



LSEG

Technical User Group

15 September 2021



LSEG



Agenda

Introduction

Data Centre Migration

London Stock Exchange – Release 9.6.12

Group Ticker Plant

- Release 1.4.6.6
- Modularisation

Turquoise

- Block Trading Functionality (BTF)
- Turquoise on OpenFin – Proof of Concept
- Customer Development Service Enhancement

TRADEcho – Release 3.9

Q&A

Data Centre Migration

Ermias Habteab
Technical Account Manager



LSEG

Data Centre Migration

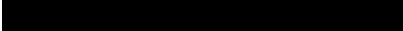
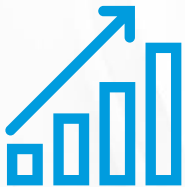
LSEG continues to review its Data Centre spaces and services.

As part of the Groups latest review, LSEG has made the decision to exit the current Primary Data Centre (PDC) facility located in City of London and operate our Trading Market Data services from a campus within Docklands.



Manage risk

Our new Primary DC site is a purpose built facility located within 5 miles of our current location.



Grow

The new site allows development of dedicated DC space to support LSEG’s future growth. The new facility is well provisioned and remains within a central London location.



Change

Moving to a new world class, highly efficient dedicated DC facility provides continued resilience and an opportunity to refresh and design new products and services.

Data Centre Migration

Hosting and Connectivity

Hosting

Customers will need to relocate into the new PDC ahead of market readiness and dress rehearsals.

A number of commercial and technical features will be available to assist customer transition between sites.

LSEG DC

Customer Migration Team will support each customer on a 1:1 basis throughout the transition.

Connectivity Products

CMC

CMC customers will need to order new circuits to the new LSEG PDC.

Alternatively, customers can make use of the Groups resilient CMC connectivity hub sites including:

- London Interxion
- Equinix Slough
- Equinix Frankfurt
- Telehouse and Interxion Paris
- Equinix New York and Chicago

Client connectivity is supported on local CMC infrastructure in these locations.

CMC VPN

CMC VPN Customers will need to established a new VPN to the new LSEG PDC.

VAN & NSP

VAN & NSP providers will need to order new circuits to the new LSEG PDC.

Across all connectivity products a dedicated DC Exit Project Manager will be available to support customers.

Data Centre Migration

Trading, Market Data Services and Customer Environments

New IP addresses

For all services and targeted availability by the end of 2021.

- London Stock Exchange
- Turquoise
- CurveGlobal Markets
- TRADEcho
- Market Data (GTP/ HSVF)

Customer Development Service (CDS)

Targeted in Q2 2022

- Parallel run expected to be available for one week to allow clients to connect to CDS in the new Data Centre

Request Service Enablement

Clients will be required to request network enablement to access services in the new Data Centre.

Quasi Live Environment

New Production environment targeted availability mid Q2 2022 for London Stock Exchange and Turquoise markets

- New technical configuration to be issued for testing
- Reference data expected to match current environment

Technical Configuration

Existing technical configuration (ComplIDs, etc) should remain for the Customer Development Service and Production.

Customer Dress Rehearsals

Targeted in Q3 2022, successful attendance will be mandatory

Data Centre Migration

Targeted Key Dates

Q3 2021

Hosting and DC
equipment installs
can begin

Q4 2021

New IP addresses
published end 2021

Q1 2022

Connectivity
customer circuit
installations can
begin

Q2 2022

LSE Network and
CDS availability

Q3 2022

LSE, Turquoise and
Market Data
Customer Market
Dress Rehearsals
and Market cut-
over weekend

Data Centre Migration

Contacts

Hosting & Connectivity

DCMigration@lseg.com

Trading, Market Data Services and Customer Environments

londontam@lseg.com

London Stock Exchange – Next Functional Release 9.6.12



Ermias Habteab
Technical Account Manager

LSE 9.6.12 Release - Summary

- Replacing unsupported characters received on **Account, Client Order ID, Quote Msg ID** and **Quote Req ID** fields on the Native and FIX protocol with “-” (hyphen) on Trade Capture Report messages.
- Enabling the optional RFQ (Request for Quote) **Market Maker Ranking** functionality
- Reduced field length to UInt32 on **Buy Side Order Quantity** and **Sell Side Order Quantity** fields on the Native protocol New Order Cross and Cross Order Cancel Request messages. Remaining field length reserved for future use.

Replacing unsupported characters

- To preserve data integrity on CCP systems the following characters, including characters outside of the 32-126 ASCII character range and ASCII 0 (NUL), will not be supported on the below fields and will be replaced with a “-” (hyphen) on Trade Capture Report messages.
- ASCII 59 character (;)
- ASCII 35 character (#)
- ASCII 47 character (/)
- ASCII 92 character (\)

Message Type	FIX Protocol	Native Protocol
New Order (35=D)	Account (tag1)	Account
	ClOrdID (tag11)	Client Order ID
Order Cancel/ Replace Request (35=G)	Account (tag1)	Account
	ClOrdID (tag11)	Client Order ID
New Order Cross (35=s)	ClOrdID (tag11)	Buy Side ClOrdID
		Sell Side ClOrdID
Quote (35=S)	QuoteMsgID (tag1166)	Quote Msg ID
Quote Request (35=R)	QuoteReqID (tag131)	Quote Req ID
Trade Capture Report (35=AE) – Client Initiated	Account (tag 1)	N/A
Trade Capture Report (35=AE) – Server Side	Account (tag1) ClOrdID (tag11)	N/A

RFQ Market Maker Ranking

- Market Maker Ranking function:
 - Allows requesters to automatically route their requests to RFQ market makers based on ranking
 - Where a requestor inputs a specific rank, all RFQ Market Makers at that rank or higher will receive the RFQ
 - Market Maker Ranking is calculated based on previous rolling 20 days data, per member firm, per instrument based on the member firm's aggregated order book and RFQ trade value (trade price x qty)*
- Note: This feature is only available for ETPs in sizes above LIS Auto-Complete Winner Takes All RFQ Model

*In case the value is the same across multiple member firms, they will be assigned the same rank. Ranking stats will be calculated using GBP as the constant currency and any trading in non-GBP securities will be converted into GBP using the previous day's exchange rate (ECB rate).

RFQ Market Maker Ranking cont.

- Native Protocol change:
 - **Quote Request** message, existing reserved field split into two fields Market Maker Rank (offset 160) and Reserved field (offset 161)

Field	Offset	Length	Data Type	Description
Market Maker Rank	160	1	UInt8	The rank of the market makers the request should be routed to. If specified, the request will be routed to the market makers with a rank equal to or better than the specified rank for the instrument, provided rank based routing is valid for the RFQ. This field is only valid for an auto RFQ. A value of 0 will be considered as unspecified
Reserved Field	161	23		

RFQ Market Maker Ranking cont.



- FIX Protocol change:
 - **Quote Request** message (35=R),
new tag 27019 MarketMakerRank

Tag		Field Name	Req	Description
146				
-> (Part of Repeating Group)	27019	MarketMakerRank	N	The rank of the market makers the request should be routed to. If specified, the request will be routed to the market makers with a rank equal to or better than the specified rank for the instrument, provided rank based routing is valid for the RFQ. This field is only valid for an auto RFQ. A value of 0 will be considered as unspecified

LSE Release 9.6.12 – Key dates

Conformance testing is mandatory for firms who make software changes to support this release.

- CDS Environment Go-Live: **Currently available**
- Production Environment Go-Live: **TBC**

Customers should provide final readiness sign-off to their Technical Account Manager or the Technical Account Management team on +44(0)20 7797 3939 or londontam@lseg.com.

London Stock Exchange Document Library has been updated with the latest updates and can be seen in the 'Next Functional Release' section: <https://www.londonstockexchange.com/resources/trade-resources?tab=technical-library>

Group Ticker Plant – Release 1.4.6.6



Ethem Arabaci

Assistant Manager, Technical Account Manager

GTP 1.4.6.6 Release - Summary

Customer impacting changes:

- Introduction of a new service line – Analytics
- Enablement of Auction Imbalance data for the London Stock Exchange Market

Analytics Service Line

Overview

- Service publishes a snapshot of statistics data every one second for instruments available on London Stock Exchange, Turquoise UK/EU
- Value Added Service – additional commercial agreement required. (marketdata@lseg.com)
- Statistics calculated for electronic (normal) order book only
- Hidden Orders do not contribute to the Statistics Data
- Replay service is available, no Recovery service.

Technical Impact

- New Service Line, new Message Type (Analytics – 0x61) and new Multicast IP ranges
- No need to self-certify if you do not intend on using the Service

Analytics - Service Line



London
Stock Exchange

Market Data Group	Source Venue	Channel Content	Level 1	Level 2 MBO	Level 2 MBP	Level 2 Incremental	MIFID II Post Trade	Analytics	Replay	Recovery
Channel A/a	London Stock Exchange	FTSE 100	N	N	N	N	N	Y	Y	N
Channel B/b	London Stock Exchange	FTSE 100	N	N	N	N	N	Y	Y	N
Channel C/c	London Stock Exchange	FTSE 250	N	N	N	N	N	Y	Y	N
Channel D/d	London Stock Exchange	Structured Products	N	N	N	N	N	Y	Y	N
Channel E/e	London Stock Exchange	Miscellaneous	N	N	N	N	N	Y	Y	N
Channel F/f	London Stock Exchange	European (EQS)	N	N	N	N	N	Y	Y	N
Channel G/g	London Stock Exchange	International (IOB and ITR)	N	N	N	N	N	Y	Y	N
Channel T/t	Turquoise	XLON	N			N	N	Y	Y	N
Channel U/u	Turquoise	XPAR	N			N	N	Y	Y	N
Channel V/v	Turquoise	XETR	N			N	N	Y	Y	N
Channel W/w	Turquoise	XCSE, XHEL, XMAD, XSTO, XSWX, XVTX	N			N	N	Y	Y	N
Channel X/x	Turquoise	MTAA, XOSL, WBAH, XDUB, ARCX...	N			N	N	Y	Y	N
Channel Y/y	Turquoise	XAMS, XBRU, XLIS and XLUX	N			N	N	Y	Y	N
Channel 1/5	TradEcho	SI Quoting				N			N	N
Channel 2/6	TradEcho	Trades					N		N	N
Channel 3/7	TradEcho	SI Quoting				N			N	N
Channel 4/8	TradEcho	Trades					N		N	N
Channel O/o	FTSE	FTSE Indices	N						N	

Analytics - Message Type 0x61



London
Stock Exchange

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
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.

Analytics - New Multicast IP range



London
Stock Exchange

4.7 London Production IP Address Ranges - Analytics Channels

	Market Data Group	Multicast Channel	Multicast Source IP Address	Multicast Address	Port	Replay Service		Recovery Service	
						Virtual-IP Address	Port	Virtual-IP Address	Port
Primary Feed	A	FTSE 100	194.169.4.55	224.4.0.40	60400	194.169.4.35	63960	194.169.4.35	64960
	B	FTSE 100		224.4.0.41			63961		64961
	C	FTSE 250		224.4.0.42			63962		64962
	D	Structured Products		224.4.0.43			63963		64963
	E	Miscellaneous		224.4.0.44			63964		64964
	F	European		224.4.0.45			63965		64965
	G	International		224.4.0.46			63966		64966
	T	XLON		224.4.0.56			63976		64976
	U	XPAR		224.4.0.57			63977		64977
	V	XETR		224.4.0.58			63978		64978
	W	XCSE, XHEL...		224.4.0.59			63979		64979
	X	MTAA, XOSL...		224.4.0.60			63980		64980
Secondary Feed	Y	XAMS, XBRU...	194.169.4.125	224.4.0.61	60400	194.169.4.100	63981	194.169.4.100	64981
	a	FTSE 100		224.4.1.40			63960		64960
	b	FTSE 100		224.4.1.41			63961		64961
	c	FTSE 250		224.4.1.42			63962		64962
	d	Structured Products		224.4.1.43			63963		64963
	e	Miscellaneous		224.4.1.44			63964		64964
	f	European		224.4.1.45			63965		64965
	g	International		224.4.1.46			63966		64966
	t	XLON		224.4.1.56			63976		64976
	u	XPAR		224.4.1.57			63977		64977
	v	XETR		224.4.1.58			63978		64978
	w	XCSE, XHEL...		224.4.1.59			63979		64979
	x	MTAA, XOSL...		224.4.1.60			63980		64980
	y	XAMS, XBRU...		224.4.1.61			63981		64981

2.7 CDS IP Address Ranges - Analytics Channels

				OTF Live Service		Replay Service		Recovery Service		
Group	Multicast Channel	Multicast Source IP Address	Multicast Address	Port	Virtual-IP Address	Port	Virtual-IP Address	Port	Virtual-IP Address	Port
Primary Feed										
A	FTSE 100	194.169.8.205	224.4.0.102	61400	194.169.8.222		194.169.8.220		53851	54851
B	FTSE 100		224.4.0.103						53852	54852
C	FTSE 250		224.4.0.104						53853	54853
D	Structured Products		224.4.0.105						53854	54854
E	Miscellaneous		224.4.0.106						53855	54855
F	European		224.4.0.107						53856	54856
G	International		224.4.0.108						53857	54857
T	XLON		224.4.0.118						53867	54867
U	XPAR		224.4.0.119						53868	54868
V	XETR		224.4.0.120						53869	54869
W	XCSE, XHEL...		224.4.0.121						53870	54870
X	MTAA, XOSL...		224.4.0.122						53871	54871
Y	XAMS, XBRU...		224.4.0.123						53872	54872
Secondary Feed										
a	FTSE 100	194.169.8.235	224.4.1.102	61450	194.169.8.252		194.169.8.250		53851	54851
b	FTSE 100		224.4.1.103						53852	54852
c	FTSE 250		224.4.1.104						53853	54853
d	Structured Products		224.4.1.105						53854	54854
e	Miscellaneous		224.4.1.106						53855	54855
f	European		224.4.1.107						53856	54856
g	International		224.4.1.108						53857	54857
t	XLON		224.4.1.118						53867	54867
u	XPAR		224.4.1.119						53868	54868
v	XETR		224.4.1.120						53869	54869
w	XCSE, XHEL...		224.4.1.121						53870	54870
x	MTAA, XOSL...		224.4.1.122						53871	54871
y	XMAS, XBRU...		224.4.1.123						53872	54872

Auction Imbalance

- Auction Imbalance data helps provide clarity as to which side of the Indicative Price has unmatched shares
- Imbalance Quantity & Direction of Imbalance populated and updated throughout the auction call period
- Auction Imbalance fields currently exist in the Production and Customer Development Service (CDS)
- Auction Imbalance only applicable to the London Stock Exchange Market

Statistics Snapshot - Auction Imbalance Fields

Imbalance Quantity	159	8	Size	Quantity that was eligible to be matched at the indicative price but was not to be matched at the last indicative price.
Imbalance Direction	167	1	Byte	Value Meaning
				B Buy Imbalance
				N No Imbalance
				O Insufficient Orders for Auction
				S Sell Imbalance

Statistics Update - Auction Imbalance Fields

Imbalance Quantity	40	8	Size	Quantity that is eligible to be matched at the indicative price but will not be matched.
Auction Info	48	1	Byte	Value Meaning
				B Buy Imbalance
				N No Imbalance
				O Insufficient Orders for Auction
				S Sell Imbalance
				M Call Market (Specific to Turquoise Plato™ Order Book)

GTP Release 1.4.6.6 Timeline



Date	Event
18 August 2021	CDS – Auction Imbalance
13 September 2021	CDS go-live 1.4.6.6.
TBC	Production go-live

New GTP Documents and Release Notes are available on the GTP website.
<https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant>

Group Ticker Plant – Modularisation

Ethem Arabaci

Assistant Manager, Technical Account Manager

Modularisation

Current State

- GTP is managed as a single application
- One Instance disseminates London Stock Exchange, Turquoise, FTSE and TRADEcho market data
- Any protocol or hardware changes impacts all markets and scalability more of an issue.

Future State - Modularised State

- Market Data GTP modules integrated directly on to each Trading System / Data Source
- No Impact on existing protocol and gateways
- Protocol/Hardware changes can be rolled out independently and offers better scalability
- Potential certification policy changes
- Multicast and Replay/Recovery IP's change due to Data Centre migration
- Post Modularisation, protocol changes are deployed in a staggered manner across the venues, therefore temporarily the protocol may differ between venues

Turquoise Update



Philippe Teillet
Technical Account Manager

Block Trade Functionality - BTF



Block Trade Functionality - BTF



Turquoise intends to introduce Block Trade Facility (BTF) functionality. The functionality will facilitate bringing bilaterally agreed trades on to the venue for the purpose of clearing.

- Turquoise Global Holdings Limited (TGHL or Turquoise®)
- All instruments available on Turquoise Lit™
- For each BTF type, the price of the order must be within a defined percentage above or below a suitable reference price
- The quantity must be equal to or greater than the Pre-Trade LIS Value
- Trades only will be published via GTP

BTF Types



BTF Orders do not interact with other order types and are classified as:

- **Internal BTF** – a dual sided order, sent in one message, by a single member firm. Once the validation rules have passed, it will result in an automated trade execution which is then routed to central counterparty clearing
- **Committed BTF** – a single sided order, sent in two different messages, by two different member firms. Once both BFT orders have been submitted, and the validation rules have passed, the trading system matches the two orders entered, resulting in an automated trade execution which is then routed to central counterparty clearing

Technical Implementation



- Only DAY TIF allowed for BTF orders
- Order Cancellation/Amendment
 - When submitted, an Internal BTF cannot be cancelled by the submitting firm
 - When submitted, a Committed BTF order which is not matched (being the first order) can be cancelled by the submitting member
 - It will not be possible to amend BTF orders

Impact on Turquoise interfaces



Native

New Order Cross - new message
Cross Order Cancel Request - new message

FIX Trading

New Order Cross - new message
Cross Order Cancel Request - new message
Execution Report - new tags: CrossID, CrossType, OrigCrossID

Drop Copy

Execution Report - new tags: CrossID, CrossType, OrigCrossID

Post Trade

Trade Capture Report – new tags: CrossID, CrossType

GTP

Trade Cross and MiFID II Trade Cross - current messages

Enablement & Certification



- Block Trade Facility will be available on CDS from October 2021
- Customers should contact their Technical Account Manager to be enabled for the new functionality
- Customers supporting BTF orders will need to certify before go-live
- All customers will need to ensure they are ready to process the GTP Trade Cross and MiFID II Trade Cross messages
- Production go-live is expected Q4 2021

Additional Information and Contact Details



The new Service & Technical Description document for BTF and the updated Millennium Exchange technical documents will be available at:

<https://www.lseg.com/markets-products-and-services/our-markets/turquoise/information-centre/document-library>

Technical Account Management team:

- LondonTAM@lseg.com
- +44 (0)207 797 3939

Turquoise on OpenFin™



Turquoise on OpenFin™ - Proof of Concept



- The **Turquoise on OpenFin™** application is a Proof of Concept, which allows users to receive a subset of live Turquoise® and Turquoise Europe™ data into their test environment
- Launched in August 2021
- **Turquoise on OpenFin™** is based on publication of Turquoise Plato Uncross™ trades and aggregated trade data from:
 - Turquoise Plato Block Discovery™
 - Turquoise Plato Trade At Last™

Note: All Turquoise Plato Continuous™ trade data is therefore excluded

Turquoise on OpenFin™ Proof of Concept



- The **Turquoise on OpenFin™** Service will stream on a per Instrument basis and per Execution Venue MIC basis (TRQM/TQEM) the following type of Statistics data:
 - **Instrument:** ISIN, Symbol, Execution Venue, Primary Market (future release) and Currency
 - **Trades:** Price, Shares, Value and Trade Time
 - **Statistics data:** Total number of Trades, Largest Trade (by Value) including Price and Number of Shares, Total Shares and Total Value
- Statistics data is always the latest value/aggregated value
- Statistics data is updated for an instrument each time a new trade/execution occurs in the Turquoise Plato Uncross™

Turquoise on OpenFin™ Proof of Concept



- Receive production Turquoise® data into your test OpenFin™ application. NOTE: Not for Production use
- Turquoise market data made available via OpenFin™ is waived of any licence fees for Non-Display or Display use when processed within the receiving system
- Turquoise on OpenFin™ documentation is available via the Turquoise website:
<https://www.lseg.com/markets-products-and-services/our-markets/turquoise/information-centre/document-library>
- Guide provides:
 - Guidance on building from scratch without existing OpenFin™ application
 - Receive the Turquoise trade data stream from existing OpenFin™ application

Customer Development Service (CDS) - Enhancement



Enhancement of Turquoise CDS



- New and enhanced functionality will be trialled within Turquoise CDS, further improving the testing experience for clients
- A virtual dynamic market calibrated with the previous days production data will be introduced based on the Turquoise Lit Order Books™
- It is intended this virtual market will provide new opportunities for clients to conduct algo performance benchmarking and testing activities

CDS Trial - Start Date	1 November 2021
CDS Trial - End Date	28 January 2022

Participation - To access the new enhancements and learn more, clients are required to contact the following: algotesting@lseg.com

TRADEcho - Update

TRADEcho – Release 3.9



TRADEcho Portal

- Chatbot functionality added to GUI – Receive interactive answers to common questions
- Save and load a Filter in the GUI Portal
- Addition of TOTV columns as a filter attribute

Trade Reports

- Trade Reports to have up to 5 decimal places for Quantity and Quantity in Measurement Unit attributes

Go-Live Dates & Documentation

Date	
23 August 2021	CDS
TBC	Production go-live

‘TRADEcho Next Functional Release’ section of the London Stock Exchange technical documentation website updated.

Thank you

Q&A

Slido: <https://app.sli.do/event/9slrcyne>



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