

Notice of Intention to Accept Commitments

Concerning commitments offered by LSEG and
[PDC Landlord] in relation to conduct
concerning low latency connectivity services

Case Reference: CA98.2023.02

5 September 2025

© Financial Conduct Authority 2025

All rights reserved.

Confidential information in the original version of the notice has been redacted from the published version. Redacted confidential information in the text of the published version of this notice is denoted by [X], or in square brackets '[]' if an anonymised term is used instead.

Contents

1	Introduction.....	6
	The FCA’s Investigations into LSEG and [PDC Landlord]	6
	The Chapter II investigation	6
	The Chapter I Investigation	6
	The commitments offers	6
	The FCA’s intention to accept the Proposed Commitments.....	7
	Invitation to comment	8
	The remainder of this document	8
2	The FCA’s Investigations.....	10
	Scope of the Investigations	10
	Undertakings subject to the Investigations	10
	<i>LSEG</i>	10
	The conduct under investigation.....	10
	<i>LSEG’s conduct subject to the Chapter II Investigation</i>	10
	<i>LSEG’s and [PDC Landlord]’s conduct subject to the Chapter I Investigation</i>	11
	The commitments process.....	12
	Other matters within scope of the Investigations	13
3	Relevant background	14
	Description of the LSE-ICE Route	14
	Demand for LLCS on the LSE-ICE Route.....	14
	LLCS provision.....	15
	Definition and characteristics of LLCS.....	15
	LLCS providers on the LSE-ICE Route	17
	Access to relevant data centres for LLCS providers.....	17
	Impact of the conduct on other LLCS providers.....	17
	Situation at the LSE.....	18
	<i>Resulting end point radio unit positioning</i>	18
	<i>Resulting fibre cable connections</i>	18
	<i>Additional over the air distance for rivals due to end point radio unit positioning</i> .	18
	<i>Line of sight issues</i>	19
	Situation at ICE.....	19
4	Market definition.....	20

Provision of LLCS on the LSE-ICE Route.....	20
Access to the LSE trading venue for LLCS providers	20
5 Competition concerns regarding the Chapter II Investigation	23
Dominance.....	23
LSEG’s position in access to the PDC Building	23
Abuse.....	23
Effects on rival LLCS providers on the LSE-ICE Route.....	24
Effects on competition.....	25
Objective justification	25
6 Competition concerns regarding the Chapter I Investigation.....	26
‘Agreement’ between ‘undertakings’	26
Restriction by object.....	26
Restriction by effect	27
Section 9 exemption criteria	27
7 The Proposed Commitments	28
LSEG’s Proposed Commitments	28
[PDC Landlord]’s Proposed Commitments	28
Duration	29
Compliance, monitoring and reporting	29
8 The FCA’s assessment of the appropriateness of the commitments	30
Applicable law and guidance.....	30
The FCA’s assessment	31
Whether the competition concerns are readily identifiable	31
Whether the Proposed Commitments address the FCA’s competition concerns	31
<i>Concern 1: Higher latencies for rivals.....</i>	<i>31</i>
Physical space.....	32
Over-the-air distance to ICE	32
Absence of line-of-sight issues	32
Fibre distance to Carrier Rooms.....	32
<i>Concern 2: asymmetric costs.....</i>	<i>33</i>
<i>Concern 3: reduced incentives to invest</i>	<i>33</i>
<i>Concern 4: more limited route design options</i>	<i>33</i>
Whether the Proposed Commitments are capable of being implemented effectively and, if necessary, within a short period of time	34
Whether the Investigations involve secret cartels between competitors or a serious abuse of a dominant position	34

Whether compliance with the Proposed Commitments and their effectiveness would be difficult to discern	34
Whether acceptance of the Proposed Commitments would undermine deterrence	35
Annex A: System latency.....	36
Over-the-air propagation.....	36
Fibre cable propagation	36
Repeater sites.....	37
Radio latency	37
Policer latency	37
Annex B: System design.....	39
Annex C: LSEG’s Proposed Commitments	42
Annex D: [PDC Landlord]’s Proposed Commitments.....	45

1 Introduction

The FCA's Investigations into LSEG and [PDC Landlord]

The Chapter II investigation

- 1.1 In July 2023, the Financial Conduct Authority (**FCA**) opened an investigation (the **Chapter II Investigation**) under the Competition Act 1998 (the **Act**) into whether the London Stock Exchange Group (**LSEG**) has infringed the prohibition in section 18 of the Act (the **Chapter II prohibition**).
- 1.2 The Chapter II Investigation relates to the supply of low latency connectivity services (**LLCS**) between the London Stock Exchange (**LSE**) trading venue in London and (i) the Cboe Europe trading venue in Slough and (ii) the ICE trading venue in Basildon, respectively. LSEG provides LLCS on these routes via its Exchange Wireless Service (**EWS**).
- 1.3 The FCA is concerned that LSEG has implemented a rooftop policy that prevents rival LLCS providers from installing equipment on the roof of a data centre building located in the London Docklands (the **PDC Building**), which currently houses LSE's primary data centre. LSEG (i.e. EWS) itself uses that roof. The policy compels rivals to use less good sites for their LLCS radio units, which may hinder their ability to compete on the LSE-ICE Route.

The Chapter I Investigation

- 1.4 In April 2024, the FCA opened an investigation (the **Chapter I Investigation**) into whether LSEG and the undertaking of which [×] and [×] form part (**[PDC Landlord]**) have infringed the prohibition contained in section 2 of the Act (the **Chapter I prohibition**).
- 1.5 The Chapter I Investigation relates to lease agreements (the **Lease Agreement**) between LSEG and [PDC Landlord] concerning the PDC Building, which [PDC Landlord] owns. It provides LSEG with exclusive rights to: (i) erect and maintain communication equipment on the rooftop of the PDC Building; and (ii) use the PDC Building for financial and market infrastructure services.
- 1.6 The FCA is concerned that these exclusive rights allow only EWS to locate its LLCS radio units on the PDC Building's rooftop. This compels rivals to use less good sites for their radio units, which may hinder their ability to compete on the LSE-ICE Route.
- 1.7 The Chapter I and II investigations concern related matters and are referred to together as the **Investigations**.

The commitments offers

- 1.8 On 4 August 2025, LSEG and [PDC Landlord] offered commitments to the FCA under section 31A of the Act to address the FCA's competition concerns (the

Proposed Commitments). The Proposed Commitments are described in Section 7 below and set out in full in Annexes C and D to this Notice of Intention to Accept Commitments (the **Notice**).

1.9 The main elements of the Proposed Commitments are:

- a) LSEG and [PDC Landlord] will agree to vary the provisions of the Lease Agreement to terminate LSEG's exclusive rights to use the PDC Building's rooftop. LSEG will continue using one half of the PDC Building's rooftop (**Area A**) for its equipment and [PDC Landlord] will regain its ability to lease out the other half of the rooftop (**Area B**) to third parties, including third party LLCS providers; and
- b) [PDC Landlord] commits to provide access to and use of Area B of the PDC Building's rooftop to all parties on a fair and non-discriminatory basis. In future, third party LLCS providers would be able to use Area B for connections to ICE and for other LLCS routes.

The FCA's intention to accept the Proposed Commitments

- 1.10 For the reasons set out below, the FCA provisionally considers the Proposed Commitments set out in the Annexes C and D to this Notice address the FCA's competition concerns set out in Sections 5 and 6 of this Notice. Subject to consultation responses to this Notice, the FCA proposes to accept the Proposed Commitments pursuant to section 31A of the Act.
- 1.11 Accordingly, under section 31A of the Act and Schedule 6A, paragraph 2 of the Act, the FCA hereby gives notice that it proposes to accept the Proposed Commitments and invites representations from persons likely to be affected by this proposed course of action.
- 1.12 If the FCA formally accepts the Proposed Commitments it would terminate its Investigations, without deciding if LSEG and [PDC Landlord] have infringed the Act. The Proposed Commitments would take effect from the date of such acceptance.
- 1.13 Acceptance of the Proposed Commitments would not prevent the FCA from continuing the Investigations, making an infringement decision, or giving a direction in circumstances where the FCA had reasonable grounds for:
- a) believing that there had been a material change of circumstances since the commitments were accepted;
 - b) suspecting that a person had failed to adhere to one or more of the terms of the commitments; or
 - c) suspecting that information which led the FCA to accept the commitments was incomplete, false or misleading in a material particular.¹

¹ Pursuant to section 31B of the Act.

Invitation to comment

- 1.14 Any person wishing to comment on the Proposed Commitments should submit written representations to the email address given below by **5pm on 29 September 2025**.

Email address: CA98.2023.02@fca.org.uk

Subject title: **'CA98.2023.02 – Response to Proposed Commitments'**.

- 1.15 The FCA will take relevant representations it receives into account before making its final decision on whether to accept the Proposed Commitments.
- 1.16 The FCA does not intend to publish any responses to this consultation. However, it may use information they contain in future, including in any commitments decision or notice of intention to accept any modified commitments, or if the Investigations are continued because the Proposed Commitments are not accepted or pursuant to section 31B of the Act. In any event, the FCA will handle such information in compliance with its legal obligations, in particular those in Part 9 of the Enterprise Act 2002.

The remainder of this document

- 1.17 The main part of this Notice sets out what the FCA's competition concerns are and how the FCA provisionally thinks the Proposed Commitments would address them. In this context, the FCA discloses only limited details regarding the locations, topographies and equipment of the UK trading venues involved, and redacts the identity of the PDC Landlord. The FCA considers that these venues are important pieces of financial and national infrastructure, and disclosing such detail may affect their security. However, this Notice does give sufficient detail to allow informed comment on the FCA's provisional assessment and the Proposed Commitments.
- 1.18 The remainder of this Notice comprises:
- Section 2: an overview of the FCA's Investigations;
 - Section 3: the relevant background, in particular information regarding the LSE-ICE Route and LLCS on that route;
 - Section 4: the FCA's provisional views on market definition;
 - Section 5: details of the FCA's competition concerns regarding the Chapter II Investigation;
 - Section 6: details of the FCA's competition concerns regarding the Chapter I Investigation;
 - Section 7: a summary of the Proposed Commitments;
 - Section 8: the FCA's assessment of the appropriateness of commitments in this case;
 - Annex A: an explanation of system latency in LLCS;
 - Annex B: an explanation of system design of LLCS;
 - Annex C: the text of LSEG's Proposed Commitments; and

Annex D: the text of [PDC Landlord]'s Proposed Commitments.

2 The FCA's Investigations

- 2.1 The FCA's Investigations concern conduct at two successive data centre sites where the LSE was or is located. The conduct under investigation changed over time and has ended in part. Against this background,
- a) Paragraphs 2.2 to 2.12 below set out the scope of the Chapter II and Chapter I Investigations, covering all the conduct under investigation.
 - b) Paragraphs 1.8 and 1.9 above and paragraphs 2.13 to 2.17 below introduce the Proposed Commitments, and the FCA's procedural history in assessing them so far.
 - c) Paragraphs 2.19 and 2.20 below explain in more detail how the Proposed Commitments relate to the scope of the Investigations, in particular that they focus on addressing the FCA's concerns regarding current conduct that, based on the evidence reviewed to date, may hinder competition in LLCS on the Relevant Routes (the Relevant Routes are defined in paragraphs 2.7 and 2.8 below).

Scope of the Investigations

- 2.2 The following paragraphs set out the scope of the Investigations:
- a) the undertakings subject to the Investigations; and
 - b) the conduct under investigation.

Undertakings subject to the Investigations

LSEG

- 2.3 LSEG is an international financial markets infrastructure and data business. In terms of its business activities that are relevant to the Investigations, it owns the LSE, which is a UK recognised investment exchange. LSEG also operates the Alternative Investment Market and has a majority stake in Turquoise, which are both multilateral trading facilities.
- 2.4 LSEG, via its EWS, provides LLCS on the Relevant Routes.

[PDC Landlord]

- 2.5 [PDC Landlord] is an international data centre service provider owned by [X]. [PDC Landlord] owns the PDC Building.

The conduct under investigation

LSEG's conduct subject to the Chapter II Investigation

- 2.6 The Chapter II Investigation concerns the following conduct:
- a) LSEG employing a 'rooftop policy' that prevents LLCS rivals to its EWS from placing radio equipment on the rooftops of the buildings housing the

LSE exchange, where LSEG (EWS) placed its own radio equipment. This started in 2014 when the LSE was located at its former PDC building in the City of London (**Former PDC Building**) and continues at LSE's current site (move effective February 2023), i.e. the PDC Building in the London Docklands; and

- b) between 2014 and November 2021, LSEG employing an internal cabling policy at the LSE trading venue which meant that LLCS rivals had to use more fibre cable within the Former PDC Building, compared to LSEG's EWS, to connect to client equipment in the co-location space.² LSEG stopped this policy in November 2021 and it does not employ this policy at the PDC Building at present.

2.7 The FCA is investigating the extent to which this conduct potentially affects the provision of LLCS on two routes:

- a) the **LSE-Cboe Route**, between LSE's trading venue in London (previously located at the Former PDC Building in the City of London, now located at the PDC Building in the London Docklands³) and the Cboe Global Markets' (**Cboe**) trading venue in Slough; and
- b) the **LSE-ICE Route**, between LSE's trading venue in London (previously located at the Former PDC Building in the City of London, now located at the PDC Building in the London Docklands) and Intercontinental Exchange Group, Inc's (**ICE**) trading venue in Basildon.

2.8 The LSE-Cboe Route and the LSE-ICE Route are defined together as the **Relevant Routes**.

LSEG's and [PDC Landlord]'s conduct subject to the Chapter I Investigation

2.9 In February 2023, the LSE moved from the Former PDC Building, a building that LSEG owned, to the PDC Building in the London Docklands, which is owned by [PDC Landlord]. To prepare the LSE's move from the Former PDC Building to the PDC Building, LSEG and [PDC Landlord] entered into several agreements. On 1 May 2020, they entered into an agreement to lease that set out the terms upon which LSEG and [PDC Landlord] would agree future lease agreements. On 25 September 2020 and 20 August 2021, LSEG and [PDC Landlord] entered into two lease agreements specifically regarding the PDC Building.⁴ The latter two lease agreements are defined together in this Notice, for simplicity, as the '**Lease Agreement**'.

² At the Former PDC Building, EWS fibre cabling ran from its end point radio units on the rooftop of the building directly to the co-location room, whereas other LLCS providers (that had based their end point radio units on other buildings) needed to access the data centre via the carrier room. Regarding cabling within the Former PDC Building, LSEG began from mid-2014 to the end of 2017 working on a 'fibre normalisation policy'. In October 2017, in response to MiFID II co-location requirements, LSEG equalised fibre cable connections (of co-location services customers) from the co-location space to the LSE matching engine. In that context, LSEG also decided to equalise fibre cable lengths between the co-location space and the carrier room (which affected the LLCS connections of rival providers, but not EWS). It carried this out between June 2018 and January 2019. In 2021, LSEG carried out further 'enhancements' to its fibre equalisation arrangements within the Former PDC Building. These increased the length of fibre cable that EWS used within the building (but did not affect the fibre cable lengths of other LLCS providers).

³ The LSE moved from the Former PDC Building to the PDC Building in February 2023.

⁴ More specifically, this refers to two co-location lease and services agreements that LSEG Business Services Limited entered into with the landlord of the PDC building, [PDC Landlord]: Lease [PDC Landlord] dated 25 September 2020 and the Lease [PDC Landlord] dated 20 August 2021. Each respective lease agreement concerns different areas of the PDC Building.

- 2.10 The Chapter I Investigation concerns provisions of the Lease Agreement. These provisions provide LSEG with exclusive rights to: (i) erect and maintain communication aerials on the rooftop of the PDC Building; and (ii) use the PDC Building for financial and market infrastructure services.
- 2.11 In particular, clause 10 of 'Part I Tenant's Rights' within Schedule 2 of the Lease Agreement states:⁵
- '10.1 [LSEG has] the exclusive right to erect and maintain [✕] telecommunications aerials and [✕] communication dishes and similar equipment [...] and a cabinet to manage communication [...] and with power delivered to it on the Roof Space with connections to the Data Hall and [...] to install such other plant and telecommunications apparatus on the roof of the Building together with connections to the Data Hall [...].
- 10.2 The Landlord covenants with the Tenant:
- 10.2.1 not to permit any other existing or new customers or occupiers to Install any more or new equipment on the roof of the Building including in the Exclusion Zones; [...]'
- 2.12 The FCA is investigating the extent to which these provisions of the Lease Agreement prevent, restrict or distort competition in the provision of LLCS on the Relevant Routes.

The commitments process

- 2.13 Section 31A of the Act provides that, for the purposes of addressing competition concerns it has identified, the FCA may accept, from such person or persons concerned as it considers appropriate, commitments to take such action (or refrain from such action) as it considers appropriate. The CMA's Procedural Guidance describes the circumstances in which the CMA is likely to consider it appropriate to accept binding commitments.⁶ Pursuant to section 31D of the Act in conjunction with section 234J paragraphs 4 and 5 of the Financial Services and Markets Act 2000, the FCA must have regard to the CMA's statutory guidance on the circumstances in which it may be appropriate to accept commitments.⁷
- 2.14 In accordance with section 31A of the Act, a business under investigation can offer commitments at any time during the course of an investigation until a decision on infringement is made. In this case, no decision on infringement has been made.
- 2.15 In August 2024, LSEG approached the FCA to discuss offering commitments to address the FCA's competition concerns. [PDC Landlord] similarly approached the FCA in September 2024. In line with the FCA's Guidance on its Powers and Procedures in CA98 cases (FG15/8) (the **Procedural Guidance**) and also relevant provisions of the Guidance on the CMA's investigation procedures in Competition Act 1998 cases (CMA8) (the **CMA's Procedural Guidance**),⁸ the

⁵ This clause is contained in both the Lease [✕] of 25 September 2020 and Lease [✕] of 20 August 2021.

⁶ The CMA's statutory guidance on the circumstances in which it may be appropriate to accept commitments is contained in paragraphs 10.18 to 10.21 of the CMA's Procedural Guidance (see also paragraph 1.9 of the CMA's Procedural Guidance, which sets this out).

⁷ See also paragraphs 1.8 and 4.22 of the Procedural Guidance.

⁸ The Procedural Guidance is available at <https://www.fca.org.uk/publication/finalised-guidance/fg15-08.pdf>; the CMA's Procedural Guidance is available at [Guidance on the CMA's investigation procedures in Competition Act 1998 cases: CMA8](#).

FCA proceeded to discuss with LSEG and [PDC Landlord] the scope of any commitments which the FCA considered would be necessary to address the concerns it had identified. It issued each of them with a Statement of its Competition Concerns.

- 2.16 Annexes C and D to this Notice set out the Proposed Commitments that LSEG and [PDC Landlord] have offered to the FCA. Offering such commitments does not constitute an admission by LSEG or [PDC Landlord] of an infringement under the Chapter I and/or Chapter II prohibitions (as applicable). They have made no such admissions.
- 2.17 The Proposed Commitments seek to address the FCA's competition concerns regarding LSEG's and [PDC Landlord]'s current conduct that it considers may hinder competition in the relevant market(s). This relates in particular to clause 10 of 'Part I Tenant's Rights' within Schedule 2 of the Lease Agreement (quoted in full in paragraph 2.11 above) and LSEG's rooftop policy at the PDC Building (discussed in paragraph 2.2a) above).
- 2.18 Having considered the Proposed Commitments, the FCA provisionally considers that they address its competition concerns for the reasons set out in this Notice, and that it is appropriate for the FCA to close the Investigations concerning the current conduct giving rise to our competition concerns by way of a formal decision accepting the Proposed Commitments. If the FCA formally accepts the Proposed Commitments, it would terminate the Investigations and not decide whether or not LSEG and [PDC Landlord] have infringed the Chapter I and/or II Prohibitions.

Other matters within scope of the Investigations

- 2.19 As noted in paragraphs 2.6 to 2.12 above, in addition to the matters the FCA provisionally considers will be addressed by the Proposed Commitments, the FCA is also investigating whether:
- a) LSEG's historic cabling policy (from 2014 to 2021) at the Former PDC Building potentially hindered competition on the Relevant Routes;
 - b) LSEG's rooftop policy (from 2014 to 2023) at the Former PDC Building potentially hindered competition on the Relevant Routes;
 - c) the Lease Agreement, in conjunction with LSEG's rooftop policy at the PDC Building, potentially hinders competition on the LSE-Cboe Route; and
 - d) the provisions in the Lease Agreement granting LSEG exclusive rights to use the PDC Building for financial and market infrastructure services potentially hinders competition on the Relevant Routes.
- 2.20 If the FCA decides to accept the Proposed Commitments, it would not investigate these elements of the Investigations further, as a matter of its administrative priorities (see Procedural Guidance, paragraph 3.8).

3 Relevant background

3.1 In this Section, the FCA sets out its provisional views on the factual background relevant for purposes of considering the commitments offered.

3.2 The remainder of this Section describes:

- a) the LSE-ICE Route;
- b) demand for LLCS connections on the LSE-ICE Route;
- c) competition in LLCS on the LSE-ICE Route;
- d) access to the relevant LSE and ICE data centres for LLCS providers; and
- e) the practical impact of LSEG's and [PDC Landlord]'s conduct on third party LLCS providers.

Description of the LSE-ICE Route

3.3 As noted at paragraph 2.7b) above, the LSE-ICE Route runs between LSE's trading venue in the London Docklands and ICE's trading venue in Basildon. This is schematically illustrated in Figure 1 below.



Figure 1: Indicative map of the LSE-ICE Route. For illustration purposes, the diagram shows a straight line between the London Docklands and Basildon and not any actual LLCS route.

Demand for LLCS on the LSE-ICE Route

3.4 The FCA's preliminary analysis indicates that there is demand for LLCS on the LSE-ICE Route. LLCS are predominantly used by firms that engage in high-frequency trading (**HFT**). Such firms generate trading profits by using proprietary technology to identify and exploit opportunities at trading venues that may exist for fleeting moments (in the order of microseconds). As such, HFT firms seek to transmit relevant information (such as trading orders and other data) between trading venues as fast as possible to exploit trading opportunities before rivals do. For example, they can exploit arbitrage opportunities provided by the variation in price of instruments that are listed on multiple trading venues.

3.5 LLCS are also used to provide market making services. Market makers demand up-to-date data to ensure that the bid and offer prices they quote reflect changing pricing and market information (and so minimise the arbitrage opportunities that might otherwise be exploited by HFT firms).

- 3.6 Such HFT and market making firms generally wish to transmit information between venues where similar financial instruments are listed (for example, two trading venues that both focus on equities), or where instruments with correlated prices are listed (for example, a trading venue focusing on equities and a trading venue focusing on corresponding derivatives). Further, relevant firms want to connect to venues with high liquidity, as these offer greater trading opportunities. This demand for information transmission between trading venues where similar or correlated instruments are listed, in turn, drives demand for the establishment of LLCS between such venues.
- 3.7 Against this background, demand for LLCS on the LSE-ICE Route is driven by the fact that it connects two important UK trading venues:
- a) the LSE, which is the largest regulated market in the UK for equity trading. The PDC Building (and previously the Former PDC Building in the City of London) also houses Turquoise, a multilateral trading facility operated by LSEG; and
 - b) the ICE trading venue in Basildon, which is a market for trading in derivatives markets (for underlying equities, commodities and indices). Until 2022, the ICE data centre also housed the Euronext trading venue.

LLCS provision

Definition and characteristics of LLCS

- 3.8 For these purposes, LLCS enable rapid transmission of information between trading venues. Connection latency is currently measured in microseconds (μ s) or nanoseconds (ns).⁹
- 3.9 The FCA provisionally considers that, from a customer perspective, latency of an LLCS connection is a primary competitive parameter. Other parameters of competition include price, reliability, and the bandwidth of a connection.
- 3.10 Latency is defined as the time required for signals to travel from one point to another in a communications network. From a technical perspective, there are five major contributors to latency in LLCS systems:
- a) over-the-air propagation;
 - b) fibre cable propagation;
 - c) repeater sites;
 - d) radio functions; and
 - e) policer functions.

Further details are set out in **Annex A**.

- 3.11 An LLCS route connects two trading venues, and more precisely the IT hardware of LLCS customers that is located inside the co-location (or proximity hosting) spaces of each respective trading venue that are being connected.
- 3.12 At each trading venue, the LLCS customer equipment in the co-location space is then connected via fibre cable to the trading venue's matching engine (which is

⁹ A microsecond equals one millionth of a second. A nanosecond equals one billionth of a second.

where bids and offers are matched and trades effected). These 'last step' connections are part of a trading venue's co-location services offering (i.e. they are not part of the LLCS offering). Such offering allows firms to place their trading equipment in close proximity to the trading venue's matching engine. The relevant cable lengths for these last step connections must be equalised in length and latency by the trading venue under the applicable MiFID II co-location rules.¹⁰

- 3.13 For LLCS connections between two trading venues at distances such as those of the LSE-ICE Route (that is, networks within a metropolitan region), LLCS providers predominantly use over-the-air radio transmission to transmit information for customers and try to minimise segments transmitting data via fibre cable. This is because over such distances transmission over the air is more direct and significantly faster than other transmission methods.
- 3.14 Radio signals travel at the speed of light through air (3.3366 nanoseconds per metre). In contrast, data travels through solid core fibre cable at 4.87 nanoseconds per metre.¹¹ There is also an expensive form of fibre cable, hollow-core fibre, which can transmit data at the speed of light through air and which can be used instead of solid-core fibre cable. Cabling pathways are, however, typically less direct and therefore longer than air distances.
- 3.15 In terms of route design, LLCS providers aim to build a route as close as possible to the geodesic line (that is, the shortest distance between two points on the surface of a sphere, such as the Earth) between the two relevant trading venues. To do so, LLCS providers use radio units (a combination of an antenna dish and a radio modem) to transmit signals. Since radio signals weaken over distance, LLCS providers must set up repeater stations to transmit the radio signal across the entire length of the route (at distances such as those of the LSE-ICE Route). Repeater stations combine two radio units, one to receive the signal, and one to pass it on. As such, a single route between two trading venues consists of two radio unit 'end points', which are connected by several radio unit 'repeaters'.
- 3.16 In practice, the geodesic line may not be achievable due to topological, physical or commercial constraints, but repeater stations are often placed on high-rise buildings to facilitate achieving a route that runs as close as possible to the geodesic line. Such placement can reduce line-of-sight issues (i.e. a situation where a radio unit is placed in a location and the radio signal path to the next radio unit is blocked or interfered with by a building or obstacle). Higher buildings (compared to lower ones) also generally provide more onward connectivity options (e.g. for placing the next repeater on a route) and so allow for a more flexible and resilient route design, which can be important if issues occur and a provider needs to update the course of a route.
- 3.17 At each end of a route, LLCS providers strive to install an 'end point' radio unit as close as possible to the trading venue (more precisely, as close as possible to a suitable building ingress point that offers the fastest access to the trading venue's co-location space). LLCS providers choose between candidate end point locations

¹⁰ Article 48(8) MiFID II and Delegated Regulation 2017/573 set out the Regulatory Technical Standards 10 (RTS 10). RTS10, Article 1, paragraph 2 provides: 'Trading venues shall provide all users which have subscribed to the same co-location services access to their network under the same conditions, including as regards space, power, cooling, cable length, access to data, market connectivity, technology, technical support and messaging types.' The UK onshoring provisions for these rules are contained in paragraph 3D of the Schedule to the Financial Services and Markets Act 2000 (Recognition Requirements for Investment Exchanges and Clearing Houses) Regulations 2001 (SI 2001/995) and the following provisions of the FCA Handbook: REC 2.5, MAR 5.3A.10R, and MAR 5A.510R.

¹¹ Further details are set out in Annex A on this topic.

based on criteria including: minimising cabling distance to the co-location space, avoiding the presence of line-of-sight and other network design issues, and other criteria such as the willingness of a landlord to offer rights to the location, the availability of sufficient space to install equipment, the potential for radio interference issues at a location, the possibility to obtain planning permission, etc.

- 3.18 A break-down of the typical route design between two trading venues from a technical perspective is set out in **Annex B**.

LLCS providers on the LSE-ICE Route

- 3.19 In addition to LSEG's EWS, the following LLCS providers have set-up relevant connections on the LSE-ICE Route at present:
- a) **McKay:** McKay Brothers Communications Limited is a provider of LLCS between data centres where major exchanges are located, and a provider of low latency market data between those data centres.
 - b) **New Line Networks:** New Line Networks LLC is a joint venture between the Jump Trading Group and Virtu Financial. It supplies LLCS on the LSE-ICE Route solely to its joint venture parents. Jump Trading Group is a market maker and trading participant in financial instruments, comprising multiple lines of trading and investment spread across multiple groups of entities. Virtu Financial is a group of financial services companies that provides, amongst other services, liquidity to the global markets.

Access to relevant data centres for LLCS providers

- 3.20 To make end point connections, LLCS providers need to obtain access to the relevant data centres and as such contract with the trading venues (and/or the data centre providers, where trading venue operators do not own or control the data centres in which they are situated). Such access includes, where applicable, the rights to run internal cabling and/or install and operate radio transmission equipment on the trading venues' premises (or other suitable premises).
- 3.21 Because it has exclusive rights under the Lease Agreement to use relevant parts of the building, including its rooftop (see paragraphs 2.10 and 2.11 above), LSEG controls access to relevant parts of the PDC Building: Rival LLCS providers require LSEG's permission to install LLCS equipment on the rooftop and to run connections in parts of the building that are part of LSEG's demise. Regarding PDC Building other than LSEG's demise, physical access is subject to [PDC Landlord]'s security and access policies. [X].
- 3.22 At the other end of the LSE-ICE Route, ICE owns the data centre building in Basildon where the ICE trading venue is located, and it controls access to it. Subject to more detail at paragraphs 3.36 to 3.39 below, ICE allows LLCS providers in principle to host their radio unit equipment on the data centre premises (that is, on the rooftop of the data centre).

Impact of the conduct on other LLCS providers

- 3.23 The FCA's provisional view on the current impact of the conduct and Lease Agreement is as follows concerning the LSE-ICE Route.

Situation at the LSE

Resulting end point radio unit positioning

- 3.24 As a result of LSEG's rooftop policy and the rooftop exclusivity granted by the Lease Agreement with [PDC Landlord], only EWS's end point radio units are currently located on the rooftop of the PDC Building.
- 3.25 Other LLCS providers are prevented from installing their end point radio units on the rooftop of the PDC Building and have, for the LSE-ICE Route, therefore located their LLCS equipment on the rooftop of a neighbouring building. That building itself is located further away from the ICE trading venue than the PDC building.

Resulting fibre cable connections

- 3.26 The PDC Building has Carrier Rooms that serve as access points for external LLCS connections.
- 3.27 Compared to EWS, rival LLCS providers must use significantly longer fibre cable to reach the Carrier Rooms. Since their end point radio units are located on the rooftop of a neighbouring building, the relevant fibre cables must first traverse the rooftop of that building and then the distance between both buildings before they reach the PDC Building and ultimately the Carrier Rooms.
- 3.28 Rival providers have tried to mitigate the resulting increased latencies by investing in (expensive) hollow-core fibre cable for their connections between their end point radio units and the relevant Carrier Room, [X].
- 3.29 For completeness, due to LSEG's 'normalisation policy', fibre cable connections are equalised in length (and type) between the Carrier Rooms and the co-location space in the PDC Building. At present this means that, from the Carrier Rooms, all providers (including EWS) connect via the same length of solid core fibre cable to their respective customers' equipment in the PDC Building's co-location space.¹²

Additional over the air distance for rivals due to end point radio unit positioning

- 3.30 The relative position of rivals' end point radio units on the neighbouring building, compared to the position of EWS's on the PDC Building, means that their radio signals to or from ICE must travel further compared to the radio signal of EWS.
- 3.31 To estimate the relevant advantages or disadvantages of end point positions in this regard, the FCA has provisionally considered the radio unit locations relative to each other in view of the geodesic lines towards their final destination at ICE. The actual (dis)advantages will differ to a degree since the actual routes of LLCS providers deviate from the geodesic path.
- 3.32 Based on this assessment, the FCA's provisional view is that EWS appears to have a material latency advantage concerning over-the-air transmission of radio signals on the LSE-ICE Route since its end point radio unit on the PDC Building is materially closer to the final destination at ICE.

¹² Onward connections from the co-hosted customer equipment to the LSE's matching engine are also equalised in length/type (which is a requirement under MiFID II). The result is that, from each Carrier Room towards customer hardware in the co-location space (and then onwards to the matching engine), all LLCS providers (including EWS) have equal connections in terms of latency.

Line of sight issues

- 3.33 Based on the evidence the FCA has obtained in its Investigations, the FCA provisionally considers that EWS does not face the same line-of-sight issues from its end point radio unit location on the rooftop of the PDC Building. EWS's rivals currently face an immediate block to their line-of-sight from their positions on the rooftop of the neighbouring building.
- 3.34 Rival LLCS providers must therefore divert their LLCS routes towards ICE away from the geodesic route. This diversion adds significant distance and so latency to their respective routes, compared to EWS.
- 3.35 Further and more generally, the FCA is also concerned that, due to the differences in rooftop height between the PDC Building and the neighbouring building where rivals are located, rival LLCS providers also have fewer options for repeater stations along the route, compared to EWS (see paragraph 3.16 above regarding the importance of flexibility in route design for the provision of LLCS).

Situation at ICE

- 3.36 For the purposes of its Investigations, the FCA has also provisionally considered the extent to which the conduct affects end-to-end latencies on the Relevant Routes.
- 3.37 In that regard, the access situation at ICE is relevant as follows. The ICE data centre has a dedicated rooftop platform on top of the data centre, where ICE allows LLCS providers to install relevant end point radio units. Fibre cable connects from this rooftop platform to the ICE co-location space.
- 3.38 While other LLCS providers have installed end point radio units on the rooftop platform, LSEG has not. [×].
- 3.39 Relevant connections from end point radio units on the rooftop platform (e.g. those of EWS's rivals on the LSE-ICE Route), and, in EWS's case, [×] to the co-location space are not equalised in length. As a result, EWS's fibre cable connection is longer than those of its rivals and incurs more latency.

4 Market definition

- 4.1 In this Section, the FCA sets out its preliminary views on market definition. For the purposes of this document, this concerns: (i) the market for the provision of LLCS on the LSE-ICE Route, and (ii) the related market(s) for access to the LSE.

Provision of LLCS on the LSE-ICE Route

- 4.2 The FCA provisionally considers that the relevant market for the provision of LLCS (regarding the LSE-ICE Route) can be defined as the market for the provision of 'connectivity only' services for customers that wish to transmit information between the LSE and ICE trading venues. The provision of LLCS does not include other services, such as the distribution of market data.
- 4.3 The relevant market includes LLCS providers that offer LLCS to third party customers and those that self-supply LLCS (within the same undertaking).
- 4.4 The relevant market only includes services that predominantly use radio technology to transmit information over the relevant distances. It does not include providers that employ slower means of connectivity, such as fibre cable-only connectivity. On distances such as the LSE-ICE Route, fibre cable-only connections are a poor substitute for radio-based LLCS connections since such connectivity is too slow to enable trading and market making strategies competitive with LLCS-based strategies.
- 4.5 Equally, other LLCS routes are not good substitutes for connectivity between LSE and ICE. Users wishing to transmit information between those venues would not consider other venue pairs as a good substitute.

Access to the LSE trading venue for LLCS providers

- 4.6 LLCS connect trading venues, and the more important the venue, in terms of trading volume and liquidity, the greater the demand for LLCS to that venue (see paragraph 3.6 above).
- 4.7 As noted in paragraph 3.11 above, LLCS customers use LLCS to transmit information between venues, and more precisely between the co-location spaces of two venues. As such, at each end of an LLCS Route, there is demand for fast access to the venue and ultimately the matching engine itself. LLCS customers are typically also co-location customers of the respective trading venue and so have their trading equipment hosted in their respective co-location spaces. This means LLCS connections are in practice established between each trading venue's co-location space. Further, as noted (see paragraph 3.12 above), connections between a trading venue's co-location space and its matching engine are regulated, so that all co-location to matching engine connections must have the same latency.
- 4.8 From the perspective of the LLCS provider, this means that demand for rapid access to a trading venue means, specifically, demand for rapid access to the venue's co-location space (or any other space from which all onward connections to the co-location space and/or the trading venue's matching engine are equalised in latency, such as the Carrier Rooms in the case of the PDC Building).

- 4.9 In that regard, the FCA provisionally considers that there is a relevant market for LLCS access to the LSE trading venue which includes:
- a) fibre cable ingress into the data centre building and onward connection within the building from that ingress point to LLCS customers' equipment that is hosted in the co-location space of the data centre¹³; and
 - b) the provision of physical space to install LLCS 'end point' radio units that connect to fibre cable entering the data centre and ultimately to customer equipment in the co-location space.
- 4.10 The geographic scope of the provision of fibre cable ingress and internal cabling is by its nature limited to the data centre building itself (i.e. in the case of the LSE, the PDC Building at present).
- 4.11 Regarding the provision of physical space to install 'end point' radio units, the geographic scope is in each case specific to any given trading venue. From a demand side perspective, it generally comprises those potential sites where radio equipment could be placed and which are sufficiently close to the co-location space of a particular trading venue (or in the case of the PDC Building, the Carrier Rooms) so that LLCS providers consider them substitutable. This is the case if any latency differences regarding connections between candidate sites and the co-location room do not differ appreciably from a competition perspective.
- 4.12 Regarding the LSE-ICE Route, compared with alternative candidate locations, the rooftop of the PDC Building appears advantageous since it:
- a) allows shorter cabling distances from end point radio units located there to the PDC Carrier Rooms;
 - b) is closer to ICE and so enables a shorter over-the-air LLCS route to ICE; and
 - c) is higher than alternative sites and, in the case of the LSE-ICE Route, positioning end point radio units on it also avoids line of sight issues (that competitors on the neighbouring building currently face).
- 4.13 The FCA need not reach a definitive conclusion on the scope of the relevant markets for the purposes of accepting commitments. However, it provisionally considers that:
- a) latency is a key parameter on which LLCS providers compete (see paragraphs 3.8 to 3.10), and as part of that competition, they seek sites for their end-point radio equipment that allow fast access to the LSE venue (see paragraph 4.7). Accordingly, the relevant market includes all those sites that allow sufficiently fast access so that they can be competitive substitutes;
 - b) the PDC Building rooftop offers a significant latency advantage to any LLCS provider (at present: EWS only) on the LSE-ICE Route when it comes to siting their 'end point' radio units, as noted in paragraph 4.12 above. This is compared to alternative locations on neighbouring buildings where EWS's rival LLCS providers currently site their equipment (see paragraphs 3.26 to 3.35); and so

¹³ Onward connections between customer equipment to the LSE matching engine are not part of the market, since they are part of the co-location services.

- c) based on the investigations to date, the PDC Building rooftop forms part of the relevant market for access by LLCS providers to the LSE trading venue on the LSE-ICE Route concerning the provision of sites to install LLCS 'end point' radio units (see paragraph 4.9b) above). The FCA has not concluded which other locations may be within this market.

5 Competition concerns regarding the Chapter II Investigation

- 5.1 This Section summarises the FCA’s competition concerns regarding the Chapter II Investigation in relation to the situation at the PDC Building, which arises out of LSEG’s conduct.

Dominance

LSEG’s position in access to the PDC Building

- 5.2 On the basis of the Investigations to date, the FCA provisionally considers that LSEG may hold a dominant position on the provisionally defined market(s) for access to the LSE data centre necessary for the LSE-ICE Route.
- 5.3 As noted in paragraph 3.7 above, there is significant demand for establishing LLCS connections with the LSE, due to its importance as a trading venue. LSEG has exclusive rights to use the PDC Building as a trading venue and to use its rooftop. Physical access is subject to [PDC Landlord]’s security and access policies. While [PDC Landlord] owns the PDC Building, LSEG controls access to its own demise within the PDC Building. LLCS providers cannot make connections to the LSE co-location space, or install LLCS equipment on the rooftop without LSEG’s consent, as a result of the exclusive rights conferred by the Lease Agreement (see paragraphs 2.9 to 2.11 above).
- 5.4 Further, the FCA provisionally considers that there are significant barriers to entry in this market. In particular, regarding the provision of physical space to install end point radio units, rivals or third parties appear to face significant barriers to establishing alternative sites, where end point radio units could be hosted, that are competitively substitutable the PDC Building’s rooftop. Paragraph 3.17 above illustrates the criteria necessary to establish a suitable end point radio unit location. The FCA is concerned that rival LLCS providers, despite having good incentives to do so, have not been able to use alternative sites that are good competitive substitutes to the PDC Building’s rooftop (see paragraphs 3.26 to 3.35 and 4.12 above).

Abuse

- 5.5 While holding a dominant market position is in itself not of concern, the FCA is concerned that LSEG’s conduct may amount to an abuse of dominance under the Chapter II prohibition. In particular, the FCA is concerned that LSEG’s rooftop policy anticompetitively discriminates against other LLCS providers, departs from competition on the merits in favour of customers, and so hinders other LLCS providers in competing against EWS. The FCA is concerned that this adversely affects competition in the supply of LLCS on the LSE-ICE Route.

- 5.6 Since LSEG controls access to relevant parts of the LSE trading venue, and in particular access to the PDC Building's rooftop which the FCA provisionally considers the most competitive site for establishing end point radio units at LSE, it can discriminate against EWS's rivals by determining the minimum latencies that rivals can achieve at that route end (see paragraphs 5.7 to 5.9 below). The FCA's provisional view of the practical consequences of LSEG's conduct in terms of rivals' LLCS route design is set out in paragraphs 3.23 to 3.35 above.

Effects on rival LLCS providers on the LSE-ICE Route

- 5.7 **Higher latencies for rivals.** On the basis of the Investigations to date, the FCA provisionally considers that, as the result of LSEG's conduct, its rivals in the provision of LLCS face significantly higher latencies at the LSE trading venue compared to EWS. As noted in paragraphs 3.26 to 3.29 above, rivals require significantly longer cabling from their end point radio units on the neighbouring building to reach the relevant Carrier Room within the PDC Building compared to EWS. EWS's location on the PDC Building's rooftop is also closer to ICE, so that radio signals from ICE arrive at EWS's end point radio unit before arriving at rivals' positions on the neighbouring building. While rivals have invested in hollow-core fibre cable for the connections between their end point radio units and the Carrier Room, this cannot overcome EWS's latency advantage, [×].
- 5.8 In addition, rivals' end point location on the neighbouring building suffers from line-of-sight issues (see paragraphs 3.33 to 3.35 above), which EWS does not face by being located on the PDC Building's rooftop. For rivals, the immediate geodesic route from the neighbouring building to ICE is blocked, so that they must deviate their routes from the geodesic path. The FCA provisionally considers that such deviation results in significant increases in latency of, in the best case, at least several microseconds for those providers on the LSE-ICE Route.¹⁴
- 5.9 Regarding LSEG's access situation at ICE (see paragraphs 3.36 to 3.39 above), the FCA has taken into account that EWS has higher latency at ICE compared to its rivals. However, it remains concerned that EWS's disadvantage at ICE does not negate EWS's advantage in latency at the PDC Building. The FCA is concerned that, as a consequence of LSEG's conduct, EWS has a significant latency advantage over the entire LSE-ICE Route, compared to other LLCS providers.
- 5.10 **Asymmetric costs.** Their investment in hollow-core fibre cable for the relevant route segment means rivals have incurred significant additional costs [×]. This means that due to LSEG's conduct they have faced asymmetrical costs in providing the LLCS services compared to EWS.
- 5.11 **Reduced incentives to invest.** By reserving the most competitive site to itself, LSEG faces reduced competitive pressure as rivals cannot hope to match EWS's current latency. This reduces both LSEG's incentives to invest in latency improvements for EWS, as well as those of rival LLCS providers to invest in their routes.
- 5.12 **More limited route design options.** Rival LLCS providers excluded from the PDC Building's rooftop may have less choice of suitable locations for repeater

¹⁴ As noted in paragraphs 3.30 to 3.32 above, the relative position of rivals' end point radio units on the neighbouring building, compared to the position of EWS on the rooftop of the PDC building, means that their radio signals to or from ICE must also travel further compared to the radio signal of EWS. However, considering the actual route latency differences between EWS and third party providers to account of line-of-sight issues already takes account of this negative latency effect.

stations, compared with EWS. Rival LLCS providers located on the neighbouring building suffer from line-of-sight issues in the direction of ICE, and the PDC Building's rooftop is higher than surrounding locations (and materially higher than the neighbouring rooftop which rivals currently use).

- 5.13 The PDC Building's rooftop may therefore present more and better options for onward connectivity at present and in the foreseeable future. Conversely, rivals excluded from the PDC Building's rooftop may suffer disadvantages in terms of route design options compared to EWS (see paragraph 3.16 above regarding the importance of flexibility in route design for the provision of LLCS).

Effects on competition

- 5.14 The FCA is concerned that LSEG's conduct may lead to the following adverse effects concerning competition in LLCS:
- a) a reduction in the number and competitiveness of other LLCS providers on the LSE-ICE Route. EWS is one of several providers of LLCS on the LSE-ICE Route. The FCA is concerned that EWS has a greater share of the market than it might have had, had its conduct not hindered the ability of other actual and potential LLCS providers to compete;
 - b) less innovation in LLCS along the LSE-ICE Route (e.g. regarding EWS or when rivals decide they cannot effectively compete¹⁵); and
 - c) customers of LLCS being offered less choice, lower quality of LLCS, and potentially higher prices than would otherwise be the case if there was undistorted competition on the merits.

Objective justification

- 5.15 At this stage, the FCA provisionally considers that LSEG's conduct is not objectively justified. Reasons provided by LSEG of alleged space limitations with respect to the rooftop of the PDC Building, interference concerns regarding hosting more LLCS radio units on the rooftop, or administrative burden regarding allowing other LLCS providers onto the rooftop do not appear to justify the conduct.

¹⁵ For instance, LSEG's EWS [3<], which may indicate reduced competitive pressure on LSEG to innovate or invest. More generally, rivals to EWS may decide not to invest or innovate in their LLCS on the LSE-ICE Route if they (perceive they) cannot overcome LSEG's present latency advantage at the PDC. There may be also a chilling effect on innovation if rivals consider that any (potentially expensive) equipment or route upgrades would unlikely translate into relative latency gains over EWS, if LSEG can immediately (and in comparison, more cheaply) improve EWS's latency through [3<].

6 Competition concerns regarding the Chapter I Investigation

- 6.1 This Section summarises the FCA’s competition concerns regarding the Chapter I Investigation in relation to the situation at the PDC Building, which arises out of the Lease Agreement between LSEG and [PDC Landlord].

‘Agreement’ between ‘undertakings’

- 6.2 The FCA provisionally considers that the relevant provisions of the Lease Agreement constitute an ‘agreement’ between ‘undertakings’ (namely LSEG and [PDC Landlord]), as each term is understood under Section 2 of the Act.

Restriction by object

- 6.3 The FCA provisionally considers that the Lease Agreement provides LSEG with the exclusive right to use the PDC Building’s rooftop, including the exclusive right to install LLCS equipment on it.
- 6.4 The FCA is concerned that the relevant exclusivity provisions in the Lease Agreement, taking into consideration all relevant aspects (in particular, the content of the relevant provisions of the Lease Agreement, their objectives, and the economic and legal context in which they operate), may amount to a restriction¹⁶ of competition ‘by object’. This means that the relevant parts of the Lease Agreement can be regarded by their very nature as harmful to the proper functioning of normal competition.
- 6.5 In particular, the Lease Agreement may, in light of its specific legal and economic context in the LLCS market (including its genesis), amount to an obvious restriction of competition. In this regard, based on the Investigations to date, the FCA provisionally considers that for the provision of LLCS on the LSE-ICE Route, the PDC Building’s rooftop is the most competitive site for end point radio units at the LSE end. LLCS providers unable to site their radio equipment on that roof must run fibre cable from their respective end point radio units on a neighbouring building and through the PDC Building to reach the LSE co-location space. They must build routes that divert significantly from the geodesic path to ICE. The FCA is therefore concerned, in view of their specific economic context, that the object of the exclusivity provisions in the Lease Agreement is to exclude LLCS rivals from the most competitive end point radio unit locations and so reduce competitive pressure on EWS.

¹⁶ The term ‘restriction’ is used in the wider sense of including the prevention, restriction, and/or distortion of competition, as set out in the Chapter I prohibition under the Act.

Restriction by effect

- 6.6 In addition, the FCA is concerned that the relevant exclusivity provisions of the Lease Agreement may result in adverse effects on competition in LLCS, by hindering other LLCS providers' ability to compete effectively with EWS in terms of latency, cost or route design options on the LSE-ICE Route. The FCA provisionally considers the effects are the same as those detailed with regard to the Chapter II prohibition, set out in paragraphs 5.7 to 5.14 above.

Section 9 exemption criteria

- 6.7 Under section 9 of the Act, an agreement is exempt from the Chapter I prohibition if it contributes to improving production or distribution, or promoting technical or economic progress, while allowing consumers a fair share of the resulting benefit, and does not impose on the undertakings concerned restrictions which are not indispensable to the attainment of those objectives; or afford the undertakings concerned the possibility of eliminating competition in respect of a substantial part of the products in question.
- 6.8 At this stage of the Investigations, neither LSEG nor [PDC Landlord] have claimed that section 9 would apply to the Lease Agreement. In any event, the FCA provisionally considers that the conditions of section 9 of the Act are unlikely to be fulfilled.

7 The Proposed Commitments

- 7.1 In order to address the FCA's competition concerns as described in Sections 5 and 6, LSEG and [PDC Landlord] have offered the Proposed Commitments to the FCA. The Proposed Commitments are set out in the Annexes C (LSEG) and D ([PDC Landlord]) to this Notice and their key provisions are summarised below.

LSEG's Proposed Commitments

- 7.2 LSEG has offered to commit to:
- a) vary the provisions of its Lease Agreement with [PDC Landlord] so as to terminate LSEG's exclusive rights to use of the PDC Building's rooftop. LSEG would continue using one half of the rooftop (Area A) and [PDC Landlord] would be able to lease out the other half of the rooftop (Area B) to whomever it chooses, including to third party LLCS providers;
 - b) agree to this variation and vacate Area B within 15 weeks from the date the FCA accepts the Proposed Commitments, and to use all reasonable endeavours to do so earlier;¹⁷ and
 - c) offer the same connectivity options with the same associated latency available to EWS between exchange hosted customer cabinets and the Carrier Rooms within the PDC Buildings, to all third parties who provide or are seeking to provide LLCS.¹⁸

[PDC Landlord]'s Proposed Commitments

- 7.3 [PDC Landlord] has offered to commit to:
- a) vary the provisions of its Lease Agreement with LSEG, so as to enable third parties to provide LLCS from Area B of the PDC Building rooftop;
 - b) complete such variation as soon as possible and in any event within 15 weeks from the date the Proposed Commitments have been accepted by the FCA;¹⁹
 - c) facilitate LSEG's efforts in vacating Area B within the same timeframe;²⁰
 - d) provide any information reasonably required by third parties to allow them to plan, prepare and submit a request for space in Area B in line with [PDC Landlord] standard practices and procedures, from the date the Proposed Commitments have been accepted by the FCA;²¹
 - e) consider requests for the provision of physical access to and use of Area B of the rooftop by third parties on a fair and non-discriminatory basis to enable them to install and operate equipment, subject to [PDC Landlord]'s standard access protocols, policies, procedures, and

¹⁷ See Clauses 3.1 to 3.3 of LSEG's Proposed Commitments.

¹⁸ See Clause 3.5 of LSEG's Proposed Commitments.

¹⁹ See Clause 3.1 of [PDC Landlord]'s Proposed Commitments.

²⁰ See Clause 3.2 of [PDC Landlord]'s Proposed Commitments.

²¹ See Clause 3.3 of [PDC Landlord]'s Proposed Commitments.

operational requirements.²² Physical access would be available once the commitments have been implemented;

- f) ensure fair and non-discriminatory treatment of all parties in the normal course of operations, including by offering fair and non-discriminatory commercial terms to all parties in connection with use of the PDC Building rooftop, and in connection with any ancillary services that [PDC Landlord] offers, and which said parties reasonably require, in connection with their contracted use of the rooftop;²³ and
- g) open and maintain an alternative communication channel by which third parties, who do not know the identity of [PDC Landlord], can contact it concerning complaints, requests for information and requests for physical access to Area B of the rooftop.²⁴

Duration

- 7.4 Subject to any variation or release pursuant to section 31A(3) and section 31A(4) of the Act, LSEG's commitments will remain in place for as long as LSEG is located at the PDC Building. [PDC Landlord]'s commitments will remain in place for as long as [PDC Landlord] owns the PDC Building and retains a lease agreement with LSEG regarding the building.

Compliance, monitoring and reporting

- 7.5 The Proposed Commitments do not provide for an independent monitoring trustee to be appointed to monitor compliance with the commitments. LSEG and [PDC Landlord] commit however to update the FCA every four weeks on implementation progress regarding the Proposed Commitments, until implementation is complete.²⁵
- 7.6 In addition, third parties will be able to complain to LSEG or [PDC Landlord] about implementation of the Proposed Commitments (and LSEG will set up a dedicated email address for these purposes). LSEG and [PDC Landlord] propose to commit to providing the FCA with a copy of any complaint they receive concerning this matter promptly.²⁶ LSEG and [PDC Landlord] also propose to commit to provide the FCA with information to verify their compliance with the Proposed Commitments should the FCA request such information.²⁷

²² See Clause 3.4 of [PDC Landlord]'s Proposed Commitments.

²³ See Clause 3.5 of [PDC Landlord]'s Proposed Commitments.

²⁴ See Clauses 3.7 to 3.9 of [PDC Landlord]'s Proposed Commitments.

²⁵ See Clause 4.1 of LSEG's Proposed Commitments; Clause 4.1 of [PDC Landlord]'s Proposed Commitments.

²⁶ See Clause 4.3 of LSEG's Proposed Commitments; Clause 4.2 of [PDC Landlord]'s Proposed Commitments.

²⁷ See Clause 4.2 of LSEG's Proposed Commitments; Clause 4.3 of [PDC Landlord]'s Proposed Commitments.

8 The FCA's assessment of the appropriateness of the commitments

- 8.1 For the reasons set out below, the FCA provisionally considers that acceptance of the Proposed Commitments would be an appropriate way to address its competition concerns.

Applicable law and guidance

- 8.2 Pursuant to section 31A of the Act, for the purposes of addressing the competition concerns it has identified, the FCA may accept from such person (or persons) as it considers appropriate, commitments to take such action (or refrain from taking such action) as it considers appropriate.
- 8.3 In order to accept commitments, the FCA must consider that they will address the competition concerns the FCA has identified, and the FCA must consider, in the exercise of its discretion, that it is appropriate to accept commitments in the case in question.²⁸
- 8.4 As noted at paragraph 2.13 above, the FCA must have regard to the CMA's Procedural Guidance on the circumstances in which it may be appropriate to accept commitments. In line with paragraph 10.19 of the CMA's Procedural Guidance, the FCA is likely to consider it appropriate to accept binding commitments only in cases where:
- a) the competition concerns are readily identifiable;
 - b) the competition concerns are addressed by the commitments offered; and
 - c) the proposed commitments are capable of being implemented effectively and, if necessary, within a short period of time.

In line with paragraph 10.20 of the CMA's Procedural Guidance,

- d) the FCA is very unlikely to accept commitments in cases involving secret cartels between competitors or a serious abuse of a dominant position.

Finally, in line with paragraph 10.21 of the CMA's Procedural Guidance,

- e) the FCA will not accept commitments where compliance with them and their effectiveness would be difficult to discern; and/or
- f) where the FCA considers that not to complete its investigation and make a decision would undermine deterrence.

- 8.5 The FCA has assessed the Proposed Commitments against these six criteria and sets out its provisional views below.

²⁸ See the CMA's Procedural Guidance, paragraphs 10.18 to 10.21.

The FCA's assessment

Whether the competition concerns are readily identifiable

- 8.6 The FCA provisionally considers that the competition concerns are readily identifiable. They are set out in Sections 5 and 6 of this Notice.

Whether the Proposed Commitments address the FCA's competition concerns

- 8.7 The Proposed Commitments (summarised in Section 7 above) directly address the heart of the FCA's competition concerns by ending the rooftop exclusivity held by LSEG's EWS and allowing third party LLCS providers to access the rooftop of the PDC Building. This is supported by LSEG's commitment to offer the same connectivity options with the same associated latency available to EWS between exchange-hosted customer cabinets and Carrier Rooms within the PDC Building to all third party LLCS providers.
- 8.8 The latter, in essence, requires LSEG to maintain its current 'fibre normalisation policy' of equalising the fibre cable connections between the Carrier Rooms and the co-location space within the PDC Building. The commitment is further supported by [PDC Landlord]'s commitment to provide access to the PDC Building rooftop to all LLCS providers on a fair and non-discriminatory basis. In summary, the Proposed Commitments therefore restore undistorted competition between EWS and rival LLCS providers concerning the situation around the PDC Building. Regarding the specific concerns set out in paragraphs 5.7 to 5.12 and 6.6 above, the FCA observes:

Concern 1: Higher latencies for rivals

- 8.9 The FCA provisionally considers that the Proposed Commitments will address the FCA's competition concern that the conduct/agreement leads to higher latencies for rival LLCS providers operating on the LSE-ICE Route (see paragraphs 5.7 to 5.9 and 6.6 above).
- 8.10 Compared to the present situation, the proposal eliminates any latency advantage LSEG's EWS has in terms of cabling length, distance to the ICE trading venue (from its end point antenna, compared to rivals), or due to rival LLCS providers suffering from line-of-sight issues and thus longer routes to ICE that arise out of the conduct/agreement under investigation.
- 8.11 The FCA provisionally considers that both Area A (where LSEG will continue to locate its radio units in future) and Area B (where rival LLCS providers will be able to locate their radio units in future) are functionally and competitively equivalent. As such, the Proposed Commitments address the FCA's concern regarding the latencies that LLCS providers can achieve around the LSE trading venue.
- 8.12 To arrive at this provisional view, the FCA considered relevant submissions from LSEG and [PDC Landlord], including copies of layout plans of the PDC Building, and also inspected the rooftop and its surroundings on a site visit in June 2024. Specifically:

Physical space

- 8.13 Areas A and B of the PDC Building's rooftop have an equivalent layout. Each Area consists of a main roof level section that has a dedicated hard-floor area where radio units can be installed. There are also additional rooftop sections where radio units can be installed.
- 8.14 Area B appears sufficiently large to host a large number of LLCS radio units. At the time of the FCA's site visit, there also appeared to be sufficient space to host LLCS equipment on each Area, including in locations of the rooftop that appear particularly suitable for the LSE-ICE Route (both from a space and avoiding potential radio interference perspective). The FCA notes that the rooftop space of Area B is significantly larger than the space that rivals currently occupy on the neighbouring rooftop. Evidence from other trading venues, as well as the neighbouring building, also shows that multiple radio units can be 'stacked' relatively tightly both horizontally and vertically (subject to planning permission).

Over-the-air distance to ICE

- 8.15 The FCA provisionally considers that the geodesic distances from both rooftop Areas to the ICE trading venue do not materially differ between each other and, as such, appear competitively equivalent.

Absence of line-of-sight issues

- 8.16 Both Areas of the PDC Building's rooftop are at the same elevation and have visibility of the same potential repeater locations near the geodesic straight path towards the ICE trading venue in Basildon. Further, during the site visit, the FCA did not identify any obvious line-of-sight issues from either rooftop Area in the direction of ICE. This is further confirmed by pictures LSEG submitted to the FCA in the context of the commitments discussions.
- 8.17 As such, the FCA provisionally considers that both Areas are competitively equivalent regarding onward connectivity options towards ICE.

Fibre distance to Carrier Rooms

- 8.18 LSEG's EWS fibre connection from its end point radio unit runs currently to a cabinet on the PDC Building's rooftop and then through a cabling riser to the Carrier Rooms. Regarding Area B, an equivalent cabinet and riser facility is available to run fibre to the Carrier Rooms in the PDC Building.
- 8.19 During our site visit in June 2024, the FCA inspected the cabling riser facilities of each rooftop Area which in each case would allow cabling to run from each respective Area to the corresponding Carrier Room. Both Areas of the rooftop appear to have the same, or very similar, riser facilities. Moreover, LSEG and [PDC Landlord] provided further information to the FCA that shows that, in each case, the shortest viable cable route from an end point radio unit located on the edge of the rooftop in Area A and Area B to the respective Carrier Room would be very similar in length. The route from Area B is marginally shorter by less than 3 metres.
- 8.20 Further, due to LSEG's cabling 'normalisation policy', onward cable connections from each Carrier Room to the LSE co-location space are equalised in length and type. As part of its Proposed Commitments, LSEG commits to maintain this policy.

- 8.21 Finally, [PDC Landlord]’s proposed commitment to offer fair and non-discriminatory treatment in connection with access to and use of the PDC Building Rooftop to all LLCS providers, and in connection with any ancillary services that [PDC Landlord] offers in this regard, will ensure that all LLCS providers on the PDC Building Rooftop will operate on a level playing field.
- 8.22 As such, the FCA provisionally considers that the Proposed Commitments would ensure that LSEG’s EWS and its rival LLCS providers would have equal opportunities to minimise latency regarding their cable connections from end point radio units on the PDC Building’s rooftop to the co-location space of the LSE trading venue.

Concern 2: asymmetric costs

- 8.23 The FCA provisionally considers that the Proposed Commitments address the FCA’s competition concern that the conduct leads to cost asymmetries between LSEG’s EWS and its rival LLCS providers (see paragraphs 5.10 and 6.6 above).
- 8.24 The Proposed Commitments will ensure that, in future, cost asymmetries should not arise between LSEG’s EWS and third party LLCS regarding the installation and operation of end point radio units on the LSE trading venue rooftop. As noted above, the FCA provisionally considers that Area A and Area B are functionally and competitively equivalent.

Concern 3: reduced incentives to invest

- 8.25 The FCA provisionally considers that the Proposed Commitments will address the FCA’s competition concern that the conduct reduces the incentives of all LLCS providers operating on the LSE-ICE Route to invest in latency improvements (see paragraphs 5.11 and 6.6 above).
- 8.26 The Proposed Commitments will ensure that incentives to invest in latency improvements are restored for all LLCS providers on the LSE-ICE Route. In particular, the Proposed Commitments would provide competitively equivalent opportunities for all LLCS providers regarding the latencies they can achieve around the LSE trading venue.

Concern 4: more limited route design options

- 8.27 The FCA provisionally considers that the Proposed Commitments address the FCA’s competition concern that the conduct leads rival LLCS providers to suffer from more limited route design options on the LSE-ICE Route (see paragraphs 5.12 and 6.6 above).
- 8.28 As noted at paragraph 8.11 above, the FCA provisionally considers that Areas A and B are functionally and competitively equivalent. This concerns in particular also the rooftop height and the absence of line-of-sight issues in the direction of ICE (see paragraph 8.16 above). As such, EWS and third party LLCS providers would have competitively equivalent opportunities regarding onward connectivity options from the PDC Building rooftop (and therefore route design options) in the direction of ICE.

Whether the Proposed Commitments are capable of being implemented effectively and, if necessary, within a short period of time

- 8.29 LSEG and [PDC Landlord] can implement the Proposed Commitments by varying their Lease Agreement to terminate LSEG's exclusivity for the PDC Building's rooftop. LSEG can also facilitate third party access to Area B of the PDC Building's rooftop by moving its equipment from that Area.
- 8.30 Once LSEG's rooftop exclusivity over Area B is terminated (and relevant LSEG equipment is moved), [PDC Landlord] as the landlord of the PDC Building will be able to grant access to any third party LLCS providers that wish to install equipment on Area B. [30]. [PDC Landlord]'s commitment to open and maintain a further communications channel, by which third parties that do not know its identity can approach it to seek obtaining relevant access and/or relevant information, supports the effective implementation of the commitments.
- 8.31 LSEG and [PDC Landlord] have proposed to implement the Proposed Commitments within 15 weeks of the FCA formally accepting the commitments, and to endeavour to do so sooner.
- 8.32 As such, the FCA is satisfied that the Proposed Commitments are capable of being implemented effectively and within a short period of time.

Whether the Investigations involve secret cartels between competitors or a serious abuse of a dominant position

- 8.33 The FCA provisionally considers that the Lease Agreement subject to the Chapter I Investigation is not a secret cartel between competitors, such as price-fixing, bid-rigging (collusive tendering), establishing output restrictions or quotas, or market sharing.²⁹
- 8.34 Equally, it provisionally considers that the Chapter II Investigation does not involve a serious abuse of a dominant position such as conduct which is inherently likely to have a particularly serious exploitative or exclusionary effect, such as excessive and predatory pricing.³⁰

Whether compliance with the Proposed Commitments and their effectiveness would be difficult to discern

- 8.35 The FCA provisionally considers that compliance with the Proposed Commitments and their effectiveness would not be difficult to discern. Compliance with the Proposed Commitments essentially requires LSEG to withdraw from Area B of the PDC Building rooftop (having given up its rooftop exclusively following its variation of the Lease Agreement) and [PDC Landlord] to grant third party LLCS providers access to it on non-discriminatory terms.
- 8.36 The Proposed Commitments set out a clear deadline of 15 weeks (from the date the FCA accepts the Proposed Commitments) by which third party LLCS providers will be able to install and operate equipment on Area B of the PDC Building's rooftop. The FCA will publish on its homepage if and when such a decision has been made. As such, compliance with the Proposed Commitments will be self-

²⁹ See the CMA's Procedural Guidance footnote 130.

³⁰ See the CMA's Procedural Guidance footnote 131.

evident to interested third parties that wish to locate their LLCS radio units on the rooftop of the PDC Building.

- 8.37 Further, under clause 4.1 of LSEG's Proposed Commitments and clause 4.1 of [PDC Landlord]'s Proposed Commitments, LSEG and [PDC Landlord], respectively, commit to keeping the FCA updated on the progress of varying the Lease Agreement, LSEG vacating Area B of the PDC Building's rooftop, and [PDC Landlord] providing third parties access to it. Under clause 4.2 of LSEG's Proposed Commitments and clause 4.3 of [PDC Landlord]'s Proposed Commitments, LSEG and [PDC Landlord] also commit to provide the FCA with further information on implementation of the commitments should the FCA request such information.
- 8.38 Moreover, under clause 4.3 of LSEG's Proposed Commitments and clause 4.2 of [PDC Landlord]'s Proposed Commitments, LSEG and [PDC Landlord] will also each operate a complaints mechanism regarding the implementation of the Proposed Commitments and commit to pass on relevant complaints they receive to the FCA promptly. These complaints mechanisms are in addition to third parties' ability to bring concerns directly to the FCA.³¹
- 8.39 Given the above, the FCA provisionally considers that compliance with the Proposed Commitments and their effectiveness will not be difficult to discern. The monitoring and enforcement provisions appear to be adequate. This is because the most likely way the FCA would uncover non-compliance is through a competitor.
- 8.40 The FCA provisionally considers that the combination of these complaints and information mechanisms will allow it sufficiently to monitor progress regarding the implementation of the Proposed Commitments.

Whether acceptance of the Proposed Commitments would undermine deterrence

- 8.41 The FCA provisionally considers that acceptance of the Proposed Commitments would not undermine deterrence. The FCA considers that its Investigations and any decision to accept binding commitments should deter LSEG and [PDC Landlord] from engaging in similar conduct. The fact that LSEG and [PDC Landlord] have offered the FCA commitments before a Statement of Objections has been issued in the Investigations is consistent with this view.
- 8.42 More generally, the FCA considers that its Investigations and any decision to accept binding commitments should help indicate to other undertakings how the FCA would assess similar conduct.
- 8.43 Acceptance of the Proposed Commitments would not preclude the FCA from taking further enforcement action in relation to other suspected breaches of competition law.

³¹ Further information on how competition concerns can be brought to the attention of the FCA is set out on our homepage at <https://www.fca.org.uk/about/what-we-do/promoting-competition/powers>.

Annex A: System latency

- A.1. Latency is defined as the time that is required for signals to travel from one point to another in a communications network. There are five major contributors to latency in LLCS systems:
- a) over-the-air propagation;
 - b) fibre cable propagation;
 - c) repeater sites;
 - d) radio; and
 - e) policer functions.
- A.2. The remainder of this Annex explains these in more detail.

Over-the-air propagation

- A.3. Wireless propagation follows the principles of electromagnetic (**EM**) radiation. In a vacuum, the EM waves travel at the speed of light, which is 299,792,458 metres per second. However, the velocity of the EM waves in a medium depends on the medium's refractive index (which determines how much the path of light is bent, or refracted, when entering the medium).
- A.4. For air, the refractive index is 1.000293, and the velocity of EM waves is therefore 299,704,645 metres per second, or $3.3366 \mu\text{s}^{32}$ per kilometre in that medium. That means that for over the air transmission each kilometre of propagation path adds $3.3366 \mu\text{s}$ of latency (or 3.3366 ns per metre, with $1 \mu\text{s} = 1,000 \text{ ns}$), and a wireless signal requires $100.098 \mu\text{s}$ to traverse a path which is 30 km in total.

Fibre cable propagation

- A.5. The same principle applies to optical signals transmitted over optical fibre cable. There are two variants though in this case, solid-core and hollow-core fibre cable (Figure A.1).

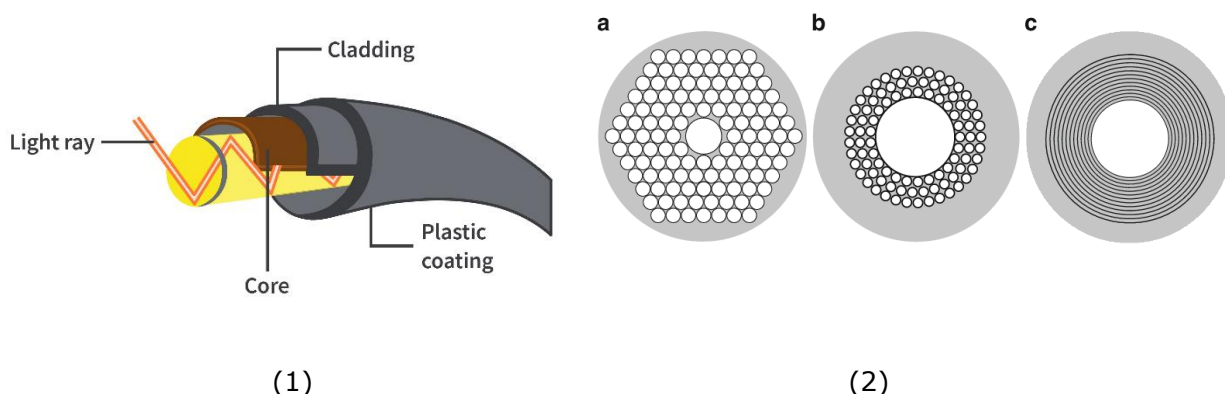


Figure A.1: Example of optical fibre cable variants; (1) a solid core optical fibre cable, where the solid core has a refractive index higher than that of the cladding, (2) a hollow-core optical fibre cable, where the core does not have any material and it is surrounded by a periodic dielectric structure.

³² As noted in footnote 9 above, a microsecond (μs) equals one millionth of a second. A nanosecond (ns) equals one billionth of a second.

- A.6. The solid-core fibre cable is a cable with a core made of silica which has a refractive index of 1.46. The EM signals in such a medium travel slower than in air and they will need 4.87 ns to transverse a meter path, or 0.487 μ s (487 ns) for a 100m optical fibre cable.
- A.7. In contrast to solid-core fibre cable, hollow-core fibre cable does not have a solid core, and the hollow core is surrounded by a periodic dielectric structure, that has electric bandgap properties, which confines the optical signal within the core. It can be viewed as a structure where the optical fibre cable is constructed by several hollow tubes put together. The light in such fibre cables travels with the same velocity as in the case of over-the-air propagation (3.3366 ns per meter), and a 100m hollow-core fibre cable will add 0.33366 μ s (333.66 ns) delay in the overall latency.

Repeater sites

- A.8. Radio signals lose energy as they propagate over the air, and this is termed propagation loss. The loss in the signal strength depends on the frequency of the wireless signals: the higher the frequency, the higher the losses, and that means that the range over which the signal can be received successfully is reduced.
- A.9. To be able to connect distant locations, LLCS providers utilise repeaters, which comprise two radios, where one radio receives the signal from one direction and the other radio re-transmits it in the other, intended, direction. The two radios are connected using a fibre cable.
- A.10. Repeaters add latency to a system, through the process of receiving the signal, carrying it over the fibre cable, and re-transmitting from the other radio. This process includes functions such as power amplification and down/up-conversion of the frequency, to name but a few.

Radio latency

- A.11. The information transmitted between the two locations is in digital form, a stream of bits. Radio equipment takes this stream and places it into corresponding signals, by way of a process called modulation. It then up-converts to the operating frequency, amplifies the signal and transmits it from the antenna (note for simplicity we have omitted a number of other steps required in the transmission process).
- A.12. Upon receiving the signal, the radio at the other end does the opposite process, by down-converting to the baseband frequency, demodulating the signal into its original form, and delivering the original digital stream.
- A.13. The time that the radio requires to perform these functions is the radio latency.

Policer latency

- A.14. Additional equipment is used to multiplex/demultiplex data streams, when data from different customers are combined to be transmitted by the radio, as well as ensuring that each customer is allocated the agreed amount of radio bandwidth. This is the task of the policer equipment, and the latency attributed to it is the policer latency. The accrued latency from its functions depends on the number of served customers, their traffic, the frame size of the digital packets, and the digital signal processing efficiency, amongst other things.

- A.15. In general, the equipment used for LLCs is specialised and customised equipment. Much of this equipment includes Field Programmable Gate Arrays – specialised chips that are programmed to perform specific functions efficiently.

Annex B: System design

- B.1. A typical system deployed by LLCS providers between two trading venues is shown in Figure B.1 below.
- B.2. The LLCS providers are responsible for transmitting messages wirelessly between the two trading venues for their customers. More specifically, they transmit customer data between customer equipment that is located in each data centre's co-location space. The customer equipment then connects to the respective trading venue matching engines through equalised cables, that is, fibre cables which have the same length.
- B.3. The matching engine and the co-location client cabinets are located within the data centre which hosts the trading venue, while end point radio units (each comprising a radio modem and an antenna) are located on or in the vicinity of the data centre building, depending on circumstances. Optical fibre cables, either solid-core or hollow-core, interconnect the various equipment.
- B.4. The following diagram provides a schematic overview of the various segments of an LLCS connection between two trading venues:

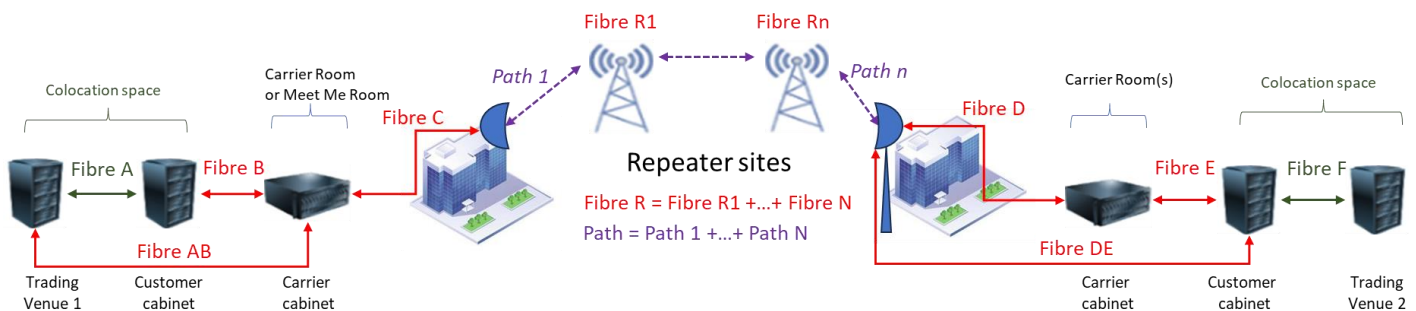


Figure B.1. The end-to-end service path between two trading venues.

- B.5. As illustrated in Figure B.1, starting at the Trading Venue 1 end, an LLCS connection between two trading venues comprises the following:
- a) **Fibre A:** refers to the fibre cable connection between Trading Venue 1's matching engine and the co-location customer equipment which is housed in cabinets in the co-location space of the relevant data centre. This connection is part of the co-location service and, as such, relevant cable lengths/types are equalised between co-location customers and the trading venue's matching engine under MiFID II.³³
 - b) **Fibre B:** refers to the fibre cable connection between the customer cabinet in the co-location space and the LLCS provider's Carrier Cabinet, which is located in a Carrier Room or Meet Me Room (that is, a room

³³ As noted, Article 48(8) MiFID II and Delegated Regulation 2017/573 sets out the Regulatory Technical Standards 10 (RTS 10). RTS10, Article 1, paragraph 2 provides: 'Trading venues shall provide all users which have subscribed to the same co-location services access to their network under the same conditions, including as regards space, power, cooling, cable length, access to data, market connectivity, technology, technical support and messaging types.' The UK onshoring provisions for these rules are contained in paragraph 3D of the Schedule to the Financial Services and Markets Act 2000 (Recognition Requirements for Investment Exchanges and Clearing Houses) Regulations 2001 (SI 2001/995) and the following provisions of the FCA Handbook: REC 2.5, MAR 5.3A.10R, and MAR 5A.510R.

where connections coming from the outside are routed to; a data centre may have multiple of such rooms). Although the connection runs inside the data centre, it is already part of the LLCS connection and relevant fibre cables lengths/types are not necessarily equalised between LLCS providers.

- c) **Fibre C:** refers to the fibre cable connection between the Carrier Cabinet (located inside the data centre) and the end point radio unit of the LLCS provider. The radio unit is located externally on or around the data centre building, e.g. on its rooftop (as depicted in Figure B.1), on the rooftop of a neighbouring building or on a monopole or lattice tower nearby). Relevant connections are not necessarily equalised in length/type between providers.
- d) **Path 1 to Path n:** refers to the LLCS radio connection between an LLCS provider's end point radio unit at Trading Venue 1 and the respective end point radio unit at Trading Venue 2. Where the entire distance cannot be bridged in one 'hop', as depicted here, radio repeater sites are employed. The number of repeaters used, and their locations (etc) differ between LLCS providers and depend on the distance and geodesic route between the two trading venues. As such, each provider utilises a certain number of repeaters ('n') on the path, and accordingly the route consists of 'n+1' radio transmission segments between the end points.
- e) **Fibre R1 to Fibre Rn:** Each repeater site consists of two radio units (one to receive the incoming signal and one to pass it on). These radio units are connected via fibre cable. These fibre cable connections are indicated in the diagram as Fibre R1 to Fibre Rn (where 'n' stands for the number of repeaters employed).
- f) **Fibre D:** refers to the fibre cable connection between the end point radio unit at the Trading Venue 2 (located externally on or around the data centre building, e.g. on its rooftop, on the rooftop of a neighbouring building or on a monopole or lattice tower nearby (as depicted in Figure B.1)) and the Carrier Cabinet inside the relevant Carrier Room of the data centre building which hosts Trading Venue 2. Fibre cable connections are not necessarily equalised between LLCS providers.
- g) **Fibre E:** refers to the fibre cable connection between the carrier cabinet in the 'Carrier Room' and respective customer cabinet(s) in the co-location space of the data centre building which hosts Trading Venue 2. Fibre cable connections are not necessarily equalised between LLCS providers.
- h) **Fibre F:** refers to the fibre cable connection between customer cabinets in the co-location space and Trading Venue 2's matching engine. Relevant co-location connections are equalised in length, as is required under MiFID II.

B.6. The actual fibre cable segments in Figure B.1 may not be a single piece of fibre cable as portrayed in the figure, but they may be subdivided into smaller segments, depending on the system design at that location.

B.7. There are potential variations to the above design:

- a) Some LLCS providers self-supply LLCS, which means they are part of an undertaking which is also a trading member of the relevant trading

venue. Depending on the circumstances, a trading venue may offer the LLCS provider then to connect directly to the matching engine, that is, it does not need to connect to a customer cabinet (as a hypothetical example, this is depicted by **Fibre AB** as a connection between a Carrier Cabinet and the matching engine in Figure B.1).

- b) In certain situations, the LLCS provider, through an agreement with the data centre owner, may connect directly from the end point radio unit to the customer cabinet, without the need to go through an intermediate carrier cabinet (this is depicted by **Fibre DE** in Figure B.1).

Annex C: LSEG's Proposed Commitments

The content of this Annex is copied directly and in full from LSEG's commitments offer, dated 4 August 2025. Consequently, any views expressed are those of LSEG.

1. Introduction

- 1.1 These commitments relate to the investigations by the UK Financial Conduct Authority (the **FCA**) under section 26 of the Competition Act 1998 (the **Act**) in relation to the Rooftop Policy that London Stock Exchange Group Plc (together with its related entities, **LSEG**) applies at its primary datacentre (the **Investigation**).
- 1.2 LSEG has not been the subject of any infringement decision or statement of objections in respect of the Investigation. It has nonetheless offered the following commitments under section 31A of the Act (the **Commitments**) in order to reassure the FCA that there is no basis for the potential concerns under investigation on a forward-looking basis. These Commitments fully address the potential competition concerns identified by the FCA in its Summary of Competition Concerns issued on 24 October 2024 for the purpose of commitments discussions.
- 1.3 These Commitments are without prejudice to LSEG's position that it has not infringed UK competition law and that the initial concerns that prompted the FCA to commence its Investigation are unfounded. Nothing in these Commitments can be construed as acceptance by LSEG that its Rooftop Policy (as defined below) or any other aspect of its conduct could amount to an infringement of the Act.
- 1.4 The market for Low Latency Wireless Connectivity Services is competitive, and customers are able to choose between various low latency wireless providers. LSEG is committed to providing a resilient service to its customers and has invested all along its routes to provide a secure, optimised service. LSEG has also demonstrated that its own services do not benefit from any latency advantage due to location. However, in order to remove any perception of advantage, LSEG offers these Commitments which eliminate all of the FCA's possible concerns.
- 1.5 These Commitments are given in accordance with sections 31A to 31B of the Act on the basis that if the FCA accepts the Commitments in accordance with section 31A(2) of the Act, it shall not continue the Investigation, make a decision within the meaning of section 31(2) of the Act, or give a direction under section 35 of the Act.

2. Definitions

- 2.1 The following definitions are applicable only for the purposes of these Commitments:
 - (a) **Area A** means the area of the Rooftop designated under LSEG's confidential supporting submission to be utilised by EWS equipment.
 - (b) **Area B** means the area of the Rooftop designated under LSEG's confidential supporting submission to be utilised by third party LLWC Service equipment.

- (c) **Complaint** means any written communication that states that LSEG is not complying with the Commitments that is received at wirelesscommitments@lseg.com or by LSEG legal personnel.
- (d) **Effective Date** means the date on which the Commitments are accepted pursuant to section 31(4)(a) of the Act.
- (e) **EWS** stands for Exchange Wireless Service and means the Low Latency Wireless Connectivity Service offered by LSEG, however it is named.
- (f) **LLWC Service** or **Low Latency Wireless Connectivity Service** means any service providing direct point-to-point low latency wireless connectivity between a client's equipment collocated within the PDC and that same client's equipment collocated within another trading venue.
- (g) **PDC** means LSEG's datacentre located in the London Docklands area.
- (h) **PDC Lease** means the lease between LSEG and the landlord of the PDC, as amended from time to time.
- (i) **Rooftop** means the rooftop of the PDC.
- (j) **Rooftop Policy** means LSEG's London Stock Exchange Communications Access Policy and Rooftop Use Policy.
- (k) **Specified Date** means the date the Specified Period ends.
- (l) **Specified Period** means the period ending 15 weeks after the Effective Date, subject to any extension granted by the FCA on reasonable written request from LSEG.
- (m) **Working Day** means any day other than a Saturday, Sunday, or a public holiday in England.

3. Commitment

- 3.1 LSEG will agree with the PDC landlord variations to the PDC Lease to enable third parties to provide LLWC Services within Area B of the Rooftop on or before the Specified Date and will use all reasonable endeavours to complete this sooner (but not before LSEG has completed the steps specified in clause 3.3 below).
- 3.2 LSEG will amend its Rooftop Policy to remove reference to restrictions on third party use of the Rooftop for LLWC Services and permit installation of new fibre circuits between LSEG Carrier Rooms and Area B of the Rooftop for LLWC Services on or before the Specified Date, and will use all reasonable endeavours to complete this sooner.
- 3.3 LSEG will remove any of its equipment located on Area B on or before the Specified Date and will use all reasonable endeavours to complete this sooner.
- 3.4 LSEG will not:
 - (a) amend its PDC Lease with the PDC landlord to prohibit third parties from using Area B for LLWC Services; or
 - (b) amend its Rooftop Policy or any other policy to prohibit third parties from using Area B to offer LLWC Services.
- 3.5 LSEG will offer the same connectivity options with the same associated latency available to EWS between exchange hosted customer cabinets and carrier rooms

within the PDC to all third parties who provide or are seeking to provide LLWC Services.

4. Reporting and Compliance

- 4.1 LSEG will report to the FCA on its progress towards implementing the Commitments every four weeks, commencing on the date on which the FCA accepts the Commitments under section 31A(2) of the Act, until the actions specified in paragraphs 3.1 – 3.3 have been completed.
- 4.2 During the Specified Period, LSEG will also provide any additional information requested by the FCA to verify LSEG's compliance with the Commitments.
- 4.3 LSEG will forward to the FCA a copy of any Complaint within ten Working Days of receipt by the team within LSEG responsible for the EWS via the email address wirelesscommitments@lseg.com.

5. Variation

- 5.1 LSEG may offer a variation or substitution of the Commitments pursuant to section 31A of the Act.

6. Effect of Invalidity

- 6.1 Should any provision of these Commitments be contrary to law or regulations or unenforceable for any reason, LSEG will continue to observe the remaining provisions, which shall remain valid and enforceable.

7. Governing Law

- 7.1 The Commitments shall be governed by and construed in all respects in accordance with English law.

Annex D: [PDC Landlord]'s Proposed Commitments

The content of this Annex is copied directly and in full from [PDC Landlord]'s commitments offer, dated 4 August 2025, with relevant redactions applied. Consequently, any views expressed are those of [PDC Landlord].

1 Introduction

- 1.1 These commitments relate to the investigation by the UK Financial Conduct Authority ("**FCA**") into whether the London Stock Exchange Group ("**LSEG**") and [×] ("**[PDC Landlord]**") have infringed the prohibition contained in section 2 of the Competition Act 1998 (respectively, the "**Chapter I prohibition**" and the "Act") (the "**Investigation**").
- 1.2 [PDC Landlord] has not been the subject of any infringement decision or statement of objections in respect of the Investigation. It received a Summary of Competition Concerns ("**SoCC**") relating to the Investigation on 1 November 2024 from the FCA for the purpose of commitment discussions. [PDC Landlord] is offering the following commitments under section 31A of the Act (the "**Commitments**") following receipt of the SoCC and considers that these Commitments, together with the LSEG Commitments, address the potential competition concerns identified by the FCA in the SoCC.
- 1.3 The Commitments are offered without prejudice to [PDC Landlord]'s position that it has not infringed UK competition law and that the initial concerns that have prompted the FCA to commence the Investigation are unfounded. For the avoidance of doubt, nothing in the Commitments can be construed as acceptance by [PDC Landlord] that its lease agreement with LSEG or any other aspect of its conduct could amount to an infringement of the Chapter I prohibition.
- 1.4 These Commitments are given in accordance with sections 31A to 31B of the Act, on the basis that if the FCA accepts the Commitments in accordance with section 31A(2) of the Act, it shall not continue the Investigation, make a decision within the meaning of section 31(2) of the Act, or give a direction under section 35 of the Act.

2 Definitions

- 2.1 The following definitions are applicable only for the purposes of the Commitments:
 - (a) "**Area A**" means the area marked A on the plan set out at Annex 1.
 - (b) "**Area B**" means the area marked B on the plan set out at Annex 1.
 - (c) "**Complaint**" means any written communication indicating that [PDC Landlord] is not complying with the Commitments that is sent to the PDC Email Address and subsequently referred to [PDC Landlord], or that is sent directly to [PDC Landlord] and is either received directly by [PDC Landlord] legal personnel or is subsequently referred to [PDC Landlord] legal personnel.

- (d) "**Effective Date**" means the date on which the Commitments are accepted pursuant to section 31(4) of the Act.
- (e) "**PDC Email Address**" means PDCCcommitments@dentons.com.
- (f) "**LLWC Service**" means any service providing direct point-to-point low latency wireless connectivity between a client's equipment collocated within the PDC and that same client's equipment collocated within another trading venue.
- (g) "**LSEG**" means London Stock Exchange Group.
- (h) "**PDC**" means LSEG's datacentre located in the Greater London area.
- (i) "**PDC Lease**" means the leases entered into between LSEG and [PDC Landlord] dated 25 September 2020 and 20 August 2021.
- (j) "**Rooftop**" means the rooftop of the PDC.
- (k) "**Route A**" means the route into the PDC from Area A.
- (l) "**Route B**" means the route into the PDC from Area B.
- (m) "**Specified Date**" means the date the Specified Period ends.
- (n) "**Specified Period**" means the period ending 15 weeks after the Effective Date, subject to extension by agreement between [PDC Landlord], LSEG and the FCA.
- (o) "**Working Day**" means any day other than a Saturday, Sunday, or a public holiday in England.

3 Commitments

- 3.1 [PDC Landlord] will endeavour to agree with LSEG variations to the PDC Lease as promptly as possible and in any event before the Specified Date to enable third parties to provide LLWC Services in Area B of the Rooftop.
- 3.2 To the extent that it is within its reasonable control, [PDC Landlord] will facilitate LSEG's relocation of its equipment located in Area B in a prompt manner on or before the Specified Date, by providing any access or consents reasonably required to facilitate the relocation including enabling the installation of a physical barrier between Area A and Area B (subject always to [PDC Landlord]'s standard policies and procedures).
- 3.3 From the Effective Date, [PDC Landlord] will provide any information reasonably required by third parties to allow them to plan, prepare and submit a request for space in Area B in line with [PDC Landlord]'s standard practices and procedures. Contractual arrangements between [PDC Landlord] and any third parties for Rooftop space will only be formalised once the PDC Lease has been varied in accordance with paragraph 3.1.
- 3.4 [PDC Landlord] will consider requests for the provision of physical access to and use of Area B of the Rooftop upon request by third parties on a fair and non-discriminatory basis to enable them to install and operate equipment, subject to [PDC Landlord]'s standard access protocols, policies, procedures, and operational requirements. Such physical access will be available only once the PDC Lease has been varied in accordance with paragraph 3.1, and the relocation described in paragraph 3.2 is complete.

- 3.5 [PDC Landlord] will ensure fair and non-discriminatory treatment of all parties in the normal course of operations, including by offering fair and non-discriminatory commercial terms to all parties in connection with use of the Rooftop, and in connection with any ancillary services that [PDC Landlord] offers, and which said parties reasonably require, in connection with their contracted use of the Rooftop.
- 3.6 [PDC Landlord] also reserves the right to refuse and/or cancel access to the Rooftop if the requested access does not meet the requirements set out in its standard access protocols.
- 3.7 [PDC Landlord] will establish the PDC Email Address which will be in use from the Effective Date. [PDC Landlord] will maintain the PDC Email Address or an appropriate alternative communication channel for as long as the Commitments remain in force.
- 3.8 [PDC Landlord] will be contactable via the PDC Email Address for complaints, requests for information, and requests for physical access to Area B from third parties from the Effective Date for as long as the Commitments remain in force. All emails sent to the PDC Email Address will be forwarded to [PDC Landlord] legal personnel within two Working Days of receipt.
- 3.9 If any circumstances change that affect the operation of the PDC Email Address, [PDC Landlord] will inform the FCA without delay and will immediately deploy an appropriate alternative communication channel to ensure that third parties can contact it.

4 Reporting and compliance

- 4.1 [PDC Landlord] will report to the FCA on its compliance with paragraph 3.1 with a high-level status report on progress to be delivered to the FCA every four weeks, with the first report to be delivered within four weeks of the Effective Date, and the second report within eight weeks of the Effective Date. [PDC Landlord] will provide a final report on compliance within five Working Days after the Specified Date.
- 4.2 [PDC Landlord] will share a copy of any Complaint with the FCA within ten Working Days of receipt of such Complaint.
- 4.3 [PDC Landlord] shall also provide any additional information requested by the FCA to verify [PDC Landlord]'s compliance with the Commitments.

5 Variation

- 5.1 [PDC Landlord] may offer a variation or substitution of the Commitments pursuant to section 31A of the Act.

6 Effect of Invalidity

- 6.1 Should any provision of these Commitments be contrary to law or regulations or unenforceable for any reason, [PDC Landlord] will continue to observe the remaining provisions, which shall remain valid and enforceable.

7 Governing Law

- 7.1 The Commitments and any obligations arising out of or in connection with the Commitments shall be governed by and interpreted in accordance with the laws of England and Wales.

'ANNEX 1'
(as referred to in [PDC Landlord]'s Proposed Commitments clauses 2.1 (a) and (b))

[X]