GROUP TICKER PLANT

GTP 002 – Technical Guide - Turquoise

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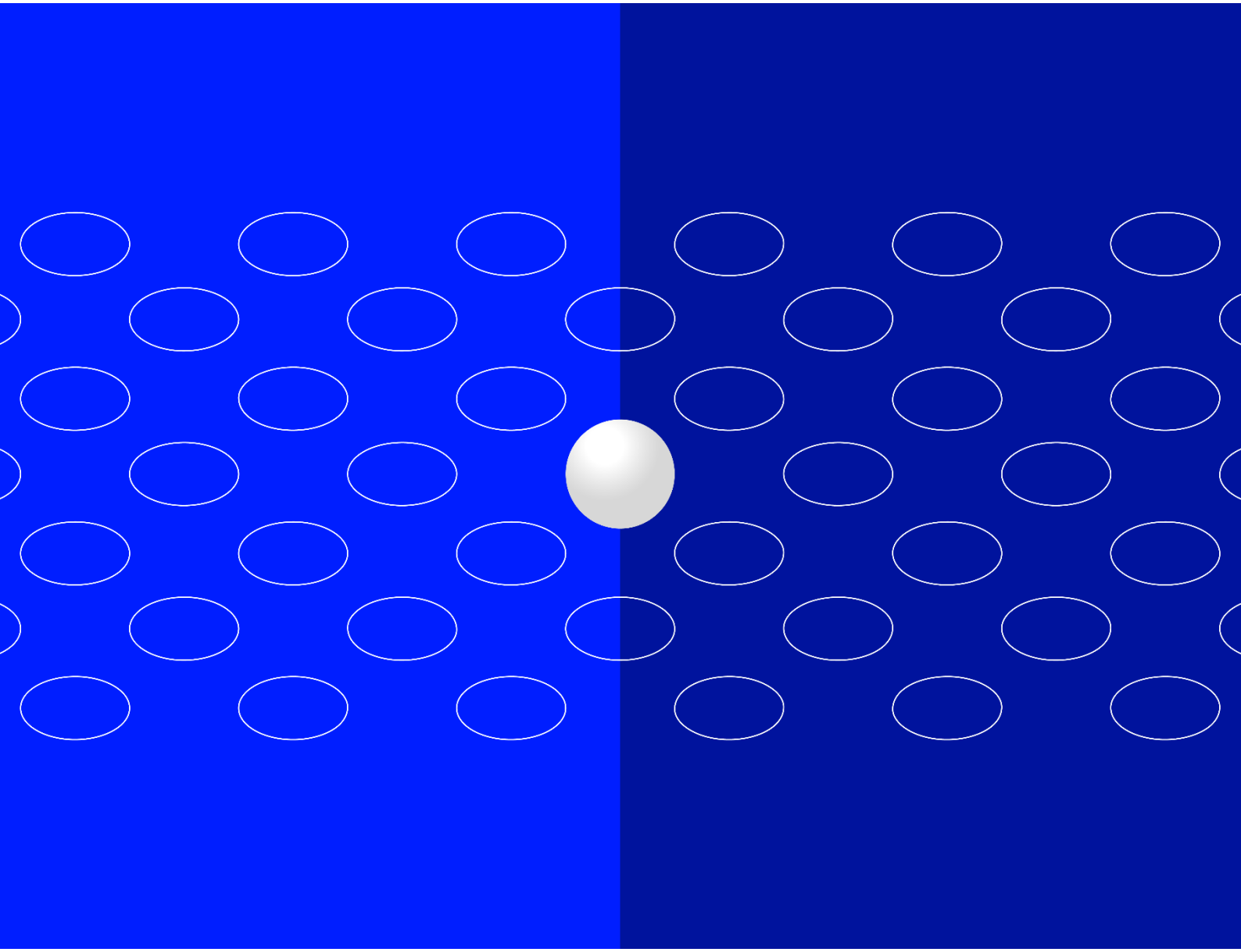

LONDON STOCK EXCHANGE

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1 Documentation

1.1 This guide

The purpose of this document is to provide a detailed guide to the various message types and message formats as employed by the interface of the Group Ticker Plant. It also provides information on the behaviour and characteristics of our service lines, including Level 1, Level 2 snapshot, Level 2 incremental and FTSE Indices as supported by the Group Ticker Plant protocol.

This guide will be updated and reissued when appropriate to do so.

1.2 Readership

This document is particularly relevant to trading, market data and technical teams within member firms, information vendors and other market participants who currently receive or are interested in receiving London Stock Exchange Group market data.

When read in conjunction with other Group Ticker Plant documents, it is intended to provide all required information to develop to, and interact with, our real-time information systems.

1.3 Document series

This guide, 'GTP002 – Technical guide', forms part of the documentation library supporting those clients interacting with the Group Ticker Plant. For information, the full series of currently available documentation is outlined below:

- GTP001 – Product guide
- **GTP002 – Technical guide - Turquoise (this document)**
- GTP002 – Technical guide – London Stock Exchange
- GTP002 – Technical guide - TRADEcho
- GTP003 – Statistics guide
- GTP004 – Parameters guide
- GTP005 – Testing guide
- GTP006 – External sources guide

Further documentation to support activities, such as testing and displaying our data, will be released in due course.

The full library of Group Ticker Plant documentation can be found at: https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant

1.4 Document history

This document has been subject to the following iterations:

Issue	Date	Description
19.9.3.1	17 January 2019	3.11.24 – Added Trade Summary to Turquoise services.
19.9.3.2	18 January 2019	Re-branding Turquoise Lit Auctions™ to Turquoise Plato Lit Auctions™. Turquoise Lit Auctions™ has recently become part of the Plato Co-operation agreement.
19.10	26 July 2019	3.11.13 – Added Hidden Execution Indicator attribute to Trade message.
19.10.2.5	20 January 2020	6.2, 6.3.5, 7.2, 3.10.7,3.11.1, 3.11.2, 3.11.13, 3.11.20 – Added the Turquoise NYLON™ Cash Order Book as a source venue for which Market Data will be published by GTP.

Issue	Date	Description
19.10.3	9 August 2019	3.11.23 – Updated service breakdown with inclusion of EuroTLX Admin channel. 6.5 – Added Security Type ML for Milan Bond Market. 5 – Updated section due to decommissioning of Tertiary Feed in GTP Milan.
19.10.4	23 December 2019	3.7 – Off Book Trade message removed. 3.11.3, 3.11.4, 3.11.5, 3.11.6 – Instrument. Directory Messages moved under Application messages. 3.11.3, 3.11.5 – Updated Data type of EMS.
19.11	28 February 2020	3.11.26 – Trade Summary: added Side of resting orders – message becomes applicable to Borsa and EuroTLX venues 4.2.2, 4.2.3– Updated Recovery Request of Order book. 6.2 – Combined Borsa and EuroTLX in a single Source Venue code.
19.11.1	16 March 2020	4.2.2, 4.2.3 – Minor update to Level 1 Order Book Recovery.
19.11.2	14 May 2020	3.11.14, 3.11.22 – Minor update to footnote and Trade Type definition. 3.7 – Updated Intelligent Throttling schema.
20.2	10 August 2020	**Changes for Release 1.4.5.0** 3.11.25, 3.11.26, 3.11.27 – Updated MiFID II Trade, MiFID II Trade Report and MiFID II Trade Cross messages positioning of ILQD, SIZE and LRGS flags. 3.11.2 – Updated the datatype of the ADT field from Price to Price4. 5, 5.1, 5.2, 5.3, 5.4, 5.5 – Sections rewritten to explain new behaviour and details relating to Failure of Primary Feed and Disaster Recovery using Secondary Data Centre. 6.9 – Added the tick sizes for the ATF Market. Removed entries on the revision history prior to 2019.
20.3	30 September 2020	6.2 – Rebranded Turquoise Global Holdings Limited (TGHL) source venues and added new Turquoise Global Holdings Europe (TGHE) source venues. 3.11.2, 3.11.3 – Under the Venue Instrument ID field on the Instrument Directory and Instrument Directory – Equities messages added new Instrument Identifiers that will be used by Instruments of the TGHE source venues. Note: This change will only go live into the production environment in a Hard Brexit Scenario. If and when this does move to production, there will be a specific notice issued to notify customers. 3.11.25, 3.11.26 – Added Venue of Publication to distinguish Trade Reports and SI quotes published on EU TRADEcho APA and UK TRADEcho APA. Note: This change will only go live into the production environment in a Hard Brexit Scenario. If and when this does move to production, there will be a specific notice issued to notify customers.
20.4	10 January 2021	**Changes for Release 1.4.6.0** All sections – Removed content related to Borsa Italiana and associated venues. 3.11.14, 3.11.22 Appended the Trade Qualifier field to the Trade message and the MiFID II Trade message. 3.11.22, 3.11.23, 3.11.24 Appended the MMT byte array to the MiFID II Trade, MiFID II Trade Cross and MiFID II Trade Report messages. 4.1.3, 4.2.9 Update to how Replay, Recovery and GTP Lite force terminate TCP sessions.

Issue	Date	Description
20.5	01 February 2021	L1 Incremental Service is now available for the Turquoise MTF.
20.6	26 March 2021	4.1.3, 4.2.9 Removed the update to how Replay, Recovery and GTP Lite force terminate TCP sessions with RST flags, instead FIN will be used.
20.7	01 August 2021	3.11.27 – Added the Analytics message. 3.11.1, 3.11.2, 3.11.4 – Updated the diagram to state that the system event message, instrument status message and the instrument directory messages will be published by the Analytics Gateway.
20.8	15 October 2021	3.11.15, 3.11.24 – Introduction of BTF trades for Turquoise. 6.3.2 – 't' will be used for stating the end of Regular Trading on Turquoise Lit™ and Turquoise Plato Lit Auctions™ Order Books.
20.9	25 May 2022	3.11.12 – the 2nd bit will be used to indicate Retail LP orders on Turquoise Plato Lit Auctions™ Order Books
20.10	15 September 2022	3.11.12 – the note 'Depth indication won't be provided for Retail LP orders' was deleted
20.11	9 November 2022	3.11.23 – Reserved field (Alpha) is converted into 'Total Number of Transactions' (Uint32) 4.2.4 – Reject code changed from 'e' to 'a' 3.11.17 – Footnote is added to 'Statistic Type' field 3.11.17 – 'Not Applicable' value is added to 'Auction Info' field 3.11.3 – 'Price Band Tolerances (%)' field converted into 'Reserved Field'
20.12	18 January 2023	Change made with 20.9 was reverted
20.13	15 February 2023	Description of rapid login protection is added to section 2.1.2
21.0	20 March 2023	3.11.12 – the 2nd bit will be used to indicate Retail LP orders on Turquoise Plato Lit Auctions™ Order Books
21.1	5 May 2023	3.11.17 – Removed 18,19 statistics types since they are not applicable to LSEG Trading Venues
22.0	5 May 2023	3.11.17 – Removed the note that Static and Dynamic Reference Prices are not applicable to LSEG Trading Venues. Description of the functionality is added to GTP 003 - Statistics Guide - Issue 11.0
24.0	21 December 2023	Specification has been split across venues (LSE, TradEcho, Turquoise). This document will now contain content applicable to Turquoise only. Decommission of Turquoise NYLON Cash Order Book™ Service and removal of all references to it. Section "5. Product failure" was removed from this document and merged with respective section in GTP001 – "4.0 System overview." The following messages are removed: • Add Order – MBO • Add Order Short – MBO • Add Order – MBP • Add Order Short – MBP

Issue	Date	Description

- FTSE Russell Indices Update
- Announcements
- Indicative Quote Information
- MiFID II Trade Report
- Systematic Internaliser (SI) Quotes

Message	Updated description of the fields
Instrument Directory – Equities	SEDOL, Allowed Book Types, Dynamic Circuit Breaker Tolerances (%), Static Circuit Breaker Tolerances (%), Expiration Date, Listing Start Date, Listing End Date, Ex Marker Code, Country Of Register, Exchange Market Size, Minimum Peak Size Multiplier, Security Maximum Spread, Strike Price, Symbol, Description, Previous Day's Closing Price
System Event	Event Code
Instrument Directory	Allowed Book Types, Average Daily Turnover (ADT)
Instrument Status	Trading Status, Order Book Type
Add Order Inc	Order Book Type, Participant, Order Type, RFQ ID
Modify Order	Order Book Type
Delete Order	Order Book Type
TOB	Order Book Type
Order Book Clear	Order Book Type
Trade	Trade Type, Auction Type, Flags, Hidden Execution Indicator, Trade Qualifier, Price
Trade Cross	Cross Type, Flags
Statistics Update	Statistic Type, Auction Type, Imbalance Quantity, Auction Info, Opening/Closing Price Indicator
Statistics Snapshot	Official Opening Price, Official Closing Price, Opening Price Indicator, Closing Price Indicator, Imbalance Quantity, Imbalance Direction, Best Closing Bid Price, Best Closing Ask Price, Best Closing Bid Size, Best Closing Ask Size, Auction Type, Static Reference Price, Dynamic Reference Price
MIFID Trade	Trade Type, Auction Type, MiFID Price, Instrument Identification Code Type, Price Notation, Price Currency, Notional Currency, Trade Qualifier, Market Mechanism, Trading Mode, Transaction Category, Negotiation Indicator, Agency Cross Indicator, Reference Price Indicator, Special Dividend Indicator, Off Book Automated Indicator, Price Formation Indicator, Post-Trade Deferral Reason, Deferral/Enrichment Type, Duplicative Indicator
MIFID Trade Cross	Cross Type, MiFID Price, Instrument Identification Code Type, Price Notation, Price Currency, Notional Currency, Market Mechanism, Trading Mode, Transaction Category, Negotiation Indicator, Agency Cross Indicator, Reference Price Indicator, Special Dividend Indicator, Off Book Automated Indicator, Price Formation Indicator, Post-

Issue	Date	Description	
			Trade Deferral Reason, Deferral/ Enrichment Type, Duplicative Indicator
		Message	**Field is renamed**
		Instrument Directory – Equities	'Group ID' into 'Segment' 'Flags' into 'Reserved Field' 'Security Subtype' into 'Reserved Field' 'Settlement System' into 'Reserved Field' 'Last Validity Date' into 'Reserved Field' 'Settlement Date' into 'Reserved Field' 'Venue Underlying ID' into 'Security Exchange' 'Underlying ISIN Code' into 'Reserved Field' 'Underlying Type' into 'Reserved Field' 'Number Of Shares In Circulation' into 'Reserved Field' 'Leverage Certificates Barrier' into 'Reserved Field' 'Option Style' into 'Reserved Field' 'Parity' into 'Reserved Field' 'Reserved field' into 'Reserved Field'
		Instrument Directory	'Group ID' into 'Segment' 'Underlying ISIN Code' into 'Reserved Field' 'Underlying Instrument ID' into 'Reserved Field' 'Flags' into 'Reserved Field'
		TOB	'Bid Yield' into 'Reserved Field' 'Offer Yield' into 'Reserved Field'
		Trade	'Yield' into 'Reserved Field'
		Trade Cross	'Yield' into 'Reserved Field'
		Statistics Snapshot	'Open Interest' into 'Reserved Field' 'Volatility' into 'Reserved Field' ‘TradeHighOffBook’ into ‘Reserved Field’ ‘TradeLowOffBook’ into ‘Reserved Field’
		MIFID Trade	'PTDeferralReasonFlag' into 'Reserved Field' 'Transaction to be Cleared' into 'Reserved Field' 'Measurement Unit' into 'Reserved Field' 'Quantity in Measurement Unit' into 'Reserved Field' 'PTTransTypeFlag' into 'Reserved Field'
		MIFID Trade Cross	'PTDeferralReasonFlag' into 'Reserved Field' 'PTLiquidityFlag' into 'Reserved Field' 'Transaction to be Cleared' into 'Reserved Field' 'Measurement Unit' into 'Reserved Field' 'Quantity in Measurement Unit' into 'Reserved Field' 'PTTradeTypeFlag' into 'Reserved Field'
24.1	5 January 2024	**Changes for Release 1.23.3.0** List of channels before each message is updated in line with the new instrument distribution 3.11.15 - MIFID II Trade is updated as follow: • Added new value 'On Demand Auction' into 'Trading Mode' field of 'MiFID II Trade' message	

Issue	Date	Description
		• Added new flag CLSE to MiFID II Trade message • Unused field converted to reserved field in MiFID II Trade message • Description and naming of field 'Price Currency' is updated • Description of field 'Notional Amount' is updated 3.11.16 – MIFID II Trade Cross is updated as follow: • Description and naming of field 'Price Currency' is updated • Description of field 'Notional Amount' is updated • Added new flag NETW to MiFID II Trade Cross Message • Unused fields converted to reserved field in MiFID II Trade Cross Message • Added new value 'NETW' and removed NLIQ, OILQ, PRIC from field 'Negotiation Indicator' 3.5 Data Type section is updated as follow: • Added new type 'Int Size' to data type list • Description of data type 'Alpha' is updated • Description of data type 'UDT' is updated 3.11.17 – Trade Summary message - added 'Best Bid Size', 'Best Bid Price', 'Best Offer Size', 'Best Offer Price' attributes 3.11.5, 3.11.6, 3.11.7 - 'Add Order Incremental', 'Modify Order', 'Delete Order' messages - added 'Transaction Time' attribute 3.11.6 – Modify Order - unused field is converted to reserved
24.2	26 January 2024	**Changes for Release 1.23.3.0** Instrument Distribution table before each message – formatting is corrected
24.3	28 February 2024	3.11.8 Top of Book – typos in data type column are corrected 3.10.5 Replay and Recovery Complete – typo in field length is corrected 3.4 Timestamp – added additional clarification related transaction time provided by market various sections - removed information about yield, implied orders since this functionality is not applicable to LSEG trading venues 3.11.9, 3.11.10, 3.11.11 – updated description of field 'Transaction Time' 3.11.16 MiFID II Trade Cross – typo in field 'Cross Type' is corrected
24.4	24 April 2023	Various sections – XSWX market is added to W channel - Turquoise Europe™ (TGHE) 3.5 Data Type section – name of extended ASCII table is corrected 3.11.15 - MIFID II Trade - 'Reference Price Indicator' (offset 278) – new value '1' Market Closing Price Trade (CLSE) is added 3.11.3 Instrument Directory Equity - description field Security Exchange is corrected

In subsequent issues of this document, where amendments have been made, these changes will be indicated through the use of red text.

1.5 Enquiries

For further information on Group Ticker Plant, please contact either your Technical Account Manager or the Client Technology Group (UK):

- Telephone: +44 (20)7797 3939
- E-mail: londontam@lseg.com

Please contact the market data team of LSEG for further information regarding data licensing for this service by e-mailing: marketdata@lseg.com.

Further information can also be found on our project websites:

https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant

2 Connectivity

2.1 Transmission Standards

The Group Ticker Plant employs industry standard data delivery and recovery transmission techniques. Further details are provided below.

Clients should note that network addressing is included as part of GTP004 – Parameters guide.

2.1.1 Multicast Channels

The Group Ticker Plant delivers real-time market data over a number of load-balanced IP multicast channels. Details of the service line allocation across multicast channels can be found in GTP001 – Product guide.

The real-time channels transmit in UDP network packets over IP version 4 (IPv4) Ethernet standards. UDP header information is as defined in the IETF RFC 791 (IPv4) and RFC 768 (UDP) transmission standards. While each UDP network packet will contain a single Unit Header, multiple application messages may be packaged in a single network packet. This is done in an effort to manage client bandwidth requirements. Further details are contained in section 4.3.1 of GTP001 – Product guide.

Clients should subscribe to both primary and secondary market data feeds. While, during normal service, replay and recovery services are only available on the primary market data gateway, through subscription to both primary and secondary feeds clients are able to arbitrage messages – recovering any missed messages on the primary market data feed from the secondary market data feed.

2.1.2 Recovery and Replay Services

The Recovery and Replay unicast channels will guarantee data delivery though use of TCP over IP version 4 (IPv4) Ethernet standards. TCP Header information is defined in the IETF RFC 793 standard and IPv4 is defined in the RFC 791 standard.

A protection mechanism is in place to protect Recovery and Replay gateways from rapid logins/logouts/disconnects. A rapid login/logout/disconnect is one that occurs very quickly following a previous login/logout/disconnect. Once a user has triggered this mechanism, the gateway response to each successive login/logout attempt or disconnect will be subject to a delayed response that grows exponentially. It is recommended that all users maintain a 100mS interval between successive login or logout attempts and disconnects to each gateway (including where the gateway has initiated the disconnection) to keep a safe margin and avoid accidentally triggering this protection mechanism.

2.2 Client Identification

All clients are required to request enablement on Group Ticker Plant service lines ahead of access to either CDS or Production environments. Access is permissioned on both the Group Ticker Plant gateways and at our network firewalls.

Upon successful completion of access request, the Group will allocate clients their CompID(s). The CompID should be used by clients to log in to either the replay or recovery services. Each CompID will be permissioned to access all Group Ticker Plant multicast gateways for which a client has the correct commercial agreement(s) in place, each CompID can only be logged in to one replay or recovery service at any one time.

Unlike the existing Millennium Exchange market data solution, the Group Ticker Plant does not require a password to access the replay or recovery services. The removal of password validation was in direct response to client feedback on our existing product provision.

3 Message formats

Group Ticker Plant delivers all real-time multi-asset class information in a single, bespoke, binary protocol. In close collaboration with clients, the Group worked to build an improved library of messages which are intuitive and clear; we believe we have made significant improvements to our legacy market data protocols. Some of these improvements include:

- Removal of password validation on both replay and recovery services
- Removal of logout process from both replay and recovery services
- Decommission of the Level 2-MITCH Time message, replacing with nanosecond time-stamping on all application messages
- Collapse of Level 2-MITCH Auction Trade, Trade, Trade Break and Order Executed messages into a single Trade message
- Introduction of the Statistics and the Statistics Update message to support the publication of derived information
- Introduction of asset-specific Instrument Directory messages available on the recovery solution to support the publication of instrument-specific reference data
- Inclusion of the 'Allowed Book Types' field in the Instrument Directory messages to facilitate the identification of applicable trading models for an instrument
- Introduction of the Top of Book message to support our new real-time streaming level 1 service. This includes a flag to indicate additional executable depth below the Best Bid and Offer

The Group protocol has been developed to be as generic as possible, facilitating the introduction of additional services as we develop and enhance the Group Ticker Plant product.

3.1 Packet composition

The Unit Header is used to deliver all administrative and application messages to and from the server on all multicast and unicast channels. Whilst a Unit Header may contain multiple application messages, it will never contain more than one administrative message. A Unit Header will not contain a combination of both application and administrative messages.

3.2 Message types

The Group Ticker Plant broadcasts a library of messages. The messages are categorised as either administrative or application messages. The administrative messages are used on the TCP/IP replay and recovery and GTP Lite services to implement the interaction of a user with the system. The application messages are used to broadcast our real-time data service lines on the multicast channels, and to provide certain static reference data information via replay and recovery services.

Clients should treat each application message as a single standalone instruction, updating their order books and systems appropriately based on the content of the application message. Clients should not program to a multicast stream of messages in an attempt to identify patterns or system logics, as the stream of messages disseminated is subject to change as we optimise our trading and market data technologies. If a client processes each application message in real-time as a standalone instruction, order books will be a true state of the trading engines of the supported markets.

3.3 Sequence Numbers

All application messages transmitted by the server on the multicast channels and the replay services are sequenced. The Unit Header only contains the sequence number of the first message; the sequence numbers of any other messages included in the same packet are implied. The sequence number of the next packet can be determined by adding the value in the Message Count field of the Unit Header to the value in the Sequence Number field.

The application messages sent from the server by the recovery service and all administrative messages (including those sent by the client) are un-sequenced.

3.4 Timestamps

All Group Ticker Plant application messages contain a timestamp with nanosecond granularity and will be sent in UTC. Timestamps are derived from the supporting infrastructure timestamp, which is synched through various processes including industry standards such as NTP – guaranteeing accuracy to the millisecond – and PTP allowing accuracy to microsecond.

Transaction times included in Trade, Add Order Incremental, Order Modify, Order Delete messages will be disseminated as reported to the Group Ticker Plant by upstream systems. Where granularity to nanosecond does not exist, the timestamp will be rounded to the nearest microsecond and disseminated to clients. It is assumed that each upstream system, by adhering to the level of accuracy requested in MIFID II RTS25 Table 2, will ensure the appropriate timestamp granularity is transmitted to Group Ticker Plant.

The upstream system's transaction time is consistent across all interfaces – GTP market data, trading, drop copy and post trade interfaces.

For more details on transaction time, clients should refer to section "Level 2 incremental service" in "GTP 001 – Group Ticker Plant Product Guide".

3.5 Data types

The fields of the messages utilized by the server will support the data types outlined below:

Data type	Length	Description
Alpha	Variable	These fields use standard ASCII and Windows-1252 (CP-1252) based on Latin-1 (ISO8859-1) character bytes. They are left justified and padded on the right with spaces.
Bit Field	1	A single byte used to hold up to eight 1-bit flags. Each bit will represent a Boolean flag. The 0 bit is the lowest significant bit and the 7 bit is the highest significant bit.
Byte	1	A single byte used to hold one ASCII character.
Date	8	Date specified in the YYYYMMDD format using ASCII characters.
Time	6	Time specified in HHMMSS format using ASCII characters in a 24-hour clock format.
UDT (Unix Date Time)	8	Little-Endian encoded 64 bit unsigned integer where; time stamp (in UTC) = (date time per second resolution in unix time format) * 1,000,000,000 + (nanoseconds component).
Price	8	Signed Little-Endian encoded 64 bit integer field with eight implied decimal places.
Size	8	Little-Endian encoded 64 bit unsigned integer with eight implied decimal places.
Price4	8	Signed Little-Endian encoded 64 bit integer field with four implied decimal places.
Size4	8	Little-Endian encoded 64 bit unsigned integer with four implied decimal places.
UInt8	1	8 bit unsigned integer.
UInt16	2	Little-Endian encoded 16 bit unsigned integer.
UInt32	4	Little-Endian encoded 32 bit unsigned integer.
UInt64	8	Little-Endian encoded 64 bit unsigned integer.
Date and Time	27	ISO 8601 date and time in the following string format:YYYY-MM-DDThh:mm:ss.ddddddZ. – 'YYYY' is the year – 'MM' is the month – 'DD' is the day

Data type	Length	Description
		– ‘T’ – means that the letter ‘T’ shall be used – ‘hh’ is the hour – ‘mm’ is the minute – ‘ss.dddddd’ is the second and its fraction of a second – Z is UTC time Dates and times shall be reported in UTC.
MiFID Decimal	20	These fields use standard ASCII character bytes to represent numeric values. They are left justified and padded on the right with spaces. {DECIMAL-n/m} – Decimal number of up to ‘n’ digits in total of which up to ‘m’ digits can be fraction digits. Decimal separator is ‘.’ (Full stop). Negative numbers are prefixed with ‘-’ (minus). Where applicable, values shall be rounded and not truncated. The default value that is populated when there is no valid value can be ‘0’ (zero) or ‘spaces’, dependent on the upstream system. For upstream system, TRADEcho it is always ‘spaces’.
Int Size	8	Signed Little-Endian encoded 64 bit integer field with eight implied decimal places.

Please note that some field descriptions in this document include ‘blank’ as valid values. ‘Blank’ should be considered as ‘space filled’ for Alpha data types and ‘0’ (zero) for data types Byte, Price, Size, UInt8, UInt16, UInt32 and UInt64.

3.6 Message overview – Administrative Messages

Name	Message type		Usage
	ASCII	Hex	
Heartbeat	-	-	Used by the server, on the real-time service, to exercise the communication line during periods of inactivity.
Login Request	(soh)	0x01	Used by the client to log in to the replay or recovery channel.
Login Response	(stx)	0x02	Used by the server to accept or reject a login request to the replay or recovery channel.
Replay Request	(etx)	0x03	Used by the client to request a retransmission of messages on the replay channel.
Replay Response	(eot)	0x04	Used by the server to respond to a retransmission request on the replay channel.
Recovery Request	•	0x81	Used by the client to request data on the recovery channel.
Recovery Response	,	0x82	Used by the server to respond to a snapshot request on the Snapshot channel.
Replay and Recovery Complete	*f*	0x83	Used by the server to indicate the successful completion of servicing a message replay or a recovery request.

3.7 Message overview – Application Messages

Each GTP Application Message is listed below with corresponding ASCII and Hex codes. Intelligent Throttling configuration is indicated for Level 2 Incremental (L2I) and Level 2 Snapshot (L2S) services. For additional information related to Intelligent Throttling, please refer to GTP Product Guide (GTP001).

	Message type			Intelligent Throttling applied?	
	ASCII	Hex		London	
Name			Usage	L2I	L2S
System Event	S	0x53	Sent to indicate the start and end of the day. For TRADEcho, recoverable to provide the trading session.	N	N
Instrument Directory	p	0x70	Used to disseminate a common and limited set of data for all configured instrument types (except strategy instruments) on the real-time channels.	Y	Y
Instrument Directory – Equities	R	0x52	Used to disseminate reference data information of equity instruments.		
Instrument Status	H	0x48	Used to communicate scheduled and unscheduled session changes. When sent in the recovery channel, used to indicate the current trading status of an instrument.	N	N
Add Order Incremental	F	0x46	Sent to instruct recipients to add a new displayable order to the retrospective order book.	N	
Delete Order	D	0x44	Sent to instruct recipients to delete an order from the retrospective order book.	N	
Modify Order	U	0x55	Sent to instruct recipients to update an order's price and/or size on the retrospective order book.	N	
Top of Book	i	0x69	Used to update the level 1 service following any change to the consolidated Best Bid and Offer.		N
Order Book Clear	y	0x79	Sent to instruct recipients to remove all orders from the order book for the specified instrument.	N	N
Trade	P	0x50	Sent to indicate trades executed on supported markets.	N	N
Trade Cross	q	0x71	Sent to indicate a cross trade execution.	N	N
Statistics	w	0x77	Contains a set of statistics that are updated frequently, usually as a result of executions.	N	N
Statistics Update	j	0x6A	Contains a set of statistics that are not updated frequently.	N	N
Statistics Snapshot	k	0x6b	A snapshot of an instrument's statistics that is used for recovery.		

Name	Message type		Usage	Intelligent Throttling applied?	
	ASCII	Hex		London	
				L2I	L2S
MiFID Trade	Q	0x51	Sent to represent different types of MiFID compliant trades published by markets.	N	N
MiFID Trade Cross	V	0x56	Sent to indicate a MiFID compliant cross trade.	N	N
Trade Summary	W	0x57	Publishing Trade Summaries for both Multi- and Single-Fill Trades	N	
Analytics	a	0x61	Analytics Message is used to disseminate additional statistics including order book activity statistics.		

3.8 Unit header

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of the message block including the header and all payload messages.
Message Count	2	1	UInt8	Number of payload messages that will follow the header.
Market Data Group	3	1	Byte	Identity of the market data group the payload messages relate to.
Sequence Number	4	4	UInt32	Sequence number of the first payload message.
Payload	8	Variable	-	One or more payload messages.

3.9 Administrative Messages (Client-Initiated)

3.9.1 Login Request

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x01	Login Request
Username	3	8	Alpha	CompID assigned to the client.	

3.9.2 Replay Request

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	Y	N

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x03	Replay Request
First Message	0	2	UInt32	Sequence number of the first message in range to be retransmitted.	
Count	7	4	UInt32	Number of messages to be resent.	
Request ID	11	4	UInt32	The value set in this will be echoed back in the corresponding Replay Response. The system will not validate uniqueness of the set value.	

3.9.3 Recovery Request

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	N	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	N	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	N	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	N	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	N	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	N	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x81	Recovery Request
Request Level	3	1	UInt8	Defines the level of the request:	
				Hex	**Meaning**
				0	Instrument
				1	Group (Segment)
				2	Multicast Channel
Instrument	4	8	UInt64	GTP Instrument identifier if Request Level is 0. Blank if not.	
Group ID	12	6	Alpha	Group/Segment ID if Request Level is 1. Blank if not.	

Field	Offset	Length	Type	Description
Order Book Type	18	1	UInt8	Only considered if the Request Level is 0. If specified, only data related to the specified order book type is provided. If not specified, data for all available book types for the instrument are provided. For Recovery Type = 3 (Statistics) this has to be set to '0' = All. **Value** / **Meaning** 0 – All Books 3 – Electronic
Source Venue	19	2	UInt16	Mandatory field if Request Level = 1. Not considered for other Request Levels. Please refer to the Additional Field Values section of this document for valid values.
Recovery Type	21	1	UInt8	The type of messages to be replayed: **Value** / **Meaning** 0 – Instrument Directory 1 – Order book 2 – All Trades 3 – Statistics 4 – Instrument Status 5 – Reserved 6 – System Event
Sequence Number	22	4	UInt32	Only valid if Recovery Type = 2 (Trades). If specified, the trades reported with an equal or higher sequence number will be sent.
Request ID	26	4	UInt32	The value set in this will be echoed back in the corresponding Recovery Response and Recovery Complete. The system will not validate uniqueness of the set value.

3.10 Administrative Messages (Server-Initiated)

3.10.1 Heartbeat

A Unit Header with a Message Count of zero (0) will be used by the server as the Heartbeat message. Such a message will never increment the sequence number of the real-time multicast channel. The next anticipated sequence number will be included in the Sequence Number to enable recipients to detect gaps on the real-time channel.

3.10.2 Login response

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message, including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x02	Login Response
Status	3	1	Byte	Status of the login request.	
				Value	**Meaning**
				A	Login Accepted
				a	CompID Inactive/Suspended
				b	Login Limit Reached
				c	Service Unavailable
				d	Maximum Connections Limit Reached
				e	Failed (other)
				f	Invalid CompID or IP Address

3.10.3 Replay Response

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	Y	N

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x04	Replay Response
First Message	3	4	UInt32	Sequence number of the first message in range to be retransmitted. This will be zero if Status is not “A”.	
Count	7	4	UInt32	Number of messages to be resent, not including any Replay and Recovery Complete messages. This will be zero if Status is not “A”.	
Status	11	1	Byte	**Value**	**Meaning**
				A	Request Accepted
				D	Request Limit Reached
				O	Out of Range
				U	Replay Unavailable
				c	Concurrent Limit Reached
				e	Failed (Other)
Request ID	12	4	UInt32	Will include the value set as Request ID in the Replay Request message.	

3.10.4 Recovery Response

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	N	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	N	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	N	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	N	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	N	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	N	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x82	Replay Response
Sequence Number	3	4	UInt32	Sequence number on the real-time channel with which the snapshot is synchronised when Recovery Type = 1, 2, 3, 4. This will be zero for other Recovery Types or if Status is not “A”.	
Count	7	4	UInt32	Number of messages to follow, not including any Replay and Recovery Complete messages. This will be zero if Status is not “A”.	
Status	11	1	Byte	**Value**	**Meaning**
				A	Request Accepted
				O	Out of Range
				a	Invalid Group or Instrument
				b	Request Limit Reached
				c	Concurrent Limit Reached
				d	Invalid Recovery Type or Request Level
				e	Failed (Other)
Request ID	12	4	UInt32	Will include the value set as Request ID in the Recovery Request message.	

3.10.5 Replay and Recovery Complete

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x83	Replay and Recovery Complete
Request ID	3	4	UInt32	Will include the value set as Request ID in the Recovery Request message.	
Trading Status	7	1	Byte	Current Trading status of the Instrument. Populated only when the message is sent at the end of individual order book snapshots during a trading session.	

3.11 Application Messages

3.11.1 System Event

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	Y	Y	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	Y	Y	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	Y	Y	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	Y	Y	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	Y	Y	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	Y	Y	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x53	System Event
Timestamp	3	8	UDT	Time the message was generated.	
Event Code	11	1	Byte	**Value**	**Meaning**
				C	End of Day
				O	Start of Day
Source Venue	12	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.	

3.11.2 Instrument directory

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	Y	Y	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	Y	Y	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	Y	Y	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	Y	Y	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	Y	Y	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	Y	Y	Y	N

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x70	Instrument Directory
Timestamp	3	8	UDT	Time the message was generated.	
Instrument	11	8	UInt64	GTP Instrument identifier.	
ISIN	19	12	Alpha	ISIN Code of an instrument.	
Allowed Book Types	31	1	Bit Field	Defines the order-book types that are allowed for the instrument. Each designated bit represents a book type. ‘0’ means not allowed and ‘1’ means allowed:	
				Bit	**Name**
				3	Electronic Order Book
Source Venue	32	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.	

<table>
<tr><th>Field</th><th>Offset</th><th>Length</th><th>Type</th><th>Description</th></tr>
<tr><td>Venue Instrument ID</td><td>34</td><td>11</td><td>Alpha</td><td>MTF symbol used by the source venue. It will contain the suffixes as specified in the table below:<table><tr><th>Suffix</th><th>Source Venue</th></tr><tr><td>_I</td><td>Turquoise Lit™ Order Book (TGHL)</td></tr><tr><td>_M</td><td>Turquoise Plato™ Order Book (TGHL)</td></tr><tr><td>_A</td><td>Turquoise Plato Lit Auctions™ Order Book (TGHL)</td></tr><tr><td>_EI</td><td>Turquoise Lit™ Order Book (TGHE)</td></tr><tr><td>_EM</td><td>Turquoise Plato™ Order Book (TGHE)</td></tr><tr><td>_EA</td><td>Turquoise Plato Lit Auctions™ Order Book (TGHE)</td></tr></table></td></tr>
<tr><td>Tick ID</td><td>45</td><td>2</td><td>Alpha</td><td>The tick structure applicable for the instrument.</td></tr>
<tr><td>Price Band Tolerances (%)</td><td>47</td><td>8</td><td>Price</td><td>Price Band Tolerance (%) of the instrument.</td></tr>
<tr><td>Dynamic Circuit Breaker Tolerances (%)</td><td>55</td><td>8</td><td>Price</td><td>Dynamic Circuit Breaker Tolerance (%) of the instrument.</td></tr>
<tr><td>Static Circuit Breaker Tolerances (%)</td><td>63</td><td>8</td><td>Price</td><td>Static Circuit Breaker Tolerance (%) of the instrument.</td></tr>
<tr><td>Segment</td><td>71</td><td>6</td><td>Alpha</td><td>Segment the instrument is assigned to.</td></tr>
<tr><td>Reserved Field</td><td>77</td><td>12</td><td>Alpha</td><td>Reserved for future use</td></tr>
<tr><td>Reserved Field</td><td>89</td><td>11</td><td>Alpha</td><td>Reserved for future use</td></tr>
<tr><td>Currency</td><td>100</td><td>3</td><td>Alpha</td><td>Currency Code as per ISO 4217.
For additional currencies supported refer to the Additional Field Values section of this document</td></tr>
<tr><td>Reserved Field</td><td>103</td><td>1</td><td>Byte</td><td>Reserved for future use.</td></tr>
<tr><td>Reserved Field</td><td>104</td><td>4</td><td>Alpha</td><td>Reserved for future use.</td></tr>
<tr><td>Average Daily Turnover (ADT)</td><td>108</td><td>8</td><td>Price4</td><td>Not Applicable to Turquoise</td></tr>
<tr><td>Reserved Field</td><td>116</td><td>8</td><td>Alpha</td><td>Reserved for future use.</td></tr>
<tr><td>Reserved Field</td><td>124</td><td>1</td><td>Bit Field</td><td>Reserved for future use</td></tr>
<tr><td>Reserved Field</td><td>125</td><td>8</td><td>Price</td><td>Reserved for future use.</td></tr>
<tr><td>Reserved Field</td><td>133</td><td>8</td><td>Price</td><td>Reserved for future use.</td></tr>
</table>

3.11.3 Instrument Directory – Equities

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	N	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	N	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	N	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	N	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	N	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	N	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x52	Instrument Directory – Equities
Timestamp	3	8	UDT	Time the message was generated.	
Instrument	11	8	UInt64	GTP Instrument identifier.	
ISIN	19	12	Alpha	ISIN code of the instrument.	
SEDOL	31	8	Alpha	Not Applicable to Turquoise	
Allowed Book Types	39	1	Bit Field	Defines the order-book types that are allowed for the instrument. Each designated bit represents a book type. 0 Means not allowed and 1 means allowed:	
				Bit	**Name**
				3	Electronic Order Book
Source Venue	40	2	UInt16	Please refer to the Additional Field Values section of this document for valid values.	

Field	Offset	Length	Type	Description
Venue Instrument ID	42	11	Alpha	Instrument identifier used by the source venue. For Turquoise, the MTF symbol will contain the suffixes as specified in the table below:

Suffix	Source Venue
_I	Turquoise Lit™ Order Book (TGHL)
_M	Turquoise Plato™ Order Book (TGHL)
_A	Turquoise Plato Lit Auctions™ Order Book (TGHL)
_EI	Turquoise Lit™ Order Book (TGHE)
_EM	Turquoise Plato™ Order Book (TGHE)
_EA	Turquoise Plato Lit Auctions™ Order Book (TGHE)

Segment	53	6	Alpha	Segment or instrument group ID as identified by the trading market.
Currency	59	3	Alpha	Currency code as per ISO 4217. For additional currencies supported refer to the Additional Field Values section of this document.
Tick ID	62	2	Alpha	The tick structure applicable for the instrument.
Previous Day's Closing Price	64	8	Price	Primary market's closing price reported for the previous trading day.
Reserved Field	72	8	Price	Reserved for future use. Any value in this field should be ignored
Dynamic Circuit Breaker Tolerances (%)	80	8	Price	Not Applicable to Turquoise
Static Circuit Breaker Tolerances (%)	88	8	Price	Not Applicable to Turquoise
Reserved Field	96	1	Bit Field	Reserved for future use.
Reserved Field	97	1	UInt8	Reserved for future use.
Expiration Date	98	8	Date	Not Applicable to Turquoise
Listing Start Date	106	8	Date	Not Applicable to Turquoise
Listing End Date	114	8	Date	Not Applicable to Turquoise
Minimum Lot/Minimum Execution Size	122	8	Size	Indicates the minimum quantity/nominal value tradable on the market for a security.
Last Price In Preceding Session	130	8	Price	Last execution price in a session prior to the current trading day.

Field	Offset	Length	Type	Description
Last Price In Preceding Session Date	138	8	Date	Last execution date in a session prior to current trading day.
Reserved Field	146	1	UInt8	Reserved for future use.
Reserved Field	147	8	Date	Reserved for future use.
Reserved Field	155	8	Date	Reserved for future use.
Ex Marker Code	163	2	Alpha	Not Applicable to Turquoise
Security Type	165	1	UInt8	Type of security. Please refer to the Additional Field Values section of this document for valid values.
Country Of Register	166	3	Alpha	Not Applicable to Turquoise
Exchange Market Size	169	8	UInt64	Not Applicable to Turquoise
Minimum Peak Size Multiplier	177	8	Size	Not Applicable to Turquoise
Security Maximum Spread	185	8	Price	Not Applicable to Turquoise
Clearing Type	193	1	UInt8	Indicates the settlement mode of the security: **Value** – **Meaning** 0 – Not Cleared 1 – Cleared
Strike Price	194	8	Price	Not Applicable to Turquoise
Security Exchange	202	11	Alpha	Market Identifier Code
Reserved Field	213	12	Alpha	Reserved for future use
Reserved Field	225	1	UInt8	Reserved for future use
Reserved Field	226	8	UInt64	Reserved for future use
Reserved Field	234	8	Size	Reserved for future use
Reserved Field	242	1	Byte	Reserved for future use
Reserved Field	243	8	Size	Reserved for future use
Reserved field	251	8	Price	Reserved for future use.
Reserved field	259	4	UInt32	Reserved for future use.
Reserved Field	263	2	UInt16	Reserved for future use.
Symbol	265	8	Alpha	MTF Common Symbol of the instrument
Description	273	40	Alpha	Description of the instrument

3.11.4 Instrument Status

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	Y	Y	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	Y	Y	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	Y	Y	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	Y	Y	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	Y	Y	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	Y	Y	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x48	Instrument Status
Timestamp	3	8	UDT	Time the message was generated.	
Instrument	11	8	UInt64	GTP Instrument identifier.	
Source venue	19	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.	
Trading Status	21	1	Byte	**Value**	**Meaning**
				H	Halted
				J	Halted – Matching Partition Suspended
				K	Halted – System Suspended
				P	Halted – Regulatory Halt
				T	Regular Trading/Start of TRQB Session
				t	End of Regular Trading/End of TRQB Session
				c	Closed
				2	Suspended
				w	No Active Session
Session Change Reason	22	1	UInt8	**Value**	**Meaning**
				0	Scheduled Transition
				1	Extended by Market Ops
				2	Shortened by Market Ops
				3	Market Order Imbalance
				4	Price Outside Range
				5	AESP/Circuit Breaker Tripped
				9	Unavailable
New End Time	23	6	Time	New time the session will end. The field will contain only spaces if Session Change Reason is “0” or the Session Change Reason is not present. New End Time will be in terms of the local time on the server (i.e., not UTC).	
Order Book Type	29	1	UInt8	**Value**	**Meaning**
				3	Electronic

3.11.5 Add Order Incremental

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	Y	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	Y	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	Y	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	Y	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	Y	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	Y	N	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x46	Add Order Incremental
Timestamp	3	8	UDT	Time the message was generated.	
Order ID	11	8	UInt64	Unique identifier of the order.	
Side	19	1	Byte	**Value**	**Meaning**
				B	Buy Order
				S	Sell Order
Size	20	8	Size	Displayed Size of the order.	
Instrument	28	8	UInt64	GTP Instrument identifier.	
Price	36	8	Price	Limit price of the order	
Transaction Time	44	8	UDT	Transaction execution timestamp as reported by the upstream system	
Source venue	52	2	UInt16	Please refer to the Additional Field Values section for valid values.	

Field	Offset	Length	Type	Description	
Order Book Type	54	1	UInt8	**Value**	**Meaning**
				3	Electronic
Participant	55	11	Alpha	Not Applicable to Turquoise	
Order Type	66	1	UInt8	**Value**	**Meaning**
				0	Limit Order (default)
RFQ ID	67	10	Alpha	Not Applicable to Turquoise.	

3.11.6 Order Modify

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	Y	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	Y	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	Y	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	Y	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	Y	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	Y	N	N	Y	N

Field	Offset	Length	Type	Description		
Length	0	2	UInt16	Length of message including this field.		
Message Type	2	1	Byte	**Hex**	**Meaning**	
				0x55	Modify Order	
Timestamp	3	8	UDT	Time the message was generated.		
Order ID	11	8	UInt64	Unique identifier of the order.		
Instrument	19	8	UInt64	GTP Instrument identifier.		
Side	27	1	Byte	**Value**	**Meaning**	
				B	Buy Order	
				S	Sell Order	
Flags	28	1	Bit Field	**Bit**	**Name**	**Meaning**
				0	Priority Flag	0: Priority Lost
						1: Priority Retained
Order Book Type	29	1	UInt8	**Value**	**Meaning**	
				3	Electronic	
New Quantity	30	8	Size	New displayed quantity of the order.		
New Price	38	8	Price	New price of the order.		
Reserved Field	46	8	Price	Reserved for future use		

Field	Offset	Length	Type	Description
Source venue	54	2	UInt16	Please refer to the Additional Field Values section for valid values.
Previous Price	56	8	Price	Previous price of the order.
Previous Quantity	64	8	Size	Previous displayed quantity of the order.
Transaction Time	72	8	UDT	Transaction execution timestamp as reported by the upstream system

3.11.7 Order Delete

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	Y	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	Y	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	Y	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	Y	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	Y	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	Y	N	N	Y	N

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x44	Delete Order
Timestamp	3	8	UDT	Time the message was generated	
Order ID	11	8	UInt64	Unique identifier of the order.	
Instrument	19	8	UInt64	GTP Instrument identifier.	
Side	27	1	Byte	**Value**	**Meaning**
				B	Buy Order
				S	Sell Order
Order Book Type	28	1	UInt8	**Value**	**Meaning**
				3	Electronic
Source venue	29	2	UInt16	Please refer to the Additional Field Values section for valid values.	
Previous Price	31	8	Price	Price of the order that was deleted from the book.	
Previous Quantity	39	8	Size	Quantity of the order that was deleted from the book.	
Transaction Time	47	8	UDT	Transaction execution timestamp as reported by the upstream system	

3.11.8 Top of Book

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	N	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	N	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	N	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	N	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	N	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	N	N	N	Y	Y

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of message including this field.
Message Type	2	1	Byte	**Hex** **Meaning** 0x69 TOB
Timestamp	3	8	UDT	Time the message was generated.
Instrument	11	8	UInt64	GTP Instrument identifier.
Source venue	19	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.
Bid Market Size	21	8	Size	Aggregated size of all bid market orders. Value will be 0 if there are no market orders.
Bid Limit Price	29	8	Price	Price of the best buy limit order
Reserved Field	37	8	Price	Reserved for future use
Bid Limit Size	45	8	Size	Aggregated size of all orders at the best buy limit price.
Offer Market Size	53	8	Size	Aggregated size of all offer market orders. Value will be 0 if there are no market orders.
Offer Limit Price	61	8	Price	Price of the best sell limit order

Field	Offset	Length	Type	Description		
Reserved Field	69	8	Price	Reserved for future use		
Offer Limit Size	77	8	Size	Aggregated size of all orders at the best sell limit price.		
Order Book Type	85	1	UInt8	**Value**	**Meaning**	
				3	Electronic	
Flags	86	1	Bit Field	**Bit**	**Name**	**Meaning**
				0	Bid Depth	0 – No 1 – Yes
				1	Offer Depth	0 – No 1 – Yes
				2	Retail LP	0 – No 1 – Yes

3.11.9 Order Book Clear

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	N	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x79	Order Book Clear
Timestamp	3	8	UDT	Time the message was generated.	
Source venue	11	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.	
Instrument	13	8	UInt64	GTP Instrument identifier.	
Order Book Type	21	1	UInt8	**Value**	**Meaning**
				3	Electronic

3.11.10 Trade

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	N	N	Y	Y

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of message including this field.
Message Type	2	1	Byte	**Hex** **Meaning** 0x50 Trade
Timestamp	3	8	UDT	Time the message was generated.
Transaction Time	11	8	UDT	Execution timestamp as reported by the supported market. If a trade is cancelled or amended, this field will contain the transaction time of the original trade.
Source venue	19	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.
Executed Size	21	8	Size	Total executed quantity.
Instrument	29	8	UInt64	GTP Instrument identifier.
Price	37	8	Price	Executed price
Reserved Field	45	8	Price	Reserved for future use
Trade ID	53	8	UInt64	Unique identifier of the trade.

Field	Offset	Length	Type	Description		
Trade Type	61	1	UInt8	**Value**	**Meaning**	
				0	Regular (or Continuous) Trade	
				2	Auction Trade – Individual[1]	
				9	On-book Trade Cancellation	
Auction Type	62	1	Byte	Not Applicable to Turquoise		
Flags	63	1	Bit Field	**Bit**	**Name**	**Meaning**
				0	Trade Cancellation	0: No 1: Yes
Hidden Execution Indicator	64	1	UInt8	**Value**	**Meaning**	
				0	N/A	
				1	Visible	
				2	Hidden	
				For Turquoise Lit™ Order Book 1[2] will be sent for execution of visible[hidden] quantities. For Turquoise Plato™ Order Book, it will be always set to 2 (Hidden). For Turquoise Lit Auctions™ Order Book 0 will be sent indicating 'Not Applicable' (N/A).		
Trade Qualifier	65	1	Byte	**Value**	**Meaning**	
				Space	N/A	
				T	Trade at Last (TAL)	

[1] When Source Venue is set to 6,15 (Turquoise Plato™ Order Book) for Turquoise Plato Uncross™ trades, 12,16 (Turquoise Plato Lit Auctions™ Order Books) individual auction trades will be published with Trade Type 2.

3.11.11 Trade Cross

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	N	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	N	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	N	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	N	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	N	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	N	N	Y	Y

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of message including this field.
Message Type	2	1	Byte	**Hex** **Meaning** 0x71 Trade Cross
Timestamp	3	8	UDT	Time the message was generated.
Transaction Time	11	8	UDT	Execution timestamp as reported by the supported market. If a trade is cancelled or amended, this field will contain the transaction time of the original trade.
Source venue	19	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.
Executed Size	21	8	Size	Size executed.
Instrument	29	8	UInt64	GTP Instrument identifier.
Price	37	8	Price	Executed price.
Reserved Field	45	8	Price	Reserved for future use
Trade ID	53	8	UInt64	Unique identifier of the trade.
Cross ID	61	20	Alpha	The unique ID of the BTF Order.

Field	Offset	Length	Type	Description		
Cross Type	81	1	UInt8	The type of the BTF Order:		
				Value	**Meaning**	
				6	Internal BTF	
				8	Committed BTF	
Flags	82	1	Bit Field	**Bit**	**Name**	**Meaning**
				0	Trade Cancellation	0: No 1: Yes

3.11.12 Statistics

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	N	N	Y	N

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of message including this field.
Message Type	2	1	Byte	**Hex** **Meaning** 0x77 Statistics
Timestamp	3	8	UDT	Time the message was generated.
Instrument	11	8	UInt64	GTP Instrument identifier.
Source venue	19	2	UInt16	Venue from which market data is received for the instrument. Please refer to the Additional Field Values section of this document for valid values.
Volume	21	8	Size4	Cumulative volume of all trades for the trading day.
Volume (on-book only)	29	8	Size4	Cumulative volume for the trading day excluding off-book trades.
VWAP	37	8	Price4	Volume weighted average price for the day for all trades.
VWAP (on-book only)	45	8	Price4	Volume weighted average price for the day excluding off-book trades.
Number of trades	53	4	UInt32	Count of all trades for the day.
Number of trades (on-book only)	57	4	UInt32	Count of trades for the day excluding off-book trades.
Turnover	61	8	Price4	Turnover of all trades for the day.

Field	Offset	Length	Type	Description
Turnover (on-book only)	69	8	Price4	Turnover for the day excluding off-book trades.

3.11.13 Statistics Update

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	Y	Y	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	Y	Y	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	Y	Y	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	Y	Y	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	Y	Y	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	Y	Y	N	N	Y	N

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of message including this field.
Message Type	2	1	Byte	**Hex** **Meaning** 0x6A Statistics Update
Timestamp	3	8	UDT	Time the message was generated.
Instrument	11	8	UInt64	GTP Instrument identifier.
Source venue	19	2	UInt16	Venue from which market data is received for the instrument. Please refer the Additional Field Values section of this document for valid values.
Statistic Type	21	2	UInt16	The statistic that is disseminated with this message instance: **Value** **Meaning** 1 Indicative Auction Uncrossing Data 4 Trade High On-Book 5 Trade Low On-Book 6 Trade High All Trades 7 Trade Low All Trades 8 52-week Trade High All Trades 9 52-week Trade Low All Trades
Statistic Price	23	8	Price	The value of price type statistics If the Opening or Closing Price is cleared manually by the venue, '-1' will be stamped
Statistic Size	31	8	Size	The value of size type statistics.
Auction Type	39	1	Byte	Populated if the Statistic Type is 1: **Value** **Meaning** L Frequent Lit Auctions
Imbalance Quantity	40	8	Size	Not Applicable to Turquoise
Auction Info	48	1	Byte	Populated if the Statistic Type is 1: **Value** **Meaning** M Call Market (Specific to Turquoise Plato™ Order Book)
Opening/Closing Price Indicator	49	1	Byte	Not Applicable to Turquoise

3.11.14 Statistics Snapshot

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	N	N	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	N	N	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	N	N	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	N	N	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	N	N	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	N	N	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x6b	Statistics Snapshot
Timestamp	3	8	UDT	Time the message was generated.	
Instrument	11	8	UInt64	GTP Instrument identifier.	
Source venue	19	2	UInt16	Please refer to the Additional Field Values section of this document for valid values.	
Volume	21	8	Size4	Cumulative volume of all trades for the trading day.	
Volume (on-book only)	29	8	Size4	Cumulative volume for the trading day excluding off-book trades.	
VWAP	37	8	Price4	Volume weighted average price for the day for all trades.	
VWAP (on-book only)	45	8	Price4	Volume weighted average price for the day excluding off-book trades.	
Number of trades	53	4	UInt32	Count of all trades for the day.	
Number of trades (on-book only)	57	4	UInt32	Count of trades for the day excluding off-book trades.	
Turnover	61	8	Price4	Turnover of all trades for the day.	
Turnover (on-book only)	69	8	Price4	Turnover for the day excluding off-book trades.	

Field	Offset	Length	Type	Description
Official Opening Price	77	8	Price	Not Applicable to Turquoise
Official Closing Price	85	8	Price	Not Applicable to Turquoise
Trade High (on-book only)	93	8	Price	Current trading day high price excluding off-book trades.
Trade Low (on-book only)	101	8	Price	Current trading day low price excluding off-book trades.
Trade High	109	8	Price	Current trading day high price of all trades.
Trade Low	117	8	Price	Current trading day low price of all trades.
52-week Trade High	125	8	Price	52-week high price of all trades.
52-week Trade Low	133	8	Price	52-week low price of all trades.
Opening Price Indicator	141	1	Byte	Not Applicable to Turquoise
Closing Price Indicator	142	1	Byte	Not Applicable to Turquoise
IAU Price	143	8	Price	Contains the last reported Indicative Auction Crossing Price
IAU Paired Size	151	8	Size	Quantity to be matched at the last reported indicative price.
Imbalance Quantity	159	8	Size	Not Applicable to Turquoise
Imbalance Direction	167	1	Byte	Not Applicable to Turquoise
Best Closing Bid Price	168	8	Price	Not Applicable to Turquoise
Best Closing Ask Price	176	8	Price	Not Applicable to Turquoise
Best Closing Bid Size	184	8	Size	Not Applicable to Turquoise
Best Closing Ask Size	192	8	Size	Not Applicable to Turquoise
Reserved Field	200	8	Price	Reserved for future use
Reserved Field	208	8	Price	Reserved for future use
Reserved Field	216	8	Size	Reserved for future use
Reserved Field	224	8	Price	Reserved for future use
Auction Type	232	1	Byte	**Value** **Meaning**
				L Frequent Lit Auctions

Field	Offset	Length	Type	Description
Last Trade Price	233	8	Price	Executed price at which the instrument was last traded. If no relevant trades have taken place the value ‘0’ will be populated.
Last Trade Quantity	241	8	Size	Executed quantity of the trade which set the ‘Last Trade Price’. If no relevant trades have taken place the value ‘0’ will be populated.
Last Trade Time	249	8	UDT	Transaction time of the trade which set the ‘Last Trade Price’. If no relevant trades have taken place the value ‘0’ will be populated.
Static Reference Price	257	8	Price	Not Applicable to Turquoise
Dynamic Reference Price	265	8	Price	Not Applicable to Turquoise

3.11.15 MiFID II Trade

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	Y	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	Y	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	Y	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	Y	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	Y	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	Y	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x51	MiFID Trade
Timestamp	3	8	UDT	Message dissemination time.	
Source venue	11	2	UInt16	Please refer to the Additional Field Values section for valid values.	
Instrument	13	8	UInt64	GTP Instrument identifier.	
Transaction identification code	21	52	Alpha	A unique trade identifier. The value will be right aligned.	
Trade Type	73	1	UInt8	**Value**	**Meaning**
				0	Regular (or Continuous) Trade
				2	Auction Trade – Individual[2]
				9	Trade Cancellation
Auction Type	74	1	Byte	Not Applicable to Turquoise	

[2] When Source Venue is set to 6,15 (Turquoise Plato™ Order Books) for Turquoise Plato Uncross™ trades 12 or 16 (Turquoise Plato Lit Auctions™ Order Books), individual auction trades will be published with Trade Type 2.

Field	Offset	Length	Type	Description
MiFID Price	75	20	MiFID Decimal	MiFID compliant Price field populated using executed price. {DECIMAL-18/13} in case the price is expressed as monetary value.
MiFID Quantity	95	20	MiFID Decimal	Number of units of the financial instrument. {DECIMAL-18/17}
Trading Date and Time	115	27	Date and Time	Date and time when the transaction was executed/agreed upon. If a trade is cancelled or amended, this field will contain the Trading Date and Time of the original trade.
Instrument Identification Code Type	142	4	Alpha	**Value** / **Meaning** ISIN / International Securities Identification Number Only relevant for non-equity instruments. Empty for equity and equity-like instruments.
Instrument Identification Code	146	12	Alpha	Instrument identification number (ISIN code).
Price Notation	158	4	Alpha	**Value** / **Meaning** MONE / Monetary value Only relevant for non-equity instruments.
Price Major Currency (TGHL) / Price Currency (TGHE)	162	3	Alpha	Major currency in which the price is expressed (applicable if the price is expressed as monetary value). Currency Code as per ISO 4217. For additional currencies supported refer to the Additional Field Values section of this document.
Notional Amount	165	20	MiFID Decimal	Notional value relevant to the security. {DECIMAL-18/5} Only relevant for non-equity instruments.
Notional Currency	185	3	Alpha	Major currency in which the notional amount is denominated. Only relevant for non-equity instruments.
Venue of Execution	188	4	Alpha	Identification of the venue where the transaction was executed.
Publication Date and Time	192	27	Date and Time	Date and time when the transaction was published.
PTRefPriceWaiver Flag	219	4	Alpha	Possible values: **Value** RFPT
Reserved Field	223	4	Alpha	Reserved for future use

Field	Offset	Length	Type	Description	
Market Closing Price Flag	227	4	Alpha	Possible values:	
				Value	
				CLSE (TGHL only)	
PTAlgoTrade	231	4	Alpha	Possible values:	
				Value	
				ALGO	
PTCancellationFlag	235	4	Alpha	Possible values:	
				Value	
				CANC	
PTAmendmentFlag	239	4	Alpha	Possible values:	
				Value	
				AMND	
Reserved Field	243	1	Byte	Reserved for future use	
Reserved Field	244	3	Alpha	Reserved for future use	
Reserved Field	247	20	MiFID Decimal	Reserved for future use	
Reserved Field	267	4	Alpha	Reserved for future use	
Trade Qualifier	271	1	Byte	**Value**	**Meaning**
				Space	N/A
				T	Trade at Last (TAL)
Market Mechanism	272	1	Byte	**Value**	**Meaning**
				1	Central Limit Order Book
				3	Dark Order Book
				5	Periodic Auction
Trading Mode	273	1	Byte	**Value**	**Meaning**
				U	Unscheduled Auction
				P	On Demand Auction (Frequent Batched Auction
				2	Continuous Trading
				3	At Market Close Trading

Field	Offset	Length	Type	Description	
Transaction Category	274	1	Byte	**Value**	**Meaning**
				D	Dark Trade
				-	None apply
Negotiation Indicator	275	1	Byte	**Value**	**Meaning**
				-	Not a Negotiated Trade
Agency Cross Indicator	276	1	Byte	**Value**	**Meaning**
				-	No Agency Cross Trade
Modification Indicator	277	1	Byte	**Value**	**Meaning**
				C	Trade Cancellation (CANC)
				A	Trade Amendment (AMND)
				-	New Trade
Reference Price Indicator	278	1	Byte	**Value**	**Meaning**
				S	Reference Price Trade (RFPT)
				1	Market Closing Price Trade (CLSE)
				-	Not a Reference Price Trade
Special Dividend Indicator	279	1	Byte	**Value**	**Meaning**
				-	No Special Dividend Trade
Off Book Automated Indicator	280	1	Byte	**Value**	**Meaning**
				-	Unspecified or does not apply
Price Formation Indicator	281	1	Byte	**Value**	**Meaning**
				P	Plain-Vanilla Trade
Algorithmic Indicator	282	1	Byte	**Value**	**Meaning**
				H	Algorithmic Trade (ALGO)
				-	Not an Algorithmic Trade
Post-Trade Deferral Reason	283	1	Byte	**Value**	**Meaning**
				-	Immediate Publication
Deferral/ Enrichment Type	284	1	Byte	**Value**	**Meaning**
				-	Not Applicable/No Relevant Enrichment Type
Duplicative Indicator	285	1	Byte	**Value**	**Meaning**
				-	Unique Trade Report

3.11.16 MiFID II Trade Cross

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	Y	N	Y	Y
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	Y	N	Y	Y
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	Y	N	Y	Y
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	Y	N	Y	Y
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	Y	N	Y	Y
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	Y	N	Y	Y

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x56	MiFID Trade Cross
Timestamp	3	8	UDT	Message dissemination time.	
Source venue	11	2	UInt16	Please refer to the Additional Field Values section for valid values.	
Instrument	13	8	UInt64	GTP Instrument identifier.	
Transaction identification code	21	52	Alpha	A unique trade identifier. The value will be right aligned.	
Cross ID	73	20	Alpha	The unique ID of the BTF Order.	
Cross Type	93	1	UInt8	The type of the BTF Order.	
				Value	**Meaning**
				6	Internal BTF
				8	Committed BTF

Field	Offset	Length	Type	Description
MiFID Price	94	20	MiFID Decimal	MiFID compliant Price field populated using executed price. {DECIMAL-18/13} in case the price is expressed as monetary value.
MiFID Quantity	114	20	MiFID Decimal	Number of units of the financial instrument. {DECIMAL-18/17}
Trading Date and Time	134	27	Date and Time	Date and time when the transaction was executed/ agreed upon. If a trade is cancelled or amended, this field will contain the MiFID Trading Date and Time of the original trade.
Instrument Identification Code Type	161	4	Alpha	**Value** **Meaning** ISIN International Securities Identification Number Only relevant for non-equity instruments.
Instrument Identification Code	165	12	12	Instrument identification number (ISIN code).
Price Notation	177	4	Alpha	**Value** **Meaning** MONE Monetary value Only relevant for non-equity instruments.
Price Major Currency (TGHL) / Price Currency (TGHE)	181	3	Alpha	Major currency in which the price is expressed (applicable if the price is expressed as monetary value).
Notional Amount	184	20	MiFID Decimal	Notional value relevant to the security. {DECIMAL-18/5} Only relevant for non-equity instruments.
Notional Currency	204	3	Alpha	Major currency in which the notional amount is denominated. Only relevant for non-equity instruments.
Venue of Execution	207	4	Alpha	Identification of the venue where the transaction was executed.
Publication Date and Time	211	27	Date and Time	Date and time when the transaction was published.
Reserved Field	238	4	Alpha	Reserved for future use
NT Pre-Trade Waiver Flag	242	4	Alpha	Possible values: **Value** NETW (TGHL only)
PTAlgoTrade	246	4	Alpha	Possible values: **Value** ALGO

Field	Offset	Length	Type	Description	
Reserved Field	250	4	Alpha	Reserved for future use	
PTCancellationFlag	254	4	Alpha	Possible values:	
				Value	
				CANC	
PTAmendmentFlag	258	4	Alpha	Possible values:	
				Value	
				AMND	
Reserved Field	262	1	Byte	Reserved for future use	
Reserved Field	263	3	Alpha	Reserved for future use	
Reserved Field	266	20	MiFID Decimal	Reserved for future use	
Reserved Field	286	4	Alpha	Reserved for future use	
Market Mechanism	290	1	Byte	**Value**	**Meaning**
				1	Central Limit Order Book
Trading Mode	291	1	Byte	**Value**	**Meaning**
				2	Continuous Trading
Transaction Category	292	1	Byte	**Value**	**Meaning**
				-	None apply
Negotiation Indicator	293	1	Byte	**Value**	**Meaning**
				8	Negotiated Trade with pre-trade transparency waiver (NETW)
				-	Not a Negotiated Trade
Agency Cross Indicator	294	1	Byte	**Value**	**Meaning**
				-	No Agency Cross Trade
Modification Indicator	295	1	Byte	**Value**	**Meaning**
				C	Trade Cancellation (CANC)
				A	Trade Amendment (AMND)
				-	New Trade
Reference Price Indicator	296	1	Byte	**Value**	**Meaning**
				S	Reference Price Trade (RFPT)
				-	Not a Reference Price Trade
Special Dividend Indicator	297	1	Byte	**Value**	**Meaning**
				-	No Special Dividend Trade

Field	Offset	Length	Type	Description	
Off Book Automated Indicator	298	1	Byte	**Value**	**Meaning**
				-	Unspecified or does not apply
Price Formation Indicator	299	1	Byte	**Value**	**Meaning**
				P	Plain-Vanilla Trade
Algorithmic Indicator	300	1	Byte	**Value**	**Meaning**
				H	Algorithmic Trade (ALGO)
				-	Not an Algorithmic Trade
Post-Trade Deferral Reason	301	1	Byte	**Value**	**Meaning**
				-	Immediate Publication
Deferral/ Enrichment Type	302	1	Byte	**Value**	**Meaning**
				-	Not Applicable/No Relevant Enrichment Type
Duplicative Indicator	303	1	Byte	**Value**	**Meaning**
				-	Unique Trade Report

3.11.17 Trade Summary

Trade Summary message is used to disseminate results of multi- and single-fill trade events.

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	Y	N	N	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	Y	N	N	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	Y	N	N	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	Y	N	N	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	Y	N	N	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	Y	N	N	Y	N

Field	Offset	Length	Type	Description
Length	0	2	UInt16	Length of message including this field.
Message Type	2	1	Byte	**Hex** **Meaning** 0x57 Trade Summary
Timestamp	3	8	UDT	Time the message was generated.
Instrument	11	8	UInt64	GTP Instrument identifier.
Source Venue	19	2	UInt16	Please refer to the Additional Field Values section for valid values[6].
Transaction Time	21	8	UDT	Execution timestamp reported by the supported Source Venue.
Far Price	29	8	Price	Far price is the highest price at which volume is depleted as part of the Matching Engine event in case of an aggressing buy order, or the lowest price at which volume is depleted in case of an aggressing sell order. Determined by considering all trades in one Matching Engine event.
Total Executed Quantity	37	8	Size	Total quantity executed (visible & hidden quantity).
Total Hidden Executed Quantity	45	8	Size	Total hidden order quantity executed (hidden quantity).

[6] Applicable to Source Venue Turquoise Lit™ Order Books

Field	Offset	Length	Type	Description
Deleted Order Quantity	53	8	Size	Order Quantity deleted due to Self Execution Prevention (SEP) during an execution.
Side	61	1	Byte	The side of the visible passive order(s) that triggered the trade summary. **Value** — **Meaning** Space — No Side (only Hidden quantity executed) **B** — Buy Side **S** — Sell Side
Best Bid Size	62	8	Int Size	Aggregated size of all orders at the best buy price available on the book at execution completion Value will be set to -1 if top of the book is not disclosed
Best Bid Price	70	8	Price	Price of best visible bid available on the book at execution completion Value will be set to -1 if top of the book is not disclosed Value will be set to 0 in case of market order is on top of the book
Best Offer Size	78	8	Int Size	Aggregated size of all orders at the best sell price available on the book at execution completion Value will be set to -1 if top of the book is not disclosed
Best Offer Price	86	8	Price	Price of best visible bid available on the book at execution completion Value will be set to -1 if top of the book is not disclosed. Value will be set to 0 in case of market order is on top of the book

3.11.18 Analytics

Analytics Message is used to disseminate additional statistics including order book activity statistics.

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel T/t	Turquoise® (TGHL)	XLON, AIMX, XLOM, MTAA	N	N	N	Y	Y	N
Channel U/u	Turquoise® (TGHL)	XNGS, XNMS, XNYS, XSWX, XHEL, XMAD, XSTO, XCSE, XBRU, XDUB, WBAH, XBUD, XOSL, XPRA, XWAR, XAMS, XLIS, XLUX, ALXB, XETR, XPAR, ALXP, ALXL, MTAH, XPRM	N	N	N	Y	Y	N
Channel V/v	Turquoise Europe™ (TGHE)	XBRU, XDUB, XBUD, XWAR, XLUX, XETR	N	N	N	Y	Y	N
Channel W/w	Turquoise Europe™ (TGHE)	XLIS, ALXB, XPAR, ALXP, ALXL, XSWX	N	N	N	Y	Y	N
Channel X/x	Turquoise Europe™ (TGHE)	XCSE, MTAA, XPRA, XAMS, MTAH	N	N	N	Y	Y	N
Channel Y/y	Turquoise Europe™ (TGHE)	XHEL, XMAD, XSTO, WBAH, XOSL, XPRM	N	N	N	Y	Y	N

Field	Offset	Length	Type	Description	
Length	0	2	UInt16	Length of message including this field.	
Message Type	2	1	Byte	**Hex**	**Meaning**
				0x61	Analytics
Timestamp	3	8	UDT	Time the message was generated.	
Instrument	11	8	UInt64	GTP Instrument identifier.	
Source Venue	19	2	UInt16	Please refer to the Additional Field Values section for valid values.	
Start Time	21	8	UDT	Time the calculation of the statistics on this message began.	
End Time	29	8	UDT	Time the calculation of the statistics on this message ended.	
Buy Order Count	37	4	UInt32	Number of buy orders received within the calculation window.	
Sell Order Count	41	4	UInt32	Number of sell orders received within the calculation window.	
Buy Order Size	45	8	Size4	Cumulative quantity of all buy orders received within the calculation window.	
Sell Order Size	53	8	Size4	Cumulative quantity of all sell orders received within the calculation window.	

Field	Offset	Length	Type	Description
Buy Order Cancellations	61	4	UInt32	Number of buy orders cancelled by clients within the calculation window.
Sell Order Cancellations	65	4	UInt32	Number of sell orders cancelled by clients within the calculation window.
Buy Limit Order Cancellations	69	4	UInt32	Number of buy limit orders cancelled by clients within the calculation window.
Buy Market Order Cancellations	73	4	UInt32	Number of buy market orders cancelled by clients within the calculation window.
Sell Limit Order Cancellations	77	4	UInt32	Number of sell limit orders cancelled by clients within the calculation window.
Sell Market Order Cancellations	81	4	UInt32	Number of sell market orders cancelled by clients within the calculation window.
Bid Ask Spread	85	8	Price	Most Recent Bid/Ask spread at the time of publication of the message. If the value is set to zero, this means, either: 1) No sell/buy liquidity 2) Order book is locked or crossed 3) No orders on order book
VWAP Buy	93	8	Price	Volume Weighted Average Price for trades triggered by an aggressing buy order. Calculated within the calculation window for trades executed in continuous trading.
VWAP Sell	101	8	Price	Volume Weighted Average Price for trades triggered by an aggressing sell order. Calculated within the calculation window for trades executed in continuous trading.

4 Client Data Recovery

The Group Ticker Plant operates with similar data recovery solutions as the existing Millennium Exchange market data product: replay and recovery service.

Should a gap in sequence numbers be noticed on both the primary and secondary feed, or following a failure at client site, clients should assume that instrument order books are stale and should initiate one of the below data recovery processes to refresh systems.

4.1 Replay Channel

The replay service provides clients the ability to request a finite number of application messages as disseminated on the real-time multicast channel. Provisioned to facilitate client recovery following a small scale data loss, the replay service caches the last 65,000 application messages published for each multicast channel.

Clients are permitted to log on to the replay service a finite number of times each day and, following successful login, subsequently submit a finite number of requests each day. Whilst these counters can be reset intraday by the Group, this will be done only in an emergency situation and should not be relied upon as normal practice.

Each client CompID is permitted to log on to the Production replay service 3,000 times per day, submitting a maximum of 3,000 requests per day. Clients are permitted to queue a maximum of 10 requests at any one time. Should any of these parameters be reached, the replay server will respond with an explanatory reason code.

4.1.1 Establishing a connection

Clients should send a Login Request message to the appropriate target replay service IP gateway address and port. Validation of appropriate credentials as configured on the Group Ticker Plant will be done against both the CompID, as supplied in the message sent by the client, and the incoming source IP address. Upon successful validation, the replay service responds with a Login Response message of Status ‘A’ – the session should now be considered active. Clients should wait for the server’s response prior to submitting replay requests. Any requests submitted prior to authentication will be ignored.

Should the attempted connection fail for any reason, the server will respond with a Login Response message which will contain a reason code. This reason code will facilitate the diagnosis of the failed login request.

4.1.2 Sending a request

Once successful connection is established, clients can queue requests for retransmission of missed messages. The Replay Request message should include the first sequence number of the range of messages to be retransmitted and the total number of messages subsequent to the first missed message required. A Request ID can also be included if required – this is not validated by the replay service.

Should the server accept the request for message retransmission, clients will receive a Replay Response message of Status ‘A.’ If a Request ID was specified, this will be included in the Replay Response message. This will be immediately followed by the requested message stream. The completion of the request will be marked by the sending of a Replay and Recovery Complete message. This will include the original Request ID if specified but will not include the current Trading Status of the instrument.

Should the replay request fail, the server will respond with a Replay Response message which will contain a reason code. This reason code will facilitate the diagnosis of the failed replay request.

Submitted requests will be processed serially, but the capability of the replay service will be split across any logged in CompID. This may mean that the performance of the replay solution may differ, dependent upon the number of CompIDs logged in to the service at any given time.

4.1.3 Terminating a connection

Clients will not be required to log out from the replay service. Instead, immediately after the completion of the request, the replay server will terminate the connection with the client.

Clients should note that, upon successful login to the replay service, a request should be submitted within five seconds or the server will force-logout the client.

Replay, Recovery and GTP Lite services will close connection to user via message with FIN flag in case termination of connection is initiated by the service itself.

4.2 Recovery Channel

The recovery service facilitates a client's resynchronisation with the order book following a large scale data loss for the which the replay service is insufficient. Following successful login, clients are able to request the following:

- A snapshot of the order book for any active instrument in the Market Data Group
- All trades reported for the trading day (both on and off book)
- A snapshot of an instrument's current statistics
- The current trading status of an instrument
- The full set of reference data for an instrument

In a similar approach to that of the replay service, clients are permitted to log in to the recovery service a finite number of times each day and, following successful login, subsequently submit a finite number of requests each day. While these counters can be reset intraday by the Group, this will be done only in an emergency and should not be relied upon as normal practice. Each client CompID is permitted to log on to the Production recovery service 3,000 times per day, submitting a maximum of 3,000 requests per day. Clients are permitted to queue a maximum of 10 requests at any one time. Should any of these parameters be reached, the recovery server will respond with an explanatory reason code.

4.2.1 Establishing a connection

Clients should send a Login Request message to the appropriate target recovery service IP gateway address and port. Validation of appropriate credentials as configured on the Group Ticker Plant will be done against both the CompID as supplied in the message by the client and the incoming source IP address. Upon successful validation, the recovery service will respond with a Login Response message of Status 'A' – the session should now be considered active. Clients should wait for the server's response prior to submitting recovery requests. Any requests submitted prior to authentication will be ignored.

Should the attempted connection fail for any reason, the server will respond with a Login Response message which will contain a reason code. This reason code will facilitate the diagnosis of the failed login request.

4.2.2 Sending a request for an Instrument Level Order Book snapshot

Following receipt of a Login Response message of Status 'A,' used to confirm successful login to the recovery service, clients may submit a request for a snapshot of the current order book using the Recovery Request message. The Recovery Request message should indicate that the client requires an instrument order book snapshot – the Recovery Type field should be '1,' and the Request Level field should be '0.' Clients are also permitted to request a specific order book, either Electronic or Firm Quote, in the Order Book Type field. Clients may also include a Request ID in the Recovery Request message – this is not validated by the server.

The server will transmit a Recovery Response message which should indicate the successful acceptance of the request. The Recovery Response message will also include the Request ID if specified by the client. The Recovery Response message will also include the real-time channel sequence number with which the snapshot is synchronised. Clients should buffer all messages as received on the real-time channel with a sequence number greater than that received in the Recovery Response message.

If active and displayable orders are present on the order book, the server will transmit an Order Book Clear message followed by a message stream to allow the rebuild of the order book. The MBO and MBP snapshot service line order book recovery will be disseminated through a number of Add Order messages. The order book should be built in the same way as on the real-time channel – further details are contained within section 3.1.2 of GTP001 – Product Guide. The level 2 incremental services should be rebuilt by processing all Add Order Incremental messages as disseminated following the Recovery Response message. The buy side will always be transmitted first. The level 1 order book recovery will publish an Order Book Clear message followed by the current best Bid and Ask aggregated levels in a single TOB message, similar to that of the real-time service.

If the snapshot request was for more than one order book as specified in the Order Book Type field of the Recovery Request message, the Electronic Order Book will always be provided first. Following transmission of each requested order book, the server will disseminate a Replay and Recovery Complete message. If no active displayable orders are present on any applicable order book type, the server will disseminate only an Order Book

Clear message followed by the Replay and Recovery Complete message. This message includes the real-time trading status of the instrument if the instrument is currently in a trading session. To complete the request, following transmission of all requested order books for an instrument, the server will disseminate a final Replay and Recovery Complete message. If a Request ID was specified by the client, this will be included.

4.2.3 Sending a request for a Group or Channel Level Order Book snapshot

Following receipt of a Login Response message of Status 'A,' used to confirm successful login to the recovery service, clients may submit a request for a snapshot of the current order book using the Recovery Request message. The Recovery Request message should indicate that the client requires Group or Channel level order book snapshots – the Recovery Type field should be '1,' and the Request Level field should be either '1' or '2'. If a Group or Channel level recovery is requested by the client, all order books will be disseminated – the Order Book Type field is not processed by the server. Clients may also include a Request ID in the Recovery Request message. This is not validated by the server.

The server will transmit a Recovery Response message which should indicate the successful acceptance of the request. The Recovery Response message will also include the Request ID, if specified by the client, and the real-time channel sequence number with which the snapshot is synchronised. Clients should buffer all messages as received on the real-time channel with a sequence number greater than that received in the Recovery Response message.

If active and displayable orders are present on the order book, the server will transmit an Order Book Clear message, followed by a message stream to allow the rebuild of the order book. The MBO and MBP snapshot service line order book recovery will be disseminated through a number of Add Order and Add Order Short messages. The order book should be built in the same way as on the real-time channel – further details are contained within section 3.1.2 of GTP001 – Product Guide.

The level 2 incremental services should be rebuilt by processing all Add Order Incremental messages as disseminated following the Recovery Response message. The buy side will always be transmitted first. Order books will be transmitted to clients serially, with the Electronic Order Book always transmitted prior to the Firm Quote book if applicable. If private RFQ book is applicable, a series of Add Order Incremental messages or a series of Indicative Quote Information messages will be transmitted pertaining to private RFQ book depending on the RFQ Transparency regime. All applicable order books will be transmitted prior to dissemination of the next instrument's snapshot. The level 1 order book recovery will publish an Order Book Clear message followed by the current best Bid and Ask aggregated levels in a single TOB message – similar to that of the real-time service.

For instruments with no active displayable orders present on any applicable order book type, the server will disseminate only an Order Book Clear message followed by the Replay and Recovery Complete message. This message includes the real-time trading status of the instrument if the instrument is currently in a trading session. For the private RFQ book, the Trading Status will always be set to No Active Session (w). To complete the full request, following transmission of all requested order books, the server will disseminate a final Replay and Recovery Complete message. If a Request ID was specified by the client, this will be included. The final Replay and Recovery Complete message will not contain a value in the Trading Status field.

4.2.4 Sending a request for the Instrument Directory (reference data)

Following receipt of a Login Response message of Status 'A,' used to confirm successful login to the recovery service, clients may submit a request for Instrument Directory messages using the Recovery Request message. The Recovery Request message should indicate that the client requires Instrument Directory messages. The Recovery Type field should be '0.' Clients should also indicate the level of the request – an individual instrument, a segment or for all instruments on the multicast channel. Clients may also include a Request ID in the Recovery Request message. This is not validated by the server.

The server will transmit a Recovery Response message which should indicate the successful acceptance of the request. The Recovery Response message will also include the Request ID, if specified by the client. The Recovery Response message will also include the real-time channel sequence number of the last Instrument Directory message sent. This will be followed by the Instrument Directory message(s) as requested by the client. Successful 'Group' or 'Multicast Channel' requests will result in the dissemination of all configured instruments on the Group Ticker Plant at that request level, irrespective of their trading status. Instrument Directory messages are available via Recovery once they have been published by multicast.

Customers should note that, should a request be made for an instrument not supported by the targeted multicast group, the server will respond with the rejection Status of 'a.'

The completion of the recovery request will be indicated through the dissemination of a Replay and Recovery Complete message. The Trading Status field of the Replay and Recovery Complete message will only be populated if the original request level was ‘Instrument.’ The Replay and Recovery Complete message will also include the Request ID, if specified by the client.

4.2.5 Sending a request for trades

Following receipt of a Login Response message of Status ‘A,’ used to confirm successful login to the recovery service, clients may submit a request for trades as reported by supported markets using the Recovery Request message. The Recovery Request message should indicate that the client requires trade recovery. The Recovery Type field should be ‘2.’ Clients should also indicate the level of the request – an individual instrument, a segment or for all instruments on the multicast channel. Clients may also include a Request ID in the Recovery Request message. This is not validated by the server.

The server will transmit a Recovery Response message, which should indicate the successful acceptance of the request. The Recovery Response message will include the Request ID, as specified by the client. This message will also include the real-time multicast channel sequence number of the last trade to be disseminated as part of the request, with the total number of trade messages to be disseminated indicated in the Count field.

The Recovery Response message will be immediately followed by a stream of execution messages as disseminated on the multicast channel. All trade types will be disseminated, including Trade, Off-book Trade, and Trade Cross messages, in their original sequence. It is not possible to request a subset of trade types on the trade recovery service. Trade cancellations as originally disseminated will be included in the recovery service message stream. While clients cannot specify a subset of trade types on the recovery service, clients may include a real-time channel sequence number on the Recovery Request message. When a sequence number is included, the recovery service will transmit only trade messages with an equal or greater sequence number to that specified.

The completion of the recovery request will be indicated through the dissemination of a Replay and Recovery Complete message. The Trading Status field of the Replay and Recovery Complete message will only be populated if the original request level was ‘Instrument.’ The Replay and Recovery Complete message will also include the Request ID, if specified by the client.

If no trade messages exist which satisfy the original request, the server will transmit a Recovery Response message followed immediately by a Replay and Recovery Complete message.

4.2.6 Sending a request for a statistics snapshot

Following receipt of a Login Response message of Status ‘A,’ used to confirm successful login to the recovery service, clients may submit a request for an instrument’s statistics as calculated by the Group Ticker Plant by using the Recovery Request message. The Recovery Request message should indicate that the client requires statistics. The Recovery Type field should be ‘3.’ Clients should also indicate the level of the request – an individual instrument, a segment or for all instruments on the multicast channel. Clients may also include a Request ID in the Recovery Request message. This is not validated by the server.

The server will transmit a Recovery Response message which should indicate the successful acceptance of the request. The Recovery Response message will include the Request ID, as specified by the client. This message will also include the real-time multicast channel sequence number of the last message sent on the multicast channel. Clients should buffer all messages as received on the real-time channel with a sequence number greater than specified. The total number of Statistic Snapshot messages to be disseminated will be indicated in the Count field.

Following dissemination of the Recovery Response message, the server will disseminate one or more Statistic Snapshot messages, the number dependent upon the level of the original request. The Statistic Snapshot message will provide clients all current statistics as calculated by the Group Ticker Plant.

The server will disseminate a Replay and Recovery Complete message to indicate the successful completion of the request. The Trading Status field will only be populated if the request level was ‘Instrument’. The Replay and Recovery Complete message will also include the Request ID if specified by the client.

If no statistics exist to satisfy the original request, the server will transmit a Recovery Response message followed immediately by a Replay and Recovery Complete message.

4.2.8 Sending a request for an Instrument Status

Following receipt of a Login Response message of Status 'A,' used to confirm successful login to the recovery service, clients may submit a request for the current Trading Status of an instrument on any supported market by using the Recovery Request message. The Recovery Request message should indicate that the client requires Instrument Status messages. The Recovery Type field should be '4.' Clients should also indicate the level of the request – an individual instrument, a segment or for all instruments on the multicast channel. Clients may also include a Request ID in the Recovery Request message. This is not validated by the server.

The server will transmit a Recovery Response message which should indicate the successful acceptance of the request. The Recovery Response message will include the Request ID, as specified by the client. This message will also include the real-time multicast channel sequence number of the last real-time message disseminated. Clients should buffer all messages as received on the real-time channel with a sequence number greater than specified. The total number of Instrument Status messages to be disseminated will be indicated in the Count field.

Following dissemination of the Recovery Response message, the server will transmit one or more Instrument Status messages, the number dependent upon the level of the original request. The current Trading Status of an instrument is indicated in the Instrument Status message.

The server will disseminate a Replay and Recovery Complete message to indicate the successful completion of the request. The Trading Status field will only be populated if the request level was 'Instrument'. The Replay and Recovery Complete message will also include the Request ID if specified by the client.

If no Instrument Status messages exist to satisfy the original request, the server will transmit a Recovery Response message followed immediately by a Replay and Recovery Complete message.

4.2.9 Terminating a connection

Clients will not be required to log out from the recovery service. Instead, immediately after the completion of the request, the recovery server will terminate the connection with the client.

Clients should note that, upon successful login to the recovery service, a request should be submitted within five seconds or the server will force-logout the client.

Replay, Recovery and GTP Lite services will close connection to user via message with FIN flag in case termination of connection is initiated by the service itself.

5 Additional field values

5.1 Source Venue

Value	Description
5	Turquoise Lit™ Order Book (TGHL)[15]
6	Turquoise Plato™ Order Book (TGHL)
12	Turquoise Plato Lit Auctions™ Order Book (TGHL)
14	Turquoise Lit™ Order Book (TGHE)[16]
15	Turquoise Plato™ Order Book (TGHE)
16	Turquoise Plato Lit Auctions™ Order Book (TGHE)

5.2 Security Types

Value	Code	Source Venue	Description	Security Definition
13	TF	Turquoise	Tradable Fund	Non-bond
76	CU	Turquoise	Exchange Traded Currency	Non-bond
77	EQ	Turquoise	Equity	Non-bond
78	CO	Turquoise	Exchange Traded Commodity	Non-bond

5.3 Supported currencies

Code	Description
EUX	Euro – cents
USX	Cent
GBX	GB pennies
ZAC	100th of RAND
ITL	Italian LIRA

[15] TGHL: Turquoise Global Holdings Limited (also referred to as Turquoise UK)
[16] TGHE B.V.: Turquoise Global Holdings Europe (also referred to as Turquoise Europe)

5.4 Tick ID

Market	GTP Tick ID	Table ID	Description	Min Value	Max Value	Tick Value
XLON (London Stock Exchange), XPAR (NYSE Euronext Paris), XETR (Deutsche Borse – Xetra), XCSE, XHEL, XMAD, XSTO, XSWX, XVTX	**01**	**Dark**		0	999999999	0.00005
	02	**ETF_GBP**		0	0.1	0.0005
				0.1	5	0.001
				5	10	0.0025
				10	25	0.005
				25	999999999	0.01
	03	**ETF_GBX**		0	10	0.05
				10	500	0.1
				500	1000	0.25
				1000	2500	0.5
				2500	999999999	1
	04	**ETF_USD**		0	0.1	0.0005
				0.1	5	0.001
				5	10	0.0025
				10	999999999	0.01
	05	**EUROZONE**		0	10	0.001
				10	999999999	0.005
	07	**FESE1**		0	1	0.0001
				1	5	0.0005
				5	10	0.001
				10	50	0.005
				50	100	0.01
				100	500	0.05
				500	1000	0.1
				1000	5000	0.5
				5000	10000	1
				10000	999999999	5
	08	**FESE2**		0	0.5	0.0001
				0.5	1	0.0005
				1	5	0.001
				5	10	0.005

Market	GTP Tick ID	Table ID	Description	Min Value	Max Value	Tick Value
				10	50	0.01
				50	100	0.05
				100	500	0.1
				500	1000	0.5
				1000	5000	1
				5000	10000	5
				10000	999999999	10
	09	**FESE2B**		0	0.5	0.0001
				0.5	1	0.0005
				1	2	0.001
				2	5	0.002
				5	10	0.005
				10	50	0.01
				50	100	0.05
				100	500	0.1
				500	1000	0.5
				1000	5000	1
				5000	10000	5
				10000	20000	10
				20000	40000	20
				40000	50000	40
				50000	80000	50
				80000	100000	80
				100000	999999999	100
	10	**FESE3**		0	0.5	0.0005
				0.5	1	0.001
				1	5	0.005
				5	10	0.01
				10	50	0.05
				50	100	0.1
				100	500	0.5
				500	1000	1

Market	GTP Tick ID	Table ID	Description	Min Value	Max Value	Tick Value
				1000	5000	5
				5000	10000	10
				10000	999999999	50
	11	**FESE4**		0	10	0.001
				10	50	0.005
				50	100	0.01
				100	999999999	0.05
	12	**MTAA_1**		0	0.25	0.0001
				0.25	1	0.0005
				1	2	0.001
				2	5	0.0025
				5	10	0.005
				10	999999999	0.01
	13	**MTAA_ETF**		0	0.25	0.0001
				0.25	1	0.0005
				1	2	0.001
				2	5	0.0025
				5	50	0.005
				50	999999999	0.01
	14	**PX**		0	10	0.01
				10	200	0.05
				200	1000	0.1
				1000	999999999	1
	15	**TEST**		0	999999999	0.1
	16	**T_0.0001**		0	999999999	0.0001
	17	**T_0.0005**		0	999999999	0.0005
	18	**T_0.001**		0	999999999	0.001
	19	**T_0.0025**		0	999999999	0.0025
	20	**T_0.005**		0	999999999	0.005
	21	**T_0.01**		0	999999999	0.01
	22	**T_0.025**		0	999999999	0.025
	23	**T_0.05**		0	999999999	0.05

Market	GTP Tick ID	Table ID	Description	Min Value	Max Value	Tick Value
	24	**T_0.1**		0	999999999	0.1
	25	**T_0.25**		0	999999999	0.25
	26	**T_1**		0	999999999	1
	27	**T_5**		0	999999999	5
	28	**XBUD_1**		0	10	0.1
				10	10000	1
				10000	999999999	5
	29	**XCSE_1**		0	0.5	0.001
				0.5	1	0.005
				1	5	0.01
				5	10	0.05
				10	50	0.1
				50	500	0.5
				500	5000	1
				5000	20000	10
				20000	999999999	100
	30	**XETR_ETF**		0	5	0.001
				5	10	0.005
				10	999999999	0.01
	31	**XETR_ETF2**		0	5	0.001
				5	999999999	0.005
	32	**XHEL_1**		0	0.5	0.001
				0.5	1	0.005
				1	999999999	0.01
	33	**XLON_1**		0	0.1	0.0001
				0.1	1	0.001
				1	10	0.01
				10	500	0.25
				500	1000	0.5
				1000	999999999	1
	34	**XLON_2**		0	0.1	0.0001
				0.1	5	0.0025

Market	GTP Tick ID	Table ID	Description	Min Value	Max Value	Tick Value
				5	10	0.005
				10	999999999	0.01
	35	**XMCE_1**		0	50	0.01
				50	999999999	0.05
	36	**XOSL_1**		0	10	0.01
				10	15	0.05
				15	50	0.1
				50	100	0.25
				100	250	0.5
				250	999999999	1
	37	**XOSL_ETF**		0	50	0.01
				50	250	0.05
				250	1000	0.1
				1000	999999999	0.5
	38	**XSTO_1**		0	0.5	0.001
				0.5	1	0.005
				1	5	0.01
				5	15	0.05
				15	50	0.1
				50	150	0.25
				150	500	0.5
				500	5000	1
				5000	999999999	5
	39	**XSTO_ETF**		0	5	0.01
				5	500	0.05
				500	5000	0.1
				5000	999999999	1
	40	**XSWX_1**		0	10	0.01
				10	100	0.05
				100	250	0.1
				250	500	0.25
				500	1000	0.5

Market	GTP Tick ID	Table ID	Description	Min Value	Max Value	Tick Value
				1000	5000	1
				5000	999999999	5
	41	**XSWX_ETF**		0	5	0.001
				5	20	0.005
				20	999999999	0.01
	42	**XWAR_1**		0	100	0.01
				100	999999999	0.05
	43	**US_1**		0	1	0.0001
				1	999999999	0.01

6 Data Mapping

6.1 Conversion of Order ID

Venue	Representation
Turquoise Lit™	To obtain GTP Order ID, from the source venue ASCII format: Step 1: Remove the leftmost Byte '0' → 04Xj7Wu76ta Step 2: Convert the rest of the digits to decimal using the base 62 dictionary
Turquoise Plato™	

6.2 Conversion of Trade ID

Venue	Representation
Turquoise Lit™	Base 36 decoded value form source venue ASCII format
Turquoise Plato™	
Turquoise Plato Lit Auctions™	

6.3 Base36, Base62 decoding alphabets

6.3.1 Base 36

HEX	ASCII	HEX	ASCII
0	G	18	Y
1	H	19	Z
2	I	20	0
3	J	21	1
4	K	22	2
5	L	23	3
6	M	24	4
7	N	25	5
8	O	26	6
9	P	27	7
10	Q	28	8
11	R	29	9
12	S	30	A
13	T	31	B
14	U	32	C
15	V	33	D

HEX	ASCII	HEX	ASCII
16	W	34	E
17	X	35	F

6.3.2 Base 62

HEX	ASCII	HEX	ASCII	HEX	ASCII	HEX	ASCII
0	0	18	I	36	a	54	s
1	1	19	J	37	b	55	t
2	2	20	K	38	c	56	u
3	3	21	L	39	d	57	v
4	4	22	M	40	e	58	w
5	5	23	N	41	f	59	x
6	6	24	O	42	g	60	y
7	7	25	P	43	h	61	z
8	8	26	Q	44	i		
9	9	27	R	45	j		
10	A	28	S	46	k		
11	B	29	T	47	l		
12	C	30	U	48	m		
13	D	31	V	49	n		
14	E	32	W	50	o		
15	F	33	X	51	p		
16	G	34	Y	52	q		
17	H	35	Z	53	r		

6.4 Conversion of negative values in price fields

Signed data types, such as Price and Price4, might indicate negative values where applicable. Negative numbers are represented using the “Sign and magnitude” method. Encoding and decoding examples are provided in the following sections.

6.5 Encoding negative values in price fields

Decimal value = -1
Decimal value with eight implied decimal places = -100000000
Remove sign bit = 100000000
Convert to binary = 00000000 00000000 00000000 00000000 00000101 11110101 11100001 00000000
Add sign bit = 10000000 00000000 00000000 00000000 00000101 11110101 11100001 00000000

Hex value = 80 00 00 00 05 f5 e1 00
Hex value converted to Little endian = 00 e1 f5 05 00 00 00 80

6.6 Decoding negative values in price fields

Received bytes in hex = 00 e1 f5 05 00 00 00 80
Change the byte order to big endian = 80 00 00 00 05 f5 e1 00
Convert to binary = 10000000 00000000 00000000 00000000 00000101 11110101 11100001 00000000
Most significant bit is set. Therefore this is a negative value.
Remove the sign bit = 00000000 00000000 00000000 00000000 00000101 11110101 11100001 00000000
Convert to decimal = 100000000
Add sign to decimal = -100000000
Mark eight implied decimal places -1.00000000