tr><td>TAG_POSITION_SIZE</td><td>7050</td><td>9050</td></tr>
<tr><td>TAG_POSITION_MARKET_VALUE</td><td>7052</td><td>9052</td></tr>
<tr><td>TAG_POSITION_REALIZED_PNL</td><td>7053</td><td>9053</td></tr>
<tr><td>TAG_POSITION_UNREALIZED_PNL</td><td>7054</td><td>9054</td></tr>
<tr><td>TAG_POSITION_AVERAGE_COST</td><td>7055</td><td>9055</td></tr>
<tr><td>TAG_POSITION_PROJECTION</td><td>7056</td><td>9056</td></tr>
<tr><td>TAG_MODULE_KEY</td><td>7221</td><td>9221</td></tr>
<tr><td>TAG_PORTFOLIO_KEY</td><td>7222</td><td>9222</td></tr>
</table>
System setting deltix.ember.fix.legacy.tags.1=true may be temporarily used to continue using old tag values.</td></tr>
</table>