GROUP TICKER PLANT

GTP 002 – Technical Guide – TRADEcho MiFID Post Trade Reporting

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Guide disclaimer

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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.

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
- GTP002 – Technical Guide – London Stock Exchange
- GTP002 – Technical Guide – TRADEcho Pre Trade SI Quote
- **GTP002 – Technical Guide – TRADEcho MiFID II Post Trade Reporting (this document)**
- GTP003 – Statistics Guide
- GTP004 – Parameters Guide
- GTP005 – Testing 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.londonstockexchange.com/resources/equities-trading-resources/gtp-technical-specifications

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.
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.

Issue	Date	Description
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.
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

Issue	Date	Description
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
23.0	7 September 2023	3.11.14 – Typo in 'Trade Qualifier' field is fixed 3.11.22 – Typo in 'Instrument Identification Code Type' field is fixed 3.11.23 - MiFID II Trade Report (0x54) is updated as follow: • New fields are added: Third-country trading venue of execution, Portfolio Transaction Flag, Contingent Transaction Flag, Missing Price • New values are added to the fields: Price Formation Indicator, Reference Price Indicator • Description of the following fields is updated: MiFID Price, Price Currency, Notional Currency, Notional Amount
23.1	20 October 2023	3.11.23 - MiFID II Trade Report (0x54) is updated as follow: • Description of field 'MiFID Quantity' is updated
24.0	21 December 2023	All sections – Removed content related to London Stock Exchange and Turquoise. 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: • Instrument Directory – Equities • Add Order – MBO • Add Order Short – MBO • Add Order – MBP • Add Order Short – MBP • Add Order Incremental • Order Modify • Top of Book • Trade • Trade Cross • Statistics Update • FTSE Russell Indices Update • Announcements • Indicative Quote Information • MiFID II Trade • MiFID II Trade Cross • Trade Summary • Analytics

Issue	Date	Description	
		Message	**Updated description of the fields**
		System Event	Event Code
		Instrument Directory	Allowed Book Types, Venue Instrument ID, Tick ID, Price Band Tolerances (%), Dynamic Circuit Breaker Tolerances (%), Static Circuit Breaker Tolerances (%)
		Instrument Status	Trading Status, Session Change Reason, New End Time, Order Book Type
		Delete Order	Order Book Type
		Order Book Clear	Order Book Type
		Statistics	VWAP, VWAP (on-book only), Turnover, Turnover (on-book only)
		Statistics Snapshot	VWAP, VWAP (on-book only), Turnover, Turnover (on-book only), Official Opening Price, Official Closing Price, Trade High (on-book only), Trade Low (on-book only), Trade High, Trade Low, 52-week Trade High, 52-week Trade Low, Opening Price Indicator, Closing Price Indicator, IAU Price, IAU Paired Size, Imbalance Quantity, Imbalance Direction, Best Closing Bid Price, Best Closing Ask Price, Best Closing Bid Size, Best Closing Ask Size, Trade High Off-Book, Trade Low Off-Book, Auction Type, Last Trade Price, Last Trade Quantity, Last Trade Time, Static Reference Price, Dynamic Reference Price
		Message	**Field is renamed**
		Instrument Directory	'Group ID' into 'Segment' 'Underlying ISIN Code' into 'Reserved Field' 'Underlying Instrument ID' into 'Reserved Field' 'Flags' into 'Reserved Field'
		Statistics Snapshot	'Open Interest' into 'Reserved Field' 'Volatility' into 'Reserved Field'
		Order Delete	‘Previous Yield’ into ‘Transaction Time’ (N/A for TRADEcho)
		MiFID II Trade Report	‘Volume Omission Flag’ (offset 329) into ‘Volume Omission For Sovereign Debt Flag’

24.1	10 January 2024	**Changes for Release - TRADEcho 3.17**
		3.5 - Description of data type 'Alpha' is updated
		3.5 - Description of data type 'UDT' is updated
		3.11.8 - MiFID II Trade Report (0x54) is updated as follow:
		• New fields are added: ‘Market Closing Price Flag’, ‘NT Large in Scale Flag’ and ‘NT Pre Trade Transparency Flag’
		• New values are added to the fields: Negotiation Indicator, Reference Price Indicator
		• The following fields are renamed:
		  ○ 'Price Currency' into ‘Price Major Currency (FCA) / Price Currency (ESMA)’
		  ○ 'Missing Price' into ‘Missing Price (ESMA) / Price Conditions (FCA)’
		• Description of the following fields is updated: MiFID Price, Notional Currency, Negotiation Indicator, Reference Price Indicator, Missing Price (ESMA) / Price Conditions (FCA), Price Major Currency (FCA) / Price Currency (ESMA)
		• Added table ‘Trade Flags Relevance Across Jurisdictions’	

Issue	Date	Description
24.2	22 January 2024	**Changes for Release - TRADEcho 3.17** 3.11.8 - MiFID II Trade Report (0x54) is updated as follow: • 'Duplicative Indicator' field is enriched with values related to Intra-Group Trade (IGRP) and Cross-Border Duplicative Trade Report (XBDT) • 'Transaction Category' field is enriched with values related to RFMD Give-Up Trade (GIVE)
24.3	28 March 2024	**Changes for Release - TRADEcho 3.17** Firm Quote book is renamed to SI Quote book in the following messages: • 3.9.3 - Recovery Request • 3.11.2 – Instrument Directory • 3.11.3 - Instrument Status • 3.11.4 - Order Delete • 3.11.5 - Order Book Clear • 3.11.9 - SI Quotes 3.11.8 - MiFID II Trade Report (0x54) is updated as follow: • 'Price Notation' field added support of unset value • 'Secondary Publication' field is renamed to 'Reserved Field'
24.4	24 April 2024	3.5 Data Type section – name of extended ASCII table is corrected 3.10.5 Replay and Recovery Complete – typo in field length is corrected
25.1	25 October 2024	3.5 Data Type section – Description of MiFID Decimal data type and 'blank' value are updated 3.11.8 – MiFID II Trade Report (0x54) • Precision of MiFID Price, MiFID Quantity, Notional Amount, Quantity in Measurement Units is updated • Description of MiFID Quantity is updated • Added a new value to reflect combination of flags CLSE and RFPT in the same trades • Trade Flags Relevance Across Jurisdictions' table is updated for flags GIVE, IGRP, XBDT in line with change done in version 24.2 • ORGN flag is removed from Duplicate Flag as it's not applicable to TRADEcho and 'Trade Flags Relevance Across Jurisdictions' table is updated respectively 3.10.5 – Replay and Recovery Complete • Added information about possible trading statuses
25.2	12 June 2025	Typo corrections: • 4.5 Data Types – MiFID Price updated to MiFID Decimal in the last paragraph • 4.9.2 Repay Request – offset and length of field 'First Message' is updated • 4.9.3 Recovery Request – sub-header column name changed from 'Hex' to 'Value' • 4.10.4 Recovery Response – description of field 'Message Type' is updated • 4.11.1 System Event – missed codes added to field • 4.11.2 Instrument Directory – description and field name at offset 89 is updated • 7.3 Base 64 decoding alphabets – column names are updated

26.2.1	4 August 2025	2.0 Service Description section is added
		• 2.1 Reference Data
		  ○ 'Instrument Status Management' table moved from 4.1.3. Instrument Status
		• 2.2 System Trading Phase
		• 2.3 Product Failure
		• 2.4 Statistics
		• 2.5 Negative Prices
		• 2.5 Representation of Trade Flags
		  ○ 'Trade Flags Relevance Across Jurisdictions' table has been moved from section 4.11.8 MiFID II Trade Report. References to jurisdictions have been removed, and the table has been updated in accordance with FIX MMT v4.2.

Issue	Date	Description
26.2.2	4 August 2025	**GTP002 – Technical Guide – TRADEcho split into:** • GTP002 - Technical Guide – TRADEcho PreTrade SI Quote • GTP002 - Technical Guide – TRADEcho MiFID II Post Trade Reporting (this document) Information related to SI Quote service removed: • 4.11.4 Order Delete • 4.11.5 Order Book Clear • 4.11.9 Systematic Internaliser (SI) Quotes • 5.2.2 Sending a request for an Instrument Level Order Book snapshot • 5.2.3 Sending a request for a Group or Channel Level Order Book snapshot • 7.1 Conversion of Order ID • 4.7 Message overview – Application Messages Added a note that SI Quote features are not applicable to MiFID II Post Trade service: • 4.9.3 Recovery Request • 4.11.2 Instrument Directory • 4.11.3 Instrument Status
26.2.3	4 August 2025	**Changes for Release 1.25.0.0 RFC273 – FCA PS 24/14 implementation:** 4.11.8 - MiFID II Trade Report (0x54) is updated as follow: • New fields are added: 'Effective date of the contract', 'Maturity date of the contract', 'Spread', 'Upfront payment', 'LEI of clearing house' • 'Transaction to be cleared' – the field is now blank for trades under UK jurisdiction • 'Instrument Identification Code Type', 'Instrument Identification Code' – may now include a Unique Product Identifier (UPI), in accordance with ISO 4914 standards for security identifiers • Field 'MiFID Trading Date' and Time renamed to 'Trading Date and Time' • Field 'MiFID Price' and Time renamed to 'Price' • Field 'MiFID Quantity' and Time renamed to 'Quantity' • Field 'Venue Measurement Unit Notation' renamed to 'Notation of the quantity in measurement unit' and the clarity of its description has been improved 4.5 Data types – MiFID Date is added
26.2.4	15 September 2025	**Changes for Release 1.25.0.0 RFC273 – FCA PS 24/14 implementation:** 4.11.8 - MiFID II Trade Report (0x54) – MiFID Quantity will be blank if the traded security is a bond under FCA jurisdiction. To determine the asset class of an instrument, clients should refer to MIT401 – Guide to Reference Data Services **Clarity and accuracy improvements:** 2.6 Representation of Trade Flags - removed reference to unsupported flags • IFND - Inter-Fund Transfer on Behalf of Clients • ENAV - Exchange Traded Funds (ETF) Net Asset Value (NAV) Trade
27.2.1	5 December 2025	**Changes for Release 1.26.0.0 – ESMA (EU) 2017/583 (RTS 2) and 2017/587 (RTS 1) amended by DR (EU) 2025/1246:** 4.11.8 - MiFID II Trade Report (0x54) is updated as follow: • New fields are added (offsets 516-532): 'Matched Principal Trade Flag', 'ESMA Standard Deferral Flags', 'Negotiation Trade Flag', 'ESMA Supplementary Deferral Flags, 'Trading System' • The FIX MMT section of the message (offsets 394–407) is updated in alignment with MMT v5.0 (Efficient Encoding): 'Negotiation Indicator', 'Agency Cross Indicator', 'Post Trade Deferral Reason', 'Deferral/Enrichment Type' • To comply with MMT v5.0 (Efficient Encoding) - The value ranges for Market Mechanism (394) and Trading Mode (295) fields are revised and updated 2.6 Representation of Trade Flags – the summary table is updated to reflect the newly introduced flags

Issue	Date	Description
27.2.2	27 January 2026	**Updated the section numbering as follows:** • Message 'Statistics' from 4.11.6 to 4.11.4 • Message 'Statistics Snapshot' from 4.11.7 to 4.11.5 • Message 'MiFID II Trade Report' from 4.11.8 to 4.11.6 **Content refresh and clarity Improvement:** • 4. Message Formats – refreshed wording to provide a clearer, more contemporary description • 4.5 Data Types - improved description of default values • 4.7 Message overview – Application Messages – update the description of messages and throttling functionality • 4.10.5 Replay and Recovery Complete – added clarification that field 'Trading System' may contain default values • 4.11.6 - MiFID II Trade Report (0x54) message – AGFW mentioned in the 'Trading Date and Time' field as a flag for which the field will be left blank • 5. Client Data Recovery – refreshed wording across subsections, removed outdated content, and removed information not applicable to the trading venue • 3.4 Timestamps – reference to regulatory documentation is updated Please note that all the above modifications are highlighted in **amber** within the document. It indicates **non-material changes**, applied to improve clarity and documentation quality. Material changes are shown in **red** and listed separately.
27.2.3	20 April 2026	4.11.6 - MiFID II Trade Report (0x54) is updated as follow: New fields are added (offset 536): 'APA Received Date and Time'
28.2.1	21 October 2026	2.6 Representation of Trade Flags - Removed deprecated trade flag definitions **ACTX, RPRI, DUPL, IDAF, VOLW, and COAF** 4.11.6 - MiFID II Trade Report (0x54) Updated message layout by repurposing the fields **Indefinite Aggregation Flag**, **Volume Omission for Sovereign Debt Flag**, and **Consecutive Aggregation Flag** (Offsets 325-336) to support publication of the **Trade Report ID** (Offset 325, Length 12). Updated the Transaction Identification Code description to differentiate it from the new Trade Report ID field. Removed deprecated enumeration values from MiFID II Trade Report fields: RPRI from Transaction Category; ACTX from Agency Cross Indicator; DUPL from Duplicative Indicator; and IDAF, VOLW, COAF from Deferral/Enrichment Type. Removed deprecated IDAF and COAF indicators from the Trading Date and Time Description field. Converted Agency Cross Trade Flag (Offset 233), Price Improvement Flag (Offset 273), and Duplicate Flag (Offset 285) to Reserved for Future Use. Please note that all the above modifications are highlighted in red and brown within the document. Material changes are shown in red. Non-material changes are in amber. Changes applied to improve clarity and documentation quality.

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
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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.londonstockexchange.com/equities-trading/market-data/group-ticker-plant

2. Service description

2.1 Reference Data

Start of Day (SOD)

Instrument Directory and Instrument Status messages are disseminated per instrument prior to the System Event – Start of Day (SOD) message.

- The Instrument Directory message (0x70), disseminated on multicast channels, is also available via Recovery.
- Instrument Status messages accompany the Instrument Directory messages, indicating the trading status of each instrument.

XLON instruments are published via MiFID II Post Trade feeds. The Instrument Directory includes the following attributes[1]:

- Instrument (GTP Instrument ID) – the only instrument identifier available in other market data messages. This attribute should be used to map market data messages to ISIN.
- ISIN – International Securities Identification Number
- Allowed Book Types –Off-Book for MiFID II Post Trade Feed
- Venue Instrument ID – unique identifier across LSE and TRADEcho system
- Segment – classification used by LSE and TRADEcho to group instrument under specific trading model
- Currency – Trading currency of the instrument
- ADT – Average Daily Turnover provided by FCA

Please note that an instrument with the same Venue Instrument ID will be assigned different GTP Instrument IDs on LSE and TRADEcho

Intraday Updates

- MiFID II Post Trade Feeds: Instrument status changes, such as suspensions or halts, are communicated through Instrument Status messages.

Instrument Status Management

TRADEcho Off Book instrument status	Accept			GTP Off Book Instrument status
	on-Exchange Trade Report	OTC Trade Report	SI Trade Report	
Active	Yes	Yes	Yes	Active
Inactive	No	No	No	Inactive
Halt	No	Yes	Yes	Reg. halt
Instrument suspended	Yes	Yes	Yes	Suspended

2.2 System Trading Phase

Session transitions are communicated via one System Event message per multicast channel for all allocated instruments.

MiFID II Post Trade Feeds: System Event message includes:

- Start of Day (SOD)
- Start of Open
- Start of Pre-Close
- End of Day (EOD)

[1] A wider list of instrument attributes – including these listed above (except for GTP Instrument ID) – can be found in the instrument reference data file. Full details are provided in MIT401 – Guide to Reference Data Services

2.3 Product Failure

- In case of switch to SDC the system resends all the data disseminated by TRADEcho MiFID Trade Reporting service in PDC before resuming SDC realtime operation
- Full details are provided in GTP001 – Product Guide

2.4 Statistics

- MiFID II Post Trade feeds: Only off-book statistics are supported on TRADEcho
- Full details are provided in GTP003 – Statistics Guide

2.5 Negative Prices

- MiFID II Post Trade Feeds: Negative prices may be present in MiFID II Trade Report messages.

2.6 Representation of Trade Flags

MiFID II Trade Report message supports two ways of representing regulatory flags - in full name format and as short codes, in line with FIX MMT Efficient Encoding.

The table below outlines the correlation between these two formats, specifying the fields used for publishing full names and identifying the corresponding MMT fields where the short codes are published

An 'N/A' in MiFID II Trade Report column signifies that the corresponding flags are not currently published via full name, short code or both publication methods

MiFID II Trade Report – Full Name | Short Codes		Flag	Flag Description
Exchange For Physicals Flag	Transaction Category	TPAC	Package Trade (excluding Exchange for Physicals)
		XFPH	Exchange for Physicals Trade
N/A		GIVE	RFMD Give-Up Trade
NT Pre Trade Transparency Flag	Negotiation Indicator	NETW	Negotiated Trade With Pre Trade Transparency Waiver
NT Liquidity Flag		NLIQ	Negotiated Trade in Liquid Financial Instruments
NT Large in Scale Flag		NTLS	Negotiated Trade Larger Than LIS Brought Onto a Venue
NT Liquidity Flag		OILQ	Negotiated Trade in Illiquid Financial Instruments
NT Price Conditions Flag		PRIC	Negotiated Trade Subject to Conditions Other Than The Current Market Price
Negotiation Trade Flag		NEGO	Negotiation Trade
Matched Principal Trade Flag	Agency Cross Indicator	MTCH	Matched Principal Trade
Amendment Flag	Modification Indicator	AMND	Trade Amendment
Cancellation Flag		CANC	Trade Cancellation
Benchmark Transaction Flag	Reference Price Indicator	BENC	Benchmark Trade
Market Closing Price Flag		CLSE	Benchmark Transactions Executed at the Market Closing Price
Contingent Transaction Flag		CONT	Contingent Trade
Portfolio Transaction Flag		PORT	Portfolio Trade
Reference Price Transaction Flag		RFPT	Reference Price Trade
Special Dividend Flag	Special Dividend Indicator	SDIV	Special Dividend Trade

MiFID II Trade Report – Full Name | Short Codes		Flag	Flag Description
Missing Price (ESMA) / Price Conditions (FCA)	Price Formation Indicator	NOAP	Price is Not Applicable
Non Price Forming Transactions Flag		NPFT	Non-Price Forming Trade (formerly defined as a Technical Trade)
Missing Price (ESMA) / Price Conditions (FCA)		PNDG	Price is Currently Not Available but Pending
Non Price Contribution to Discovery		TNCP	Trade not Contributing to the Price Discovery Process (formerly defined as a Technical Trade)
Algo Transaction Flag	Algorithmic Indicator	ALGO	Algorithmic Trade
PTIliquid Flag	Post Trade Deferral Reason	ILQD	Non-Immediate Publication: Deferral for Illiquid Instrument
PTDeferralReason Flag		LRGS	Non-Immediate Publication: Deferral for Large in Scale
PTDeferralReason Flag		SIZE	Non-Immediate Publication: Deferral for Size Specific
ESMA Standard Deferral Flags		MLF1	Non-Immediate Publication: Deferral for "Medium Size Liquid Market”
		MIF2	Non-Immediate Publication: Deferral for "Medium Size Illiquid Market”
		LLF3	Non-Immediate Publication: Deferral for "Large Size Liquid Market"
		LIF4	Non-Immediate Publication: Deferral for "Large Size Illiquid Market"
		VLF5	Non-Immediate Publication: Deferral for "Very Large Size Liquid Market"
		VIF5	Non-Immediate Publication: Deferral for "Very Large Size Illiquid Market"
		DEFF	Non-Immediate Publication: Deferral for ETCs, ETNs, SFPs, Emission Allowances
Daily Aggregated Transaction Flag	Deferral/ Enrichment Type	DATF	Daily Aggregated Trade
DAFull Details Flag		FULA	Full Details of Earlier Daily Aggregated Trade (DATF)
LDFull Details Flag		FULF	Full Details of Earlier Limited Details Trade (LMTF)
FAFull Details Flag		FULJ	Full Details of Earlier Four Weeks Aggregation Trade (FWAF)
VOFull Details Flag		FULV	Full Details of Earlier Volume Omission Trade (VOLO)
Four Weeks Aggregation Flag		FWAF	Four Weeks Aggregation Trade
Limited Details Flag		LMTF	Limited Details Trade
Volume Omission Flag		VOLO	Volume Omission Trade
ESMA Supplementary Deferral Flags		OMIS	Volume Omission for Sovereign Bonds Trade
		FULO	Full Details of Earlier "Volume Omission Sovereign Bond Trade (OMIS)"
		AGFW	Four Weeks Aggregation for Sovereign Bonds Trade
		FULG	Full Details of Earlier "Aggregated Sovereign Bond Trade (AGFW)"
N/A	Duplicative Indicator	IGRP	Intra-Group Trade
N/A		XBDT	Cross-Border Duplicative Trade Report

3 Connectivity

3.1 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.

3.1.1 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.

3.1.2 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.

3.2 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.

4 Message formats

The Group Ticker Plant delivers comprehensive real-time, multi–asset class information through a single, bespoke binary protocol. Developed in close collaboration with clients, the protocol features a clear and intuitive message library that reflects the current structure of our market data model. Its functionality includes:

- Replay and recovery services operate without password validation
- Replay and recovery services function without a logout process
- Statistics messages for the publication of derived information
- An Allowed Book Types field in Instrument Directory messages to identify applicable trading models
- MiFID-compliant market data messages supporting transmission of data in line with regulatory standards

The protocol is designed to be generic and highly extensible, enabling straightforward integration of additional services as the Group Ticker Plant evolves.

4.1 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.

4.2 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 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.

4.3 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.

4.4 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 MiFID II Trade Report message 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 required under DR (EU) 2025/1155 and the onshored DR (EU) 2017/574 (RTS 25) in the UK, will ensure that the appropriate timestamp granularity is consistently transmitted to the Group Ticker Plant.

4.5 Data types

The fields used within the messages adopt the data types defined below. Where individual field descriptions later in this document reference a value of 'blank' or 'default value', this denotes the default value of the corresponding data type, as specified in the table that follows:

Data Type	Length	Default Value	Description
Alpha	Variable	Spaces	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	0 (zero)	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	0 (zero)	A single byte used to hold one ASCII character.
Date	8	Spaces	Date specified in the YYYYMMDD format using ASCII characters.
Time	6	Spaces	Time specified in HHMMSS format using ASCII characters in a 24-hour clock format.
UDT (Unix Date Time)	8	0 (zero)	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	0 (zero)	Signed Little-Endian encoded 64 bit integer field with eight implied decimal places.
Size	8	0 (zero)	Little-Endian encoded 64 bit unsigned integer with eight implied decimal places.
Price4	8	0 (zero)	Signed Little-Endian encoded 64 bit integer field with four implied decimal places.
Size4	8	0 (zero)	Little-Endian encoded 64 bit unsigned integer with four implied decimal places.
UInt8	1	0 (zero)	8 bit unsigned integer.
UInt16	2	0 (zero)	Little-Endian encoded 16 bit unsigned integer.
UInt32	4	0 (zero)	Little-Endian encoded 32 bit unsigned integer.
UInt64	8	0 (zero)	Little-Endian encoded 64 bit unsigned integer.
Date and Time	27	Spaces	ISO 8601 date and time in the following string format:YYYY-MM-DDThh:mm:ss.dddddddZ. – 'YYYY' is the year – 'MM' is the month – 'DD' is the day – '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	Spaces	These fields use standard ASCII character bytes to represent numeric values. They are left justified and padded on the right with spaces. Negative numbers are prefixed with '-' (minus). Decimal separator is '.' (Full stop). A numerical value sent with omitted integer part (starting with dot): • {DECIMAL-n/m} – Positive decimal number of up to 'n' digits in total of which up to 'm' digits can be fraction digits. • {DECIMAL-n/m} – Negative decimal number of up to 'n-1' digits in total of which up to 'm-1' digits can be fraction digits. A numerical value sent with a present integer part: • {DECIMAL-n/m} – Positive decimal number of up to 'n-1' digits in total of which up to 'm-1' digits can be fraction digits. {DECIMAL-n/m} – Negative decimal number of up to 'n-2' digits in total of which up to 'm-2' digits can be fraction digits.
MiFID Date	10	Spaces	ISO 8601 date in the following string format:YYYY-MM-DD – 'YYYY' is the year – 'MM' is the month – 'DD' is the day Dates shall be reported in UTC.

4.6 Message overview – Administrative Messages

Name	Message type ASCII	Hex	Usage
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.

4.7 Message overview – Application Messages

Each GTP Application Message is listed below with corresponding ASCII and Hex codes. For additional information related to Intelligent Throttling, please refer to GTP Product Guide (GTP001).

Name	Message Type ASCII	Hex	Usage	Intelligent Throttling applied?
System Event	S	0x53	The message will be broadcast at the start and end of day on TRADEcho. Session transition is advertised via one system event message for all instruments allocated to the same multicast channel.	N
Instrument Directory	p	0x70	Used to disseminate a limited set of data for all configured instrument types on the real-time channels	Y
Instrument Status	H	0x48	Should a specific instrument be subject to individual status change – such as suspension or halt – this will be communicated by the instrument status message. Customers should note that instrument status messages may be disseminated prior to system event – start of day message	N
Statistics	w	0x77	Contains a set of statistics that are updated frequently, usually as a result of executions.	N
Statistics Snapshot	k	0x6b	A snapshot of an instrument's statistics that is used for recovery.	
MiFID II Trade Report	T	0x54	Sent to report the MiFID compliant details of a privately negotiated trade.	Y

4.8 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.

Field	Offset	Length	Type	Description
Payload	8	Variable	-	One or more payload messages.

4.9 Administrative Messages (Client-Initiated)

4.9.1 Login Request

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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.	

4.9.2 Replay Request

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	Y	N
Channel 4/8	TRADEcho Partition B MiFID II	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	**3**	**4**	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.	

4.9.3 Recovery Request

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	N	Y
Channel 4/8	TRADEcho Partition B MiFID II	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:	
				Value	**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.	
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
				2	Off-book
Source Venue	19	2	UInt16	Venue from which market data is received for the instrument.	
				Value	**Meaning**
				11	TRADEcho

Field	Offset	Length	Type	Description	
Recovery Type	21	1	UInt8	The type of messages to be replayed:	
				Value	**Meaning**
				0	Instrument Directory
				1	Order book (Not applicable to MiFID II Post Trade)
				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.	

4.10 Administrative Messages (Server-Initiated)

4.10.1 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.

4.10.2 Login response

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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

Field	Offset	Length	Type	Description	
				c	Service Unavailable
				d	Maximum Connections Limit Reached
				e	Failed (other)
				f	Invalid CompID or IP Address

4.10.3 Replay Response

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	Y	N
Channel 4/8	TRADEcho Partition B MiFID II	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.	

4.10.4 Recovery Response

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	N	Y
Channel 4/8	TRADEcho Partition B MiFID II	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	Recovery 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.	

4.10.5 Replay and Recovery Complete

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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. **Value** — **Meaning** 1 — Inactive/Underlying Suspended 2 — Suspended 3 — Active P — Halt – Regulatory Halt Blank if not applicable

4.11 Application Messages

4.11.1 System Event

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	Y	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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**
				O	Start of Day
				T	Start of Open
				P	Start of Pre Close
				C	End of Day
Source Venue	12	2	UInt16	Venue from which market data is received for the instrument.	
				Value	Meaning
				11	TRADEcho

4.11.2 Instrument Directory

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	Y	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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** 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** 2 / Off-book
Source Venue	32	2	UInt16	Venue from which market data is received for the instrument. Value / Meaning 11 / TRADEcho
Venue Instrument ID	34	11	Alpha	Instrument identifier used by the source venue.
Tick ID	45	2	Alpha	Not Applicable to TRADEcho
Price Band Tolerances (%)	47	8	Price	Not Applicable to TRADEcho
Dynamic Circuit Breaker Tolerances (%)	55	8	Price	Not Applicable to TRADEcho
Static Circuit Breaker Tolerances (%)	63	8	Price	Not Applicable to TRADEcho
Segment	71	6	Alpha	Segment the instrument is assigned to.
Reserved Field	77	12	Alpha	Reserved for future use.
Security Exchange	89	11	Alpha	Not Applicable to TRADEcho
Currency	100	3	Alpha	Currency Code as per ISO 4217. For additional currencies supported refer to the Additional Field Values section of this document
Reserved Field	103	1	Byte	Reserved for future use.
Reserved Field	104	4	Alpha	Reserved for future use.

Field	Offset	Length	Type	Description
Average Daily Turnover (ADT)	108	8	Price4	Average Daily Turnover as reported by the Source Venue.
Reserved Field	116	8	Alpha	Reserved for future use.
Reserved Field	124	1	Bit Field	Reserved for future use.
Reserved Field	125	8	Price	Reserved for future use.
Reserved Field	133	8	Price	Reserved for future use.

4.11.3 Instrument Status

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	Y	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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.	
				Value	**Meaning**
				11	TRADEcho
Trading Status	21	1	Byte	**Value**	**Meaning**
				1	Inactive
				2	Suspended
				3	Active
				P	Halt – Regulatory Halt
Session Change Reason	22	1	UInt8	**Value**	**Meaning**
				0	Scheduled Transition
New End Time	23	6	Time	Not Applicable to TRADEcho	
Order Book Type	29	1	UInt8	**Value**	**Meaning**
				2	Off-book

4.11.4 Statistics

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	Y	Y	N
Channel 4/8	TRADEcho Partition B MiFID II	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** 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. **Value** / **Meaning** 11 / TRADEcho
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	Not Applicable to TRADEcho
VWAP (on-book only)	45	8	Price4	Not Applicable to TRADEcho
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	Not Applicable to TRADEcho
Turnover (on-book only)	69	8	Price4	Not Applicable to TRADEcho

4.11.5 Statistics Snapshot

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	N	N	Y
Channel 4/8	TRADEcho Partition B MiFID II	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	Venue from which market data is received for the instrument. **Value** / **Meaning** 11 / TRADEcho
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	Not Applicable to TRADEcho
VWAP (on-book only)	45	8	Price4	Not Applicable to TRADEcho
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	Not Applicable to TRADEcho
Turnover (on-book only)	69	8	Price4	Not Applicable to TRADEcho
Official Opening Price	77	8	Price	Not Applicable to TRADEcho
Official Closing Price	85	8	Price	Not Applicable to TRADEcho
Trade High (on-book only)	93	8	Price	Not Applicable to TRADEcho
Trade Low (on-book only)	101	8	Price	Not Applicable to TRADEcho
Trade High	109	8	Price	Not Applicable to TRADEcho
Trade Low	117	8	Price	Not Applicable to TRADEcho
52-week Trade High	125	8	Price	Not Applicable to TRADEcho
52-week Trade Low	133	8	Price	Not Applicable to TRADEcho
Opening Price Indicator	141	1	Byte	Not Applicable to TRADEcho

Field	Offset	Length	Type	Description
Closing Price Indicator	142	1	Byte	Not Applicable to TRADEcho
IAU Price	143	8	Price	Not Applicable to TRADEcho
IAU Paired Size	151	8	Size	Not Applicable to TRADEcho
Imbalance Quantity	159	8	Size	Not Applicable to TRADEcho
Imbalance Direction	167	1	Byte	Not Applicable to TRADEcho
Best Closing Bid Price	168	8	Price	Not Applicable to TRADEcho
Best Closing Ask Price	176	8	Price	Not Applicable to TRADEcho
Best Closing Bid Size	184	8	Size	Not Applicable to TRADEcho
Best Closing Ask Size	192	8	Size	Not Applicable to TRADEcho
Trade High Off-Book	200	8	Price	Not Applicable to TRADEcho
Trade Low Off-Book	208	8	Price	Not Applicable to TRADEcho
Reserved Field	216	8	Size	Reserved for future use.
Reserved Field	224	8	Price	Reserved for future use.
Auction Type	232	1	Byte	Not Applicable to TRADEcho
Last Trade Price	233	8	Price	Not Applicable to TRADEcho
Last Trade Quantity	241	8	Size	Not Applicable to TRADEcho
Last Trade Time	249	8	UDT	Not Applicable to TRADEcho
Static Reference Price	257	8	Price	Not Applicable to TRADEcho
Dynamic Reference Price	265	8	Price	Not Applicable to TRADEcho

4.11.6 MiFID II Trade Report

Market Data Group	Channel Content	MiFID II Post Trade	Replay	Recovery
Channel 2/6	TRADEcho Partition A MiFID II	Y	Y	Y
Channel 4/8	TRADEcho Partition B MiFID II	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** 0x54 / MiFID II Trade Report
Timestamp	3	8	UDT	Time the message was generated.
Instrument	11	8	UInt64	GTP Instrument Identifier. This field will be populated with 0 for Non-Exchange listed instruments
Transaction identification code	19	52	Alpha	A unique trade identifier. This identifier will be same across the trade life cycle (new, amend, cancel). The value will be right aligned.
Total Number of Transactions	71	4	Uint32	Total Number of Transactions of aggregated trade
Reserved Field	75	8	Price	Reserved for future use.
Source venue	83	2	UInt16	Venue from which market data is received for the instrument. **Value** / **Meaning** 11 / TRADEcho
Price	85	20	MiFID Decimal	The trade price, limited to a precision of {DECIMAL-19/18} Will be set to default value (20 spaces) if there is a pending price (PNDG) In case of transactions under ESMA jurisdiction: • Will be set to default value (20 spaces) if price is not available (NOAP)
Quantity	105	20	MiFID Decimal	The number of units of the financial instrument or the number of derivative contracts in the trade, limited to a precision of {DECIMAL-19/18} Will be set to default value (20 spaces) if quantity is not available In case of transactions under FCA jurisdiction: • Will be set to default value (20 spaces) if the traded security is a bond

Field	Offset	Length	Type	Description
Trading Date and Time	125	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. Blank for aggregated publications: • DATF (Daily Aggregated Transaction Flag) • FWAF (Four Week Aggregation Flag) • AGFW (Four Weeks Aggregation for Sovereign Bonds Trade)
Instrument Identification Code Type	152	4	Alpha	**Value** — **Meaning** UPI — Unique Product Identifier ISIN — International Securities Identification Number
Instrument Identification Code	156	12	Alpha	Instrument identification number (UPI or ISIN code).
Price Notation	168	4	Alpha	Indicates if the price is expressed in monetary value, in percentage or yield. Will be set to default value (4 spaces) if not available Possible values: **Value** — **Meaning** MONE — Monetary value PERC — Percentage YIEL — Yield BAPO — Basis Point
Price Major Currency / Price Currency[2]	172	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	175	20	MiFID Decimal	Notional value relevant to the security, limited to a precision of {DECIMAL-19/18}
Notional Currency	195	3	Alpha	Major currency in which the notional amount is denominated.
Venue of Execution	198	4	Alpha	Identification of the venue where the transaction was executed. Possible Values: **Value** — **Meaning** XOFF — OTC SINT — Systematic Internaliser {MIC} — Reported by RM/MTF/OTF (the MIC corresponding to the relevant venue)
Publication Date and Time	202	27	Date and Time	Date and time when the transaction was published.
Benchmark Transaction Flag	229	4	Alpha	Possible values: **Value** BENC
Reserved Field	233	4	Alpha	Reserved for future use

[2] Price Major Currency (FCA 2017/587) / Price Currency (ESMA, FCA 2017/583)

Field	Offset	Length	Type	Description
Non Price Forming Transactions Flag	237	4	Alpha	Possible values:
				Value
				NPFT
Non Price Contribution to Discovery	241	4	Alpha	Possible values:
				Value
				TNCP
Special Dividend Flag	245	4	Alpha	Possible values:
				Value
				SDIV
PTDeferralReasonFlag	249	4	Alpha	Possible values:
				Value
				SIZE
				LRGS
Reference Price Transaction Flag	253	4	Alpha	Possible values:
				Value
				RFPT
NT Liquidity Flag	257	4	Alpha	Possible values:
				Value
				NLIQ
				OILQ
NT Price Conditions Flag	261	4	Alpha	Possible values:
				Value
				PRIC
Algo Transaction Flag	265	4	Alpha	Possible values:
				Value
				ALGO
PTIliquidFlag	269	4	Alpha	Possible values:
				Value
				ILQD
Reserved Field	273	4	Alpha	Reserved for future use
CancellationFlag	277	4	Alpha	Possible values:
				Value
				CANC
AmendmentFlag	281	4	Alpha	Possible values:
				Value
				AMND
Reserved Field	285	4	Alpha	Reserved for future use

Field	Offset	Length	Type	Description
Exchange For Physicals Flag	289	4	Alpha	Possible values:
				Value
				TPAC
				XFPH
Limited Details Flag	293	4	Alpha	Possible values:
				Value
				LMTF
LDFull Details Flag	297	4	Alpha	Possible values:
				Value
				FULF
Daily Aggregated Transaction Flag	301	4	Alpha	Possible values:
				Value
				DATF
DAFull Details Flag	305	4	Alpha	Possible values:
				Value
				FULA
Volume Omission Flag	309	4	Alpha	Possible values:
				Value
				VOLO
VOFull Details Flag	313	4	Alpha	Possible values:
				Value
				FULV
Four Weeks Aggregation Flag	317	4	Alpha	Possible values:
				Value
				FWAF
FAFull Details Flag	321	4	Alpha	Possible values:
				Value
				FULJ
Trade Report Id	325	12	Alpha	Unique **Identifier** generated for each trade report publication. A distinct identifier will be assigned for every life cycle events (new, amend and cancel).
Reserved Field	337	1	UInt8	Reserved for future use
Venue Type	338	1	UInt8	Type sent by the venue:
				Value — **Meaning**
				0 — Unspecified
				1 — MTF
				2 — OTF
				3 — Regulated Market

Field	Offset	Length	Type	Description	
Venue Book Definition ID	339	1	UInt8	Book Definition ID sent by the venue.	
				Value	**Meaning**
				0	On Book
				1	Off Book
Notation of the Quantity in Measurement Unit	340	25	Alpha	Indication of measurement units used to represent the value in the Quantity in Measurement Unit	
Quantity in Measurement Unit	365	20	MiFID Decimal	The Quantity in Measurement Unit, limited to a precision of IEEE 754 Double Standard	
Transaction to be Cleared	385	1	Byte	Identifies if the firm intends to clear the transaction. ESMA field for derivatives.	
				Value	**Meaning**
				0	No
				1	Yes
				Blank if not applicable	
Type	386	4	Alpha	Emission Allowance Type::	
				Value	**Meaning**
				EUAE	European Union Allowance
				CERE	Certified Emission Reductions
				ERUE	Emission Reduction Units
				EUAA	European Union Aviation Allowances
				OTHR	Other
				Blank if not applicable	
Venue of Publication	390	4	Alpha	Identification of the regulatory regime under which the transaction was published. The value sent by the source venue is passed on.	
				Value	**Meaning**
				ECHO	Published under UK APA Regulation
				ECEU	Published under EU APA Regulation
				{MIC}	Reported by RM/MTF/OTF (the MIC corresponding to the relevant venue)”
Market Mechanism	394	1	Byte	**Value**	**Meaning**
				1	Central Limit Order Book
				2	Quote Driven Market
				3	Dark Order Book
				4	Off Book
				5	Periodic Auction
				6	Request for Quotes
				7	Any Other, Including Hybrid
				8	Hybrid Market
				9	Other Market

Field	Offset	Length	Type	Description	
Trading Mode	395	1	Byte	**Value**	**Meaning**
				1	Undefined Auction
				2	Continuous Trading
				3	At Market Close Trading
				4	Out of Main Session Trading
				5	Trade Reporting (On Exchange)
				6	Trade Reporting (Off Exchange)
				7	Trade Reporting (Systemic Internaliser)
				O	Scheduled Opening Auction
				K	Scheduled Closing Auction
				I	Scheduled Intraday Auction
				U	Unscheduled Auction
Transaction Category	396	1	Byte	**Value**	**Meaning**
				Z	Package Trade, excluding Exchange for Physicals (TPAC)
				Y	Exchange for Physicals Trade (XFPH)
				G	RFMD Give-Up Trade (GIVE)
				H	RFMD Give-Up Trade (GIVE) and Exchange for Physicals Trade (XFPH)
				-	None apply
Negotiation Indicator	397	1	Byte	**Value**	**Meaning**
				N	Negotiation Trade (NEGO)
				1	Negotiated Trade in Liquid Financial Instruments (NLIQ)
				2	Negotiated Trade in Illiquid Financial Instruments (OILQ)
				3	Negotiated Trade Subject to Conditions Other than the Current Market Price (PRIC)
				7	Negotiated Trade Larger than LIS brought onto a venue (NTLS)
				8	Negotiated Trade with pre trade transparency waiver (NETW)
				-	Not a Negotiated Trade
Agency Cross Indicator	398	1	Byte	**Value**	**Meaning**
				M	Matched Principal Trade (MTCH)
				-	No Agency Cross Trade
Modification Indicator	399	1	Byte	**Value**	**Meaning**
				C	Trade Cancellation (CANC)
				A	Trade Amendment (AMND)
				-	New Trade

Field	Offset	Length	Type	Description	
Reference Price Indicator	400	1	Byte	**Value**	**Meaning**
				B	Benchmark Trade (BENC)
				S	Reference Price Trade (RFPT)
				O	Benchmark Trade (BENC) & Portfolio Transaction (PORT) & Contingent Transaction (CONT)
				N	Portfolio Transaction (PORT) & Contingent Transaction (CONT)
				M	Benchmark Trade (BENC) & Contingent Transaction (CONT)
				Y	Benchmark Trade (BENC) & Portfolio Transaction (PORT)
				C	Contingent Transaction (CONT)
				P	Portfolio Transaction (PORT)
				1	Market Closing Price (CLSE)
				2	Market Closing Price (CLSE) & Portfolio Transaction (PORT)
				6	Reference Price Trade (RFPT) and Market Closing Price (CLSE)
				-	Not a Reference Price Trade
Special Dividend Indicator	401	1	Byte	**Value**	**Meaning**
				E	Special Dividend Trade (SDIV)
				-	No Special Dividend Trade
Off Book Automated Indicator	402	1	Byte	**Value**	**Meaning**
				M	Off Book Non-Automated
				Q	Off Book Automated
				-	Unspecified or does not apply
Price Formation Indicator	403	1	Byte	**Value**	**Meaning**
				P	Plain-Vanilla Trade
				T	Non-Price Forming Trade (NPFT)
				J	Trade not Contributing to Price Discovery (TNCP)
				N	Pending Price (PNDG)
				Z	Price is not Applicable (NOAP) (ESMA only)
Algorithmic Indicator	404	1	Byte	**Value**	**Meaning**
				H	Algorithmic Trade (ALGO)
				-	Not an Algorithmic Trade

Field	Offset	Length	Type	Description	
Post-Trade Deferral Reason	405	1	Byte	**Value**	**Meaning**
				2	Non-Immediate Publication: Deferral for “Large in Scale” (LRGS)
				3	Non-Immediate Publication: Deferral for “Illiquid Instrument” (ILQD)
				4	Non-Immediate Publication: Deferral for “Size Specific” (SIZE)
				5	Non-Immediate Publication: Deferrals of “ILQD” and “SIZE”
				6	Non-Immediate Publication: Deferrals of “ILQD” and “LRGS”
				A	Non-Immediate Publication: Deferral for "Medium Size Liquid Market" (MLF1)
				B	Non-Immediate Publication: Deferral for "Medium Size Illiquid Market" (MIF2)
				C	Non-Immediate Publication: Deferral for "Large Size Liquid Market" (LLF3)
				D	Non-Immediate Publication: Deferral for "Large Size Illiquid Market" (LIF4)
				E	Non-Immediate Publication: Deferral for "Very Large Size Liquid Market" (VLF5)
				F	Non-Immediate Publication: Deferral for "Very Large Size Illiquid Market" (VIF5)
				G	Non-Immediate Publication: Deferral for ETCs, ETNs, SFPs, Emission Allowances (DEFF)
				-	Immediate Publication
Deferral/ Enrichment Type	406	1	Byte	**Value**	**Meaning**
				1	LMTF
				2	DATF
				3	VOLO
				4	FWAF
				7	FULF
				8	FULA
				9	FULV
				V	FULJ
				J	OMIS
				L	FULO
				K	AGFW
				M	FULG
				-	Not Applicable/No Relevant Enrichment Type

Field	Offset	Length	Type	Description	
Duplicative Indicator	407	1	Byte	**Value**	**Meaning**
				2	Intra-Group Trade (IGRP)
				4	Cross-Border Duplicative Trade Report (XBDT)
				7	Intra-Group Trade (IGRP) and Cross-Border Duplicative Trade Report (XBDT)
				-	Unique Trade Report
Third-country trading venue of execution	408	4	Alpha	Identification of the third-country trading venue where the transaction was executed.	
Portfolio Transaction Flag	412	4	Alpha	Possible values:	
				Value	
				PORT	
Contingent Transaction Flag	416	4	Alpha	Possible values:	
				Value	
				CONT	
Missing Price / Price Conditions[3]	420	4	Alpha	Possible values:	
				Value	
				PNDG	
				NOAP	
Market Closing Price Flag	424	4	Alpha	Possible values:	
				Value	
				CLSE	
NT Large in Scale Flag	428	4	Alpha	Possible values:	
				Value	
				NTLS	
NT Pre Trade Transparency Flag	432	4	Alpha	Possible values:	
				Value	
				NETW	
Effective Date of the Contract	436	10	MiFID Date	Start date of the contract Blank if not applicable	
Maturity Date of the Contract	446	10	MiFID Date	Termination date of the financial instrument's contract Blank if not applicable	
Spread	456	20	MiFID Decimal	The spread on the floating leg, limited to a precision of IEEE 754 Double Standard Blank if not applicable	
Upfront Payment	476	20	MiFID Decimal	The upfront payment exchanged as part of CDS transactions, limited to a precision of {DECIMAL-19/18} Blank if not applicable	

[3] Missing Price (ESMA) / Price Conditions (FCA)

Field	Offset	Length	Type	Description
LEI of Clearing House	496	20	Alpha	Clearing house which the transaction will be cleared through Blank if not applicable
Matched Principal Trade Flag	516	4	Alpha	Possible values:
				Value
				MTCH
ESMA Standard Deferral Flags	520	4	Alpha	Possible values:
				Value
				MLF1
				MIF2
				LLF3
				LIF4
				VLF5
				VIF5
				DEFF
Negotiation Trade Flag	524	4	Alpha	Possible values:
				Value
				NEGO
ESMA Supplementary Deferral Flags	528	4	Alpha	Possible values:
				Value
				OMIS
				FULO
				AGFW
				FULG
Trading System	532	4	Alpha	Type of trading system on which the transaction was executed Possible values:
				Value / **Meaning**
				CLOB / Central Limit Order Book
				QDTS / Quote Driven Market
				PATS / Periodic Auction
				RFQT / Request for Quote
				VOIC / Voice Trading
				HYBR / Hybrid System
				OTHR / Any Other
				Blank if not specified in underlying trade report or 'Venue of execution' is populated with "SINT" or "XOFF"
APA Received Date and Time	536	27	Date and Time	Date and time when the transaction was received by an APA

5 Client Data Recovery

The Group Ticker Plant provides both replay and recovery services to facilitate data recovery.

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.

5.1 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.

5.1.1 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.

5.1.2 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.

5.1.3 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.

5.2 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:

- 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.

5.2.1 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.

5.2.2 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.

5.2.3 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.

5.2.4 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.

5.2.5 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.

5.2.6 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.

6 Additional field values

6.1 Supported currencies

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

7 Data Mapping

7.1 Conversion of Trade ID

Venue	Representation
TRADEcho	Base 64 decoded value from source venue ASCII format

7.2 Base 64 decoding alphabets

DEC	Base64	DEC	Base64	DEC	Base64	DEC	Base64
0	A	18	S	36	k	54	2
1	B	19	T	37	l	55	3
2	C	20	U	38	m	56	4
3	D	21	V	39	n	57	5
4	E	22	W	40	o	58	6
5	F	23	X	41	p	59	7
6	G	24	Y	42	q	60	8
7	H	25	Z	43	r	61	9
8	I	26	a	44	s	62	-
9	J	27	b	45	t	63	_
10	K	28	c	46	u		
11	L	29	d	47	v		
12	M	30	e	48	w		
13	N	31	f	49	x		
14	O	32	g	50	y		
15	P	33	h	51	z		
16	Q	34	i	52	0		
17	R	35	j	53	1		

7.3 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.

7.4 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

7.5 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