

TQ301 · TECHNICAL SPECIFICATION

Turquoise Equities Trading Gateway (NATIVE)

ISSUE 2.6 · 20 February 2013

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1 Introduction

Turquoise offers a native low latency trading interface to provide clients with a protocol optimised to meet the needs of trading strategies where speed is a primary consideration. The protocol uses the minimum number of attributes and a binary format to ensure that messaging is as efficient as possible.

The native protocol provides the ability to submit, replace, cancel and mass cancel orders on Turquoise. This specification describes a conceptual overview of the protocol as well as providing technical guidance on adopting the native protocol to connect to Turquoise.

The interface is a point-to-point service based on the TCP/IP standard. For consistency FIX message identifiers are used on the native Interface. However, the format and content of the messages are different.

1.1 Purpose

The purpose of this document is to provide a technical description of the Native trading interface available at Turquoise.

1.2 Readership

This document outlines how to connect to the Native trading gateway 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 clients require to develop to the trading services.

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

1.3 Document Series

This document is part of series of documents providing a holistic view of full trading and information services available from Turquoise.

For reference the full range of documents is outlined below:

- TQ102 - Connectivity Guide
- TQ103 - Trading Technical Parameters
- TQ201 - Trading Gateway (FIX 5.0) Specification
- TQ202 - Post Trade Gateway (FIX 5.0) Specification
- TQ203 - Drop Copy Gateway (FIX 5.0) Specification
- TQ301 - Trading Gateway (Native) Specification (this document)

- TQ401 - ITCH Level-2 Market Data Specification
- TQ501 - Guide to Reference Data Services
- TQ601 - Guide to Certification

1.4 Document History

This document has been through the follow iterations:

Issue	Date	Description
R1 1.0	17 March 2010	First issue of this document published.
R1 1.1	27 April 2010	Second issue of this document published for Release 1 of the Turquoise test platform.
R2 1.0	24 May 2010	First issue of CDS release 2 document published
R2 1.1	25 June 2010	Order Mass Cancel Request message length corrected
R2.1 1.0	09 July 2010	Added/updated on Liquidity Pools, Mass Cancellation, Security Identification, Amending an Order, Client Order ID, Trade Match ID and Application ID in Setrvice Description section. Updated description of AppID and Client Order ID in Message Formats section. Updated description and offset of Order ID field Message Formats section. Removed TotalAffected Orders field in Order Mass Cancel Report. Changed data type of all quantity fields from Float to Int32.
R2.1 1.2	14 July 2010	Updated description to Order Types section. Updated description for ExpireDateTime, DisplayQty, TargetBook, CommonSymbol and Trade Liquidity Indicator.
R2.1 1.3	9 August 2010	Updated description for Order Ownership section Updated description for Client Order ID section Updated description of Pegged in Order Type section Updated description of Amending an Order section User name replaced with CompID Updated description for Mass Cancellation on Disconnect section Updated description for TransactTime in Timestamps and Dates section Updated description for Order ID in Execution Report Updated description for Limit Price field in Order Cancel/Replace Request Updated description for TradeMatchID in Execution Report Addition of Appendix A
R2.1 1.4	16 August 2010	Added Client Order ID to Reject message Added 9990 Reject code Updated description for Message Rate Throttling to reflect use of Reject message Addition of value to ResponseType in Missed Message Request Ack Addition of Client Order ID to Reject Message Updated description for Order Qty Total order quantity. The intended Order Qty has to be inserted here, as this is a mandatory field. Updated description for TargetBook Updated description of Transact Time
1.5	17 December 2010	Order Qty updated for Order Cancel/Replace Request Order throttling behaviour clarified.

1.6	18 February 2011	Updated description for Iceberg order type Added value 0 for ApplID in Business Reject message Updated description for ExpireDateTime in New Order and Order Cancel/Replace Request messages
1.7	31 March 2011	Updated document for Sponsored Accesss. Section 2.4.1 - Order Ownership Section 2.4.11 - Redrafted Created section 3.7 - Mass Cancellation on Disconnect of Member Firm for Sponsored User Created section 3.8 - Mass Cancellation on Suspension of a Sponsored User Updated sections 7.3.5, 7.3.6, 7.3.7, 7.4.5, 7.4.6, 7.4.7, 7.5.1 Section 7.3.9 added Updated section 8.1 - Appendix A with new error codes for Sponsored Access
1.8	24 May 2011	Updated section 2.4.4 to clarify restriction added in respect to amending orders which are hidden, visible and Iceberg orders Updated section 7.1.1 with System Status message
1.9	6 July 2011	Addition of 2 new error messages in section 8.1 Error & Reject Messages
2.0	31 October 2011	Support for clearing interoperability.
2.1	4 January 2012	Section 2.3.3 - Added details of CFD Give Up capacity Section 7.4.1 - Added CFD Give Up capacity Section 7.4.5 - Added Capacity field Appendix A - Added reject codes 121901 & 121903
2.2	27 April 2012	Section 2.2 - Change to matching priority in Dark Midpoint book Section 2.3.1 - Updated details of minimum fill functionality and continuous only orders Section 2.4.4 - added attributes of an order that can be amended Added Section 4.4 - Dormant Account Policy Sections 7.4.1, 7.4.2 - New Exec Instruction enum added Appendix A - Added reject code 121908
2.3	31 August 2012	Section 2.3.1 - Added details of Passive Only Order type Section 2.4.4 - Added Passive Only Order to amendable attributes Section 7.4.1, 7.4.2 - Added PassiveOnlyOrder field Section 7.4.5 - Added TradeLiquidityIndicator enum of 'C' for Periodic Uncross, added PriceDifferential field Appendix A - Added reject codes 111906, 111908, 111912, 121201, 121202.
2.4	3 October 2012	Section 7.4.1 - Clarified PassiveOnlyOrder only support for Integrated order book Section 7.4.5 - Removed references to 'dark' order types
2.5	25 October 2012	Section 6 - Clarified customer processing logic for Data Types
2.6	20 Feb 2013	Updated contact details

In subsequent issues where amendments have been made to the previous version, these changes will be identified using a series of side bars as illustrated opposite.

1.5 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 08:00UK to 18:00UK

- Telephone: +44 (0)20 7797 3939
- Email: londontam@londonstockexchange.com

2 Service Description

2.1 System Architecture

The Native Trading Gateway consists of two channels. A Real-Time Channel which provides the main order management functionality and a Recovery Channel that allows clients to retrieve missed messages due to disconnection from the Real Time Channel.

2.2 Liquidity Pools

The Turquoise MTF supports the following liquidity pools for clients to execute their interest:

- (i) Integrated Order Book - The Integrated Order Book will execute orders in a continuous price-time method with large in scale hidden orders getting the lowest priority. Clients have the option to specifying the minimum fill size per order for non-persistent orders only.
- (ii) Dark Midpoint Order Book - The Dark Midpoint Order Book accepts only dark orders. Orders will execute at the Primary Market Midpoint on entry and at uncrossings done at randomized time intervals, midpoint changes or when a firm amends order price, order size or MES. Clients have the option of specifying a minimum fill size per order.

Orders in the Dark Midpoint Order Book will be matched and prioritised on a Size then Time basis.

Clients can submit orders to the Integrated or Dark Midpoint Book by explicitly specifying the order book in the TargetBook tag. If the value is not specified the order will be rejected.

2.3 Order Handling

2.3.1 Order Types

Clients may submit the order types outlined below via the [New Order](#) message.

Order Type	Description
Market	<p>Market orders will execute at the best available prices in the Integrated book and any remainder will be cancelled. Orders will be subject to Price Band and Maximum Order Value validations.</p> <p>Market orders in the Dark Midpoint book will execute at the PBBO midpoint.</p>
Limit	<p>Limit orders will execute at or better than the specified price in the Integrated book. Orders will be subject to Price Band and Maximum Order Value validations.</p> <p>Limit orders will execute in the Dark Midpoint order book at the PBBO midpoint only if the limit price is equal to or better than the midpoint. Orders will be subject to Maximum Order Value validations.</p>
Iceberg	<p>An order that contains a disclosed quantity which will be the maximum quantity displayed on the order book. Once the displayed quantity is reduced to zero, it will be replenished by the lower of the disclosed quantity and the remainder. The displayed quantity will be replenished by the lower of the disclosed quantity and the remainder once the quantity is reduced to zero in case of a passive order or immediately if executed on aggression.</p>
Hidden	<p>An order that meets MiFID large in scale requirements that is not displayed in the order book. These orders will receive the lowest priority within a price point when executing in the Integrated book.</p>
Midpoint Pegged (Dark)	<p>An order that will execute at the midpoint of the Primary Best Bid and Offer. This order type can behave as a Limit or Market order depending on order entry parameters.</p>

Minimum Fill	<p>In the Integrated order book, MAQ (Minimum Acceptable Quantity) will be used. This means that a firm can execute against multiple counterparties if the order's MAQ requirement is satisfied. For the Integrated order book this quantity is valid for non persistent orders only.</p> <p>In the Dark Midpoint order book, MES (Minimum Execution Size) will be used. This means that a firm will only execute against another order if that order alone meets the order's MES requirement. For the Dark Midpoint order book this quantity is valid for both persistent and non-persistent orders.</p> <p>Firms can also specify whether they want MES to apply for the first execution only or to persist for the lifetime of the order.</p> <p>Where MAQ/MES is greater than remaining Order Quantity, the MAQ/MES will be reduced to equal the remaining Order Quantity.</p>
Periodic Uncrossing Only	<p>These orders will only execute during a periodic uncrossing in the Dark Midpoint book.</p> <p>This instruction will be ignored for the Integrated book.</p>
Continuous Only	<p>These orders will only execute during continuous trading and will not match during Randomised Periodic Uncrossing events.</p> <p>This instruction will be ignored for the Integrated book.</p>
Periodic Uncrossing & Continuous	<p>These orders will execute both in continuous matching and in periodic un-crossings in the Dark Midpoint Book.</p> <p>This instruction will be ignored for the Integrated book.</p>
Passive Only Order	<p>Only applicable to persistent limit orders.</p> <p>These orders will not match with visible orders upon entry, and will expire if they will aggress.</p> <p>These orders <u>can</u> match on entry against large in scale hidden orders sat within the BBO.</p>

2.3.2 Time in Force (TIF)

The server recognizes the following TIFs.

Time in Force	Description
Day	An order that will expire at the end of the day.
Immediate or Cancel (IOC)	An order that will be executed on receipt and the remainder, if any, immediately cancelled.
Fill or Kill (FOK)	An order that will be fully executed on receipt, or immediately cancelled.
Good Till Time (GTT)	An order that will expire at a specified time during the current day, or at the end of day, whichever occurs earliest. When specifying the expiry time for a GTT order, a date component will also be specified along with the expiry time. The server takes the date component into consideration when validating the expiry time. I.e. if a GTT order is sent with an already elapsed expiry time but with a future date in the date component, the order will be accepted and will expire at the end of trading of the current trading day. i.e. the order is treated as a DAY order.
Good Till Date (GTD)	An order that will expire at the end of the day.
Good Till Cancelled (GTC)	An order that will expire at the end of the day.

2.3.3 Order Capacity

The server recognises four order capacities; Agency, Principal, Riskless Principal and CFD Give Up. Clients are responsible for indicating the capacity an order is submitted under.

The capacity “CFD Give Up” will be applicable only for Sponsored Access users who are given the privilege for capacity conversion. If the submitter with appropriate user privileges submits an order with dealing capacity “CFD Give Up”, such orders will be converted to “Principal” upon successful submission of the order.

2.4 Order Management

2.4.1 Order Ownership

All orders will be associated with the CompID under which the order was entered. Capacity is available via Sponsored Access to enter orders on behalf of another CompID.

2.4.2 Cancellation

The remainder of a live order may be cancelled via the [Order Cancel Request](#) message. The server will respond with an [Execution Report](#) or [Order Cancel Reject](#) to confirm or reject the cancellation request respectively.

2.4.3 Mass Cancellation

A client may mass cancel live orders via the [Order Mass Cancel Request](#). The server will respond with an [Order Mass Cancel Report](#) to indicate via the `MassCancelResponse` field whether the request is successful or not. Clients may receive more than one Mass Cancel Report having different AppIDs to distinguish the order cancellations carried out for each partition.

If the cancellation request is accepted, the server will then immediately transmit Execution Reports for each order that is cancelled. The Client Order ID of all such messages will be the Client Order ID of the [Order Mass Cancel Request](#).

If the mass cancel request is rejected, the reason will be specified in the `MassCancelRejectReason` field of the [Order Mass Cancel Report](#).

Clients may use the [Order Mass Cancel Request](#) to mass cancel all orders or only those for a particular instrument or segment. A mass cancel request may apply to all the orders of the trading firm or only to those of that particular CompID.

A mass cancel request sent in via the Native Trading Gateway or the FIX Gateway may cancel orders submitted through both gateways. In such a case, the execution reports for the order cancellation will be sent to the gateway through which each order was originally submitted.

2.4.4 Amending an Order

The following attributes of a live order may be amended via the [Order Cancel/Replace Request](#) message:

- (i) Order quantity
- (ii) Displayed quantity*
- (iii) Price
- (iv) Expiration time (GTT orders)
- (v) Expiration date (GTD orders)
- (vi) Client reference
- (vii) Minimum Execution Size (valid for Dark Midpoint book)
- (viii) Execution Instruction (valid for Dark Midpoint book)
- (ix) Passive Only Order

* The following restrictions apply. Participants may not:

- amend a hidden order to become an Iceberg order
- amend an Iceberg order to become a hidden order
- amend a visible order to a hidden order
- amend a hidden order to a visible order

Participants may:

- amend a fully visible order to become an Iceberg order
- amend an Iceberg order to become a visible order

Whilst the field being amended will have to be filled with the new value, clients must fill in the current values of all the fields that are not being amended as well.

For Market Orders, the LimitPrice field should be filled with a negative value.

An order's Passive Only Order value will not be re-evaluated unless the order's price is amended.

The server will respond with an [Execution Report](#) or [Order Cancel Reject](#) to confirm or reject the amendment request respectively.

When an order amended for price, re-aggresses the order book where it gets fully filled, the sender will only receive an [Execution Report](#) for the trade and not acknowledging the amendment.

A Passive Only Order amended for price may expire if it falls into a worse price point or would aggress a visible price point on the other side of the order book.

If a client tries to amend the Order Quantity and/or Display Quantity, and if the request cannot be completely fulfilled due to edge conditions, the server will do the amendment to the maximum possible extent. Here the system will not allow order quantity to be amended below filled quantity, nor display quantity to be amended below leaves quantity. In order to allow order fills that are yet to be notified to the client, the system will automatically adjust the quantities where necessary.

For example if an order is sent with order quantity and display quantity as 800 and then tries to amend the display quantity to 500 two scenarios can happen:

- (i) The client may have already received a partial fill for 400 and tries to amend the leaves quantity via the display quantity which is not permitted.
- (ii) While the amend request is on the wire, there may be a partial fill of 400 which is not known to the client at the point of generating the amend request; at this case, rejecting the amend request is not ideal. The server cannot differentiate the two scenarios hence it has implemented fairer option which is to execute the amend request to the maximum possible extent.

Clients may not amend orders that are fully filled.

2.4.5 Order Status

The Order Status field is used to convey the current state of an order. If an order simultaneously exists in more than one order state, the value with highest precedence is reported as the Order Status. The relevant order statuses are given below from the highest to lowest precedence. When a cancellation or amendment to a “Filled” or “Cancelled” or “Expired” order is rejected, order status is given as “Rejected” in the Order Cancel Reject instead of the actual status of the order. For example when an amend request to change the side of an order is rejected, the order status is given as “Rejected” in the Order Cancel Reject.

Value	Meaning
2	Filled
4	Cancelled
6	Expired
1	Partially Filled
0	New
8	Rejected

2.4.6 Execution Reports

The [Execution Report](#) message is used to communicate many different events to clients. The events are differentiated by the value in the ExecType field as outlined below.

Exec Type	Usage	Ord Status
0	Order Accepted Indicates that a new order has been accepted. This message will also be sent unsolicited if an order was submitted by Market Operations on behalf of the client.	0
8	Order Rejected Indicates that an order has been rejected. The reason for the rejection is specified in the field Order Reject Code.	8
F	Order Executed Indicates that an order has been partially or fully filled. The execution details (e.g. price and quantity) are specified.	1, 2
C	Order Expired Indicates that an order has expired in terms of its time qualifier or due to an execution limit.	6

4	Order Cancelled Indicates that an Order Cancel Request has been accepted and successfully processed. This message will also be sent unsolicited if the order was cancelled by Market Operations.	4
5	Order Cancel/Replaced Indicates that an Order Cancel/Replace Request has been accepted and successfully processed.	0, 1
D	Order Cancel/Replace by Market Operations Indicates that an order has been amended by Market Operations.	0, 1
H	Trade Cancel Indicates that an execution has been cancelled by the Market Operations. An Execution Report Ref ID to identify the execution being cancelled will be included.	0, 1, 4, 6

2.4.7 Client Order ID

The server does not validate each Client Order ID for uniqueness. However, it is recommended that clients ensure unique Client Order IDs across all messages (e.g. [New Order](#), [Order Cancel Request](#), etc.) per CompID.

Clients must specify the Client Order ID when submitting a [New Order](#), [Order Cancel Request](#), [Order Mass Cancel Request](#) or [Order Cancel/Replace Request](#).

If a client submits multiple orders with the same Client Order ID they will only be able to cancel/amend the most recent order (using Client Order ID) as the system only maintains one order per Client Order ID.

2.4.8 Order ID

The server will use the OrderID field of the [Execution Report](#) to affix the order identification numbers of the trading engine. Order IDs will be unique across trading days.

Unlike Client Order ID which requires a chaining through cancel/replace requests and cancel requests, the OrderID of an order will remain constant throughout its life.

Clients have the option of specifying the OrderID (instead of the Original Client Order ID) when submitting an [Order Cancel Request](#) or [Order Cancel/Replace Request](#). The Common Symbol and Target Book should always be specified along with either option.

Using the OrderID when amending or canceling an order will be faster, since the system maintains orders by the Order ID.

2.4.9 Execution ID

The server will use the Execution ID field to affix a unique identifier for each [Execution Report](#). Execution IDs will be unique across trading days.

2.4.10 Trade Match ID

Trade Match Id in the Native Trading gateway matches exactly with the Trade Match ID field on the ITCH gateway execution report which is in binary. It also matches the TradeMatchID (tag 880) on FIX Trading & Drop Copy execution reports as well as the TradeID (tag 1003) in the Post Trade gateway. However this is in base 62 with a one character prefix. It can be converted to an 8 byte integer for comparison after removing the prefix of 'T' or 'M'.

The ExecID generated by the CCP gateway could be deduced from the Trade Match ID after the prefix T/M, the side indicator (B/S prefix) and the sequence numbers (1 for cancelled trades) are removed and then the remainder converted to binary using base 62.

2.4.11 Application ID

The trading system consists of a series of parallel partitions each of which services an exclusive set of instruments. Each application message transmitted by the server will include the identity of the partition that generated the message. The number of partitions could increase/ decrease in the future.

2.5 Security Identification

Clients submit and manage orders by specifying the MTF Common Symbol. Clients can submit and manage orders by specifying the MTF Common Symbol. When using the MTF Common Symbol scheme, the client must specify the following:

- The Common Symbol in the CommonSymbol field
- The order book in the TargetBook field:
 - '0' for Dark Midpoint Order Book
 - '1' for Integrated Order Book

2.6 Market Operations

2.6.1 Order Deletion

Market Operations are able to cancel orders on behalf of a client in accordance with the Turquoise rulebook.

The client will be notified of the [Order Cancel Request](#) submitted on its behalf if and when it is accepted. The client will not be notified if the action is rejected.

This feature is intended to help a client manage an emergency situation and should not be relied upon as a normal business practice.

2.6.2 Trade Cancellations

Market Operations may cancel any on-book trade. The server will transmit [Execution Reports](#) to the relevant clients to notify them of a trade cancellation or correction.

If an execution is cancelled to reduce the executed quantity, the cancelled quantity will have to be reduced from the order quantity for that order.

Therefore, the order will have to be restated to reduce its order quantity by the cancelled quantity. The client will receive two notifications in such a scenario; one for the trade cancel and another for the restatement.

2.7 Conditionally Required fields

All fields that are not conditionally required will not be validated by the server, and will only be passed back on execution reports.

2.8 Timestamps and Dates

ExpireDateTime should be in Unix (Posix) time which will be the number of seconds elapsed since midnight proleptic Coordinated Universal Time (UTC) of January 1, 1970, not counting leap seconds.

The first 4 bytes of the TransactTime timestamp will represent the Unix (Posix) time while the next 4 bytes will specify the microseconds. The TransactTime will be in UTC.

2.9 Information for Billing

Customers may use the Native Execution Report to estimate billing. For the current Turquoise rebates and fees, please refer to the [TQ Equity Tariff Schedule](#).

In general, rebates and fees can be determined via the following Native Execution Report fields:

- Integrated Order Book - aggressive trades
 - TargetBook=1 and TradeLiquidityIndicator = R
- Integrated Order Book - passive trades
 - TargetBook=1 and TradeLiquidityIndicator = A
- Dark Midpoint Order Book - all trades
 - TargetBook=0 (The TradeLiquidityIndicator field is not required for calculation)

In addition, the CommonSymbol field may be relevant for stocks that are eligible for rebates during new market segment promotions:

- CommonSymbol

3 Connectivity

3.1 ComplIDs

ComplIDs will be confirmed with each client before communications can begin through the Native Trading Gateway. A single client may have multiple connections to the server (i.e. a client can maintain multiple sessions if he has multiple ComplIDs).

3.2 Passwords

Each ComplID will be assigned a password on registration. Clients will be required to change the password to one of their choosing via the [Logon](#) message. When a new password is submitted by the client, a successful login will indicate that the new password is accepted. The new password will, if accepted, be effective for subsequent logins. If a new password is rejected, the RejectReason of the [Logon Reply](#) will indicate why the password is rejected.

In terms of the Turquoise password policy, the initial password of each ComplID must be changed at least once. If not, the client will be unable to login to the server. In such a case, the client should contact Turquoise.

3.3 Production IP Addresses and Ports

The IP addresses and ports for the Native Trading Gateway are published in the Turquoise [Connectivity Guide](#).

3.4 Failover and Recovery

The system has been designed with fault tolerance and disaster recovery technology that ensures that trading should continue in the unlikely event of a process or site outage.

If the client is unexpectedly disconnected from the server, it should attempt to re-connect to primary site within a few seconds. The client should only attempt to connect to the backup IP address and port if so requested by Turquoise.

If a service interruption occurs in the Native Recovery Channel (due to Order Cache outage) the Native Gateway will send a [System Status](#) message to all logged in clients of that gateway's recovery channel with AppID stamped to indicate the service non availability of the partition. When this message is received, clients are expected to identify that the recovery service is not available for the partition indicated by AppID. They would be able to continue recovery activities on other partitions without interruption.

If the gateway was in the middle of serving a [Missed Message Request](#), it will send a [Missed Message Report](#) message with 'ResponseType' = 3 (service unavailable) to the client.

If a new [Missed Message Request](#) is sent by a user, the gateway will reject the message with a '[Missed Message Request Ack](#)' with 'ResponseType' = 3 (service unavailable) to the client.

Once the service is available again, the Native Gateway will send another [System Status](#) message with AppID to indicate the service availability of the partition to the clients who are still connected on to the recovery channel with 'AppStatus' = 1. When this message is received, clients are expected to resend the request for missed messages (preferably from the point of interruption) to the gateway to resume the missed message recovery.

3.5 Message Rate Throttling

Turquoise has implemented a scheme for throttling message traffic where each client is only permitted to submit up to a specified number of messages per second.

Every message which exceeds the maximum rate of a CompID will be rejected via a [Reject](#).

A client's connection will be disconnected by the server if its message rate exceeds the maximum rate for a specific time duration. In such a case, the server will transmit a [Logout](#) message and immediately terminate the TCP/IP connection.

3.6 Mass Cancel On Disconnect

At the request of the client, the server can be configured to automatically cancel certain live orders submitted by a client whenever it disconnects from the server.

The user can mark each order (through the Auto Cancel field) showing whether the user's settings should be checked in the event of a disconnection/log out or whether the order should remain unaffected. For each server initiated cancellation, Exec Type and Order Status fields in the execution report will be stamped with the value 'Expired' as opposed to 'Cancelled' which would be applicable to all firm initiated cancellations.

This feature does not guarantee that all outstanding marked orders will be successfully cancelled as executions that occur very near the time of disconnect may not be reported to the client. During such a situation, the client should contact Market Operations to verify that all marked orders have been cancelled and all Execution Report messages have been received.

The configuration of the mass cancellation on disconnect feature cannot be updated during a session.

3.7 Mass Cancel on Disconnect of Member Firm for Sponsored User

Sponsoring Firms are able to constantly monitor their Sponsored Users via a Drop Copy Gateway connection. Should a Sponsoring Firm lose their ability to monitor their Sponsored Users (e.g. Disconnect) and not reconnect within the configured amount of time, their Sponsored Users will be restricted from submitting new orders, while all their existing orders will be expired.

3.8 Mass Cancel on Suspension of a Sponsored User

Sponsoring Firms will have the ability to suspend access to a Sponsored User via the Sponsor Portal. On suspension of a Sponsored User they will be restricted from submitting new orders, while all their existing orders will be cancelled.

4 Connections and Sessions

4.1 Establishing a Connection

Each client will use the assigned IP address and port to establish a TCP/IP session with the server. If the client does not initiate the session by sending the [Logon](#) message within one heartbeat interval of establishing the session, the connection will be dropped by the server. The client will identify itself using the CompID field. The server will validate the CompID and password of the client.

Once the client is authenticated, the server will respond with a [Logon Reply](#) message. If the client's logon is successful or if the client's new password is accepted, the RejectCode of the [Logon Reply](#) will be Successful (0). If the client's logon is unsuccessful (e.g. invalid username, invalid or expired password or locked user) the [Logon Reply](#) will include the RejectCode which corresponds to the reason for rejection.

The client must wait for the server's Logon before sending additional messages. Messages received from the client before the exchange of [Logon](#) messages will be rejected by the server.

4.2 Maintaining a Session

4.2.1 Application Sequence Numbers

While the Server-initiated application messages will always have an AppID and an Sequence No, the Client-initiated application messages will not be numbered. The AppID will correspond to the partition ID of the instrument the message is sent for, and the Sequence No will be a sequence number assigned to messages of the given partition.

The Sequence Number received by a client for a particular AppID although incremental will not be sequential since the sequence numbers are not maintained per client. Therefore, a client should not connect to the recovery channel and request missed messages if the difference in SequenceNo between two consecutive messages is more than one. Recovery should be initiated only upon a reconnection after a session disconnection.

Uniqueness of Client-initiated messages will be achieved through the provision of unique Client Order IDs per user.

4.2.2 Heartbeats

The client and server will use the [Heartbeat](#) message to exercise the communication line during periods of inactivity and to verify that the interfaces at each end are available. The heartbeat interval is 3 seconds, for both client and server.

The server will send a [Heartbeat](#) anytime it has not transmitted a message for the heartbeat interval. The client is expected to employ the same logic.

If the server detects inactivity for the specified heartbeat interval, the server will send a [Logout](#) and break the TCP/IP connection with the client. The client is expected to employ similar logic if inactivity is detected on the part of the server.

4.3 Terminating a Connection

The client is expected to terminate each connection at the end of each trading day before the server shuts down. The client will terminate a connection by sending the [Logout](#) message. The client will then break the TCP/IP connection with the server.

All open TCP/IP connections will be terminated by the server when it shuts down (a [Logout](#) will not be sent). Under exceptional circumstances the server may initiate the termination of a connection during the trading day by sending the [Logout](#) message.

Either party that wishes to terminate the connection may wait the heartbeat interval duration before breaking the TCP/IP connection, in order to ensure that the other party received the [Logout](#) message.

4.4 Dormant Account Policy

Clients are advised that CompIDs for both the Native and FIX Trading services will automatically be deactivated after a period of 100 days without a successful logon.

If a client is unable to connect because a CompID has been marked as inactive, they should contact Turquoise Market Operations who will reactivate CompIDs as required.

Clients that may have allocated specific Trading CompIDs for a disaster recovery site are strongly advised to take note of the above.

5 Recovery

If a client gets disconnected from the server, the recovery channel shall be used to recover missed messages. This section explains the protocol to be followed when recovering missed messages.

5.1 Requesting Missed Messages

When a client needs to recover missed messages he must first connect to the Real Time Channel and establish a session by exchanging [Logon](#) and [Logon Reply](#) messages. The client may then connect to the Recovery Channel and exchange [Logon](#) and [Logon Reply](#) messages to establish a recovery session. Any attempt to connect to the Recovery Channel without first connecting to the Real Time Channel shall be rejected, and the server will send a [Logon Reply](#) message, which will include the appropriate Reject Code. The client must ensure proper authentication (i.e. same CompID and password) when logging in to both channels. Any values sent for the NewPassword field in the [Logon](#) message sent to the Recovery Channel will be ignored.

After establishing a connection with the Recovery Channel, the client may send a [Missed Message Request](#) with the relevant AppID and the last received Sequence No corresponding to that AppID. The client will have to send separate [Missed Message Request](#) messages to retrieve messages from each partition.

If a service interruption (via Order Cache Primary failing over to its Mirror or via both Order Cache Processes going down) occurs in the Native Recovery Channel the Native Gateway will send a [System Status](#) message to all logged in clients of that gateway's recovery channel with AppID to indicate the service non availability of the partition. When this message is received, the clients are expected identify that the recovery service is not available for the partition indicated by AppID. They would be able to continue recovery activities on other partitions without interruptions.

If the gateway was in the middle of serving a [Missed Message Request](#), it will send a [Missed Message Report](#) message with 'Status' = 3 (service unavailable) to the client.

If a new [Missed Message Request](#) is sent by a user, the gateway will reject the message with a '[Missed Message Request Ack](#)' with 'Status' = 3 (service unavailable) to the client. Once the service is available again, the Native Gateway will then send another [System Status](#) message with AppID and with 'AppStatus' = 1 to indicate the service availability of the partition to the clients who are still connected on to the recovery channel. When this message is received, the clients are expected to resend the request for missed messages (preferably from the point of interruption) to the gateway to resume the missed message recovery.

5.2 Response to a Missed Message Request

The server will respond to the [Missed Message Request](#) with a [Missed Message Request Ack](#) to indicate whether the recovery request is successful or not. If the request is unsuccessful, the reason will be specified in the field ResponseType.

The total number of [Missed Message Requests](#) that a client may send on the Recovery channel is limited each day. This limit is defined by Turquoise. Once this limit is reached, the server will reject any additional request via a [Missed Message Request Ack](#) with a ResponseType of Recovery Request limit reached (1).

In the case of a successful recovery request, the server will transmit the requested messages immediately after the [Missed Message Request Ack](#). It should be noted that due to race conditions duplicate messages may be transmitted via the recovery channel. Clients are advised to use the AppID and SeqNum to carry out duplicate discard.

Upon transmitting all the missed messages (i.e. messages from the last received Sequence No to the first message received through the Real Time Channel) the Recovery Channel will send a [Missed Message Report](#) which will indicate whether or not all requested messages have been sent.

The total number of messages that a client may receive is limited per [Missed Message Request](#). Therefore, if the client's missed message request exceeds this limit, the server will send the first set of messages from the AppID and Sequence No provided, followed by a [Missed Message Report](#) with a ResponseType of Message Limit Reached (1).

A client should not send subsequent [Missed Message Requests](#) prior to receiving the [Missed Message Report](#), since these will be rejected by the server.

Upon receiving the [Missed Message Report](#), the client can send a [Logout](#) message and terminate the connection or submit a new [Missed Message Request](#) for any more messages that need to be transmitted.

5.3 Terminating the Recovery Session

Upon sending the [Missed Message Report](#) the server will wait three heartbeat intervals prior to disconnecting the client. If the client has received only part of the message set that was requested, the client may send in a new [Missed Message Request](#) message for the messages that were not recovered in the first attempt. However, if such a request is not sent within three heartbeat intervals the Server will terminate the connection. If the client is unable to send a new request within this time, the client can re-login to the Recovery Channel and send in the [Missed Message Request](#).

6 Data Types

The fields of the messages utilised by the server will support the data types outlined below.

Data Type	Length	Description
Alpha	1	A single byte used to hold one ASCII character.
Price	8	Signed Little-Endian encoded eight byte integer field with eight implied decimal places.
Int8	1	Little-Endian encoded 8 bit signed integer
UInt16	2	Little-Endian encoded 16 bit unsigned integer
Int32	4	Little-Endian encoded 32 bit signed integer.
UInt32	4	Little-Endian encoded 32 bit unsigned integer.
UInt64	8	Little-Endian encoded 64 bit unsigned integer
String (null terminated)	Variable	These fields use standard ASCII character bytes. A field will be null terminated if the full fixed length is unused. The first byte will contain a null if the field is unused.

Customers should design their applications such that:

- When sending messages, it populates all Reserved fields with nulls (hex 0x00)
- When receiving messages, it disregards and does not process any fields marked as Reserved

7 Message Formats

This section provides details on the eight administrative messages and eight application messages utilized by the server. Any message not included in this section will be rejected by the server.

7.1 Supported Message Types

7.1.1 Administrative Messages

All administrative messages may be initiated by either the client or the server (unless otherwise indicated).

Message	Message Type	Usage
Logon	A	Allows the client and server to establish a session.
Logon Reply	B	Allows the server to acknowledge a clients Logon.
Logout	5	Allows the client and server to terminate a session.
Heartbeat	0	Allows the client and server to exercise the communication line during periods of inactivity and verify that the interfaces at each end are available.
Missed Message Request	M	Allows the client to subscribe to missed messages through the Recovery Channel.
Missed Message Request Ack	N	Allows the server to acknowledge a client's Missed Message Request.
Missed Message Report	P	Allows the Server to communicate the result of a Missed Message Request.
Reject	3	Allows the Server to reject a message that does not comply with the Native Trading Gateway messaging protocol.
System Status	n	Sent to All Native Recovery Channel users on the event of Order Cache Outage.

7.1.2 Application Messages: Order Handling

7.1.2.1 Client-Initiated

Message	Message Type	Usage
New Order	D	Allows the client to submit a new order.
Order Cancel Request	F	Allows the client to cancel a live order.
Order Mass Cancel Request	q	Allows the client to mass cancel: <ul style="list-style-type: none"> (i) All live orders. (ii) All live orders for a particular instrument. (iii) All live orders for a particular segment. The mass cancel may apply to the orders of a particular trading party or to all orders of the firm.
Order Cancel/Replace Request	G	Allows the client to cancel/replace a live order.

7.1.2.2 Server-Initiated

Message	Message Type	Usage
Execution Report	8	Indicates one of the following: <ul style="list-style-type: none"> (i) Order accepted. (ii) Order rejected. (iii) Order executed. (iv) Order expired. (v) Order cancelled. (vi) Order cancel/replaced. (vii) Trade cancel.
Order Cancel Reject	9	Indicates that an Order Cancel Request or Order Cancel/Replace Request has been rejected.
Order Mass Cancel Report	r	Indicates one of the following: <ul style="list-style-type: none"> (i) Mass order cancel request accepted. (ii) Mass order cancel request rejected.
Business Message Reject	j	Indicates that an application message could not be processed.

7.2 Message Header

Field	Offset	Length	Data Type	Description
Start of Message	0	1	Int8	Indicates the start of the message. Clients will have to send the binary value of '2' at the start of each message. Server will also follow the same protocol.
Message Length	1	2	UInt16	Length of the message from the Message Type field onwards i.e. total message length - 3.
Message Type	3	1	Alpha	Type of Message.

7.3 Administrative Messages

7.3.1 Logon

Field	Offset	Length	Data Type	Description
Header	MsgType = A (0x41)			
CompID	4	25	String	User name
Password	29	25	String	Password
NewPassword	54	25	String	New Password
Message Version	79	1	Int8	Message Version that will be used in this session. Always set to 1.

7.3.2 Logon Reply

Field	Offset	Length	Data Type	Description
Header	MsgType = B (0x42)			
RejectCode	4	4	Int32	Code specifying the reason for the reject.
PasswordExpiryDayCount	8	30	String	The number of days before the password will expire.

7.3.3 Logout

Field	Offset	Length	Data Type	Description
Header	MsgType = 5 (0x35)			
LogoutReason	4	20	String	Reason for the logout.

7.3.4 Heartbeat

Field	Offset	Length	Data Type	Description
Header	MsgType = 0 (0x30)			

7.3.5 Missed Message Request

Field	Offset	Length	Data Type	Description								
Header	MsgType = M (0x4D)											
AppID	4	1	Int8	Partition ID <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Partition 1</td> </tr> <tr> <td>2</td> <td>Partition 2</td> </tr> <tr> <td>3</td> <td>Partition 3</td> </tr> </tbody> </table>	Value	Meaning	1	Partition 1	2	Partition 2	3	Partition 3
Value	Meaning											
1	Partition 1											
2	Partition 2											
3	Partition 3											
LastMsgSeqNum	5	4	Int32	Last received Sequence Number.								

7.3.6 Missed Message Request Ack

Field	Offset	Length	Data Type	Description										
Header	MsgType = N (0x4E)													
ResponseType	4	1	Int8	<table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Successful</td> </tr> <tr> <td>1</td> <td>Recovery Request limit reached</td> </tr> <tr> <td>2</td> <td>Invalid App ID</td> </tr> <tr> <td>3</td> <td>Service Unavailable</td> </tr> </tbody> </table>	Value	Meaning	0	Successful	1	Recovery Request limit reached	2	Invalid App ID	3	Service Unavailable
Value	Meaning													
0	Successful													
1	Recovery Request limit reached													
2	Invalid App ID													
3	Service Unavailable													

7.3.7 Missed Message Report

Field	Offset	Length	Data Type	Description								
Header	MsgType = P (0x50)											
ResponseType	4	1	Int8	<table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Download Complete</td> </tr> <tr> <td>1</td> <td>Message limit reached</td> </tr> <tr> <td>3</td> <td>Service Unavailable</td> </tr> </tbody> </table>	Value	Meaning	0	Download Complete	1	Message limit reached	3	Service Unavailable
Value	Meaning											
0	Download Complete											
1	Message limit reached											
3	Service Unavailable											

7.3.8 Reject

Field	Offset	Length	Data Type	Description
Header	MsgType = 3 (0x33)			
RejectCode	4	4	Int32	Code specifying the reason for the reject.
Reject Reason	8	30	String	Reject Reason.
Rejected MessageType	38	1	Alpha	Message type of the rejected message.
Client Order ID	39	20	String	Client specified identifier of the rejected message if it is available.

7.3.9 System Status

Field	Offset	Length	Data Type	Description								
Header	MsgType = n (0x6E)											
AppID	4	1	Int8	Partition ID <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Partition 1</td> </tr> <tr> <td>2</td> <td>Partition 2</td> </tr> <tr> <td>3</td> <td>Partition 3</td> </tr> </tbody> </table>	Value	Meaning	1	Partition 1	2	Partition 2	3	Partition 3
Value	Meaning											
1	Partition 1											
2	Partition 2											
3	Partition 3											
Reject Reason	5	1	Int8	<table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Recovery Service Resumed</td> </tr> <tr> <td>2</td> <td>Recovery Service Not Available</td> </tr> </tbody> </table>	Value	Meaning	1	Recovery Service Resumed	2	Recovery Service Not Available		
Value	Meaning											
1	Recovery Service Resumed											
2	Recovery Service Not Available											

7.4 Application Messages: Order Handling

7.4.1 New Order

Field	Offset	Length	Data Type	Description														
Header	MsgType = D (0x44)																	
Client Order ID	4	20	String	Client specified identifier of the request.														
Trader ID	24	11	String	Optional Trader ID that clients may submit.														
Account	35	10	String	Optional reference of the desk the order is submitted for.														
ClearingAccount	45	1	Int8	Clearing Account Type <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Client</td> </tr> <tr> <td>3</td> <td>House</td> </tr> </tbody> </table>	Value	Meaning	1	Client	3	House								
Value	Meaning																	
1	Client																	
3	House																	
CommonSymbol	46	6	String	MTF Common Symbol of the instrument.														
Order Type	52	1	Int8	Type of order <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Market</td> </tr> <tr> <td>2</td> <td>Limit</td> </tr> </tbody> </table>	Value	Meaning	1	Market	2	Limit								
Value	Meaning																	
1	Market																	
2	Limit																	
TIF	53	1	Int8	Time qualifier of the order <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Day</td> </tr> <tr> <td>1</td> <td>Good Till Cancel (GTC)</td> </tr> <tr> <td>3</td> <td>Immediate or Cancel (IOC)</td> </tr> <tr> <td>4</td> <td>Fill or Kill (FOK)</td> </tr> <tr> <td>6</td> <td>Good Till Date (GTD)</td> </tr> <tr> <td>8</td> <td>Good Till Time (GTT)</td> </tr> </tbody> </table>	Value	Meaning	0	Day	1	Good Till Cancel (GTC)	3	Immediate or Cancel (IOC)	4	Fill or Kill (FOK)	6	Good Till Date (GTD)	8	Good Till Time (GTT)
Value	Meaning																	
0	Day																	
1	Good Till Cancel (GTC)																	
3	Immediate or Cancel (IOC)																	
4	Fill or Kill (FOK)																	
6	Good Till Date (GTD)																	
8	Good Till Time (GTT)																	
ExpireDateTime	54	4	UInt32	This field will indicate the time the order expires on. GTT and GTD orders will be rejected if a value greater than zero is not specified for this field.														

Side	58	1	Int8	Side of the order
				Value Meaning
				1 Buy
				2 Sell
Order Qty	59	4	Int32	Total order quantity.
DisplayQty	63	4	Int32	Maximum quantity that may be displayed. The intended display quantity has to be inserted as this is a mandatory field.
LimitPrice	67	8	Price	Limit Price. Required if OrderType is Limit. Else this field will be ignored.
Capacity	75	1	Int8	Capacity of the order
				Value Meaning
				1 Riskless Principal
				2 Principal
				3 Agency
4 CFD Give Up				
AutoCancel	76	1	Int8	Checks user preferences on logout/disconnection of session
				Value Meaning
				0 Do not cancel on disconnect
				1 Check system preference
OrderSubType	77	1	Int8	This should always be populated with the following value
				Value Meaning
				0 Order
ReservedField1	78	1	Int8	Reserved for future use.
ReservedField2	79	8	Price	Reserved for future use.

TargetBook	87	1	Int8	<p>Indicates the target book for the order</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dark Midpoint order book</td> </tr> <tr> <td>1</td> <td>Integrated order book</td> </tr> </tbody> </table>	Value	Meaning	0	Dark Midpoint order book	1	Integrated order book		
Value	Meaning											
0	Dark Midpoint order book											
1	Integrated order book											
Exec Instruction	88	1	Int8	<p>Indicates if the order should participate only in the uncrossing, or in continuous trading as well. The value set in this field will be ignored for orders entering the Integrated Lit Book.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Continuous and Periodic un-crossings</td> </tr> <tr> <td>1</td> <td>Periodic un-crossings only</td> </tr> <tr> <td>2</td> <td>Continuous only</td> </tr> </tbody> </table>	Value	Meaning	0	Continuous and Periodic un-crossings	1	Periodic un-crossings only	2	Continuous only
Value	Meaning											
0	Continuous and Periodic un-crossings											
1	Periodic un-crossings only											
2	Continuous only											
MinQty	89	4	Int32	<p>Minimum fill size. Set to zero if not used.</p>								
ReservedField3	93	1	Int8	Reserved for future use.								
ReservedField4	94	1	Int8	Reserved for future use.								
ReservedField5	95	1	Int8	Reserved for future use.								

PassiveOnlyOrder	96	1	Int8	<p>Used to specify whether an order will rest prior to execution, with flexibility for visible orders to rest at a specified price level on the book. No protection is provided against order execution with large in scale hidden orders sat within the BBO. A hidden order submitted with a value other than 0 or 99 will be rejected. A Dark Midpoint order submitted with a value other than 0 will be rejected.</p> <table border="1" data-bbox="871 730 1374 1697"> <thead> <tr> <th data-bbox="879 730 975 775">Value</th> <th data-bbox="975 730 1374 775">Meaning</th> </tr> </thead> <tbody> <tr> <td data-bbox="879 775 975 909">0</td> <td data-bbox="975 775 1374 909">No constraint (ignore this field, i.e. aggressive or passive)</td> </tr> <tr> <td data-bbox="879 909 975 1077">99</td> <td data-bbox="975 909 1374 1077">Accept order only if passive upon order entry. Otherwise expire.</td> </tr> <tr> <td data-bbox="879 1077 975 1200">100</td> <td data-bbox="975 1077 1374 1200">Accept order if setting new BBO. Otherwise expire.</td> </tr> <tr> <td data-bbox="879 1200 975 1368">1</td> <td data-bbox="975 1200 1374 1368">Accept order if setting new BBO or joining existing BBO. Otherwise expire.</td> </tr> <tr> <td data-bbox="879 1368 975 1536">2</td> <td data-bbox="975 1368 1374 1536">Accept order if joining existing BBO or within one visible price point. Otherwise expire.</td> </tr> <tr> <td data-bbox="879 1536 975 1697">3</td> <td data-bbox="975 1536 1374 1697">Accept order if joining existing BBO or within two visible price points. Otherwise expire.</td> </tr> </tbody> </table>	Value	Meaning	0	No constraint (ignore this field, i.e. aggressive or passive)	99	Accept order only if passive upon order entry. Otherwise expire.	100	Accept order if setting new BBO. Otherwise expire.	1	Accept order if setting new BBO or joining existing BBO. Otherwise expire.	2	Accept order if joining existing BBO or within one visible price point. Otherwise expire.	3	Accept order if joining existing BBO or within two visible price points. Otherwise expire.
Value	Meaning																	
0	No constraint (ignore this field, i.e. aggressive or passive)																	
99	Accept order only if passive upon order entry. Otherwise expire.																	
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1	Accept order if setting new BBO or joining existing BBO. Otherwise expire.																	
2	Accept order if joining existing BBO or within one visible price point. Otherwise expire.																	
3	Accept order if joining existing BBO or within two visible price points. Otherwise expire.																	

7.4.2 Order Cancel/Replace Request

Field	Offset	Length	Data Type	Description
Header	MsgType = G (0x47)			
Client Order ID	4	20	String	Client specified identifier of the request.
Original Client Order ID	24	20	String	Client Order ID of the order being amended.
OrderID	44	12	String	Unique identifier of the order assigned by the matching system.
CommonSymbol	56	6	String	MTF Common Symbol of the instrument.
ExpireDateTime	62	4	UInt32	This field will indicate the time the order expires at. GTT and GTD orders will be rejected if a value greater than zero is not specified for this field.
Order Qty	66	4	Int32	Total order quantity.
DisplayQty	70	4	Int32	Maximum quantity that may be displayed. The intended display quantity has to be inserted as this is a mandatory field.
Limit Price	74	8	Price	For market orders only this field should be filled with a negative. For limit orders the intended limit price has to be inserted.
Account	82	10	String	The reference of the investor the order is submitted for. This field should be null if it is not being amended.

TIF	92	1	Int8	<p>Time qualifier of the order being amended. This should be the same as the original time qualifier, and is used to identify the value entered in the ExpiryDateTime field.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Day</td> </tr> <tr> <td>1</td> <td>Good Till Cancel (GTC)</td> </tr> <tr> <td>3</td> <td>Immediate or Cancel (IOC)</td> </tr> <tr> <td>4</td> <td>Fill or Kill (FOK)</td> </tr> <tr> <td>6</td> <td>Good Till Date (GTD)</td> </tr> <tr> <td>8</td> <td>Good Till Time (GTT)</td> </tr> </tbody> </table>	Value	Meaning	0	Day	1	Good Till Cancel (GTC)	3	Immediate or Cancel (IOC)	4	Fill or Kill (FOK)	6	Good Till Date (GTD)	8	Good Till Time (GTT)
Value	Meaning																	
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Side	93	1	Int8	<p>Side of the order.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Buy</td> </tr> <tr> <td>2</td> <td>Sell</td> </tr> </tbody> </table>	Value	Meaning	1	Buy	2	Sell								
Value	Meaning																	
1	Buy																	
2	Sell																	
ReservedField1	94	8	Price	Reserved for future use.														
TargetBook	102	1	Int8	<p>Indicates the target book for the order.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dark Midpoint order book</td> </tr> <tr> <td>1</td> <td>Integrated order book</td> </tr> </tbody> </table>	Value	Meaning	0	Dark Midpoint order book	1	Integrated order book								
Value	Meaning																	
0	Dark Midpoint order book																	
1	Integrated order book																	
Exec Instruction	103	1	Int8	<p>Indicates if the order should participate only in the uncrossing, or in continuous trading as well. The value set in this field will be ignored for orders entering the Integrated Book.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Continuous and Periodic un-crossings only</td> </tr> <tr> <td>1</td> <td>Periodic Un-crossings only</td> </tr> <tr> <td>2</td> <td>Continuous only</td> </tr> </tbody> </table>	Value	Meaning	0	Continuous and Periodic un-crossings only	1	Periodic Un-crossings only	2	Continuous only						
Value	Meaning																	
0	Continuous and Periodic un-crossings only																	
1	Periodic Un-crossings only																	
2	Continuous only																	
MinQty	104	4	Int32	Minimum fill size														

PassiveOnlyOrder	108	1	Int8	Value	Meaning
				0	No constraint (ignore this field, ie. aggressive or passive)
				99	Accept order only if passive upon order entry. Otherwise expire.
				100	Accept order if setting new BBO. Otherwise expire.
				1	Accept order if setting new BBO or joining existing BBO. Otherwise expire.
				2	Accept order if joining existing BBO or within one visible price point. Otherwise expire.
3	Accept order if joining existing BBO or within two visible price points. Otherwise expire.				
ReservedField2	109	3	String	Reserved for future use.	

7.4.3 Order Cancel Request

Field	Offset	Length	Data Type	Description
Header	MsgType = F (0x46)			
Client Order ID	4	20	String	Client specified identifier of the request.
Original Client Order ID	24	20	String	Client Order ID of the order being cancelled.
OrderID	44	12	String	Unique identifier of the order assigned by the matching system.
CommonSymbol	56	6	String	MTF Common Symbol of the instrument.
Side	62	1	Int8	Side of the order
				Value Meaning
				1 Buy
2 Sell				
TargetBook	63	1	Int8	Indicates the target book for the order.
				Value Meaning
				0 Dark Midpoint order book
1 Integrated order book				
ReservedField1	64	9	String	Reserved for future use.

7.4.4 Order Mass Cancel Request

Field	Offset	Length	Data Type	Description														
Header	MsgType = q (0x71)																	
Client Order ID	4	20	String	Client specified identifier of mass cancel request.														
MassCancelType	24	1	Int8	Type of Mass Cancellation <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>All firm orders for an instrument</td> </tr> <tr> <td>4</td> <td>All firm orders in a segment</td> </tr> <tr> <td>7</td> <td>All orders submitted by the CompID</td> </tr> <tr> <td>8</td> <td>All firm orders</td> </tr> <tr> <td>9</td> <td>All orders submitted by the CompID for an instrument</td> </tr> <tr> <td>15</td> <td>All orders submitted by the CompID for a segment</td> </tr> </tbody> </table>	Value	Meaning	3	All firm orders for an instrument	4	All firm orders in a segment	7	All orders submitted by the CompID	8	All firm orders	9	All orders submitted by the CompID for an instrument	15	All orders submitted by the CompID for a segment
Value	Meaning																	
3	All firm orders for an instrument																	
4	All firm orders in a segment																	
7	All orders submitted by the CompID																	
8	All firm orders																	
9	All orders submitted by the CompID for an instrument																	
15	All orders submitted by the CompID for a segment																	
CommonSymbol	25	6	String	MTF Common Symbol of the instrument. Required if MassCancelType = 3 or 9. Else this field will be ignored.														
Segment	31	4	String	The segment for which the orders will be cancelled. Required if MassCancelType = 4 or 15. Else this field will be ignored.														
ReservedField1	35	1	Int8	Reserved for future use.														
TargetBook	36	1	Int8	Indicates the target book for the order. Required if MassCancelType = 3 or 9. Else this field will be ignored. <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dark Midpoint order book</td> </tr> <tr> <td>1</td> <td>Integrated order book</td> </tr> </tbody> </table>	Value	Meaning	0	Dark Midpoint order book	1	Integrated order book								
Value	Meaning																	
0	Dark Midpoint order book																	
1	Integrated order book																	
ReservedField2	37	9	String	Reserved for future use.														

7.4.5 Execution Report

Field	Offset	Length	Data Type	Description																		
Header	MsgType = 8 (0x38)																					
AppID	4	1	Int8	Partition ID <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Partition 1</td> </tr> <tr> <td>2</td> <td>Partition 2</td> </tr> <tr> <td>3</td> <td>Partition 3</td> </tr> </tbody> </table>	Value	Meaning	1	Partition 1	2	Partition 2	3	Partition 3										
Value	Meaning																					
1	Partition 1																					
2	Partition 2																					
3	Partition 3																					
Sequence No	5	4	Int32	Sequence number of the message.																		
Execution ID	9	12	String	Unique ID of the Execution Report. Unique across all partitions.																		
Client Order ID	21	20	String	Client specified identifier of the New Order Request, Order Cancel Request, Order Cancel/Replace Request, or Order Mass Cancel Request.																		
Order ID	41	12	String	Unique identifier of the order assigned by the matching system. This will be an 11 character base 62 encoded value in ASCII format with an 'O' prefix. After removing the prefix 'O' and converting to an 8 byte binary, this can be mapped exactly to the ITCH Order ID. However, please note that the field 'secondary order id' already contains this mapping.																		
Exec Type	53	1	Alpha	The reason the Execution Report is being sent. <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> <tr> <td>H</td> <td>Trade Cancel</td> </tr> </tbody> </table>	Value	Meaning	0	New	4	Cancelled	5	Replaced	8	Rejected	C	Expired	D	Restated	F	Trade	H	Trade Cancel
Value	Meaning																					
0	New																					
4	Cancelled																					
5	Replaced																					
8	Rejected																					
C	Expired																					
D	Restated																					
F	Trade																					
H	Trade Cancel																					

Execution Report Ref ID	54	12	String	Execution ID of the trade being cancelled or corrected. Populated if ExecType is Trade Cancel.
Order Status	66	1	Int8	The status of the order
				Value Meaning
				0 New
				1 Partially filled
				2 Filled
				4 Cancelled
6 Expired				
8 Rejected				
Order Reject Code	67	4	Int32	Code specifying the reason for the reject. The value in this field should be disregarded if Exec Type is not Rejected (8).
Executed Price	71	8	Price	Value of this fill. Required if ExecType is Trade.
Executed Qty	79	4	Int32	Quantity that was executed in this fill.
LeavesQty	83	4	Int32	Quantity available for further execution. Will be "0" if Order Status is Filled, Cancelled, Rejected or Expired.
ReservedField1	87	1	Int8	Reserved for future use.
DisplayQty	88	4	Int32	Maximum quantity that may be displayed.
CommonSymbol	92	6	String	MTF Common Symbol of the instrument.
Side	98	1	Int8	Side of the order
				Value Meaning
				1 Buy
2 Sell				
Secondary Order ID	99	8	UInt64	ITCH Order ID

Counterparty	107	11	String	Set to the MemberFirmID for internalised trade executions else set to the CCP name: EMCF EuroCCP LCH X-Clear
Trade Liquidity Indicator	118	1	Alpha	Whether the order added or removed liquidity. The value in this field should only be considered if the Exec Type is Trade (F) or Trade Cancel (H). For the rest of the exec types, the value in this field should be ignored. Value Meaning A Added Liquidity R Removed Liquidity C Periodic Uncrossing execution (valid for Dark orders only)
TradeMatchID	119	8	UInt64	Contains the trade identifier sent on the ITCH market data feed. This is also sent to the CCP by converting the number to a 9 character base 62 string and adding a 'T/M' (On book/Off book) character prefix. To this a 'B/S' prefix should be added. For trade cancellations, this also requires the addition of a '1' character prefix.
Transact Time	127	8	UInt64	Time the Execution Report was generated.
TargetBook	135	1	Int8	Indicates the target book for the order. Value Meaning 0 Dark Midpoint order book 1 Integrated order book

TypeOfTrade	136	1	Int8	<p>Indicates whether the executed portion is visible or hidden. Valid only if ExecType (150) = F. Ignore value in all other cases.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Visible</td> </tr> <tr> <td>1</td> <td>Hidden</td> </tr> </tbody> </table>	Value	Meaning	0	Visible	1	Hidden		
Value	Meaning											
0	Visible											
1	Hidden											
Capacity	137	1	Int8	<p>Capacity of the order</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Riskless Principal</td> </tr> <tr> <td>2</td> <td>Principal</td> </tr> <tr> <td>3</td> <td>Agency</td> </tr> </tbody> </table>	Value	Meaning	1	Riskless Principal	2	Principal	3	Agency
Value	Meaning											
1	Riskless Principal											
2	Principal											
3	Agency											

PriceDifferential	138	1	Alpha	Value	Meaning
				A	Aggressive. Any residual visible quantity is then stamped based on its deviation from the current BBO. Set to 'P' if hidden.
				B	New visible BBO.
				1	Join visible BBO.
				2	Joining/setting 2 nd best visible price point.
				3	Joining/setting 3 rd best visible price point.
				4	Joining/setting 4 th best visible price point.
				5	Joining/setting 5 th best visible price point.
				6	Joining/setting 6 th best visible price point.
				7	Joining/setting 7 th best visible price point.
				8	Joining/setting 8 th best visible price point.
				9	Joining/setting 9 th best visible price point (or a worse price point).
P	Passive. Valid for large in scale hidden orders only.				
<nul>	PriceDifferential Unspecified.				
ReservedField2	139	6	String	Reserved for future use.	

7.4.6 Order Cancel Reject

Field	Offset	Length	Data Type	Description								
Header	MsgType = 9 (0x39)											
AppID	4	1	Int8	Partition ID <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Partition 1</td> </tr> <tr> <td>2</td> <td>Partition 2</td> </tr> <tr> <td>3</td> <td>Partition 3</td> </tr> </tbody> </table>	Value	Meaning	1	Partition 1	2	Partition 2	3	Partition 3
Value	Meaning											
1	Partition 1											
2	Partition 2											
3	Partition 3											
Sequence No	5	4	Int32	Sequence number of the message.								
Client Order ID	9	20	String	Client Order ID that was submitted with the order cancel or cancel/replace request being rejected.								
Order ID	29	12	String	Server specified identifier of the order for which the cancel or cancel/replace was submitted.								
Cancel Reject Reason	41	4	Int32	Code specifying the reason for the reject.								
Transact Time	45	8	UInt64	Time the Order Cancel Reject occurred.								
ReservedField1	53	10	String	Reserved for future use.								

7.4.7 Order Mass Cancel Report

Field	Offset	Length	Data Type	Description								
Header	MsgType = r (0x72)											
AppID	4	1	Int8	Partition ID <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Partition 1</td> </tr> <tr> <td>2</td> <td>Partition 2</td> </tr> <tr> <td>3</td> <td>Partition 3</td> </tr> </tbody> </table>	Value	Meaning	1	Partition 1	2	Partition 2	3	Partition 3
Value	Meaning											
1	Partition 1											
2	Partition 2											
3	Partition 3											
Sequence No	5	4	Int32	Sequence number of the message.								
Client Order ID	9	20	String	Client specified identifier of mass cancel request.								

MassCancel Response	29	1	Int8	Whether the Mass Cancel Request was accepted or rejected. Value Meaning 0 Rejected 7 Accepted
MassCancel RejectReason	30	4	Int32	The code that identifies the reason the order mass cancel was rejected.
ReservedField1	34	4	String	Reserved for future use.
Transact Time	38	8	UInt64	Time the order mass cancel report generated.
ReservedField2	46	10	String	Reserved for future use.

7.5 Application Messages: Others

7.5.1 Business Reject

Field	Offset	Length	Data Type	Description
Header	MsgType = j (0x6A)			
AppID	4	1	Int8	Partition ID Value Meaning 1 Partition 1 2 Partition 2 3 Partition 3 0 System Suspended
Sequence No	5	4	Int32	Sequence number of the message.
RejectCode	9	4	Int32	Code specifying the reason for the reject.
Client Order ID	13	20	String	Client specified identifier of the order.
OrderID	33	12	String	Unique identifier of the order assigned by the matching system.
Transact Time	45	8	UInt64	Time the transaction the reject message corresponds to occurred.
ReservedField1	53	10	String	Reserved for future use.

8 APPENDIX A

8.1 Error & Reject Messages

Code	Description
1	INVALID_USERID_PWD
2	ALREADY_LOGGED
4	USER_NOT_FOUND
5	FLAGGED_FOR_DELETION
6	BROKER_SUSPENDED
8	ACCOUNT_LOCKED
9	ACCOUNT_EXPIRED
10	UNAUTHORIZED_MACHINE
11	UNAUTHORIZED_FE
14	MIN_PSWD_LEN
15	MAX_PSWD_LEN
16	MIN_PSWD_DIGITS
17	MIN_PSWD_DIFF
19	INVALID_PROCESS
20	NO_TIME_ZONE
22	USER_LOGGEDIN
23	USER_NOT_LOGGEDIN
24	INIT_USER_LOGIN
26	PAM_SAME_AS_OLD
27	PAM_PALINDROME
28	PAM_CASE_CHANGES_ONLY
29	PAM_TOO_SIMILAR
30	PAM_TOO_SIMPLE
31	PAM_ROTATED_VERSION
32	USER_NOT_LOCKED
33	INVALID_FE_VERSION
50	LOGIN_CONTEXT_NOT_FOUND
51	INVALID_LOGIN_PRIV_CODE
52	MISMATCH_IN_CONTEXT_ID
53	ROLE_FLAGGED_FOR_DELETE
54	NODE_SUSPENDED
55	NODE_HIERARCHY_SUSPENDED
56	NODE_FLG_DELETE
57	NODE_HIERARCHY_FLG_DELETE
624	UNAUTHORIZED_GATEWAY
625	USER_ROLE_NOT_FOUND
626	ACCOUNT_SUSPENDED

627	ACCOUNT_DELETED
628	ACCOUNT_INACTIVATED
630	SYSTEM_END_OF_DAY
1000	Invalid order size (\leq zero)
1001	Invalid order size ($<$ minimum size)
1002	Invalid order size (not multiple of lot size)
1003	Invalid order size ($>$ maximum size)
1004	Invalid order quantity
1005	Invalid order size ($>$ maximum order value)
1006	Max Gross Consideration Reached
1100	Invalid display size ($<$ zero)
1101	Invalid display quantity (greater than order quantity)
1102	Invalid display size (not multiple of lot size)
1103	Invalid display quantity
1200	Invalid limit price (\leq zero or no limit price)
1201	Invalid limit price (not multiple of tick)
1202	Invalid limit price (price band breached)
1203	Invalid limit price ($>$ maximum price)
1204	Invalid limit price ($<$ minimum price)
1400	Invalid order type (unknown)
1500	Invalid TIF (unknown)
1501	Invalid expire time (elapsed)
1502	Invalid expire time (time is for a future date)
1503	Invalid expire date (elapsed)
1508	Invalid TIF (invalid date format)
1509	No time qualifier specified
1550	Expired (end of day)
1800	User not registered to submit interest for instrument
1802	Invalid order type for user (market order)
1900	Invalid side
1901	Invalid order status (%d)
1902	Received Prior to First Trading Date of instrument
1903	Last Trading Date of instrument elapsed
1904	Invalid order capacity
1905	Invalid instrument set up (no tick structure)
1912	Monitoring user from sponsoring firm not connected
2000	Order not found (too late to cancel or unknown order)
2001	User not registered to mass cancel interest
2002	User not registered to mass cancel interest for firm
2003	Unknown user (submitting Trader ID)
2004	Unknown instrument
2005	Unknown underlying
2006	Unknown segment
2007	Unknown firm
2008	Unknown clearing mnemonic
2009	Unknown user (target Owner ID)

2010	Unknown user (target Trader ID)
2011	Invalid mass cancel type
2012	No orders for instrument/underlying
2099	Other
3000	Invalid order quantity (less than filled quantity)
3100	Invalid display quantity (greater than order quantity)
3700	Invalid owner (different from original order)
3900	Invalid side (different from original order)
4000	Invalid bid size (> maximum size)
4001	Invalid offer size (> maximum size)
4102	Invalid displayed bid size (> bid size)
4103	Invalid displayed offer size (> offer size)
4200	Invalid bid price (\leq zero)
4201	Invalid offer price (\leq zero)
6002	Received Prior to First Trading Date of instrument
6003	Last Trading Date of instrument elapsed
9000	Unknown SecurityID
9001	Unknown order book
9002	Instrument halted
9003	Instrument halted or suspended
9004	Instrument halted (last trading day reached)
9005	market is closed
9006	Instrument halted (market suspended)
9007	Instrument halted (invalid trading session)
9008	Session is closed
9009	Instrument halted (order book in invalid state)
9012	Instrument halted (invalid set up)
9013	Instrument halted (invalid order book set up)
9100	Unknown user (Owner ID)
9102	User suspended
9200	Invalid trading session (unknown)
9201	Invalid new order message
9202	Invalid amend order message
9203	Invalid cancel order message
9901	Invalid value in field
9904	Invalid Gateway (Not configured for sponsored Access)
9905	System unavailable (to sponsored users)
9906	Logons not allowed at this time
9990	Maximum message rate exceeded
9998	Matching partition suspended
9999	System suspended
010005	Service Interrupted
111000	Invalid reserve value (< minimum reserve order value)
111001	Invalid qty (>max order qty)
111100	Invalid display size (< minimum disclosed size)
111101	Invalid display size (pegged orders cannot be displayed)

111102	Invalid display size (> order size)
111103	Invalid order (un priced order with hidden quantity)
111400	Invalid order type (named orders are not allowed)
111401	Invalid order type (stop/stop limit orders are not allowed)
111402	Invalid order type (not allowed in the session)
111403	Invalid order type (pegged orders cannot be stop orders)
111404	Invalid amend (cannot amend order type)
111500	Invalid amend (cannot amend TIF)
111501	Invalid TIF (relevant session elapsed/not found)
111502	Invalid TIF (not allowed for the session)
111503	Invalid TIF (maximum order duration is set)
111504	Invalid expiry date (maximum order duration is violated)
111505	Invalid TIF (not allowed for stop/stop limit orders)
111506	Invalid TIF (not permitted for pegged orders)
111600	Invalid session (cannot enter orders/quotes)
111601	Invalid session (orders are not allowed)
111800	Invalid session (cannot cancel/amend orders/quotes)
111801	Invalid clearing set up (clearing information not defined)
111900	Invalid account type (unknown)
111901	Invalid capacity (unknown)
111902	No internal mid-point established
111906	Passive only orders disabled for instrument
111908	Passive only indicator not valid for TIF
111912	Invalid passive only indicator for hidden order
113101	Invalid amend (iceberg/fully visible to hidden)
113100	Invalid amend (hidden to iceberg/fully visible)
114008	Invalid bid size (> max qty)
114009	Invalid offer size (> max qty)
114802	Invalid clearing set up (clearing information not defined)
117001	Invalid capacity type
117002	Invalid price band
117003	Invalid Instrument with no closing price maintained.
117004	Invalid settlement date
117007	Trade Reporting time over
117008	Invalid TrdSubType(829) for zero priced trade
121001	Failed maximum order value validation
121002	Invalid MES (> order size)
121003	Invalid MES (less than minimum size)
121004	Invalid MES (negative)
121005	Invalid MES (not a multiple of lot size)
121006	MES Should be greater than the Minimum Size of the Book
121007	Minimum Quantity Cannot be negative
121008	Order Value Cannot exceed the maximum value
121201	Dynamic price band tolerance breached
121202	Static price band tolerance breached
121401	Invalid Order Sub Type

121402	Non Persistent Orders Can not be Periodic Uncrossings only
121500	Invalid Order Qualifier
121901	Invalid Capacity (Capacity Conversion Disabled)
121902	MES not allowed for persistent orders
121903	Invalid Capacity (Not a Sponsored User)
121908	Invalid Execution Instruction for Instrument
123201	Invalid amend (cannot amend MES)
127001	Invalid capacity or account type for executing party
127200	Settlement Date is specified in the trade
129001	Invalid Book Target Book in the Received Order
129201	Failed price band validation
129202	Quotes not allowed
129500	Attached Instrument Is not Dark
129501	Cannot amend Account Type
129502	Cannot amend Capacity
129503	Invalid display quantity (> zero)

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