

Anticipated Acquisition by Keysight Technologies, Inc of Spirent Communications plc

Decision on relevant merger situation and substantial lessening of competition

ME/7112/24

The Competition and Markets Authority's decision on relevant merger situation and substantial lessening of competition under section 33(1) of the Enterprise Act 2002 given on 13 March 2025. Full text of the decision published on 16 May 2025.

The Competition and Markets Authority (**CMA**) has excluded from this published version of the decision information which the CMA considers should be excluded having regard to the three considerations set out in section 244 of the Enterprise Act 2002 (specified information: considerations relevant to disclosure). The omissions are indicated by [X]. Some numbers have been replaced by a range, which are shown in square brackets.

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SUMMARY

OVERVIEW OF THE CMA'S DECISION

1. On 28 March 2024, Keysight Technologies Inc (**Keysight**) agreed to acquire Spirent Communications plc (**Spirent**) (the **Merger**). The Competition and Markets Authority (**CMA**) has concluded that it has jurisdiction to review this Merger because a relevant merger situation has been created. Keysight and Spirent are together referred to as the Parties and, for statements relating to the future, the Merged Entity.
2. The CMA has concluded that the Merger would result in SLCs in certain markets, however, given the small size of those markets in the UK the CMA has exercised its discretion based on the de minimis exception not to refer the Merger for an in-depth investigation.

Who are the businesses and what products/services do they provide?

3. Keysight is a supplier of testing and measurement equipment (**TME**). Keysight supplies TME across a wide variety of end-user applications (including communications equipment).
4. Spirent is a supplier of TME primarily for the communications sector.
5. TME is used by a range of different customers to test, measure, and evaluate the overall performance, signal strength, and frequency of electronic systems and devices, including for example mobile telephones, Wi-Fi network equipment or larger systems such as radio access networks. TME is used across the lifecycle of products and systems ranging from early development stages (ie before they are introduced to the market) to checking performance once products and systems are in operation.
6. The products that the CMA looked at in detail were:
 - (a) channel emulation testing solutions;
 - (b) mobile core testing solutions;
 - (c) Open Radio Access Network (**O-RAN**) testing solutions;
 - (d) Wi-Fi lab testing solutions;
 - (e) Location-based conformance and performance testing solutions;
 - (f) Global Navigation Satellite System (**GNSS**) testing solutions;

- (g) High Speed Ethernet (**HSE**) testing solutions; and
- (h) network security testing solutions.

What evidence has the CMA looked at?

- 7. In assessing this Merger, the CMA considered a wide range of evidence in the round.
- 8. The CMA received several submissions and responses to information requests from the Parties.
- 9. The CMA also examined the Parties' own internal documents, which show how they run their business and how they view their rivals in the ordinary course of business. These internal documents were also helpful in understanding the Parties' plans for future development of their respective products which is an important element in this industry with communications equipment going through regular innovation cycles.
- 10. The CMA spoke to and gathered evidence from other companies and organisations to understand better the competitive landscape, to get their views on the impact of the Merger.

What did the evidence tell the CMA about the effects on competition of the Merger?

- 11. The CMA carefully examined the overlaps and relationships between Keysight's and Spirent's products across a wide range of TME areas to assess the impact of the Merger. The CMA found that the Merger gives rise to a realistic prospect of a substantial lessening of competition (**SLC**) in five TME markets. The CMA considers that the Merger would eliminate competition between two suppliers that exert constraint on each other in the following global TME markets:
 - (a) channel emulation testing solutions;
 - (b) mobile core testing solutions;
 - (c) GNSS testing solutions;
 - (d) HSE testing solutions; and
 - (e) network security testing solutions.
- 12. In all of these markets, except GNSS, the CMA found that the Merged Entity would be the clear market leader, and would not face sufficient constraints from the remaining competitors post-Merger. The CMA also found that barriers to entry and

expansion in these markets are high, in particular because of the high levels of investment in research and development, technical expertise and time required to develop new products. In GNSS, the CMA found that the Merger would lead to a loss of future competition. Keysight, who currently has a minor position in this concentrated market, had clear plans to expand, and, absent the Merger, would have competed with the market leader Spirent. The Merger could therefore result in increased prices and reduced quality and innovation in these five markets.

13. The CMA also considered whether the Merger would lead to an SLC in the following global TME markets:
 - (a) O-RAN testing solutions;
 - (b) Wi-Fi lab testing solutions; and
 - (c) Location-based conformance and performance testing solutions.
14. For O-RAN testing solutions, the CMA found that Keysight was a significant player in this market and Spirent, having a minor position, had made attempts to enter and compete in recent years. However, the CMA found that Spirent's efforts had achieved very limited commercial success which meant that it provides only a limited constraint on Keysight. The CMA did not see any evidence which suggested that Spirent intended to adopt a new strategy or expand its offering in order to compete more closely with Keysight in the future. Therefore, on balance, the CMA found that, absent the Merger, Spirent would not have become a significant competitive constraint to Keysight going forward.
15. For Wi-Fi lab testing solutions, the CMA found that the Parties previously competed more closely before Keysight discontinued one of its Wi-Fi lab testing products. For the Parties' current solutions, the CMA found that the Parties are more distant competitors across their Wi-Fi lab testing portfolios and face strong competitive pressures from other suppliers.
16. For location-based conformance and performance testing solutions, the CMA found that the Parties are competitors and that the market is concentrated. However, the CMA also found that any loss of competition in the UK is likely to be limited, as there is little overlap between the Parties' products and no competition between the Parties for UK customers due to low demand for location-based conformance testing and Spirent not supplying location-based conformance testing relevant to the UK.

The application of de minimis

17. Where the CMA's duty to refer is engaged, the CMA may decide not to refer the merger under investigation for a phase 2 investigation on the basis that the market(s) concerned is/are not of sufficient importance to justify the making of a

reference (the de minimis exception). The CMA considered whether it is appropriate to apply the de minimis exception to the present case.

18. While initial data received by the CMA suggested that the value of the relevant markets would be above £30 million, following its detailed assessment of the markets and of revenue data, the CMA has ultimately concluded that the markets for channel emulation, mobile core, GNSS, HSE and network security testing solutions in the UK have an aggregate value below £30 million. The CMA has concluded that it is appropriate to exercise its discretion not to refer the Merger on the basis of the de minimis exception.

What happens next?

19. The Merger will therefore **not be referred** under section 33(1) of the Act.

ASSESSMENT

1. PARTIES, MERGER AND MERGER RATIONALE

1. Keysight is a supplier of testing and measurement equipment (TME). Keysight supplies equipment across a variety of end-user applications, including for the communications sector. In the last financial year, Keysight had global turnover of £4.4 billion, of which £[<] was generated in the UK.
2. Spirent provides TME equipment primarily for the communications sector.¹ In the last financial year, Spirent had global turnover of £382 million of which £[<] was generated in the UK.²
3. On 22 March Keysight submitted its initial offer to Spirent.³ This initial offer was subsequently approved by Spirent's board on 27 March 2024.⁴ On 28 March 2024, Keysight agreed to acquire sole control of Spirent by way of a public offer for all of Spirent's issued (or to be issued) share capital.⁵
4. The Parties informed the CMA that the Merger is also the subject of review by competition authorities in the US and China.
5. The Parties submitted that their products are largely complementary, and the Merger will allow Keysight to access new market opportunities.⁶ New market opportunities described by the Parties are as follows:
 - a) Spirent's expertise in GNSS will allow Keysight to offer differentiated solutions covering use cases in the aerospace and defence, automotive and communications segments.⁷
 - b) Spirent's live network assurance business, with expertise in software, cloud and automation, will better enable Keysight to serve next generation communication network use cases.⁸
 - c) The Merged Entity will be able to provide better solutions for new and emerging applications for private and industrial networks.⁹
6. The CMA considers that many documents prepared in connection with the transaction support this rationale. As discussed below in the competitive

¹ FMN, paragraph 2.

² FMN, paragraph 144.

³ Parties' response to the CMA's RFI 1, paragraph 12.

⁴ Parties' response to the CMA's RFI 1, paragraph 18.

⁵ FMN, paragraph 58.

⁶ FMN, paragraph 83.

⁷ FMN, paragraph 84.

⁸ FMN, paragraph 85.

⁹ FMN, paragraph 85.

assessment in more detail, the CMA considers, however, that some pre-existing internal documents do not support the position that the Parties' products are complementary. In particular, some docs show clear tracking of the other Party in overlapping areas.

2. PROCEDURE

7. The CMA's mergers intelligence function identified the Merger as warranting an investigation.¹⁰
8. The CMA commenced its phase 1 investigation on 16 January 2025. As part of its phase 1 investigation, the CMA gathered a significant volume of evidence from the Parties. In response to targeted information requests, the CMA received and reviewed internal documents from Keysight and Spirent. The Parties also had opportunities to make submissions and comment on our emerging thinking throughout the phase 1 investigation. For example, on 18 February 2025 the CMA invited the Parties to attend an Issues Meeting, and the Parties submitted their views in writing. The CMA also gathered evidence from other market participants, such as customers and competitors. The evidence the CMA has gathered has been tested rigorously, and the context in which the evidence was produced has been considered when deciding how much weight to give it.
9. Where necessary, this evidence has been referred to within this Decision.
10. The Merger was considered at a Case Review Meeting.¹¹

3. JURISDICTION

11. Each of Keysight and Spirent is an enterprise. As a result of the Merger, these enterprises will cease to be distinct.
12. The Parties overlap in the supply of communications TME in the UK, with a combined share of supply of [30-40]% (with an increment of [5-10]%) by value in 2023.¹² At least one of the Parties has a UK turnover exceeding £10 million. The CMA therefore believes that the share of supply test in section 23 of the Act is met.
13. The CMA therefore believes that it is or may be the case that arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation.

¹⁰ [Mergers: Guidance on the CMA's jurisdiction and procedure \(CMA2\)](#), 25 April 2024, paragraphs 6.4–6.6.

¹¹ [CMA2](#), page 47.

¹² FMN, paragraph 14.

14. The CMA announced the launch of its merger inquiry by notice to the parties on 16 January 2025. The initial period for consideration of the Merger under section 34ZA(3) of the Act started on 17 January 2025 and the statutory 40 working day deadline for a decision is therefore 13 March 2025.

4. COUNTERFACTUAL

15. The CMA assesses a merger's impact relative to the situation that would prevail absent the merger (ie the counterfactual).¹³
16. In an anticipated merger, the counterfactual may consist of the prevailing conditions of competition, or conditions of competition that involve stronger or weaker competition between the parties to a merger than under the prevailing conditions of competition.¹⁴ In determining the appropriate counterfactual, the CMA will generally focus on potential changes to the prevailing conditions of competition only where there are reasons to believe that those changes would make a material difference to its competitive assessment.¹⁵
17. In this case, the CMA has not received submissions (or other evidence) suggesting that the Merger should be assessed against an alternative counterfactual. Therefore, the CMA believes the prevailing conditions of competition to be the relevant counterfactual.

5. COMPETITIVE ASSESSMENT

5.1 Background and nature of competition

18. Both Parties are suppliers of testing and measurement equipment and software (**TME**). TME is used to test, measure and evaluate the overall performance, signal strength, and frequency of electronic systems and devices.¹⁶
19. The Parties specifically overlap in the supply of TME for communications. TME for communications is used to test and measure components of a communications network (including user equipment that connects with the network) and to validate network performance. These TME are also used across the lifecycle of products and systems, from R&D to maintenance. The CMA refers to these products as Communications TME.¹⁷

¹³ [Merger Assessment Guidelines](#) (CMA129), March 2021, paragraph 3.1.

¹⁴ CMA129, paragraph 3.2.

¹⁵ CMA129, paragraph 3.9.

¹⁶ FMN, paragraphs 4 and 178.

¹⁷ FMN, paragraph 4.

20. Communications TME are used by a range of different customers including network equipment manufacturers (**NEMs**), communications network providers, chipset providers and large cloud computing providers.¹⁸ For example, communications network providers in the UK will purchase communications TME to test the performance of their networks in the UK. In addition, TME has a significant indirect effect in the UK as it is needed to ensure the performance of equipment installed on UK networks, within mobile phones sold in the UK, etc. Where these products are manufactured outside the UK, TME will be used to test them and to ensure they meet UK and other standards prior to import and sale in the UK.
21. Customers procure Communications TME in a variety of ways (eg through formal tender processes, quotes based on a master or framework agreement, informal and ad hoc quotes) and some will evaluate and validate a product before seeking a quote.¹⁹
22. The CMA considered eight specific product testing areas where the Parties are active. These are: (i) channel emulation; (ii) mobile core testing; (iii) O-RAN testing; (iv) GNSS testing; (v) Wi-Fi labs testing; (vi) location-based conformance and performance testing; (vii) High-Speed Ethernet (**HSE**) testing; and (viii) network security testing.

5.1.1 Channel emulation

23. Channel emulators test the performance of wireless devices and network equipment by simulating real-world radio channel or frequency conditions, such as noise, interference, attenuation, delay, and latency, in a lab environment. Network and communications equipment, device and chipset manufacturers use these tests to optimise equipment for challenging conditions to improve performance and reliability.²⁰
24. Channel emulators can be used to test 'terrestrial' communications – for example cellular standards (eg 4G, 5G) and Wi-Fi standards (eg Wi-Fi 7)²¹ – and non-terrestrial networks (eg satellite communications).²²
25. Channel emulators can also have massive Multiple-in; Multiple out (**mMIMO**) functionality – this is where multiple data streams are transmitted simultaneously through many antenna elements. This functionality is used to enhance spectral

¹⁸ FMN, paragraph 9.

¹⁹ Response to the CMA questionnaire from third parties, January 2025, question 3.

²⁰ Annex 119 to the FMN, 'Channel Emulator White Paper (13 August 2024), page 1.

²¹ Annex 119 to the FMN, 'Channel Emulator White Paper (13 August 2024), page 1.

²² Annex 119 to the FMN, 'Channel Emulator White Paper (13 August 2024), page 5.

and energy efficiency, increase data throughput and network capacity, and improve coverage in challenging environments by reducing interference.²³

26. The Parties are currently active in the supply of channel emulation testing solutions through: (i) Keysight's Prosim product line;²⁴ and (ii) Spirent's Vertex channel emulator.²⁵

5.1.2 Mobile core testing

27. Mobile networks, including 5G and 4G, have three elements: (i) User Equipment ('UE', ie mobile devices); (ii) the RAN (i.e. propriety networks that connect to UE via access points, usually cell towers), and (iii) the **mobile core** or 'network core'.²⁶
28. The mobile core is essentially the nervous system and brain of a mobile network and is comprised of nodes with specific functions. Manufacturers and operators of mobile core equipment conduct testing to validate the capacity, performance, and protocol conformance (ie compliance with industry standards) of their products. Testing may encompass whole 5G network mobile cores or individual nodes in isolation (eg the AMF²⁷). Testing is performed by emulating real world performance of: (i) mobile devices, (ii) antennas, or (iii) individual/multiple nodes.²⁸
29. Mobile core testing products can be used in other areas, eg as part of O-RAN testing, where they are required to emulate the mobile core as part of the system under test.²⁹
30. The Parties are currently active in the supply of mobile core testing solutions through Keysight's LoadCore and IxLoad, and Spirent's Landslide.³⁰ These mobile core testing solutions can be sold either as standalone products or as part of a wider O-RAN testing solution (see paragraphs 34 and 35 below).

5.1.3 O-RAN testing

31. A RAN is comprised of three elements: (i) antennas, which convert electrical signals to radio waves; (ii) radios, which transform digital information into signals that can be transmitted wirelessly; and (iii) baseband units, which process the

²³ FMN, paragraph 219

²⁴ Keysight offers four channel emulator models – Prosim F8800A F64, Prosim F8800B F64, F8820A Prosim FS16 and F8820B Prosim FS16. FMN, paragraph 213.

²⁵ FMN, paragraph 216.

²⁶ FMN, paragraph 273.

²⁷ The Access and Mobility Management Function, which among other things manages the registration, reachability, and connection of UE.

²⁸ FMN, paragraphs 274-275.

²⁹ For example, see [5G Deployment, Core Network Testing with Landslide - Spirent](#). Last accessed 11 February 2025. Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 3.

³⁰ FMN, paragraphs 282-283.

signals and manage wireless resources. In a traditional RAN setup, a single vendor supplies all components.³¹

32. The cellular industry is shifting to an Open-Radio Access Network (O-RAN) model where the RAN is disaggregated into a centralised unit (**CU**), distributed unit (**DU**), radio unit (**RU**) and RAN intelligence controller (**RIC**). These components and the interfaces between them are standardised rather than proprietary.³²
33. O-RAN testing refers to testing solutions that assess the conformance, performance, and interoperability of these components. This includes emulating UE network traffic from a large number of devices.³³
34. O-RAN testing solutions are generally not a single product, but instead constitute a variety of different products in combination that are bespoke to a customer's particular testing requirements.³⁴ O-RAN customers include NEMs and network operators.³⁵
35. The Parties are currently active in the supply of O-RAN testing solutions through: Keysight's KORA offering³⁶ and a Spirent solution that involves its mobile core, channel emulation and conformance and performance products as well as the resale of a Simnovus UE emulator.³⁷

5.1.4 Wi-Fi labs testing

36. Wi-Fi lab testing refers to products which test the performance, conformance, interoperability, and security of Wi-Fi-enabled devices in R&D or lab settings.³⁸
37. Wi-Fi lab testing generally involves the testing of:
 - (a) Wi-Fi chipsets (ie the component that allows something to connect with a Wi-Fi network) for incorporation in user devices (eg a smartphone);
 - (b) user devices themselves; or
 - (c) access points which are devices that connect to a wired router, switch, or hub using an Ethernet cable and projects a Wi-Fi signal, creating a wireless local

³¹ Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 1.

³² Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 1.

³³ Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), pages 1 and 2.

³⁴ Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 2.

³⁵ Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 2.

³⁶ Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 2.

³⁷ Annex 146 to the FMN, 'O-RAN Testing White Paper (Sept. 4, 2024), page 3.

³⁸ This excludes non-signalling solutions for manufacturing testing. Signalling tests, primarily used in R&D and product development in lab settings, conduct complex measurements to evaluate a device's response to active signals in real time and test layers above the physical layer. Non-signalling tests, used primarily in manufacturing, test a device's functionality and calibration (ie focusing on physical layer performance) without requiring it to transmit or receive live signals. Due to their speed and efficiency, non-signalling testing solutions are commonly employed in high-volume manufacturing environments.

area network (**WLAN**). The access point sends and receives data wirelessly over radio frequency and can act as a hub to which other access points or user devices connect.³⁹

- 38. Given this, customers include chipset manufacturers, user device manufacturers and access point manufacturers as well as mobile network operators.⁴⁰
- 39. The Parties are currently active in the supply of Wi-Fi Lab testing solutions through: (i) Keysight's WaveTest and certain UXM products;⁴¹ and (ii) Spirent's Octobox.⁴²

5.1.5 GNSS testing

- 40. GNSS testing solutions test the accuracy, reliability and performance of GNSS-based communication systems and products which rely on these systems. To do this, GNSS testing solutions emulate satellite signals and a variety of environmental conditions, allowing developers to assess how their devices will perform in various scenarios when deployed.⁴³
- 41. Customers include manufacturers of GNSS-enabled devices, such as smartphones and automotive navigation systems, as well as defence and aerospace applications.⁴⁴
- 42. Spirent is currently active in GNSS testing solutions providing a broad range of products with so called dedicated GNSS simulators such as the PNT X⁴⁵ and Keysight's GNSS testing solutions include, among other products, its own general purpose signal generator MXG that provides for some GNSS capabilities, as well as its VXG signal generator that is sold together with Syntony's Constellator (see paragraph 313).

5.1.6 Location-based conformance and performance testing

- 43. Conformance or device acceptance testing solutions ensure devices and chipsets meet requirements that government regulators, industry (ie the 3rd Generation Partnership Project or **3GPP**) and mobile network carriers establish and update.⁴⁶ In a mobile network context this includes testing whether a device or chipset

³⁹ A WLAN is a group of computers or other devices that form a network based on radio transmissions rather than wired connections. FMN, paragraphs 235 and 236.

⁴⁰ FMN, paragraph 238 and 239.

⁴¹ FMN, paragraph 245.

⁴² FMN, paragraph 264.

⁴³ FMN, paragraphs 338 and 339.

⁴⁴ FMN, paragraph 340.

⁴⁵ FMN, paragraph 342.

⁴⁶ FMN, paragraph 296.

conforms with 2G/3G/4G/5G mobile 3GPP technical specifications and a network operators' protocols (carrier acceptance testing or CAT).⁴⁷

44. Performance testing solutions test the performance of a new device or chipset on mobile networks before deployment. This involves testing the quality of the user experience in areas such as video and audio quality and data throughput. Lab-based performance testing involves simulating real world conditions to predict how devices will perform under adverse conditions.⁴⁸
45. While conformance and performance testing can relate to cellular technologies (eg 5G), conformance and performance testing can also relate to location technologies. For example, conformance location testing includes testing compliance with 3GPP standards for location-based services and carriers' location testing requirements, including GNSS technologies (eg GPS accuracy).⁴⁹ Performance testing assesses real-world functionality, such as signal strength, positioning accuracy and reliability in various environments.
46. The Parties are currently active in the supply of location-based conformance and performance testing solutions through: (i) Keysight's S870xA Series;⁵⁰ and (ii) Spirent's 8100 5G Mobile Device Test System.⁵¹

5.1.7 HSE testing

47. An ethernet network involves a collection of devices that are connected by and transmit data via physical cables or wires. Ethernet networks are commonly found in data centres, enterprise networks and telecommunications infrastructure.
48. HSE testing solutions test both the hardware and software components of equipment that runs at speeds of over 100 gigabits per second.⁵² This testing is done in the lab before deployment by analysing signals sent out and received through the 'data link layer' (Layer 2) and the 'network layer' (Layer 3) of the Open Systems Interconnection (**OSI**) model.⁵³
49. The Parties are both active in the supply of HSE testing solutions through a number of products, some of which are software-only solutions.⁵⁴

⁴⁷ FMN, paragraphs 299 and 300.

⁴⁸ FMN, paragraph 302.

⁴⁹ FMN, paragraph 301.

⁵⁰ This series includes S8704A Protocol Conformance Toolset; S8705A RF and RRM Conformance Toolset; S8706A Protocol Carrier Acceptance Toolset; and S8707A RF and RRM Carrier Acceptance Toolset. FMN, paragraph 305.

⁵¹ FMN, paragraph 309.

⁵² FMN, paragraph 198.

⁵³ The OSI model encompasses the seven layers that computer systems use when they communicate over a network. FMN, paragraphs 193, 196 and 197.

⁵⁴ Keysight's products include IxNetwork, AresONE, Novus, IxAnvl, IxVerify, AresONE, 800G G800GE-02, and 100GE UHD100T32; and Spirent's products include TestCenter FX, MX, PX, and DX solutions, and the virtual version, TestCenter Virtual. FMN, paragraphs 196 and 549.

5.1.8 Network security testing

50. Network security products simulate cybersecurity threats to test multiple aspects of a network's infrastructure prior to deployment. The security testing targets firewalls as well as other security-related network features like proxy and secure content gateways.⁵⁵
51. Network security test solutions focus on layers 4 through 7 of the OSI model, with a concentration of solutions for layer 7, referred to as the 'application layer'. Customers include NEMs, SPs⁵⁶, government agencies, and other large enterprises.⁵⁷
52. The Parties are both active in the supply of network security testing solutions through a number of products.⁵⁸ Both Parties offer network security solutions for OSI layers 4-7, while one of Keysight's products (BreakingPoint) also offers layer 2 and 3 testing.

5.1.9 Parameters of competition

5.1.9.1 *Functionality and product development*

53. Over time, communications standards or specifications change – for example, from 4G to 5G in mobile networks or Wi-Fi 6 to Wi-Fi 7 for wireless networks. As well as these 'transition' points, evidence from customers shows that technology is constantly evolving even within an overarching standard or specification.⁵⁹
54. Suppliers of Communications TME therefore need to keep pace with these changes ensuring that they have the functionality to test new use cases and standards / specifications as they are being developed. Suppliers of Communications TME do this by investing in R&D in order to engage in product development and innovation. Existing products are updated and new products or features are developed / launched on a periodic basis to ensure suppliers offer products with the functionality to meet their customers' needs.

⁵⁵ FMN, paragraph 204.

⁵⁶ The CMA understands that the abbreviation SP refers to a network Service Provider.

⁵⁷ FMN, paragraph 206.

⁵⁸ Keysight's products are called BreakingPoint, IxLoad and CyPerf; and Spirent's products are CyberFlood and Avalanche. Keysight's network security products that operate through Keysight's hardware can use the PerfectStorm series appliances, CloudStorm series appliances, or, increasingly, the APS-100/400GE series appliances. See FMN, paragraph 562.

⁵⁹ For example: response to the CMA questionnaire from third parties, January 2025, question 8, and response to the CMA questionnaire from a third party, January 2025, question 7.

55. Consistent with this, a Keysight internal document for ‘network test’ which covers HSE and network security testing solutions, states that ‘[m]ost competition takes the form of new product innovation and the race to be first to market.’⁶⁰
56. This is also consistent with the Parties having product development roadmaps which are regularly shared with customers⁶¹ and both Parties spending a material proportion of revenue on R&D. In particular, in the areas where the Parties overlap, Keysight spent \$[<] on R&D in 2023 which amounts to [10-20]% of its revenue in 2023.⁶² Similarly, Spirent spent \$[<] on R&D in 2023 which amounts to [10-20]% of its revenue in 2023.⁶³
57. This is also consistent with customers identifying the functionality of TME and suppliers’ product development plans (which, as outlined above, are regularly shared with customers) as the two most important factors in deciding which supplier to purchase a particular TME from.
58. In terms of functionality, all customers identified the functionality of Communications TME as a very important parameter of competition.⁶⁴ For example:
- (a) One customer stated that it is a ‘paramount’ consideration as it directly influences the customer’s ability to validate, optimise and ensure the quality of its products. The customer explained that TME must align with its specific testing requirements and product development goals.⁶⁵
 - (b) Another customer stated that it operates at the cutting edge of technology such that the highest specification and functionality are frequently required from suppliers.⁶⁶

⁶⁰ Keysight’s Internal Document, KEYS-CMA-00007758, ‘Network Test SPR 2025-27 1’, page 20. This is also reflected in the Parties’ submissions. For example, Keysight submitted that it has incrementally updated [<] and other overlapping products to catch up with latest standards/specifications: Keysight is continuously releasing updates to its [<] products; in [<] updates driven by requirements from both the certification forums and mobile network operators; and more generally [<] products are evolutionary, reflecting updates to support standards. Similarly, Spirent submitted that, like most TME suppliers, Spirent undertakes regular product upgrades and functional improvements that are necessary to keep up with customer needs or evolving technology parameters. FMN, paragraphs 785, 789, 790, 795, 797 and 811.

⁶¹ FMN, paragraphs 493 to 504.

⁶² These figures represent an underestimate as they do not include R&D spending on network security. Parties’ response to the CMA’s Request for Information, 21 January 2025 (RFI 6), Annex 05_Q4 - Keysight summary of revenues; Keysight’s response to the CMA’s section 109 Notice, 1 November 2024, Annex 1.

⁶³ These figures represent an underestimate as they do not include R&D spending on network security. Parties’ response to RFI 6, Annex 06_Q4 – Spirent summary of revenues; Spirent’s response to the CMA’s section 109 Notice, 1 November 2024, Annex 1 – Question 2.

⁶⁴ Response to the CMA questionnaire from third parties, January 2025, question 7.

⁶⁵ Response to the CMA questionnaire from a third party, January 2025, question 7.

⁶⁶ Response to the CMA questionnaire from a third party, January 2025, question 7.

59. In terms of product development plans, over half of customers identified them as ‘very important’⁶⁷ and most of the rest identified them as ‘important’.⁶⁸ For example:
- (a) One customer said that development is important, especially with the introduction of new technologies like 5G.⁶⁹
 - (b) Another customer said that development plans are ‘critically important’ because they align the tools and resources needed to support the company’s innovation and operational goals. The customer said that without such plans, it risks inefficiencies, delays, and a loss of competitive edge.⁷⁰ For example, the customer stated that it typically releases new products regularly and that its innovations require equally advanced testing solutions to ensure that each new generation meets relevant requirements.⁷¹
 - (c) Another customer said that suppliers of Communications TME need to innovate as technology evolves.⁷²
60. Evidence from other suppliers of Communications TME also support the importance of product development and innovation.⁷³
61. Customers who are looking to switch suppliers are more likely to make a switch as technology evolves.⁷⁴ This is reflected in the Parties’ internal documents. For example, a Spirent Wi-Fi business plan review states that ‘[X]’ setting out a graph of the timings for Wi-Fi 4, Wi-Fi 5 and Wi-Fi 6. In addition, the document states ‘[X]’ as it can either ‘[X]’ or ‘[X]’. The document also states that ‘[X]’.⁷⁵
62. However, evidence from customers shows that, while it may be easier to switch at or just before transition points,⁷⁶ most customers stated that as long as a supplier’s product offering meets new standards/specifications, there are advantages to staying with their current supplier(s). Challenges associated with

⁶⁷ Response to the CMA questionnaire from third parties, January 2025, question 7.

⁶⁸ Response to the CMA questionnaire from third parties, January 2025, question 7.

⁶⁹ Response to the CMA questionnaire from a third party, January 2025, question 7.

⁷⁰ Response to the CMA questionnaire from a third party, January 2025, question 7.

⁷¹ Submission to the CMA from a third party, October 2024

⁷² Response to the CMA questionnaire from a third party, January 2025, question 7.

⁷³ For example, one supplier of Communications TME said that innovation is an ‘important factor’ for end users, that suppliers must focus their R&D efforts to ensure they keep pace with the technological developments of their customers. Note of a call with a third party, August 2024, paragraphs 24 to 26. Also see Note of a call with a third party, August 2024, paragraphs 91 to 94 and 98.

⁷⁴ Submissions from other suppliers of Communications TME also supported this. For example, one supplier noted that the primary opportunity for suppliers to win new customers comes during inflection points when a network transitions from one lifecycle to the next. Submission to the CMA from a third party, July 2024, page 9.

⁷⁵ Spirent’s Internal document; SPRNT_CMA-00048910.pptx, ‘[X]’, 13 September 2022, pages 4, 5 and 6.

⁷⁶ For example, one customer said that switching normally happens in technology shifts, another said it was easy to switch when moving from 4G to 5G as the costs of upgrading equipment were similar to buying new equipment and another said it is better to establish a relationship before switching. One customer said they may consider switching if a supplier had cutting edge technology, another said it is possible to switch if an alternative supplier offers products with a certain level of technical competence and reliability and another said it evaluates alternatives at transition points and there can be advantages to switching if alternative suppliers have better capabilities and product roadmaps. Response to the CMA questionnaire from third parties, January 2025, question 8.

switching include migration costs,⁷⁷ learning costs,⁷⁸ and dependencies on legacy technology and past integration with suppliers.⁷⁹

5.1.9.2 Price

63. Customers identified price as the third most important factor in deciding which supplier to purchase a particular TME from. Just under half of customers⁸⁰ identified it as 'very important' and most of the rest identified it as 'important'.⁸¹ Some customers stated that while price is important other factors such as functionality, reliability and performance are more important.⁸²
64. However, while customers identified price as a relatively important factor to them, one Keysight internal document for 'network test' states that '[X]' with most competition being via product innovation (see paragraphs 54 to 56 above). The document states that '[X]' and in relation to price competition it states that:
- (a) '[X].'
- (b) '[X].'⁸³

5.2 Market definition

65. Where the CMA makes an SLC finding, this must be 'within any market or markets in the United Kingdom for goods or services'. An SLC can affect the whole or part of a market or markets. In that context, the assessment of the relevant market(s) is a tool that forms part of the analysis of the competitive effects of the merger.⁸⁴
66. The CMA's experience is that in most mergers, the evidence gathered as part of the competitive assessment, which will assess the potentially significant constraints on the merger parties' behaviour, captures the competitive dynamics more fully than formal market definition.⁸⁵ In many cases, especially those involving differentiated products, there is often no 'bright line' that can or should be drawn with regards to market definition. Rather, it can be more helpful to describe the constraint posed by different categories of product or supplier as sitting on a continuum between 'strong' and 'weak'. The constraint posed by firms 'outside' the market will also be carefully considered.⁸⁶

⁷⁷ Response to the CMA questionnaire from third parties, January 2025, question 8.

⁷⁸ Response to the CMA questionnaire from third parties, January 2025, question 8.

⁷⁹ Response to the CMA questionnaire from third parties, January 2025, question 8.

⁸⁰ Response to the CMA questionnaire from third parties, January 2025, question 7.

⁸¹ Response to the CMA questionnaire from third parties, January 2025, question 7.

⁸² Response to the CMA questionnaire from a third party, January 2025, question 7.

⁸³ Keysight's Internal Document, KEYS-CMA-00007758, '[X]', pages 19 and 20.

⁸⁴ [CMA129](#), paragraph 9.1 and 9.4.

⁸⁵ [CMA129](#), paragraph 9.2.

⁸⁶ [CMA129](#), paragraph 9.4.

5.2.1 Product market

5.2.1.1 Parties' submissions

67. The Parties submit that the widest plausible product market would be an overall market for communications TME, which they submit is in line with Keysight's internal documents assessing competition in a 'commercial communications' market.⁸⁷
68. The Parties also submit that a wide product market for all TME is supported by the CMA's conclusions in *Electro Rent*⁸⁸ that narrower market segmentations of TME were not appropriate. This was based on the wide variety of customer types, their differing requirements, and the lack of agreement among the merger parties to that transaction and third parties on what any sensible market segmentation could be in that case.⁸⁹
69. However, the Parties also noted that different TME products are highly differentiated and are not generally substitutable from a demand-side perspective because they serve different testing needs. The Parties therefore submitted that a product market definition based on the type of testing a product offered would be the narrowest plausible market definition.⁹⁰ The Parties identified the following as potentially relevant product markets, based on their submissions regarding where they are both present: (i) HSE, (ii) network security, (iii) channel emulation, (iv) Wi-Fi lab, (v) mobile core and (vi) conformance and performance.

5.2.1.2 CMA assessment

70. The CMA notes that it will consider each merger with due regard to the circumstances of that case.⁹¹ Product market definition starts with the relevant products of the merging parties. As a result, there is no one market definition that can be expected to apply across all cases in a similar area.⁹²
71. The CMA notes that, as acknowledged by the Parties, TME designed for different applications is not substitutable from a demand side perspective (eg TME designed for use in the communications sectors is not a substitute for TME designed for the aerospace sector and even within the communications sector, applications and functions vary considerably). While certain Keysight documents assess competition for 'commercial communications' broadly, the Parties' internal

⁸⁷ FMN, paragraph 400, citing Annex 004 [§<], page 22; [§<], page 2; and [§<], page 10.

⁸⁸ CMA final report in *Electro Rent/Microlease Test Equipment Asset Management*, paras 5.109-5.112.

⁸⁹ FMN, paragraphs 397 and 402.

⁹⁰ FMN, paragraph 403.

⁹¹ [CMA129](#), paragraph 1.12 and footnote 13.

⁹² [CMA129](#), paragraph 9.6 and footnote 154.

documents often segment strategy and the monitoring of developments and competitors by product areas separately.⁹³

72. Therefore, as a starting point, the CMA considered product markets for each of the following types of testing products in which the Parties are active:

- (a) channel emulation testing solutions;
- (b) mobile core testing solutions;
- (c) O-RAN testing solutions;
- (d) Wi-Fi lab testing solutions;
- (e) conformance and performance testing solutions;
- (f) GNSS testing solutions;
- (g) HSE testing solutions; and
- (h) network security testing solutions.

73. The Parties' market definition submissions did not address O-RAN or GNSS testing, but the CMA notes the following:

- (a) **O-RAN testing solutions:** both the Parties' internal documents⁹⁴ and the third-party evidence show that there is demand for O-RAN testing solutions independent of mobile core testing solutions and other TME solutions used in O-RAN testbeds.⁹⁵ Accordingly, the CMA considers it appropriate to assess the supply of O-RAN testing solutions as a separate product market segment. The CMA notes that there are certain linkages between O-RAN and mobile core testing, which will be considered as part of the competitive assessment, where relevant.⁹⁶
- (b) **GNSS testing solutions:** customer feedback shows that customers who require the emulation of satellite signals require GNSS testing capabilities,⁹⁷ so from a demand-side perspective, it is appropriate to consider GNSS

⁹³ See eg. Spirent's internal document [redacted], slide 5; Keysight's internal document, KEYS-CMA-00005580, 5 July 2023, pages 25 and 27; and the internal documents cited for each theory of harm below.

⁹⁴ See, for example: Spirent Internal Document, SPRNT_CMA-00063980, '[redacted]', 9 September 2022, pages 3-16; Keysight's internal document, KEYS-CMA-00005580, 5 July 2023, pages 27 and 28.

⁹⁵ Response to the CMA questionnaire from third parties, January 2025, question 30: while most customers said there may be some advantages to procuring O-RAN and mobile core testing from the same supplier, none indicated that this was necessary or critical. See also the replies to the CMA questionnaire from third parties, January 2025, question 25: most third-parties stated that there are customers who demand only O-RAN testing solutions without also requiring mobile core-testing or vice versa.

⁹⁶ The CMA also notes that the Parties' documents refer to channel emulators being used as part of O-RAN testing solutions to emulate the parts of the network that are not being tested, as noted at paragraph 25 above. However, only one customer stated that they use a standalone channel emulator as part of their O-RAN testbed: Response to the CMA questionnaire from a third party, January 2025.

⁹⁷ Response to the CMA questionnaire from third parties, January 2025, question 53.

testing solutions as a separate product market. While most customers consider specific GNSS-generators more suitable for their needs,⁹⁸ some customers and third parties indicated that general purpose signal generators can be an alternative for some use-cases.⁹⁹ Where relevant, the constraint posed by general purpose signal generators used for GNSS testing applications will be considered in the competitive assessment.

74. The CMA considered whether to widen the product market definitions in paragraph 72, but has not received any evidence to show that there is demand-side substitution between the product types above.
75. The boundaries of the relevant product market are generally determined by reference to demand-side substitution alone, unless there is strong evidence of supply-side substitution.¹⁰⁰ The CMA considers that there is limited scope for supply-side substitution between providers of different types of TME solutions. Third-party evidence shows that there are significant barriers to entry and expansion in the supply of different types of TME.¹⁰¹ This is because these products are typically developed to carry out a specific function and require a high level of engineering expertise, R&D investment (in time and cost) and innovation, as discussed at paragraphs 54 to 56 above.¹⁰² This is reflected in the differences in the competitor sets and strengths across the various product areas considered in each of the theories of harm below.¹⁰³
76. Therefore, the CMA considers that the relevant product markets are no wider than those identified in paragraph 72 above.
77. Within each of these potential product markets, the CMA has considered if further segmentation is appropriate. In doing so, the CMA had regard to its approach in *Electro Rent* and the risk of overly narrow sub-segmentations – eg based on variations in customers’ requirements or specific test functionality – making the analysis intractable.¹⁰⁴ Where appropriate, the CMA has instead taken into account in its competitive assessment such variations in customers’ requirements,

⁹⁸ Response to the CMA questionnaire from third parties, January 2025, question 53.

⁹⁹ Response to the CMA questionnaire from third parties, January 2025, question 53 and Responses to CMA questionnaire from third-parties, January 2025, question 55. See also Spirent internal document, SPRNT_CMA-00086778, [3<], 19 June 2023, page 6, which indicates that [3<].

¹⁰⁰ CMA64, paragraph 9.8. The CMA would generally consider aggregating markets where: (a) firms routinely use existing production assets to supply a range of products that are not demand-side substitutes; and (b) the same firms compete to supply these different products and the conditions of competition between the firms are the same for each product.

¹⁰¹ Response to the CMA questionnaire from third parties, 25 January 2025, questions 12, 20, 38, 53 and 58: almost all respondents identified barriers to entry and expansion for providers of TME products to supply a product they are not active in.

¹⁰² The Parties’ internal documents also reflect these dynamics, see for example the documents listed in relation to Spirent’s development of Vertex [3<] (paragraphs 118-123 below) and Keysight’s expansion plans in GNSS (paragraphs 321 to 323 below).

¹⁰³ See eg Spirent’s internal document Annex 001. [3<], slide 5; Keysight’s internal document, KEYS-CMA-00005580, 5 July 2023, pages 25 and 27 and the shares of supply and other evidence cited for each theory of harm.

¹⁰⁴ DMN paragraph 402, citing CMA final report in *Electro Rent/Microlease Test Equipment Asset Management*, para. 5.112.

the extent to which each supplier within the market is able to satisfy them and constraints from outside the relevant product market.

78. The two exceptions to the approach above relate the following areas, where the CMA considers narrower product markets to be appropriate:
- (a) **Wi-Fi lab (signalling) testing solutions:** Keysight's documents distinguish between signalling and non-signalling testing.¹⁰⁵ The CMA understands signalling solutions are used in a lab setting for complex measurement tasks using emulated Wi-Fi signal and testing layers above the physical layer, whereas non-signalling test solutions are primarily used in manufacturing settings for physical layer compliance and performance testing.¹⁰⁶ These differences indicate a lack of demand-side substitutability between these solutions. This is reflected in the fact that none of the Parties' Wi-Fi testing customers identified products used exclusively for non-signalling testing as alternatives to the Parties'.¹⁰⁷ The Parties proposed narrowest plausible market definition of 'Wi-Fi lab' appears to implicitly limit the segment to signalling solutions, on the basis that these solutions are used for lab-testing. The CMA considers this the appropriate product market for Wi-Fi testing solutions given that there is no overlap between the Parties for non-signalling solutions. Most competitors also indicated that it would be challenging for a supplier of non-signalling Wi-Fi testing solutions to launch a signalling Wi-Fi testing solution.¹⁰⁸
 - (b) **Location-based conformance and performance testing solutions:** the CMA considered whether it is appropriate to sub-segment conformance and performance testing solutions further between location-based and non-location-based testing. On the basis that the Parties overlap only in relation to location-based testing, the Parties' documents delineate between location and non-location-based testing¹⁰⁹ and there is limited demand¹¹⁰ and supply-side substitutability between the two, the CMA considers that location-based conformance and performance testing solutions is the narrowest plausible product market.
79. While the Parties have not made specific submissions with respect to in-house solutions in relation to market definition, the CMA notes that in-house solutions

¹⁰⁵ See eg Keysight Internal Document, KEYS-CMA-00005772, July 2022, page 18.

¹⁰⁶ See also footnote 38 above.

¹⁰⁷ Response to the CMA questionnaire from third-parties, January 2025, questions 39 and 41.

¹⁰⁸ Response to the CMA questionnaire from third-parties, January 2025, question 39: all competitors who indicated that they were active in the Wi-Fi testing solutions segmented indicated that it would be challenging for a supplier of non-signalling solutions to launch a signalling solution.

¹⁰⁹ See, for example: Spirent Internal Document, SPRNT_CMA-00077314, '[>]', page 6; Keysight's internal document, KEYS-CMA-00005580, 5 July 2023, pages 27 and 31.

¹¹⁰ Response to the CMA questionnaire from third parties, January 2025, question 44. Several customers indicated that location-based testing capabilities are important to them when selecting a supplier for cellular device conformance and performance testing solutions.

have been included in the Parties' market share estimates for several product areas. The CMA did not receive evidence from customers indicating that in-house solutions were a credible alternative to the tools offered by the Parties (or other third parties), such that it should be included within the relevant product market(s). Where relevant, the constraint from in-house solutions will be considered in the assessment of competitive constraints for each theory of harm below.

5.2.2 Geographic market

5.2.2.1 Parties' submissions

80. The Parties submit that all plausible relevant segments are worldwide in scope on the basis that: (a) unlike the rental supply of TME in *Electro Rent*, all major suppliers of communications TME offer their products for purchase globally; (b) transport costs and tariffs are relatively low; and (c) regulatory requirements are generally uniform worldwide, such that equipment/software does not need to be customised according to country of use.
81. In the Parties' view, the presence of local sales forces and locally present support teams is also not an important competitive factor for the supply of Communications TME.¹¹¹

5.2.2.2 CMA assessment

82. Consistent with the Parties' submissions, internal documents assess competition on a worldwide basis.¹¹²
83. On the demand side, the CMA notes that mobile telecommunications standards, such as the 3GPP and Wi-Fi standards are global, which means that technology tested by the Parties' customers are typically homogenous between countries and customers purchase from a global pool of suppliers.
84. Third party feedback is broadly consistent with a global market. A majority of customers did not identify geographic preferences or requirements with regards to the sourcing of TME¹¹³ products and several stated that they purchase based on global procurement processes.¹¹⁴
85. The CMA notes that only a limited number of customers identified some geographic preferences as to their supplier's origin, which appear to be more pertinent for specific use cases or end-users, eg for security related use-cases or

¹¹¹ FMN paragraphs 405-407.

¹¹² See eg. Keysight's internal document: Annex 004 [3<], page 22 and Spirent's internal document: Annex 006. [3<].

¹¹³ Responses to the CMA questionnaire from third-parties, January 2025, question 4.

¹¹⁴ Response to the CMA questionnaire from third parties, January 2025, question 3.

government users.¹¹⁵ Others also highlighted that sourcing locally closer to R&D or production facilities may be easier logistically.¹¹⁶

86. On the supply side, the CMA notes that global suppliers provide services to product development labs and manufacturing sites wherever customer is located.¹¹⁷
87. Therefore, the CMA considers that the appropriate geographic market is global.

5.2.3 Conclusion

88. Accordingly, the CMA assessed the impact of the Merger in the following markets:
- (a) Global supply of channel emulation testing solutions;
 - (b) Global supply of mobile core testing solutions;
 - (c) Global supply of O-RAN testing solutions;
 - (d) Global supply of Wi-Fi lab testing solutions;
 - (e) Global supply of location-based conformance and performance testing solutions;
 - (f) Global supply of GNSS testing solutions;
 - (g) Global supply of HSE testing solutions; and
 - (h) Global supply of network security testing solutions.

5.3 Theories of harm

89. The CMA assesses the potential competitive effects of mergers by reference to theories of harm. Theories of harm provide a framework for assessing the effects of a merger and whether or not it could lead to an SLC relative to the counterfactual.¹¹⁸

¹¹⁵ Response to the CMA questionnaire from third parties, January 2025, question 4. One customer stated that they did not have any geographic preferences 'as long as meets current government procurement guidelines for suppliers or unless there are specific security related exemptions or constraints.' Another customer stated that they preferred domestically manufactured products given government end-users.

¹¹⁶ Response to the CMA questionnaire from third parties, January 2025, question 4.

¹¹⁷ Response to the CMA questionnaire from third parties, January 2025, question 4. For example, one customer stated that most of its TME is 'procured in the US [...] prior to being shipped worldwide'. A second stated that it: 'has a GFA in place with Keysight for the purchase of testing and measurement equipment to support the execution of its projects worldwide.'

¹¹⁸ [CMA129](#), paragraph 2.11.

90. In its investigation of this Merger, the CMA is currently considering the following theories of harm:
- (a) Horizontal unilateral effects in the supply of channel emulation testing solutions.
 - (b) Horizontal unilateral effects in the supply of mobile core testing solutions.
 - (c) Horizontal unilateral effects in the supply of O-RAN testing solutions.
 - (d) Horizontal unilateral effects in the supply of Wi-Fi testing solutions.
 - (e) Horizontal unilateral effects in the supply of GNSS testing solutions.
 - (f) Horizontal unilateral effects in the supply of location-based conformance and performance testing solutions.
 - (g) Horizontal unilateral effects in the supply of HSE testing solutions.
 - (h) Horizontal unilateral effects in the supply of network security testing solutions.
91. Each of these theories of harm is considered below.
92. The CMA also sought third-party views regarding the overall impact of the Merger on competition. Some customers and competitors had negative views on the impact of the Merger. In particular:
- (a) These customers said that it reduced choice and could, for example, lead to increased prices and reduced product development, with some customers limiting their concerns to the specific areas of HSE, Channel Emulation and Network Security.¹¹⁹
 - (b) Most of these competitors identified that it would reduce choice and could, for example, lead to increased prices.¹²⁰ A number identified that the Merged Entity could use its combined portfolio to make it harder for smaller competitors to compete, and one identified that the Merged Entity could restrict access to some Spirent products that competitors rely on.¹²¹
93. Most customers and all other competitors had neutral views on the impact of the Merger.¹²² However:

¹¹⁹ Response to the CMA questionnaire from third-parties, January 2025, question 8.

¹²⁰ Response to the CMA questionnaire from third-parties, January 2025, question 2.

¹²¹ The CMA considers these non-horizontal concerns where relevant within its assessment of the theories of harm set out at paragraphs 198 to 196. Response to the CMA questionnaire from third-parties, January 2025, question 2.

¹²² Response to the CMA questionnaire from third parties, January 2025, question 8. Response to the CMA questionnaire from third parties, January 2025, question 2.

- (a) Some of these customers caveated their answers. For example:
- (i) One customer said that the Merger will not have an impact ‘provided that the Merger does not lead to higher prices for those specific TME solutions where it has no credible alternative to the Parties, as well as to less favourable commercial and support conditions’.¹²³
 - (ii) Another customer of both Parties does not anticipate a meaningful impact ‘as long as the cost and functionality of products is not meaningfully altered’.¹²⁴
 - (iii) Another customer said that it was neutral to positive at the moment until it has a clearer understanding of what will happen to the product lines it uses. The customer said that overall pricing and products will probably improve if they keep, integrate and improve certain products and do not end the life of any products.¹²⁵
 - (iv) Another customer said that Keysight and Spirent have premium pricing, and while they have been able to negotiate and arrive at acceptable pricing to date, they are interested to see if this would change post-Merger when there are fewer options.
- (b) Most of these competitors either did not see themselves as competing in the same space as one or both the Parties, felt it would lead to some opportunities for them even if it came at some cost to customers, or identified that the Parties could use the combined portfolio to make it harder for smaller competitors to compete.¹²⁶
94. Only a few customers had a positive view of the Merger citing factors such as synergies, increased investment, better product support and possible advantages in terms of discounts (due to having more purchases with one supplier).¹²⁷

5.3.1 Theory of Harm 1: Horizontal unilateral effects in channel emulation testing solutions

95. Horizontal unilateral effects may arise when one firm merges with a competitor that previously provided a competitive constraint, allowing the merged entity profitably to raise prices or to degrade non-price aspects of its offering on its own and without needing to coordinate with its rivals. Non-price aspects of a competitive offering may include quality, range, service, and innovation,¹²⁸ which

¹²³ Response to the CMA questionnaire from third parties, January 2025, question 8.

¹²⁴ Response to the CMA questionnaire from third parties, January 2025, question 8.

¹²⁵ Response to the CMA questionnaire from third parties, January 2025, question 8.

¹²⁶ Response to the CMA questionnaire from third parties, January 2025, question 2.

¹²⁷ Response to the CMA questionnaire from third parties, January 2025, question 8.

¹²⁸ [CMA129](#), paragraph 4.1.

may be taken into account by the CMA in assessing the impact of a merger and whether it may be expected to give rise to an SLC. Accordingly, a horizontal unilateral effects theory of harm may relate to both competition on parameters related to current product offerings and in relation to product development and innovation.

96. Horizontal unilateral effects (whether considering price or non-price parameters of competition) are more likely where the merger firms are close competitors. The more closely they compete, the greater the likelihood of unilateral effects arising as a result of the merger because the merged entity will recapture a more significant share of the sales lost in response to a price increase or other worsening in its offering, eg reduced innovation or reduced product development efforts.¹²⁹
97. Closeness of competition is a relative concept. The CMA will consider the overall closeness of competition between the merger firms in the context of the other constraints that would remain post-merger. Where there is evidence that competition mainly takes place among few firms, any two would normally be sufficiently close competitors that the elimination of competition between them would raise competition concerns, subject to evidence to the contrary.¹³⁰ In addition, where one merger firm has a strong position in the market, even small increments in market power may give rise to competition concerns.¹³¹
98. In assessing the extent of competition in relation to product development and innovation, the CMA is considering how the Parties offerings are likely to evolve and the extent of any dynamic competitive interactions between the Parties, such as whether they take each other into account when making investment decisions or launching new products. In addition, the CMA does not need to show that new, closely competing product developments by the Parties would have been likely or indeed successful in order to establish an SLC in relation to product development and innovation.¹³² Evidence on the number of competitors and the existing positions of these competitors continue to be relevant to the CMA's assessment.¹³³
99. The evidence set out above (at paragraphs 54 to 56) shows that suppliers of communications TMEs need to engage constantly in product development and innovation to meet the evolving needs of customers as technological standards evolve. This is particularly (but not exclusively) the case as one technology cycle ends and another begins, as at these points there may be material changes in market position depending on which supplier(s) is best able to meet demand for

¹²⁹ [CMA129](#), paragraph 4.8.

¹³⁰ [CMA129](#), paragraph 4.10.

¹³¹ [CMA129](#), paragraph 4.12(a).

¹³² [CMA129](#), paragraph 5.23.

¹³³ [CMA129](#), paragraph 4.13.

testing solutions for the latest technological standard. The frequency of product development may also mean, despite customers being regularly informed by their communications TME suppliers of new developments, they may not always be aware of the latest product developments.

100. Therefore, the CMA considered competition based on both current product offerings and product development and innovation. In doing this the CMA has taken into account all sources of evidence in the round and any evidence on where the market may be with regards to technology cycles.

101. On this basis, the CMA has assessed whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in channel emulation testing solutions. The CMA considered evidence from:

- (a) the Parties' submissions;
- (b) shares of supply;
- (c) internal documents;
- (d) third-party evidence; and
- (e) opportunities data.

5.3.1.1 *Parties' submissions*

102. The Parties submitted that their channel emulation products do not compete closely.¹³⁴ The Parties noted that Spirent's Vertex product is outdated and does not compete with Keysight's market leading product Propsim as Vertex does not offer the latest cellular and Wi-Fi standards such as 5G and Wi-Fi 7,¹³⁵ and Vertex's decline is also evidenced by [REDACTED] sales between [REDACTED].¹³⁶

103. The Parties submitted that Vertex's worldwide sales in 2023 and 2024 overstate its competitive significance because [REDACTED].¹³⁷

104. The Parties also noted that Spirent's plans regarding updating Vertex are modest and will only serve to extend the life [REDACTED].¹³⁸ The Parties submitted that Spirent's [REDACTED]¹³⁹.¹⁴⁰ However, Spirent subsequently reduced the scope of its planned

¹³⁴ FMN, paragraph 587.

¹³⁵ FMN, paragraph 539, 568.

¹³⁶ Parties' response to the Issues Letter, 20 February 2025, page 9 paragraph 37.

¹³⁷ FMN, paragraph 576 and Parties' response to the Issues Letter, 20 February 2025, page 10 paragraph 40.

¹³⁸ Parties' response to the Issues Letter, 20 February 2025, page 12 paragraph 44.

¹³⁹ Spirent internal document, SPRNT_CMA-00048850, '[REDACTED]', 4 November 2022 page 14

¹⁴⁰ Spirent internal document, SPRNT_CMA-00048850, '[REDACTED]', 4 November 2022, pages 4 and 5. The Parties submitted that mMIMO is a core 5G and Wi-Fi technology that is used to increase data throughput and network capacity and improve coverage in challenging environments by reducing interference. FMN, paragraph 219.

updates [X].¹⁴¹ Spirent said that [X] would not compete with Prosim [X] because [X] would be a less complex [X] than Prosim.¹⁴² In addition, Spirent said that [X].

105. The Parties further submitted that moving forward Keysight will face stronger competition from Rohde & Schwarz (**R&S**), Anritsu, KSW, Kratos, dBM and SquarePeg than from Spirent.¹⁴³

5.3.1.2 CMA assessment

5.3.1.2.1 Shares of supply

106. Shares of supply can be useful evidence when assessing closeness of competition in some circumstances.¹⁴⁴ However, in this case while shares of supply may be a useful starting point, the CMA considers that they provide only a partial indication of a supplier's competitive strength and positioning. This is because:

- (a) The product offerings of suppliers are differentiated,¹⁴⁵ and where this is the case shares of supply may not provide evidence on the closest alternatives available to the merger firms' customers, as these may be different from the products that achieve the greatest sales across a wider body of customers.¹⁴⁶ The extent of differentiation in each product overlap is considered where relevant in relation to each theory of harm.
- (b) The supply of Communications TME is characterised by technology cycles and material levels of product development and innovation, as set out at paragraphs 54 to 56 above. Current shares of supply reflect a supplier's historic success in winning customers and may provide helpful evidence on which suppliers may be well positioned to compete going forward. However, they may understate or overstate a supplier's current and future competitive strength as they do not capture the extent of dynamic / future competition between the Parties and other suppliers.

107. As such, the CMA considers it appropriate to assess evidence on shares of supply alongside other evidence, particularly on product development plans, to understand if there is any evidence to suggest that any suppliers are likely to become relatively stronger or weaker in the future.

108. Where possible the CMA has presented shares of supply estimates calculated using revenue data provided by the Parties and their competitors. The CMA

¹⁴¹ Parties' response to the Issues Letter, 20 February 2025, page 16 paragraph 59.

¹⁴² Parties' response to the Issues Letter, 20 February 2025, page 17 paragraph 61.

¹⁴³ FMN, paragraph 593; Parties' response to the Issues Letter, 20 February 2025, page 18 paragraph 67.

¹⁴⁴ [CMA129](#), paragraph 4.14.

¹⁴⁵ See paragraphs 67 to 69 above.

¹⁴⁶ [CMA129](#), paragraph 4.15.

considers its share of supply estimates to be a more accurate representation of the market than those provided by the Parties. This is because the CMA's estimates rely on actual revenue figures provided to it by competitors, rather than estimated revenue figures for competitors provided by the Parties.¹⁴⁷

109. The Parties estimated a combined share of supply of [20-30]% with an increment of [5-10]% as a result of the Merger. This is not consistent with the CMA's market testing or the Parties' internal documents.
110. The CMA's share of supply estimates for channel emulation testing solutions in 2024 are set out in Table 1 below.

Table 1: **Global shares of supply in channel emulation testing solutions (2024)**

Supplier	Share (%)
Keysight	[30-40]
Spirent	[5-10]
Combined	[40-50]
Kratos	[10-20]
dBm	[5-10]
R&S	[0-5]
KSW	[0-5]
Others	[20-30]

Source: CMA estimates based on revenue data from the Parties and third parties.

Notes: Where third-party revenue data for specific competitors was unavailable, the CMA has relied on the midpoints of the Parties' estimates of their revenues in 2023. The Parties' 'Others' category has not been included as the evidence currently available to the CMA does not show that there are other suppliers who exert a competitive constraint on the Parties.

111. Table 1 shows that the Parties' combined share of supply is [40-50]% with an increment of [5-10]% (see Table 1). By comparison the next largest player is Kratos with a share of [10-20]% and then dBm with a share of [5-10]%.
112. The Parties' internal documents are broadly consistent with the above but sometimes show consistently higher shares of supply estimates for channel emulation, generally indicating a Keysight shares between 40-60% and Spirent shares of between 10-20%.¹⁴⁸
113. The CMA notes the Parties' submission that [70-80]% of Spirent's 2024 revenue for channel emulation testing is attributable to revenue generated from support and maintenance services for existing Vertex units rather than sales of new units. The CMA also notes however that Spirent had [§<] bookings for Vertex units in 2024. The CMA considers that this shows that Vertex was still providing a

¹⁴⁷ The Parties submitted that their estimates of market sizes and competitor revenues were based on initial estimates from salespeople with relevant experience which were then refined through an iterative process considering inputs from one or both Parties depending on the type of testing solution. The Parties submitted that this was necessary as company reports, market reports and data from third-party suppliers is not sufficiently granular to estimate shares of supply. Parties' response to the CMA's Request for Information, 4 December 2024 (RFI 5), question 1.

¹⁴⁸ Keysight Internal Document, KEYS-CMA-00005580, 31 May 2023, pages 24-25; Spirent Internal Document, Annex 010. [§<], June 2023, page 19; Spirent Internal Document, Annex 010. [§<], June 2023, page 19 and Spirent Internal Document, SPRNT_CMA-00061290, '[§<]', 15 February 2024, page 3

competitive constraint, and competing with products like Propsim, in the market for channel emulation testing solutions in 2024.

5.3.1.2.2 *Closeness of competition*

5.3.1.2.2.1 *Competition between Vertex and Propsim*

114. Spirent's internal documents consistently identify Keysight's Propsim as the market leader and Spirent's main competitor for channel emulation.¹⁴⁹ The documents also indicate that Spirent's [X] channel emulator [X] was designed to compete closely with Propsim and take market share from it.¹⁵⁰
115. Keysight's internal documents also track Spirent for channel emulation, noting its efforts to compete in [X] channel emulation¹⁵¹ and recently mentioning it as a key competitor.¹⁵²

5.3.1.2.2.2 *Vertex*

116. Spirent's internal documents recognise that Vertex' [X] had declined in recent years. For example, a 2023 portfolio review document noted that Vertex was a [X]'.¹⁵³ There is also evidence in Spirent's internal documents that Vertex was a mature product that [X].¹⁵⁴
117. The CMA therefore considers that Vertex's [X], may be reflective of the stage the product was at in its current lifecycle rather than a reflection of a decline in Spirent's ability to provide a material competitive constraint against Keysight and [X], in particular having regard to the following Spirent plans.

5.3.1.2.2.3 *Updates to Spirent's channel emulation offering*

118. The CMA considers that there is considerable evidence in Spirent's internal documents that it planned to update Vertex or [X]. A business overview document from 2022 sets out that Spirent's strategy for Vertex was to [X].¹⁵⁵
119. Spirent's internal documents show that it began discussing [X] updates to its channel emulation offering in 2022 and these discussions continued through to

¹⁴⁹ See for example: Spirent Internal Document, SPRNT_CMA-00053825, '[X]' pages 13, 14 and Spirent Internal Document, SPRNT-005991223.pptx, '[X]', pages 7, 8.

¹⁵⁰ Spirent Internal Document, SPRNT_CMA-00061290, '[X]', 19 February 2024, page 6

¹⁵¹ Keysight Internal Document, KEYS-CMA-00005924.pptx, March 2023, page 9. The CMA considers that this document is particularly relevant given the forward-looking nature of Keysight's discussions of Spirent. In particular, Keysight sees Spirent as a competitor [X].

¹⁵² Keysight Internal Document, KEYS-CMA-00014058.pdf, February 2024, page 34 and 35

¹⁵³ Spirent Internal Document, SPRNT_CMA-00097072, '[X]', 30 October 2023, page 2.

¹⁵⁴ For example, a document from November 2022 [X]. Spirent Internal Document, SPRNT_CMA-00053825, '[X]', 4 November 2022 page 4

¹⁵⁵ Spirent Internal Document, SPRNT_CMA-00055910, June 2022, page 52

2024. In 2022, Spirent initiated an internal project [REDACTED] which entailed the development of a next generation channel emulation offering¹⁵⁶ and to be able to offer, among other things, [REDACTED].¹⁵⁷ Subsequent documents further describe the efforts and steps in [REDACTED]:

- (a) [REDACTED].¹⁵⁸
- (b) A channel emulation product roadmap document from 2023 sets out that [REDACTED] will be a [REDACTED] which supports advanced [REDACTED] technologies including [REDACTED] requirements.¹⁵⁹
- (c) A document titled '[REDACTED]' makes clear that the [REDACTED] Channel Emulator [REDACTED] should include [REDACTED] and would have different use cases, [REDACTED].¹⁶⁰
- (d) [REDACTED].¹⁶¹

120. As mentioned in paragraph 104104 the Parties submitted that the timeline for [REDACTED] was uncertain and a decision had been taken to [REDACTED] the project so that any [REDACTED] would not compete with Prosim. However, the CMA considers that Spirent's internal documents suggest that Spirent wanted to progress [REDACTED] and viewed the updates it was making to Vertex as a pathway to [REDACTED].¹⁶² The CMA has not seen any documentary evidence which shows a clear decision to develop the [REDACTED] product in a way that would [REDACTED] its overlap with Prosim or to focus on a [REDACTED] of the channel emulation market. A document the Parties rely on as evidence of a decision to scope down [REDACTED]¹⁶³ suggests that Spirent intended [REDACTED] to address key areas of channel emulation, such as [REDACTED].¹⁶⁴ The CMA considers this evidence would rather indicate that [REDACTED] would move Spirent closer to Keysight and Prosim, [REDACTED].

121. As well as developing a [REDACTED] channel emulator under [REDACTED], Spirent also maintained plans to make [REDACTED] updates to its Vertex product. An internal document from March 2024 titled [REDACTED], however it also discusses planned updates to Vertex noting that Spirent had identified an update including a new [REDACTED].¹⁶⁵ Another Spirent internal document from May 2024 shows that Spirent estimated that it invested [REDACTED] to

¹⁵⁶ Spirent Internal Document, SPRNT_CMA-00055910, June 2022, page 52

¹⁵⁷ Spirent Internal Document, SPRNT_CMA-00048850, '[REDACTED]', 4 November 2022, pages 4, 5 and 12

¹⁵⁸ Spirent Internal Document, SPRNT_CMA-00039978, '[REDACTED]', 31 August 2023, page 11

¹⁵⁹ DMN, Annex 123, '[REDACTED]', page 4. [REDACTED]. See for example Spirent Internal Document, SPRNT_CMA-00048850.pptx, '[REDACTED]', November 2022, slide 4.

¹⁶⁰ Spirent Internal Document, SPRNT_CMA-00049126.pptx, '[REDACTED]', 19 May 2024, slides 6 and 13

¹⁶¹ [REDACTED], pages 2 and 4

¹⁶² For example, a [REDACTED]; see Spirent Internal Document, SPRNT_CMA-00046460.pptx, '[REDACTED]', 24 May 2024, slide 5

¹⁶³ Parties' response to the Issues Letter, 20 February 2025, page 15 paragraph 56; Spirent Internal Document, SPRNT-001272132.pdf, '[REDACTED]', 10 March 2024.

¹⁶⁴ Spirent Internal Document, SPRNT-001272132.pdf, '[REDACTED]', 10 March 2024, page 12.

¹⁶⁵ Spirent Internal Document, SPRNT-001272132.pdf, '[REDACTED]', 10 March 2024, page 2.

update Vertex in 2024.¹⁶⁶ This investment aimed to increase Vertex's [X].¹⁶⁷ [X].¹⁶⁸

122. The Parties submitted that even taking account of the new [X], it would still be unclear whether Vertex will be able to cover [X] requirements due to [X].¹⁶⁹ However, the CMA notes that Spirent's internal documents show that it intended to [X] improve [X] Vertex [X]¹⁷⁰ would bring Vertex[X] to a level that is closer to Propsim's [X].¹⁷¹
123. The CMA considers that there is clear evidence in Spirent's internal documents that [X] and remaining competitive in channel emulation was important to the Spirent business. The CMA considers that Spirent's internal documents show that absent the Merger it would have [X] its channel emulation offering by updating Vertex and [X]. These actions would have ensured that Spirent continued to provide a competitive constraint on the market leader, Propsim, going forward.

5.3.1.2.2.4 Opportunities data

124. In the ordinary course of business, both Parties record sales opportunities in their respective CRM databases.¹⁷² Keysight submitted its opportunities data for all relevant product areas for the period November 2020 to November 2024, while Spirent provided data covering January 2021 to November 2024. While not systematically documented, these records can include information on competitors for specific opportunities.¹⁷³
125. As these records capture all types of sales opportunities — including repairs, upgrades, and renewals — they include opportunities that may not have involved direct competition. The Parties also submitted that often the identified competitor will be competing to meet different requirements or supply a different technology to the end customer – however, the Parties provided no evidence (eg in terms of internal documents discussing this data) to support this.¹⁷⁴

¹⁶⁶ Spirent Internal Document, SPRNT_CMA-00046460.pptx, '[X]', 24 May 2024, slide 19

¹⁶⁷ Spirent Internal Document, SPRNT_CMA-00046460.pptx, '[X]', 24 May 2024, slide 5. See also Spirent Internal Document, SPRNT-001272132.pdf, '[X]', 10 March 2024,

¹⁶⁸ Spirent Internal Document, SPRNT_CMA-00046460.pptx, '[X]', 24 May 2024, slide 5.

¹⁶⁹ Parties' response to the Issues Letter, 20 February 2025, page 13 paragraph 46. Keysight also submitted at a very late stage that there would be [X]. However, the CMA notes that the underlying internal documents do not support Spirent's submission [X].

¹⁷⁰ Spirent Internal Document, SPRNT_CMA-00046460.pptx, '[X]', 24 May 2024, slide 12; and Spirent Internal Document, SPRNT_CMA-00049126.pptx, '[X]', 19 May 2024, slide 11 and Spirent Internal Document, SPRNT-001272132.pdf, '[X]', 10 March 2024, page 21

¹⁷¹ Vertex's new EVM is estimated to be between 45-47 dBm whereas Propsim has an EVM of between -49 to -50 dBm. See [F8800B PROPSIM F64 Radio Channel Emulator | Keysight](#)

¹⁷² Parties' response to the CMA's Request for Information, 21 January 2025 (RFI 6), question 2(a).

¹⁷³ The Parties submitted that these records are relatively comprehensive and sales that are not associated with an entry in the database will be rare. Parties' response to RFI3 dated 18 October 2024, question 2.

¹⁷⁴ The Parties stated that TME suppliers typically respond to customer requests even if their testing solution does not correspond to a customer's criteria. Parties' response to RFI 6, question 2(e).

126. Aside from entries explicitly identifying a competitor, the Parties were unable to distinguish which opportunities were subject to direct competition. As a result, it has not been possible to calculate the proportion of all competitive opportunities for which the Parties recorded information about competitors. While in some instances the total number of opportunities containing competitor information is relatively high in absolute terms, the CMA notes that, across all product areas, the number of opportunities containing competitive information is low as a proportion of the total number of recorded opportunities (<10% for both Parties). Where the number of opportunities for which competitors are identified is sufficiently high, the opportunities data may therefore be considered more representative of competitive conditions and the CMA may place more weight on this information.
127. The CMA further notes that this data is reflective of perceived competition for opportunities, rather than confirmed instances of competition.¹⁷⁵
128. The CMA further notes that the opportunities data reflects instances of past competition and may not reflect ongoing competition in R&D and/or innovation, and as explained above this is a market in which offerings and customer requirements change over time. As such they are only a partial indication of competition between suppliers.
129. In light of the points noted above, the CMA considers it appropriate to assess the evidence from opportunities data alongside other evidence, particularly on product development plans, to understand if there is any evidence to suggest that any suppliers are likely to become relatively stronger or weaker in the future.
130. In relation to the opportunities data for channel emulation, Keysight¹⁷⁶ and Spirent¹⁷⁷ were each other's most identified competitor overall and in each year:¹⁷⁸
- (a) Spirent was identified in more than two thirds [3<] ([70-80]% ([3<])) of Keysight's opportunities where a competitor was identified. The number of opportunities has been fairly consistent between [3<] and [3<] per year between 2022 and 2024.¹⁷⁹
 - (b) Keysight was identified in the vast majority [3<] ([90-100]% ([3<])) of Spirent's opportunities where a competitor was identified.

¹⁷⁵ RFI6, question 2(e).

¹⁷⁶ Keysight's opportunities dataset contained [3<] opportunities with [0-5]% ([3<]) of those opportunities identifying a competitor. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

¹⁷⁷ Spirent's dataset contained [3<] opportunities with [0-5]% ([3<]) of those opportunities identifying a competitor. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

¹⁷⁸ For channel emulation, the CMA consider it appropriate to place more weight on Keysight's opportunities data as the number of opportunities for which competitors are identified is low in relation to Spirent's opportunities data.

¹⁷⁹ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

131. The Parties submitted that their opportunities data shows that Vertex is not a [X] competitor.¹⁸⁰ The Parties noted that Spirent went from winning \$[X] million in non-renewal opportunities in 2021 to [X] \$[X] million for most of 2024. During this period Spirent's [X] win rate for non-renewal opportunities fell to [X]% ([X] in 2021).¹⁸¹ While the CMA considers that this is consistent with Vertex's competitive position [X], the CMA notes that Spirent was still competing for and winning opportunities in 2024. This suggests that Vertex continues to provide a competitive constraint in relation to channel emulation testing solutions. Furthermore, as set out above, during this period Spirent was also actively working to [X] an enhanced offering that could have been used to compete in future tenders.
132. Given the Parties' submissions on the decline of Vertex discussed (including the submissions discussed at paragraphs 102-103)102103, the CMA considers it informative that Spirent still remained the most identified competitor in Keysight's data up to, and including, 2024. While the CMA notes that some other competitors were identified more regularly in 2024 than previous years, the CMA has not seen any evidence which suggests other competitors are imposing a closer constraint on Keysight than Spirent.

5.3.1.2.2.5 *Third-party evidence*

133. The CMA asked customers to identify alternatives to the Parties' channel emulation testing products. As noted in paragraph 10098100, the CMA has considered this evidence in the round, recognising that while customers may regularly get roadmaps from suppliers, customer views on current substitutes may not fully capture dynamic competitive interactions between the Parties.
134. Slightly less than half of the customers responding to the CMA's questionnaire identified the Parties' solutions as alternatives to each other. All of these customers identified Keysight's Prosim as being a very effective or fully effective alternative.¹⁸² A few of them identified Spirent's Vertex solution as being a very effective alternative to Keysight's Prosim. One of these customers identified it as being a fully effective alternative, and one identified it as being a moderately effective alternative.
135. One customer who uses both Parties' products told the CMA that it had a negative view of the Merger. The third party explained that it expected the Merged Entity to have a 'near monopoly' in the supply of 'high end' channel emulators.¹⁸³

¹⁸⁰ Parties' response to the Issues Letter, 20 February 2025, page 11 paragraph 41

¹⁸¹ Parties' response to the Issues Letter, 20 February 2025, page 11 paragraph 41

¹⁸² Response to the CMA's questionnaire from a third party, January 2025, questions 14 and 15.

¹⁸³ Response to the CMA's questionnaire from a third party, January 2025, question 8.

136. The CMA also asked competitors to identify alternatives to the Parties' channel emulation products. The vast majority identified the Parties' solutions as alternatives to the other Party and generally described them as similar or comparable.¹⁸⁴

5.3.1.2.3 *Alternative competitive constraints*

5.3.1.2.3.1 *Kratos*

137. Kratos is the second largest player with a share of [10-20]% see Table 1 above. In one Keysight document, in the context of discussing NTN channel emulation requirements Keysight notes that competitors to Prosim, including Kratos, are everywhere in NTN although the CMA notes that this document is from April 2024, and is therefore from after the Merger was in contemplation.¹⁸⁵ The CMA did not find regular references to Kratos in either Party's internal documents. Further, Kratos [redacted]^{186, 187}
138. No customers identified Kratos as an alternative to the Parties. A few competitors identified Kratos as an alternative supplier to the Parties channel emulation solutions.¹⁸⁸ However, of these, one noted that Kratos was specific to defence applications,¹⁸⁹ while another described Kratos as weak.¹⁹⁰ One other competitor noted that it was a moderate to very weak alternative to the Parties.¹⁹¹

5.3.1.2.3.2 *dBm*

139. dBm is the fourth largest provider with a share of [5-10]% see Table 1 above.
140. The CMA did not find regular references to dBm in the Parties' internal documents in the context of channel emulation. While one Keysight document, in the context of discussing NTN channel emulation requirements, notes that competitors to Prosim, including dBm are everywhere in NTN, the CMA notes that this document is from April 2024, and is therefore after the Merger was in contemplation.¹⁹²
141. [redacted] dBm as an alternative to the Parties for channel emulation testing solutions.

¹⁸⁴ Response to the CMA's questionnaire from a third party, January 2025, questions 14 and 15.

¹⁸⁵ Keysight internal document, KEYS-CMA-00019789, '[redacted]', 19 April 2024, page 16

¹⁸⁶ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

¹⁸⁷ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

¹⁸⁸ Response to the CMA's questionnaire from a third party, January 2025, question 7 and 8.

¹⁸⁹ Response to the CMA's questionnaire from a third party, January 2025, question 7 and 8

¹⁹⁰ Response to the CMA's questionnaire from a third party, January 2025, question 7

¹⁹¹ Response to the CMA's questionnaire from a third party, January 2025, question 7

¹⁹² Keysight internal document, KEYS-CMA-00019789, '[redacted]', 19 April 2024, page 16

142. In response to the CMA's merger investigation, around a third of competitors identified dBM as a 'strong' competitor to the Parties' channel emulation solutions.¹⁹³

5.3.1.2.3.3 R&S

143. R&S is the fifth largest provider with a share of [0-5]% see Table 1 above.

144. The Parties' internal documents make infrequent references to R&S in the context of channel emulation. While one Keysight internal document noted that Keysight expected increased competition from R&S [X],¹⁹⁴ other Keysight internal documents show that it tracks R&S less frequently than other competitors such as Spirent or KSW.¹⁹⁵

145. While R&S is the [X] most frequently identified competitor in Keysight's opportunities data it [X].¹⁹⁶ Specifically, R&S is identified in [10-20]% ([X]) of Keysight's opportunities where a competitor was identified, and this has increased to [X] in 2024 from [X] in each year from 2021 to 2023.¹⁹⁷

146. R&S was identified by less than a quarter of customers as an alternative to the Parties. One customer noted Keysight's Prosim is 'likely a little better of an overall solution, compared to that of Rohde & Schwarz'.¹⁹⁸ Another customer considered that R&S' product 'was a less effective solution' than Vertex. Only one customer told the CMA that R&S has similar solutions to Keysight and Spirent.¹⁹⁹

147. More than half of the competitors identified R&S as an alternative to the Parties. However, of these, a number of competitors described R&S' solution as weak,²⁰⁰ and another number described R&S' solution as moderate with one also noting that R&S only provides a product with an internal fading solution.²⁰¹ Only one competitor described it as very strong.²⁰²

5.3.1.2.3.4 KSW

148. KSW is the sixth largest player with an estimated share of between [0-5]% see Table 1 above.

¹⁹³ Responses to the CMA's questionnaire from a third party, January 2025, question 7 and 8.

¹⁹⁴ Keysight Internal Document, KEYS-CMA-00005580, June 2023, page 4

¹⁹⁵ See Keysight Internal Document, KEYS-CMA-00005924.pptx, March 2023, page 9 and Keysight Internal Document, KEYS-CMA-00014058.pdf, February 2024, page 34 and 35

¹⁹⁶ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

¹⁹⁷ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

¹⁹⁸ Responses to the CMA's questionnaire from a third party, January 2025, question 14.

¹⁹⁹ Note of a call with a third party, paragraph 12-13.

²⁰⁰ Responses to the CMA's questionnaire from a third party, January 2025, question 7 and 8.

²⁰¹ Responses to the CMA's questionnaire from a third party, January 2025, question 7 and 8.

²⁰² Response to the CMA's questionnaire from a third party, January 2025, question 7 and 8.

149. The Parties' internal documents show that they track KSW more frequently than they do R&S, however several documents indicate that KSW is only a competitive threat [REDACTED].²⁰³
150. KSW was the only competitor other than Keysight to be identified in Spirent's opportunities data, being identified in [REDACTED] [0-5]% of Spirent's opportunities where a competitor was identified.²⁰⁴ However, KSW [REDACTED].²⁰⁵
151. KSW was identified by only one customer as an alternative to the Parties. This customer noted that KSW only provided a constraint locally in China. This is consistent with the Parties' internal documents which consistently note that KSW only provides a constraint [REDACTED].
152. Only one competitor identified KSW as an alternative to the Parties, describing its solution as a very strong alternative.

5.3.1.2.3.5 Others

153. The Parties estimate that Anritsu, Viavi, IZT, SquarePeg make up the remainder of the channel emulation testing solution market each having a share of between [0-5]%.²⁰⁶
154. These competitors do not appear frequently in internal documents:
 - (a) In relation to Anritsu, Viavi and IZT, the CMA did not find regular references to any of these third parties in the Parties' internal documents in the context of channel emulation.
 - (b) While one Keysight document, in the context of discussing NTN channel emulation requirements, notes that competitors to Prosim, including SquarePeg and Kratos are everywhere in NTN, the CMA notes that this document is from April 2024, and is therefore after the Merger was in contemplation.²⁰⁷
 - (c) In another Keysight document, Keysight includes Anritsu in [REDACTED].²⁰⁸ In a Spirent internal document Spirent also included Anritsu in [REDACTED] channel emulation.²⁰⁹

²⁰³ Spirent Internal Document, SPRNT_CMA-00094651, '[REDACTED]', 14 September 2024, page 7; Spirent Internal Document, SPRNT_CMA-00057873, '[REDACTED]', 15 April 2024, page 21; Keysight internal document, KEYS-CMA-00013679, '[REDACTED]', 28 June 2023, page 30; Keysight internal document, KEYS-CMA-00002601.pptx, '[REDACTED]', 17 January 2024, page 6

²⁰⁴ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

²⁰⁵ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²⁰⁶ Keysight internal document, KEYS-CMA-00019789, '[REDACTED]', 19 April 2024, page 16

²⁰⁷ Keysight internal document, KEYS-CMA-00005580, page 24

²⁰⁸ Spirent Internal Document, Annex 010. [REDACTED], June 2023, page 19

155. In relation to the opportunities data described at paragraph 130:
- (a) Anritsu was identified as a competitor in [5-10]% ([X]) of Keysight's opportunities where a competitor was identified²⁰⁹ [X].²¹⁰
 - (b) Viavi [X] appeared [X] as a competitor in Keysight's opportunities where a competitor was identified – it was identified in [5-10]% ([X]) opportunities.²¹¹ [X].²¹²
 - (c) National Instruments was identified as a competitor in [X] of Keysight's opportunities where a competitor was identified²¹³ and was [X].²¹⁴
 - (d) The other competitors, IZT, SquarePeg [X].
156. Very few customers identified Anritsu as an alternative to the Parties, however its solution was described as 'not at all effective'.²¹⁵ No customers identified any of Viavi, IZT or SquarePeg as an alternative to the Parties for channel emulation testing solutions.
157. In response to the CMA's merger investigation, around a third of competitors identified dBM, Anritsu and IZT as alternatives to the Parties' channel emulation solutions. Only one competitor identified Viavi as an alternative to the Parties' channel emulation solutions. SquarePeg and Maury Microwave Corporation were identified once by competitors as an alternative to the Parties for channel emulation testing solutions.
158. Additionally, several competitors identified that it would be difficult for a supplier of another TME solution to enter and expand in the supply of channel emulation testing solutions with a standalone channel emulation product.²¹⁶ For example, one competitor said the costs and resources required to enter are 'difficult to justify' and that there is a 'significant barrier' to customers adopting a new solution.²¹⁷ More generally, as in other areas, the supply of channel emulation testing solutions is characterised by continuous product development and

²⁰⁹ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²¹⁰ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

²¹¹ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²¹² Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

²¹³ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²¹⁴ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Channel Emulation (2024-12-12).xlsx'.

²¹⁵ Response to the CMA's questionnaire from a third party, January 2025, question 17.

²¹⁶ Response to the CMA questionnaire from third parties, January 2025, question 12.

²¹⁷ Response to the CMA questionnaire from a third party, January 2025, question 12. Another competitor said it would take 'considerable effort' to convince customers who are already using equipment from established suppliers to switch as they prefer solutions that are 'tried and tested' over those from new entrants. Response to the CMA questionnaire from a third party, January 2025, question 12. A further competitor said that the R&D investment would be over \$20 million and it would be two to three years of development. Response to the CMA questionnaire from a third party, January 2025, question 12.

innovation, see paragraphs 53 to 62 above, which present a barrier to entry and expansion.

5.3.1.3 Conclusion

159. The CMA considers that the Parties are close competitors in the supply of channel emulation testing solutions.
160. The Parties' internal documents show that Spirent and Keysight considered their respective solutions, Vertex and Propsim, to closely compete. In particular, while Spirent observed that its Vertex solution needed to be updated [X], the competitor that it intended to win market share from following the relevant updates was [X]. In addition, internal documents show that Spirent made plans to update its Vertex solution by making a [X] investment [X] that it hoped would enable Vertex to address [X], among other upgrades in functionality. Spirent's internal documents also show that it planned to release a [X] channel emulator product that would address advanced technologies such as [X].
161. The Parties' opportunities data shows that the Parties compete against one another to a much greater extent than compared to other competitors.
162. Evidence from third parties also shows that the Parties compete closely for channel emulation testing solutions. Almost half of customers indicated that the Parties were alternatives to one another with very few other alternatives identified. Competitors also consistently described Propsim and Vertex as offering very similar functionality.
163. Accordingly, the CMA considers that there is a realistic prospect that the Merger gives rise to an SLC as a result of horizontal unilateral effects in the supply of channel emulation testing solutions on a global basis.

5.3.2 Theory of Harm 2: Horizontal unilateral effects in mobile core testing solutions

164. To assess whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in the supply of mobile core testing solutions on a global basis, the CMA has adopted the framework set out in paragraphs 95 to 101 above.

5.3.2.1 Parties' submissions

165. The Parties submitted that they are not sufficiently close competitors in mobile core to raise competition concerns for the following reasons:

- (a) The Parties submitted that their current products – Spirent’s Landslide and Keysight’s LoadCore – do not compete closely, if at all. They are fundamentally different in design, targeted at different applications. Keysight’s LoadCore is optimised for (and overwhelmingly sold for) use in a wider O-RAN solution, while Landslide is used mainly for standalone mobile core testing and offers a wider set of functionalities. The products are also sold at [redacted] different price points.²¹⁸ The Parties’ product subsequently face different competitors.²¹⁹
- (b) The Parties further submitted that where Keysight’s LoadCore does serve certain mobile core testing functions, this is high-performance testing that is complementary to, not competitive with, Spirent’s Landslide.²²⁰ Product roadmaps show that the Parties will continue to serve divergent applications going forward.²²¹
- (c) The Parties submitted that, insofar as some market participants might perceive that Keysight and Spirent compete closely in mobile core testing, the Parties submitted that this perception is ‘probably’ based on past competition between Keysight’s outdated IxLoad product for 4G mobile core testing and Spirent’s Landslide.²²²
- (d) Keysight’s IxLoad is a legacy product which provides only 4G mobile core test capability and [redacted].^{223, 224} IxLoad cannot be a meaningful competitor for mobile core testing because there are no material upcoming deployments of 4G mobile infrastructure, much less developments of new 4G mobile core components for which lab testing equipment would be required.²²⁵
- (e) The Parties submitted that they face strong competition from other core test solutions, including Viavi, Mobileum and NEMs’ in-house supply.²²⁶ The Parties further submitted that Mobileum’s recent emergence from bankruptcy is likely to make it a stronger competitor going forward.²²⁷

166. The CMA has considered each of these points in the assessment below.

²¹⁸ See paragraph 176.

²¹⁹ FMN, paragraphs 649, 652, 654.

²²⁰ Parties’ response to the Issues Letter, 20 February 2025, paragraph 80. The Parties further submitted [redacted]. The CMA considers that reduced weight should be placed on this evidence as the analysis only covers 2023-24 and is not consistent with results over a longer period. CMA analysis shows that, when extending the analysis to the period 2021-24 (ie after the introduction of LoadCore), [redacted]. The CMA was also unable to validate the cross-party matching process as it was not submitted as part of this analysis. Parties’ response to the Issues Letter, 20 February 2025, paragraph 100; CMA analysis of the Parties’ response to the CMA’s follow-up questions dated 24 February 2025, question 2.

²²¹ Parties’ response to the Issues Letter, 20 February 2025, paragraph 81.

²²² Parties’ response to the Issues Letter, 20 February 2025, paragraph 69.

²²³ FMN, paragraph 22.

²²⁴ FMN, paragraph 626.

²²⁵ Parties’ response to the Issues Letter, 20 February 2025, paragraph 71.

²²⁶ Parties’ response to the Issues Letter, 20 February 2025, paragraphs 83-97.

²²⁷ Parties’ response to the Issues Letter, 20 February 2025, paragraph 93.

5.3.2.2 CMA assessment

5.3.2.2.1 Shares of supply

167. As noted above at paragraphs 106 and 107, while shares of supply can be a useful starting point for the analysis, the CMA considers it appropriate to assess evidence on shares of supply alongside other evidence, including product development plans. In addition, the CMA has concerns about the reliability of the estimates provided by the Parties (see paragraph 108) such that has placed more weight on its own market reconstruction than the Parties' estimates.
168. The Parties estimated a combined share of supply of [X] with an increment of [X] as a result of the Merger. The CMA's market testing, set out below, suggests that the Parties' combined share of supply is higher, at [50-60]% with an increment of [5-10]%. The Parties' internal documents also suggest higher shares of supply, with one document estimating a combined share of over [X].²²⁸ The CMA notes that on any version of market shares, Spirent is currently the largest supplier with a significantly larger share than the second largest supplier.
169. The Parties' estimates only include Keysight's revenues from sales of standalone mobile core testing solutions and do not include revenues for mobile core testing products sold as part of a wider O-RAN solution.²²⁹ The CMA considers that the Parties' submitted market shares set out above may therefore understate Keysight's position in the wider market for mobile core testing products.²³⁰
170. The Parties also submitted that NEMs' built-in testing capabilities (ie self-supply) make up around 10-18% of the market.²³¹ The CMA does not consider it appropriate to consider self-supply within its share of supply calculations, but has considered the extent of constraint from such solutions in its assessment of the competitive constraints arising from alternatives to the Parties in paragraphs 211 to 216 below.

²²⁸ See for example Keysight Internal Document, KEYS-CMA-00005580, 'KEYS-CMA-00005580', 5 July 2023, page 28. This document estimates that Keysight is the second biggest supplier of 5G mobile core testing products. See also Spirent Internal Document, SPRINT_CMA-00055848, '[X]', April 2023, page 14, which estimates a combined share of 82%.

²²⁹ FMN, paragraph 425(d), FN 145.

²³⁰ For example, one customer submitted that it uses LoadCore for both standalone mobile core testing and O-RAN use cases. If this purchase was made through Keysight's O-RAN solution, these LoadCore revenues would be excluded from the market share calculation. Response to the CMA questionnaire from a third party, January 2025, question 19. The Parties submitted that including LoadCore O-RAN sales overstates LoadCore's competitive significance as customers buying a mobile core testing solution as part of an O-RAN solution have very different requirements to customers that are seeking a standalone mobile core test solution. Parties' response to the Issues Letter, 20 February 2025, paragraph 99. The CMA considers that O-RAN customers have a choice of which mobile core testing solution to use alongside their O-RAN testing system, and these customers can and do use third-party mobile core testing solutions. As such, there is competition here between mobile core testing solutions which should be taken into account. See paragraph 177.

²³¹ FMN, paragraph 617.

171. The CMA's share of supply estimates for mobile core testing solutions in 2024 are set out in Table 2 below.

Table 2: Global shares of supply in mobile core testing solutions (2024)

Supplier	Share (%)
Keysight	[5-10]%
Spirent	[40-50]%
Combined	[50-60]%
Viavi	[10-20]%
Mobileum	[5-10]%
Others ²³²	[15-20]%

Source: CMA estimates using Parties' and third parties' data.

Note: Where third-party revenue data for specific competitors was unavailable, the CMA has relied on the midpoints of the Parties' estimates of competitor revenues in 2023. The Parties' 'Others' category has not been included as the evidence available to the CMA does not show that there are other suppliers who exert a competitive constraint on the Parties.

172. Table 2 shows that Spirent is by far the largest supplier, holding just under half of the market ([40-50]%). Spirent is significantly larger than the next largest competitor, Viavi ([10-20]%). Keysight is the third largest player in the market, holding a [5-10]% share. The Parties' combined share of [50-60]% is more than three times larger than that of the next largest supplier, Viavi.
173. Overall, these shares of supply show that Spirent holds a strong position in a concentrated market. Just three other suppliers appear to have a share of supply of over [5-10]% – Keysight, Viavi and Mobileum.²³³

5.3.2.2.2 Closeness of competition

5.3.2.2.2.1 Discontinuation of IxLoad

174. The Parties submitted that Keysight stopped selling most IxLoad components in 2022/23 and plans to stop selling the rest by [X] 2025.²³⁴
175. The CMA has not seen evidence of this discontinuation in Keysight's internal documents and has therefore considered competition between Keysight's IxLoad and Spirent's Landslide in its assessment. Regardless, based on the evidence set out below, the CMA considers that excluding IxLoad does not materially alter its assessment

²³² 'Others' is made up of Polaris, Valid8, Exfo, DoTouch, Emblasoft, GL Communications, Tetcos, Simnovus and Teradyne.

²³³ The Parties submitted that including LoadCore O-RAN sales overstates mobile core revenues due to double-counting of revenues (Parties' response to the Issues Letter, 20 February 2025, paragraph 212). The CMA acknowledges that there is a risk of this occurring on a small scale and notes that shares of supply are a starting point and are considered alongside other evidence set out below. The CMA therefore does not consider that accounting for this in the share of supply figures would affect its competitive assessment.

²³⁴ FMN, paragraph 626.

5.3.2.2.2.2 *Product differentiation*

176. The CMA considers that, as regards the Parties' arguments on differentiation outlined in paragraph 165, there is some supporting evidence. In particular, the CMA notes that there is a [X] price difference between the Parties' mobile core testing solutions.²³⁵ In addition, some Keysight internal documents that discuss competition with Spirent also seem to refer to O-RAN or higher performance testing.²³⁶
177. However, the CMA notes that LoadCore generally being sold alongside Keysight's O-RAN solution does not necessarily mean that the Parties' mobile core products are not competing. O-RAN customers have a choice of which mobile core testing solution to use alongside their O-RAN testing system, and these customers can and do use third-party mobile core testing solutions.²³⁷ Additionally, Spirent's Landslide can be used (and is used) for those same O-RAN applications.²³⁸ LoadCore can also be used for, and competes for, some non-O-RAN (ie standalone) applications.²³⁹

5.3.2.2.2.3 *Internal documents*

178. Contrary to the Parties' submissions, the Parties' internal documents show clear tracking of one another in mobile core testing solutions, alongside limited other competitors in this space. Both Parties acknowledge one another as significant competitors in mobile core testing solutions in their internal documents with LoadCore²⁴⁰ and Landslide.²⁴¹ One Spirent document indicates its desire to '[X] [...] and take [X] market share!' with [X] in the 5G mobile core testing space.²⁴²

²³⁵ Parties' response to the Issues Letter, 20 February 2025, paragraph 77. The CMA notes that, while Landslide's mean selling price in 2023/24 in the US was [X] and LoadCore's was [X], Landslide's [X], a price at which the CMA would expect it to be competing with LoadCore. Annex 129 FMN.

²³⁶ For example, a Keysight document notes that [X]. Keysight Internal Document, KEYS-CMA-00019086, '[X]', 3 April 2023, page 10.

²³⁷ For example, one provider of both O-RAN and mobile core testing products told the CMA that most of its customers used either Spirent's Landslide or Keysight's LoadCore alongside its wider O-RAN testing solution, with only a small minority using its own mobile core product. Third party response to the CMA's follow-up questions dated 18 December 2024, question 3.

²³⁸ In addition to the provider's submission cited above, one customer submitted that it uses Spirent's Landslide for O-RAN applications. Response to the CMA's questionnaire from a third party, January 2025, question 19. [X] Keysight Internal Document, KEYS-CMA-00017849, '[X]', 20 July 2023, page 11.

²³⁹ [X] Keysight Internal Document, KEYS-CMA-00020229, '[X]', 3 March 2024, page 2. Additionally, almost all LoadCore customers submitted that they used their respective products for standalone mobile core testing. Response to the CMA's questionnaire from third parties, January 2025, question 19.

²⁴⁰ [X]. The CMA considers that lXLoad is therefore unlikely to have materially influenced the production of these documents.

²⁴¹ [X]. No other competitors are identified (Spirent Internal Document, SPRNT_CMA-00055848, '[X]', 1 August 2023, page 14). (Keysight Internal Document, KEYS-CMA-00015201, '[X]', 14 April 2022, page 32). See also: Keysight Internal Document, KEYS-CMA-00005580, 5 July 2023, page 28; Keysight Internal Document, KEYS-CMA-00020427, '[X]', 5 June 2023, page 11; Spirent Internal Document, '[X]', May 2022, pages 9, 10; Spirent Internal Document, SPRNT-005688133, 20 January 2023, page 1; Keysight Internal Document, KEYS-CMA-00020229, '[X]', 3 March 2024, page 2.

²⁴² Spirent Internal Document, '[X]', June 2022, page 9. The Parties submitted that this document should be understood in the context of [X] (Parties' response to the Issues Letter, 20 February 2025, paragraph 80) but the CMA has not seen any evidence of this being the case.

179. Both Parties' internal documents contain examples of competition between them for specific opportunities in mobile core. For example, one Keysight internal document describes Keysight's LoadCore as 'heavily competing with Spirent [redacted]'.²⁴³ An October 2022 Spirent internal document describes Keysight as Spirent's primary competitor for [redacted] mobile core testing requirements.²⁴⁴
180. Some of the Parties' internal documents also suggest they are both continuing to develop their mobile core testing products²⁴⁵ and, prior to the announcement of the Merger, that the Parties would compete with one another in this space in the future, with Keysight expressing a desire to [redacted],²⁴⁶ identifying Spirent as a [redacted] competitor.²⁴⁷
181. The CMA notes that the Parties submitted that mobile core testing solutions will have to be updated for the 6G era, and that their products could likely be adapted to work with the 6G standard.²⁴⁸ To the extent that the Parties are currently competing in mobile core, the CMA anticipates that the Parties will continue to compete for the foreseeable future. This intention to continue to compete in mobile core testing is also reflected in the Parties' spending on R&D in relation to mobile core²⁴⁹ and both Parties regularly sharing mobile core testing roadmaps with their customers.²⁵⁰
182. The Parties submitted that the documents cited above show LoadCore offering high-performance testing capabilities that are complementary to, not competitive with, Landslide.²⁵¹ The CMA notes that some of these documents show examples of customers' testing requirements that were previously '100% Landslide' but now

²⁴³ Keysight Internal Document, KEYS-CMA-00014188, '[redacted]', 19 November 2020, page 9. The CMA notes that the document is likely from H2 2022, and cannot be from 2020, as it refers to 'Status: Started {Sept 2022-Nov 2022}' on page 4. [redacted]: Keysight Internal Document, KEYS-DOJ-02264134, 16 June 2023, page 1; Keysight Internal Document, KEYS-CMA-00013655, '[redacted]', 6 August 2023, tab 'Top 20 Accounts', cell AS81; Keysight Internal Document, KEYS-CMA-00020308, '[redacted]', 14 August 2023, page 1; Keysight Internal Document, KEYS-CMA-00023776, '[redacted]', 30 November 2022, sheet '[redacted]', cell T11; KEYS-CMA-00018643, '[redacted]', 2 May 2023, page 3; Keysight Internal Document, KEYS-DOJ-02180898, 15 February 2024, pages 1,4; Keysight Internal Document, KEYS-CMA-00016471, '[redacted]', 12 October 2019, pages 15-17; Keysight Internal Document, KEYS-CMA-00019086, '[redacted]', 3 April 2023, page 10.

²⁴⁴ [redacted]. Spirent Internal Document, [redacted]', 9 December 2022, page 5.

²⁴⁵ Spirent Internal Document, 'Annex 119. [redacted]', 12 November 2024, page 5; Keysight Internal Document, 'Annex 007. [redacted]', pages 9, 10; Keysight Internal Document, KEYS-CMA-00019707, '[redacted]', 14 September 2022, pages 46-47; Keysight Internal Document, KEYS-CMA-00011320, '[redacted]', October 2024, pages 4-5.

²⁴⁶ Keysight Internal Document, KEYS-CMA-00013071, '[redacted]', 13 June 2024, page 4.

²⁴⁷ Keysight Internal Document, KEYS-CMA-00019707, '[redacted]', 14 September 2022, page 47.

²⁴⁸ FMN, paragraphs 774-776.

²⁴⁹ Spirent spent [redacted] on R&D in 2023 ([redacted] of its mobile core revenues that year) and Keysight spent [redacted] ([redacted] of its mobile core revenues that year). CMA analysis of Annex I - Question 2 of s109 Notice_1 November 2024.xlsx and Spirent's response to the CMA's RF16 dated 21 January 2025, question 6; CMA analysis of Annex 1 Response to Section 109 Notice_Keysight_12 November 2024.xlsx and Keysight's response to the CMA's RF16 dated 21 January 2025, question 5, Annex 'RFI 6 Annex 12_Q5 - Keysight ORAN and Mobile Core revenues v2', sheet 'Q5 - Mobile Core'.

²⁵⁰ FMN, paragraphs 496, 503.

²⁵¹ Parties' response to the Issues Letter, 20 February 2025, paragraph 80. The CMA notes that some documents that the Parties submitted show complementary functions appear to show only that LoadCore can scale better than Landslide. For example, one Keysight internal document notes that LoadCore '[redacted]'. Keysight Internal Document, KEYS-CMA-00016471, '[redacted]', 12 October 2019, page 17.

are a mix of LoadCore and Landslide.²⁵² The CMA considers this an example of competition between the Parties for at least some workloads, wherein LoadCore has taken some testing requirements away from Landslide.

183. Therefore, while in some of these documents the Parties acknowledge the relative strengths/weaknesses of their product relative to alternatives, the CMA does not consider this indicates they are differentiated to the extent that they do not compete. In many markets, alternative suppliers will compete despite having different strengths and weaknesses.

5.3.2.2.4 *Third-party evidence*

184. The CMA asked customers whether they used their mobile core solutions as standalone mobile core testing units, as part of a wider O-RAN solution, or both.²⁵³ The vast majority of customers across all of the Parties' mobile core products submitted that they use these products (both Landslide and LoadCore) for standalone mobile core testing use cases only (ie not as part of an O-RAN solution).²⁵⁴ Customers told us that they use Keysight's LoadCore and Spirent's Landslide for similar use cases, suggesting overlap in functionality.²⁵⁵
185. However, almost all customers who provided a view also indicated that having mobile core testing capabilities provides a competitive advantage in supplying O-RAN testing solutions.²⁵⁶ Similarly, two thirds of customers who provided a view said that mobile core testing capabilities are 'important' or 'very important factors in the choice of O-RAN testing supplier.'²⁵⁷ Therefore, while not all mobile core customers use the same product for standalone mobile core testing and their O-RAN use cases, customers recognise that there are linkages between the two.
186. Responses to the customer questionnaire indicate that Keysight and Spirent compete closely in the supply of mobile core testing solutions.²⁵⁸ Nearly half of customers that responded to the CMA's questionnaire identified Keysight's

²⁵² [§<]. Keysight Internal Document, KEYS-DOJ-02264134, 16 June 2023, page 2. [§<]. Keysight Internal Document, KEYS-DOJ-02180898, 15 February 2024, page 4.

²⁵³ While the Parties submitted that market participants' perceptions are 'probably based on past competition between Keysight's outdated IxLoad product for 4G mobile core testing and Spirent's Landslide' (see paragraph 165(c)), the CMA asked about LoadCore and IxLoad individually and therefore considers this unlikely.

²⁵⁴ All IxLoad customers, almost all LoadCore customers and almost all Landslide customers submitted that they used their respective products for standalone mobile core testing only. One LoadCore customer submitted it used LoadCore for an O-RAN use case only. One Landslide customer submitted it used Landslide for both standalone core testing and as part of O-RAN. Response to the CMA questionnaire from third parties, January 2025, question 19.

²⁵⁵ Response to the CMA's questionnaire from a number of third parties, January 2025, question 24.

²⁵⁶ Response to the CMA's questionnaire from a number of third parties, January 2025, question 34 and 35.

²⁵⁷ Most respondents identified Keysight's IxLoad as a 'very effective' or 'fully effective' alternative to Spirent's Landslide. Response to the CMA's questionnaire from a number of third parties, January 2025, question 33.

²⁵⁸ Customers occasionally identified Keysight's CloudStorm and Spirent's TestCenter as alternatives to LoadCore, IxLoad and/or Landslide. The Parties have not suggested these products are relevant to mobile core testing, so the CMA does not consider these responses further. Response to the CMA questionnaire from third parties, January 2025, question 24-25.

LoadCore as an effective alternative to Spirent's Landslide.²⁵⁹ Spirent's Landslide was identified as a 'very effective' or 'fully effective' alternative to Keysight's LoadCore by most customers.²⁶⁰

187. The CMA also asked competitors to identify the main competitors to each of the Parties' respective mobile core testing solutions and rank them in terms of their competitive strength. LoadCore was identified as an alternative to Spirent's Landslide.²⁶¹ Spirent's Landslide was identified as a 'strong' or 'very strong' alternative to Keysight's LoadCore by most competitors.²⁶²

5.3.2.2.2.5 Opportunities data

188. The Parties submitted opportunities data for mobile core, for the period November 2020 (January 2021 for Spirent) to November 2024, in which they record sales opportunities and identify competitors. This data and its potential limitations are discussed in paragraphs 124 to 129.
189. Spirent was identified in [in a large majority] of Keysight's mobile core opportunities where a competitor was identified, more often than any other competitor.²⁶³ Spirent was identified in [in a large majority] of LoadCore-specific opportunities over this period.²⁶⁴ Keysight was identified in [in the vast majority] of Spirent's mobile core opportunities²⁶⁵ where a competitor was identified, more often than any other competitor.²⁶⁶
190. While Spirent's opportunities identifying Keysight do not distinguish between IxLoad and LoadCore, and it is therefore unclear whether this trend is driven by IxLoad opportunities or by LoadCore opportunities, the CMA considers it likely that a significant proportion of these opportunities relate to LoadCore given the frequency with which LoadCore opportunities identify Spirent. Nevertheless, the

²⁵⁹ Two customers submitted that both LoadCore and IxLoad are 'very effective' alternatives to Spirent's Landslide. Response to the CMA questionnaire from third parties, January 2025, question 25.

²⁶⁰ Spirent's Landslide was identified as a 'very effective' or 'fully effective' alternative to IxLoad by most customers. Response to the CMA questionnaire from third parties, January 2025, question 24.

²⁶¹ IxLoad was also identified as a 'very strong' alternative to Landslide. Response to the CMA questionnaire from a third party, January 2025, question 17.

²⁶² Landslide was also identified as a 'strong' alternative to IxLoad. Response to the CMA questionnaire from third parties, January 2025, question 16.

²⁶³ Keysight's opportunities data included [redacted] opportunities ([5-10]% of all opportunities recorded) between 2020 and 2024 where competitors were identified. In this data, Spirent was identified [redacted] times and Viavi [redacted] times. It was not possible to identify if some opportunities involved more than one alternative competitor. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²⁶⁴ Keysight's LoadCore opportunities data included [redacted] mentions of competitors between 2020 and 2024. In this data, Spirent was identified [redacted] times. Viavi, [redacted], was identified [redacted] times. CMA analysis of Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²⁶⁵ For mobile core, the CMA consider it appropriate to place more weight on Keysight's opportunities data as the number of opportunities for which competitors are identified is low in relation to Spirent's opportunities data.

²⁶⁶ Spirent's opportunities data included [redacted] opportunities ([0-5% of all opportunities recorded) between 2021 and 2024 where competitors were identified, in this data Keysight was identified [redacted] times and Mobileum [redacted]. It was not possible to identify if some opportunities involved more than one alternative competitor. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Mobile Core (2024-12-12)'.

CMA recognises the potential limitations of this data and has considered this evidence alongside evidence in the round.

5.3.2.2.3 *Alternative competitive constraints*

5.3.2.2.3.1 *Viavi*

191. Viavi is active in the mobile core testing market through its TeraVM product. As shown in Table 2, Viavi is the second-largest competitor by share of supply in mobile core testing solutions after Spirent.
192. Both Parties' internal documents monitor Viavi and identify it as a competitor in the mobile core testing space.²⁶⁷ Spirent monitors Viavi more closely than Keysight does, although internal documents indicate it perceives Viavi as a weaker competitor.²⁶⁸ The Parties' internal documents generally identify Viavi as the third largest competitor in the mobile core space,²⁶⁹ with some documents identifying Viavi as the only other competitor in mobile core.²⁷⁰ Internal documents also carry examples of competition for a specific customer between Spirent and Viavi, leading to discounts on Landslide.²⁷¹
193. Viavi is the [REDACTED]-most frequently identified competitor in Keysight's opportunities data, appearing in [REDACTED]% of Keysight's opportunities in mobile core.²⁷² It is [REDACTED] in this space, although Spirent's opportunities data in mobile core is limited to a small number of opportunities.²⁷³
194. Third party evidence indicates that the Parties may also face some degree of competition from Viavi. Several customers that responded to our questionnaire identified Viavi as offering at least a 'moderately effective' alternative to either of the Parties' mobile core testing solutions.²⁷⁴

²⁶⁷ Keysight Internal Document, KEYS-CMA-00015201, '[REDACTED]', 14 April 2022, page 32; Keysight Internal Document, KEYS-CMA-00019286, '[REDACTED]', 1 May 2024, sheet '[REDACTED]'; Keysight Internal Document, KEYS-CMA-00015758, '[REDACTED]', 22 July 2022, page 16; Spirent Internal Document, '[REDACTED]', 'Annex 001. [REDACTED]', May 2022, pages 9, 10, 15; Spirent Internal Document, '[REDACTED]', '9 December 2022, pages 5 and 8; Spirent Internal Document, SPRNT_CMA-00000126, '[REDACTED]', 30 March 2023, page 1; Spirent Internal Document, SPRNT_CMA-00055848, '[REDACTED]', April 2023, page 14.

²⁶⁸ [REDACTED]. Spirent Internal Document, SPRNT_CMA-00051326, '[REDACTED]', 31 August 2022, page 3. See also: Spirent Internal Document, 'Annex 001. [REDACTED]', May 2022, page 10; Spirent Internal Document, '[REDACTED]', June 2023, page 29.

²⁶⁹ For example, see Spirent Internal Document, SPRNT_CMA-00055848, '[REDACTED]', 1 August 2023, page 14.

²⁷⁰ For example, see Keysight Internal Document, KEYS-CMA-00019286, '[REDACTED]', 1 May 2024, sheet 'SPR Market Share'.

²⁷¹ Parties' response to the Issues Letter, 20 February 2025, paragraph 86; Spirent Internal Document, SPRNT-000038141, January 2023; Spirent Internal Document, SPRNT-000038158, undated.

²⁷² Keysight's opportunities data included [REDACTED] opportunities between 2020 and 2024 where competitors were identified. In this data Viavi was identified [REDACTED] times. It was not possible to identify if some opportunities involved more than one alternative competitor. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

²⁷³ [REDACTED]. CMA analysis of Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4 and Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Mobile Core (2024-12-12)'.

²⁷⁴ No competitor identified TeraVM as an effective alternative to the Parties' products. However, competitor responses to this question were generally limited. Response to the CMA questionnaire from third parties, January 2025, questions 24-25.

195. A few of the internal documents discuss a [REDACTED].²⁷⁵ The Merged Entity will combine Spirent's leading market position in mobile core testing solutions, with Keysight's large position in O-RAN (see the CMA's assessment of Theory of harm 3). The CMA has therefore considered whether, post-Merger, alternative suppliers active in mobile core testing solutions will be able to compete effectively with the Merged Entity.²⁷⁶
196. As shown above in Table 2, Viavi is the second-largest competitor by share of supply in mobile core testing solutions. Viavi is also active in O-RAN testing solutions, holding the largest share of supply (see Table 3 below). The CMA does not therefore consider that Viavi would be a weaker competitor to the Merged Entity in Mobile Core testing solutions going forward as a result of any potential convergence between Mobile Core and O-RAN testing solutions.

5.3.2.2.3.2 *Mobileum*

197. Mobileum is active in the mobile core testing market through its DStest and SITE products. As shown in Table 2, Mobileum is the fourth-largest competitor by market share in mobile core testing after Spirent, Viavi and Keysight.
198. Both Parties' internal documents occasionally identify Mobileum as a competitor.²⁷⁷ Spirent internal documents in particular identify Mobileum as a [REDACTED] competitor in mobile core, [REDACTED].²⁷⁸
199. However, the Parties' internal documents also indicate that Mobileum's offering is seen as weak by customers. A February 2023 Spirent internal document cites an external market report that notes that Mobileum [REDACTED].²⁷⁹
200. Mobileum is identified in [REDACTED] in mobile core. It is the [REDACTED] identified competitor in Spirent's opportunities data, appearing in [REDACTED] of Spirent's mobile core opportunities.²⁸⁰

²⁷⁵ Spirent Internal Document, '[REDACTED]', June 2022, page 20.

²⁷⁶ As noted further below, there are interdependencies with Channel Emulation testing solutions (as well as Mobile Core testing solutions) in relation to O-RAN testing. These are discussed in the CMA's assessment of Theory of harm 3.

²⁷⁷ Mobileum is occasionally referred to as 'DevSol' [REDACTED]. Keysight Internal Document, KEYS-CMA-00015201, '[REDACTED]', 14 April 2022, page 32; Keysight Internal Document, KEYS-CMA-00015758, '[REDACTED]', 22 July 2022, page 16; 'Annex 001. [REDACTED]', May 2022, pages 9, 10, 15; Spirent Internal Document, SPRNT_CMA-00000126, '[REDACTED]', 30 March 2023, page 1; Spirent Internal Document, SPRNT_CMA-00055848, '[REDACTED]', April 2023, page 14; Spirent Internal Document, SPRNT_CMA-00096043, '[REDACTED]', 28 April 2022, page 15.

²⁷⁸ For example, a Spirent internal document dated August 2022 classified the competitive threat [REDACTED]. Spirent Internal Document, SPRNT_CMA-00051316, '[REDACTED]', 31 August 2022, page 5. [REDACTED]: Spirent Internal Document, SPRNT-000535164, 5 December 2022, page 2; Spirent Internal Document, 'Annex 001. [REDACTED]', May 2022, pages 5, 9-10; Spirent Internal Document, SPRNT_CMA-00055848, '[REDACTED]', April 2023, page 14. The CMA notes it has not seen any specific examples of competition [REDACTED].

²⁷⁹ Spirent Internal Document, SPRNT_CMA-00000826, '[REDACTED]', 23 February 2023, page 12. [REDACTED]. Spirent Internal Document, SPRNT_CMA-00066358, '[REDACTED]'.
²⁸⁰ CMA analysis of Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4 and Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Mobile Core (2024-12-12)'.

201. Third party evidence on the strength of Mobileum in the market for mobile core indicates that customers and competitors do not see Mobileum as a strong or viable competitor in mobile core:
- (a) Just one customer that responded to the CMA questionnaire identified Mobileum's DStest as offering a 'slightly effective' alternative to the Parties' mobile core testing solutions. This customer noted that 'Mobileum is relatively small company with limited resources'.²⁸¹ Another customer submitted that its procurement staff have been disappointed with Mobileum's performance and that Mobileum has failed to deliver in some local markets.²⁸²
 - (b) Just one competitor identified Mobileum's DStest ('very strong') as an alternative to the Parties' mobile core products.²⁸³
 - (c) Mobileum's SITE was identified as a weak alternative to LoadCore, IxLoad and/or Landslide by over half of the customers.²⁸⁴ No customer identified it as an effective alternative to the Parties' products.
202. The CMA notes that Mobileum recently launched in O-RAN through a partnership with Artiza,²⁸⁵ but its strength remains unclear, making it uncertain whether this will enhance Mobileum's competitiveness in mobile core testing going forward.
203. The CMA also notes that Mobileum filed for Chapter 11 bankruptcy in July 2024 and emerged from this process in September 2024. As part of this process, Mobileum was able to eliminate \$530 million in debt, secure access to \$60 million in new financing, and received approval for an additional \$100 million in financing.²⁸⁶ As noted in paragraphs 180 to 181 above, mobile core testing is characterised by a high level of R&D. The Parties have submitted that, in light of this, Mobileum may be in a position to invest additional resources into R&D, such that it may be a stronger mobile core test competitor going forward.²⁸⁷ The CMA notes that, while this is possible, it has not seen evidence either way to suggest it is likely to become materially stronger or weaker.

²⁸¹ Response to the CMA questionnaire from a third party, January 2025, questions 24-25.

²⁸² Note of a call with a third party, paragraph 13.

²⁸³ Response to the CMA questionnaire from a third party, January 2025, question 17.

²⁸⁴ Response to the CMA questionnaire from third parties, January 2025, question 24-25.

²⁸⁵ Mobileum website, [Mobileum and Artiza Networks Partner to Offer a Complete Testing Solution to Support an OpenRAN Future | Mobileum](#), accessed 6 March 2025.

²⁸⁶ Mobileum website, [Mobileum Takes Strategic Actions to Strengthen Balance Sheet and Position Business for Sustainable Long-Term Growth | Mobileum](#), accessed 25 January 2025; Mobileum website, [Mobileum Announces Successful Emergence from Financial Restructuring Process Well-Positioned for Long-Term Growth and Industry Leadership | Mobileum](#), accessed 4 March 2025.

²⁸⁷ Parties' response to the Issues Letter, 20 February 2025, paragraph 93.

5.3.2.2.3.3 Other competitors

204. As shown in Table 2, shares of supply for other competitors are very low. The Parties submitted that Exfo, Polaris and Valid8 are competitors in mobile core testing solutions, and that their shares of supply each sit below 5%.²⁸⁸
205. Internal documents from both Parties show few competitors overall, with smaller competitors identified very rarely.²⁸⁹ For example, a Keysight internal document^[REDACTED] lists Viavi as the ^[REDACTED] other competitor.²⁹⁰ Where they are included, they are generally identified as ^[REDACTED] and/or ^[REDACTED] competitors.²⁹¹ For example, a Spirent internal email chain dated January 2023 notes that Keysight is one of Landslide's ^[REDACTED] competitors in core testing, alongside ^[REDACTED] and ^[REDACTED]. This document describes other competitors (eg ^[REDACTED]) as 'minor'.²⁹²
206. These competitors are also rarely identified in the Parties' opportunities data, generally appearing just once or twice in each relevant dataset (if at all), consistent with the evidence from the Parties' internal documents.²⁹³ A few other suppliers – Anritsu, Agilent, R&S, Cisco and Netscout – are also identified in the Parties' opportunities data, albeit very rarely.²⁹⁴
207. Most of these competitors were not identified as alternatives to the Parties' mobile core testing solutions by any of the customers that responded to the CMA questionnaire. One customer said that R&S offer a very effective but expensive alternative to Spirent's Landslide.²⁹⁵ In contrast, one customer submitted that there are no alternatives to either LoadCore or Landslide.²⁹⁶
208. In addition, a competitor identified R&S, Polaris, Simnovus and Amarisoft as alternatives to both Spirent's Landslide and Keysight's LoadCore but rated them all as 'weak' alternatives.²⁹⁷ Another competitor identified Emblasoft's Evolver as a 'moderate' competitor to LoadCore and IxLoad.²⁹⁸

²⁸⁸ FMN, paragraph 617.

²⁸⁹ In addition to the examples presented, see also Keysight Internal Document, KEYS-CMA-00015758, '[REDACTED]', 22 July 2022, page 16; Spirent Internal Document, SPRNT_CMA-00051321, '[REDACTED]', 19 April 2022, pages 2-4.

²⁹⁰ Keysight Internal Document, KEYS-CMA-00019286, '[REDACTED]', 1 May 2024, sheet '[REDACTED]'.

²⁹¹ See, for example, Keysight Internal Document, KEYS-CMA-00015201, '[REDACTED]', 14 April 2022, page 32.

²⁹² Spirent Internal Document, SPRNT-005688133, 20 January 2023, page 1. While the Parties have submitted that ^[REDACTED]. Submission to the CMA dated 28 January 2025, Submission on Mobile Core Testing, page 1.

²⁹³ CMA analysis of Annex I - Question 2 of s109 Notice_1 November 2024.xlsx and Spirent's response to the CMA's RFI6 dated 21 January 2025, question 6.

²⁹⁴ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4; Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - Mobile Core (2024-12-12)'.

²⁹⁵ Response to the CMA questionnaire from a third party, January 2025, question 25.

²⁹⁶ Response to the CMA questionnaire from a third party, January 2025, questions 24-25.

²⁹⁷ Response to the CMA questionnaire from a third party, January 2025, question 17.

²⁹⁸ Response to the CMA questionnaire from a third party, January 2025, question 16.

209. Several competitors also identified that it would be difficult for a supplier of another TME solution to enter and expand in mobile core testing solutions.²⁹⁹ More generally, as in other areas, mobile core is characterised by continuous product development and innovation, see paragraphs 53 to 62 above, which present a barrier to entry and expansion.
210. The CMA notes that several customers submitted that the introduction of cloud-based solutions could reduce barriers to switching by reducing new hardware costs, but the adoption of these technologies would depend heavily on several factors, such as the costs of cloud integration, the products on offer and how standardised the tests are.³⁰⁰ One noted that any switching would still require meaningful investments and therefore barriers to switching remain.³⁰¹ There is also limited evidence to suggest that cloud-based solutions are widespread at present.³⁰²

5.3.2.2.3.4 *Constraint from NEMs' in-house supply*

211. The Parties submitted that NEMs, who are customers of mobile core testing solutions, can and do develop and use their own testing solutions that other customers often use to meet core testing needs, rather than buy from a dedicated mobile core supplier. For example, one Spirent internal document states that [redacted].³⁰³
212. The Parties further submitted that NEMs are ideally suited to offer mobile core test solutions as they design and manufacture the mobile core equipment that is tested. Spirent considers that a significant proportion of network operators use test products that NEMs offer. Accordingly, they exert a competitive constraint on mobile core test suppliers.³⁰⁴
213. While the CMA has seen some brief mentions of NEMs' in-house supply in the Parties' internal documents,³⁰⁵ and one NEM told the CMA that it has internal test

²⁹⁹ Response to the CMA questionnaire from third parties, January 2025, question 20. One said that it is neither feasible nor attractive due to switching costs – see paragraph 62) and a lack of near-term market growth as 5G deployments slow down and 6G is still in the process of being specified. Another said that entering would be difficult since it is a 'niche use case with a few established and well-known players'.

³⁰⁰ Response to the CMA questionnaire from third parties, January 2025, question 23.

³⁰¹ Response to the CMA questionnaire from third parties, January 2025, question 23.

³⁰² The CMA has only seen evidence of two customers using cloud-based solutions in mobile core.

³⁰³ Parties' response to the Issues Letter, 20 February 2025, paragraph 96.

³⁰⁴ Parties' response to the Issues Letter, 20 February 2025, paragraph 97.

³⁰⁵ For example, [redacted]. Keysight Internal Document, KEYS-CMA-00015201, '[redacted]', 14 April 2022, page 32. [redacted]. Keysight Internal Document, KEYS-CMA-00014188, '[redacted]', 19 November 2020, pages 8, 9, 23. The CMA notes that the document is likely from H2 2022, and cannot be from 2020, as it refers to 'Status: Started {Sept 2022-Nov 2022}' on page 4. See also Keysight Internal Document, KEYS-CMA-00015758, '[redacted]', 22 July 2022, page 16

tools within mobile core that are ‘often prioritised’,³⁰⁶ the CMA has not seen evidence that the constraint from NEMs is substantial or widespread.³⁰⁷

214. Of the NEMs that responded to the CMA questionnaire, only one mentioned having any in-house tools, despite a number of them being specifically identified in the Parties’ internal documents.³⁰⁸ This NEM also identified itself as using mobile core testing solutions from Keysight, Spirent and Viavi, indicating that its in-house tool is not appropriate for at least some use cases.³⁰⁹
215. Further, no customer or competitor identified NEMs’ in-house tools as an alternative to any of the Parties’ products, nor did they identify such tools from NEMs when asked what solutions they use to meet their mobile core testing needs.
216. As such, the CMA does not consider that NEMs’ in-house tools exert a substantial or meaningful competitive constraint on the Parties in mobile core testing.

5.3.2.3 Conclusion

217. The CMA considers that Spirent is the clear market leader in mobile core testing, being much larger than the next biggest competitor (Viavi). The merged entity would have a large market share of [50-60%] (with a 5-10%] increment from the merger). On balance, while there is some evidence of differentiation in the Parties’ offerings, the available evidence indicates that Keysight and Spirent’s mobile core testing products overlap in functionality, have competed for some customers and are seen as alternatives to one another by third parties in a market where there are limited alternatives.
218. Constraints on the Merged Entity are limited to Viavi and Mobileum. Smaller competitors, including NEMs’ in-house mobile core testing products, do not appear to exert any meaningful competitive constraint on the Parties in this space. While there is mixed evidence on the strength of Mobileum as a competitor, the CMA notes that the lack of alternative constraints to the Merged Entity and the fact the Merger involves the market leader makes it more likely that the CMA will find an SLC.³¹⁰
219. For the reasons set out above, the CMA considers that the Merged Entity would face little competitive pressure in an already concentrated mobile core testing market. Accordingly, the CMA found that there is a realistic prospect that the

³⁰⁶ Response to the CMA questionnaire from a third party, January 2025, question 20.

³⁰⁷ The CMA notes that it has also not received evidence indicating that customers would switch to self-supply in response to a deterioration in the offering of external suppliers.

³⁰⁸ Response to the CMA questionnaire from third parties, January 2025, questions 19-25.

³⁰⁹ Response to the CMA questionnaire from a third party, January 2025, question 19.

³¹⁰ [Merger Assessment Guidelines \(CMA129\)](#), March 2021, paragraph 2.18(a).

Merger gives rise to an SLC as a result of horizontal unilateral effects in the supply of mobile core testing solutions.

5.3.3 Theory of Harm 3: Horizontal unilateral effects in the supply of O-RAN testing solutions

220. To assess whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in the supply of O-RAN testing solutions on a global basis, the CMA has adopted the framework set out in paragraphs 95 to 101 above.
221. In response to concerns raised by third parties, the CMA has also considered whether, as a result of the Merger, the Merged Entity could weaken the competitive pressure from rival O-RAN suppliers by leveraging its market position in mobile core and channel emulation testing solutions.

5.3.3.1 Parties' submissions

222. The Parties submitted that Keysight is a market leader in O-RAN testing through its KORA offering, which is a comprehensive solution for performance testing of 5G RAN and mobile core elements utilising O-RAN technology.³¹¹
223. The Parties submitted that Spirent is neither a significant competitor in O-RAN testing nor a close rival to Keysight and is unlikely to become a material competitor in the future.³¹² Specifically:
- (a) Spirent has a minimal presence in O-RAN testing, faced challenges gaining traction in O-RAN and lacks a comprehensive solution comparable to Keysight and others;
 - (b) Its offering is limited to software that enables its Landslide mobile core product for O-RAN, along with the resale of third-party RAN component testing products;
 - (c) [REDACTED].³¹³
224. The Parties submitted that Keysight faces strong competition for broad O-RAN testing solutions from multiple providers. In particular, the Parties submitted that Viavi offers a comparable solution, while R&S, Anritsu, and Arista Networks are significant competitors in O-RAN testing.³¹⁴

³¹¹ FMN, paragraph 707; Parties' response to the CMA's RFI 6, Annex 09, page 2.

³¹² Parties' response to the CMA's RFI 6, Annex 09; Parties' response to the Issues Letter, 20 February 2025, paragraph 107.

³¹³ FMN, paragraphs 748-750; Parties' response to the CMA's RFI 6, Annex 09; Parties' response to the Issues Letter, 20 February 2025, paragraphs 107 and 121-125.

³¹⁴ FMN, paragraph 704; Parties' response to the CMA's RFI 6, Annex 09, page 4.

5.3.3.2 CMA assessment

5.3.3.2.1 Shares of supply

225. As noted above at paragraphs 106 and 107, while shares of supply can be a useful starting point for the analysis, the CMA currently considers it appropriate to assess evidence on shares of supply alongside other evidence, including product development plans.
226. The Parties estimate that Keysight and Viavi are the largest suppliers of O-RAN testing solutions, holding a [30-40]% and [30-40]% share respectively, while Spirent is the eight-largest supplier with a share of only [0-5]%.³¹⁵
227. The CMA's share of supply estimates for O-RAN testing solutions in 2023 and 2024 are set out in Table 3.

Table 3: Global shares of supply in O-RAN testing solutions (2023 and 2024)

Supplier	Share (%)	
	2023	2024
Keysight	[30-40]	[30-40]
Spirent	[0-5]	[0-5]
Combined	[30-40]	[30-40]
Viavi	[50-60]	[40-50]
Calnex	[0-5]	[5-10]
Anritsu	[0-5]	[0-5]
R&S	[0-5]	[0-5]
Aritza	[0-5]	[0-5]
Teradyne	[0-5]	[0-5]
Simnovus	[0-5]	[0-5]
DoTouch	[0-5]	[0-5]
Others	[0-5]	[0-5]

Source: CMA estimates based on revenue data from the Parties and third parties.

Notes: Where third-party revenue data for specific competitors was unavailable, the CMA has relied on the midpoints of the Parties' estimates of their revenues in 2023.

228. Table 3 shows shares of supply that are consistent with the Parties' estimates. Keysight and Viavi are the leading suppliers, holding [30-40]% and [40-50]% of the market in 2024, respectively. In contrast, Spirent has a market share of less than [0-5]% in both 2023 and 2024. All remaining suppliers also have a very small share of supply.³¹⁶
229. Overall, the share estimates indicate that Keysight holds a strong position in a highly concentrated market.³¹⁷ By comparison, these show that Spirent has a small market position that has seen no growth over the past two years.

³¹⁵ FMN, Annex 101.

³¹⁶ The CMA notes that these estimates are broadly in line with estimates included in Keysight's internal documents., albeit Keysight estimates that others, aside from Viavi, hold only a total share of [5-10]%, compared to the CMA's estimate of [20-30]%. Keysight Internal Document, KEYS-CMA-00005580, July 2023, page 27.

³¹⁷ [3<]. Keysight Internal Document, KEYS-CMA-00005580, July 2023, pages 4, 27 and 28.

5.3.3.2.2 Closeness of competition

5.3.3.2.2.1 Spirent's O-RAN offering

230. Spirent's internal documents show that it had been targeting O-RAN as a growth opportunity.³¹⁸ Spirent's internal documents indicate that it had sought to develop its O-RAN offering, including through partnerships [REDACTED] to provide an integrated solution for end-to-end testing as well as individual component testing [REDACTED].³¹⁹
231. Spirent planned to develop its offering [REDACTED].³²⁰ Notably, Spirent appears to have released a significant portion of its planned O-RAN testing functionality and test suites [REDACTED].³²¹ Spirent did continue to develop its O-RAN product [REDACTED]. The Parties argue that Spirent has no plans [REDACTED] O-RAN product and intends to [REDACTED], but the CMA considers that there is evidence that Spirent planned to issue additional releases [REDACTED].³²²

5.3.3.2.2.2 Spirent's commercial success

232. Spirent's internal documents indicate it had plans for [REDACTED]³²³ [REDACTED].³²⁴
233. However, actual revenues have [REDACTED] fallen [REDACTED] short of these projections. In 2023, Spirent forecasted sales of approximately \$[REDACTED] million but achieved only \$[REDACTED] million. The CMA also notes that Spirent's O-RAN sales declined between 2023 and 2024.³²⁵ Furthermore, Spirent has [REDACTED] underperformed compared to its forecasted or pipeline opportunities [REDACTED].³²⁶ The Parties also submitted that in 2024, Spirent secured [REDACTED] O-RAN opportunities compared to its target of [REDACTED].³²⁷
234. Furthermore, the Parties stated that Spirent [REDACTED] sales from its broader O-RAN portfolio, particularly its end-to-end testing offering. Instead, its O-RAN revenues

³¹⁸ See, for example: Spirent Internal Document, Annex 162 [REDACTED], 'Annex 162 [REDACTED]', April 2023, page 3; Spirent Internal Document, SPRNT_CMA-0005281, July 2023, page 4.

³¹⁹ In this context, end-to-end testing refers to where the system under test includes the O-RU, O-DU, and O-CU. Spirent's internal documents also note that it supplies open fronthaul testing. Spirent Internal Document, 'Annex 119. [REDACTED]', 12 November 2024, page 5; Spirent Internal Document, SPRNT_CMA-00057077, '[REDACTED]', 8 April 2023, pages 15-16; Spirent Internal Document, 'Annex 010. 7 - [REDACTED]', June 2023, page 3; Spirent Internal Document, SPRNT_CMA-0005281, July 2023, pages 4, 6, 7, 8, 9 and 23. The CMA notes that Spirent markets these solutions on its website and states that its O-RAN solutions provide full wraparound testing for the O-RU, O-DU, O-CU, RIC, adjacent components, and end-to-end systems. It also notes that for advanced testing that fully evaluates and benchmarks performance, channel emulation can be incorporated into the O-RU, O-DU, or end-to-end solutions. [Spirent O-RAN Test Solutions - Spirent](#).

³²⁰ Spirent Internal Document, 'Annex 007. [REDACTED]', pages 20 and 21.

³²¹ Spirent Internal Document, 'Annex 010. [REDACTED]', June 2023, page 35; Spirent Internal Document, Annex 162 [REDACTED], 'Annex 162 [REDACTED]', April 2023, page 6.

³²² Spirent Internal Document, 'Annex 119. [REDACTED]', 12 November 2024, page 5

³²³ See, for example: Spirent Internal Document, SPRNT_CMA-00047691.pdf, '[REDACTED]', April 2023, page 23; Spirent Internal Document, SPRNT_CMA-00057077, '[REDACTED]', 8 April 2023, pages 15 and 16.

³²⁴ Spirent Internal Document, SPRNT_CMA-00098499, '[REDACTED]', April 2023, page 23.

³²⁵ Parties' response to the CMA's RFI 6, Annex 06.

³²⁶ Spirent Internal Document, SPRNT_CMA-00006855, '[REDACTED]', 12 December 2023, pages 3-7; Spirent Internal Document, SPRNT_CMA-00059327, '[REDACTED]', 21 December 2022, pages 3-5.

³²⁷ FMN, paragraph 748.

are [REDACTED] derived from sales of Landslide for O-RAN use cases.³²⁸ Additionally, Spirent had not achieved any sales from its [REDACTED].³²⁹

235. [REDACTED], the Parties submitted that Spirent does not have its own UE emulator, it instead Spirent partners with Simnovus to provide one and considers Simnovus' offering to be weak..³³⁰

5.3.3.2.2.3 Internal documents

236. Spirent's internal documents identify Keysight as a leading competitor in O-RAN testing and indicate that its O-RAN offering was designed as a lower-cost alternative to Keysight's solutions, with a focus on [REDACTED].³³¹
237. Keysight's internal documents identify Spirent as a competitor to its O-RAN portfolio, including its offering and how it developed across multiple O-RAN components.³³² However, Spirent is generally regarded as a weaker competitor or is seen as competing within partnerships that include Spirent alongside other suppliers.³³³

5.3.3.2.2.4 Opportunities data

238. The Parties submitted opportunities data for O-RAN, for the period November 2020 (January 2021 for Spirent) to November 2024, in which they record sales opportunities and identify competitors. This data and its potential limitations are discussed in paragraphs 124 to 129.
239. Keysight's opportunities data for O-RAN testing indicates that it competes with Spirent. Of Keysight's opportunities where a competitor was identified, Spirent was

³²⁸ Parties' response to the CMA's RFI 6, question 6. This appears to be supported by the Parties internal documents albeit the commercial significance of this is unclear as evidence provided by the Parties, [REDACTED]. Spirent Internal Document, SPRNT_CMA-00006855, '[REDACTED]', 12 December 2023, pages 3-7; Spirent Internal Document, SPRNT_CMA-00059327, '[REDACTED]', 21 December 2022, pages 3-5; Spirent Internal Document, 'Annex 119. [REDACTED]', 'Annex 119. [REDACTED]', 12 November 2024, page 5; FMN, Annex 103.

³²⁹ Parties' response to the Issues Letter, 20 February 2025, paragraph 114.

³³⁰ FMN, paragraph 748.

³³¹ Spirent Internal Document, SPRNT_CMA-00063980, '[REDACTED]', 9 September 2022, pages 3-16; Spirent Internal Document, Annex 010. [REDACTED], June 2023, pages 33-34; Spirent Internal Document, '[REDACTED]', 25 March 2023, page 5; Spirent Internal Document, SPRNT_CMA-00063720, '[REDACTED]', 1 May 2023, page 7; Spirent Internal Document, SPRNT_CMA-00057077, '[REDACTED]', 8 April 2023, pages 9 and 11; Spirent Internal Document, SPRNT_CMA-00000126, '[REDACTED]', 30 March 2023, page 2; Spirent Internal Document, SPRNT_CMA-00003953, '[REDACTED]', 13 June 2023, page 5; Spirent Internal Document, SPRNT_CMA-00004372, '[REDACTED]', 9 November 2023, page 8; Spirent Internal Document, SPRNT_CMA-00047163, '[REDACTED]', 19 October 2022, pages 10-11; Spirent Internal Document, SPRNT_CMA-00071458, '[REDACTED]', 30 December 2022, page 3.

³³² See for example: Keysight Internal Document, KEYS-CMA-00000366, March 2023, page 24; Keysight Internal Document, KEYS-CMA-00016538, '[REDACTED]', 8 March 2023, page 3. Keysight Internal Document, KEYS-CMA-00000663, March 2023, page 9.

³³³ See, for example: Keysight Internal Document, KEYS-CMA-00014675, '[REDACTED]', 23 December 2022, page 3; Keysight Internal Document, KEYS-CMA-00023119, '[REDACTED]', 23 March 2023, page 4; Keysight Internal Document, KEYS-CMA-00019769, '[REDACTED]', 17 May 2023, page 2; Keysight Internal Document, KEYS-CMA-00020311, '[REDACTED]', 7 November 2023, page 7; Keysight Internal Document, KEYS-CMA-00013234, '[REDACTED]', 10 May 2024, pages 2 and 3; Keysight Internal Document, KEYS-CMA-00020640, '[REDACTED]', 11 January 2023, page 5.

identified in more than a third ([redacted]).³³⁴ No competitors were identified in any of the O-RAN opportunities in Spirent's dataset.³³⁵

5.3.3.2.2.5 *Third-party evidence*

240. The CMA asked third parties to identify alternatives to the Parties' O-RAN testing products.
241. Only one customer stated that it uses Keysight and Spirent as part of its end-to-end O-RAN solution and identified both as fully effective alternatives.³³⁶ In contrast, one customer said Spirent did not provide any effective O-RAN products, another said it is not foreseen that they will overlap here, and a third indicated that Keysight's products were more advanced than Spirent's.³³⁷ While the CMA received responses from only a small number of Spirent's O-RAN customers, those customers specified Keysight as a fully effective alternative.³³⁸
242. Most competitors did not indicate that Spirent was an effective alternative to Keysight. Only one stated that the combination of Simnovus and Spirent's products provides a viable alternative to Keysight.³³⁹ One other competitor identified Spirent as a weak alternative alongside several other weak and stronger alternatives.³⁴⁰

5.3.3.2.3 *Alternative competitive constraints*

5.3.3.2.3.1 *Viavi*

243. Viavi is the largest supplier of O-RAN testing, by revenue, with a portfolio that supports testing of individual network elements, including O-RU, O-DU, O-CU, and RIC, as well as combined elements and full end-to-end testing.³⁴¹ In addition, Viavi partners with R&S to offer O-RU conformance testing as part of its portfolio.³⁴²
244. The Parties' internal documents consistently identify Viavi as a market leading supplier of O-RAN solutions, including for end-to-end testing.³⁴³ Consistent with

³³⁴ Keysight's opportunities dataset contained [redacted] opportunities with [5-10]% ([redacted]) of those opportunities identifying a competitor. FMN, Annexes 136-142.

³³⁵ There were [redacted] opportunities in the dataset. Spirent response to the CMA's section 109 Notice, 17 December 2024, question 1.

³³⁶ Response to the CMA's questionnaire from a third party, January 2025, question 34.

³³⁷ Response to the CMA's questionnaire from a third party, January 2025, questions 34-36.

³³⁸ Response to the CMA's questionnaire from a number of third parties, January 2025, question 34.

³³⁹ Response to the CMA's questionnaire from a third party, January 2025, question 34 and 35.

³⁴⁰ Response to the CMA's questionnaire from a third party, January 2025, question 34 and 35.

³⁴¹ See paragraph 226; Response to the CMA's questionnaire from a third party, January 2025, question 21

³⁴² Response to the CMA's questionnaire from a third party, January 2025, question 21; [Rohde & Schwarz and VIAVI Solutions Jointly Offer O-RAN Radio Unit Conformance Test Solution | VIAVI Solutions Inc.](#)

³⁴³ See, for example: Spirent Internal Document, SPRNT_CMA-00063980, '[redacted]', 9 September 2022, pages 3-16; Spirent Internal Document, SPRNT_CMA-00071458, '[redacted]', 30 December 2022, page 3; Keysight Internal Document, KEYS-CMA-00014675, '[redacted]', 23 December 2022, page 3; Keysight Internal Document, KEYS-CMA-00023119, '[redacted]', 23 March

this, Keysight's opportunities data indicates that Keysight regularly competes against Viavi which was identified in the majority of opportunities where a competitor was recorded ([REDACTED]).³⁴⁴

245. Additionally, all of Keysight's customers that responded to the CMA's questionnaire identified Viavi as an effective alternative to Keysight.³⁴⁵ One of these customers noted that Keysight is a 'step ahead' of Spirent in terms of product development and it is more likely to look at Viavi as an alternative going forward.³⁴⁶
246. Based on the available evidence, the CMA believes that Viavi will continue to constrain Keysight. In particular, the CMA notes there is limited evidence that Viavi's O-RAN offering relies on integration, interoperability, or technology licensed from Keysight or Spirent.³⁴⁷

5.3.3.2.3.2 Other suppliers

247. With the exception of Calnex, all other O-RAN suppliers individually held a market share of less than 5% in 2024, according to the CMA's estimates.³⁴⁸
248. The CMA understands that other O-RAN suppliers focus on specific testing areas,³⁴⁹ such as O-RU³⁵⁰ or O-DU³⁵¹ conformance testing and do not offer end-to-end testing or solutions for testing all network components. Other suppliers appear to compete in a limited number of opportunities.³⁵²
249. The CMA also notes that several suppliers partner with Viavi or Spirent to provide broader testing capabilities. R&S and, at least historically, Anritsu partnered with

2023, page 4; Keysight Internal Document, KEYS-CMA-00019769, '[REDACTED]', 17 May 2023, page 2; Keysight Internal Document, KEYS-CMA-00020311, '[REDACTED]', 7 November 2023, page 7; Keysight Internal Document, KEYS-CMA-00019086, '[REDACTED]', 3 April 2023, page 9.

³⁴⁴ FMN, Annexes 136-142.

³⁴⁵ Response to the CMA's questionnaire from a number of third parties, January 2025, question 34.

³⁴⁶ See, paragraph 28. Response to the CMA's questionnaire from a third party, January 2025, question 35.

³⁴⁷ However, [REDACTED].

³⁴⁸ See Table 3.

³⁴⁹ Spirent's internal documents only identify [REDACTED] as suppliers of end-to-end testing solutions and describe [REDACTED] as speciality suppliers. Spirent Internal Document, SPIRINT_CMA-00071458, '[REDACTED]', 30 December 2022, page 3. See, for example: Spirent Internal Document, SPRINT_CMA-00063980, '[REDACTED]', 9 September 2022, pages 3-16. Response to the CMA's questionnaire from a number of third parties, January 2025, question 21.

³⁵⁰ Several Keysight internal documents that focus on competition for O-RU conformance testing identify R&S, Anritsu, Simnovus and Calnex as competitors. See, for example: Keysight Internal Document, KEYS-CMA-00005580, 5 July 2023, page 37; Keysight Internal Document, KEYS-CMA-00020640, '[REDACTED]', 11 January 2023, page 2-4, 7, 13; Keysight Internal Document, KEYS-CMA-00013999, '[REDACTED]', 6 February 2024, pages 2, 6, 8-10, 12.

³⁵¹ Keysight internal documents identify Amarisoft and Artiza as competitors in O-DU conformance testing. See, for example: Keysight Internal Document, KEYS-CMA-00000366, March 2023, page 24; Keysight Internal Document, KEYS-CMA-00013615, '[REDACTED]', 14 March 2023, page 29.

³⁵² This is reflected in Keysight's opportunities data, where only R&S and Anritsu were identified more than once. In total, [REDACTED] and [REDACTED] accounted for just [5-10]% and [0-5]% of identified competitors, respectively. FMN, Annexes 136-142.

Viavi and Spirent, respectively.³⁵³ Spirent also partners with Simnovus for UE emulation.³⁵⁴

250. While one competitor noted that it is considering expanding its offering, this is limited to just one specific area of testing where they are already active.³⁵⁵ The CMA also notes that Mobileum launched an O-RAN testing product in February 2025 in partnership with Artiza although the CMA has not received evidence as to the strength and types of testing covered by this product.³⁵⁶

5.3.3.3 Conclusion

251. The CMA found that Keysight holds a strong position in the supply of O-RAN testing solutions. The O-RAN testing solutions market is highly concentrated, with Keysight and Viavi together accounting for the vast majority of the market. The evidence suggests that Viavi has been, and will continue to be, the main constraint on Keysight with other suppliers providing more limited constraints.
252. The available evidence shows that Spirent had an intention to expand its market position to challenge Keysight and Viavi and that Keysight was monitoring this. However, the evidence shows that, on balance, Spirent was a weak competitor, its expansion attempts have had little commercial success and it was unlikely to provide a stronger constraint going forward. In particular:
- (a) The CMA notes that Spirent has been seeking to expand its presence in O-RAN for several years. However, it has [§<] underperformed in both projected revenue growth and secured opportunities.
 - (b) Moreover, the CMA has not seen any evidence of Spirent adopting a significant new strategy that would alter its trajectory or enhance the functionality of its products.
 - (c) In fact, the CMA notes that Spirent's product development plans suggest it has [§<] its offering [§<] beyond the current functionality of its O-RAN products, which have achieved limited sales.
253. Therefore, on balance, the CMA does not believe that the Parties would have competed with each other more significantly going forward. Accordingly, the CMA found that the Merger does not give rise to a realistic prospect of an SLC as a result of horizontal unilateral effects in the supply of O-RAN testing solutions on a global basis.

³⁵³ Response to the CMA's questionnaire from a number of third parties, January 2025, questions 21, 27 and 31.

³⁵⁴ Response to the CMA's questionnaire from a third party, January 2025, questions 21, 27 and 31.

³⁵⁵ Response to the CMA's questionnaire from a third party, January 2025, question 23.

³⁵⁶ [Mobileum and Artiza Networks Partner to Offer a Complete Testing Solution to Support an OpenRAN Future | Mobileum.](#)

5.3.4 Theory of Harm 4: Horizontal unilateral effects in Wi-Fi lab testing solutions

254. To assess whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in the supply of Wi-Fi lab testing solutions on a global basis, the CMA has adopted the framework set out in paragraphs 95 to 101 above.

5.3.4.1 Parties' submissions

255. The Parties submitted that their Wi-Fi testing products are highly differentiated and serve different customers and applications as:³⁵⁷

- (a) Keysight's products are used for early-stage R&D testing of Wi-Fi product prototypes under simulated ideal conditions, using wired connections. Keysight's products are primarily designed for testing Wi-Fi chipsets and user devices, with only limited capability for access point testing.³⁵⁸ Keysight offers a third-party over-the-air chamber for use with the UXM-W, but this provides only limited capabilities for over-the-air testing and therefore, is generally used for early-stage R&D testing of Wi-Fi product prototypes.³⁵⁹
- (b) Spirent supplies Wi-Fi lab testing for mesh network and access point OEMs and is generally used to test Wi-Fi access point devices in late-stage system and regression testing by using simulated real-world conditions using over-the-air connections.³⁶⁰

256. The Parties submitted that there had been some competition between Wavetest and Spirent's Octobox, but that Keysight has discontinued its Wavetest product.³⁶¹

257. Accordingly, the Parties submitted that there is no material competition between Keysight and Spirent in Wi-Fi lab testing. Rather, the Parties submitted that Keysight's main competitors include Anritsu, R&S, and Teradyne (LitePoint), while Spirent's Octobox primarily competes with products supplied by Alethea Tech, Candela, and ChangeSelf.³⁶²

³⁵⁷ FMN, page 129; Parties' response to the Issues Letter, 20 February 2025, paragraph 129.

³⁵⁸ Specifically, the Parties submitted UXM-W is restricted to testing devices acting as access points, such as mobile phone hotspots. The CMA notes that the Parties did not specify the UXM-P or other UXM models as relevant product in the supply of Wi-Fi lab testing. FMN, page 129 and 130.

³⁵⁹ Parties submission on Wi-Fi testing, 16 December 2024.

³⁶⁰ FMN, page 129 – 131.

³⁶¹ FMN, paragraph 607; Annex 151, questions 11-13; Parties submission on Wi-Fi testing, 16 December 2024.

³⁶² FMN, page 7.

5.3.4.2 CMA's assessment

5.3.4.2.1 Shares of supply

258. As noted above at paragraphs 106 and 107, while shares of supply can be a useful starting point for the analysis, the CMA considers it appropriate to consider evidence on shares of supply alongside other evidence, including development plans. This is particularly relevant for the supply of Wi-Fi lab TME, given that:
- (a) It is difficult to precisely attribute revenues solely to Wi-Fi lab testing, as some products also encompass broader cellular conformance and performance testing functionality.
 - (b) The Parties' revenue figures are predicted to change materially as the market transitions from legacy standards to Wi-Fi 7, particularly for Keysight, which has recently launched the UXM-W and UXM-P. Consequently, current estimates may understate their actual market position.³⁶³
 - (c) It has not been possible to obtain revenue information from all suppliers of Wi-Fi lab testing.³⁶⁴
259. Table 4 below presents the CMA's share of supply estimates for Wi-Fi lab testing solutions, based on revenue information gathered from the Parties and other suppliers.³⁶⁵
260. Contrary to the Parties' submissions, the CMA has included Keysight's UXM-P sales in the supply share estimates below, as it offers the same Wi-Fi testing functionality as the UXM-W, with Wi-Fi 7 capability being one of the main functionality differences from other UXM models.³⁶⁶

³⁶³ UXM-W was released in 2023 and is projected to have sales of \$[<] in FY24, [<] in FY27 (FMN, Table 'UXM-W - Worldwide Revenue Projections (USD Millions)'). In addition, sales appear to have outperformed these targets as Keysight's sales of the UXM-W between 2023 and October 2024 were [<]. (FMN, Annex 104). Keysight's sales of the UXM-P were [<] in FY2024 and are projected to be [<] each year to FY27 (FMN, Annex 151, question 5). The Parties also submitted that Wavetest is being discontinued and that it stopped accepting WaveTest orders at the beginning of December 2024, meaning this may offset revenue increases for other products. (FMN, paragraph 247; FMN, Annex 151) Spirent's internal documents indicate that its revenues in Wi-Fi testing are [<] (Spirent Internal Document, SPRINT_CMA-00048910, '[<]', September 2022, pages 3 and 5).

³⁶⁴ Although, taking all available evidence into account, the CMA considers that ChangeSelf does not appear to hold a significant market position or be a close competitor to the Parties across all geographies.

³⁶⁵ The Parties were unable to provide share of supply estimates for Wi-Fi lab testing: FMN, paragraph 425(e). The CMA notes that it was unable to obtain revenues information or estimates from all third parties

³⁶⁶ See, for example: Keysight Internal Document, KEYS-CMA-00005988, October 2023, page 7 and 14; Keysight Internal Document, KEYS-CMA-00012535, '[<]', September 2023, page 13.

Table 4: Global shares of supply in Wi-Fi lab testing solutions (2024)

Supplier	Share (%)
Keysight	[10-20]
Spirent	[30-40]
Combined	[40-50]
R&S	[10-20]
Anritsu	[10-20]
Candela	[5-10]
Alethea	[5-10]

Source: CMA estimates based on revenue data from the Parties and third parties; Parties' response to the CMA's RFI 6, Annexes 5 and 6; FMN, footnote 192.

261. Table 4 shows that Spirent is the largest supplier of Wi-Fi lab testing solutions, with a market share of [30-40]%. Spirent is materially larger than the next largest suppliers R&S, Anritsu, and Keysight which each hold shares between 10-20%. Candela and Alethea are smaller suppliers with shares between [5-10]%. The Parties' combined share of [40-50]% (with an increment of [10-20]%) is more than twice as large as that of the next largest supplier, R&S.

5.3.4.2.2 Closeness of competition

5.3.4.2.2.1 Internal documents

262. Spirent's internal documents identify Keysight as a competitor, with some [X]. The CMA notes that a number of internal documents also acknowledge differentiation between the Parties' testing solutions, including the fact that Keysight is [X].³⁶⁷
263. Similarly, Keysight's internal documents [X] acknowledge competition with Spirent. They also show that Keysight considers Spirent a competitor to both its UXM-W and Wavetest products [X].³⁶⁸ Furthermore, internal emails from Keysight's sales team discussing the UXM-W specifically highlight concerns about competition with the Octobox.³⁶⁹
264. As discussed further below, however, each of the Parties also monitors other competitors in its internal documents and, in fact, identifies other suppliers as its closest competitor (or competitors) in its internal documents.

³⁶⁷ Spirent Internal Document '[X]', May 2022, page 10; Spirent Internal Document, SPINT_CMA-00004479, '[X]', May 2024, page 50; Spirent Internal Document, '[X]', October 2022, page 5; Spirent Internal Document, SPINT_CMA-00007137, '[X]', November 2022, page 8; Spirent Internal Document, SPINT_CMA-00057873, '[X]', April 2024, pages 21 and 27; ³⁶⁷ Spirent Internal Document, SPINT_CMA-00048910, '[X]', September 2022, page 6.

³⁶⁸ See, for example: Keysight Internal Document, KEYS-CMA-00005772, July 2022, page 18; Keysight Internal Document, KEYS-CMA-00023232, '[X]', around 2023, page 3; Keysight Internal Document, KEYS-CMA-00005435, '[X]', February FY2023, page 7; Keysight Internal Document, KEYS-CMA-00005972, June 2023, page 4; Keysight Internal Document, KEYS-CMA-00005733, March 2023, page 2; Keysight Internal Document, KEYS-CMA-00012535, '[X]', September 2023, pages 3, 6, 8, and 20; Keysight Internal Document, KEYS-CMA-00012526, '[X]', undated; Keysight Internal Document, KEYS-CMA-00012562, '[X]', August 2024, page 12; Keysight Internal Document, KEYS-CMA-00006529, around Q2 2024, page 8 and 12; Keysight Internal Document, KEYS-CMA-00006601, '[X]', April 2024, pages 2 and 19 to 24.

³⁶⁹ Keysight Internal Document, KEYS-DOJ-03782781, April 2023;

5.3.4.2.2.2 *Opportunities data*

265. The Parties submitted opportunities data for Wi-Fi lab testing solutions, for the period November 2020 (January 2021 for Spirent) to November 2024, in which they record sales opportunities and identify competitors. This data and its potential limitations are discussed in paragraphs 124 to 129.
266. Consistent with Keysight's internal documents, Keysight's opportunities data for Wi-Fi testing suggests that Keysight's Wavetest product has regularly competed with Spirent. For the Wavetest product, Spirent was identified as a competitor in the majority of opportunities where a competitor was recorded, including several instances in 2024.
267. However, Spirent was only identified in a very small number of instances in relation to UXM-W opportunities. [REDACTED].³⁷⁰
268. Spirent's opportunities data includes a very small number of examples of competition with Keysight.³⁷¹ The data does not identify which of Keysight's products Spirent was competing with and as these opportunities were before 2023 it could reflect competition with Keysight's WaveTest and Octobox rather than Keysight's UXM-W.
269. The Parties submitted that the instances where they identify each other in relation to Octobox and UXM-W opportunities involve marginal or atypical cases. The Parties also submitted that the opportunities data is not suitable for assessing competition, as it reflects historical competition involving discontinued products.³⁷² While the CMA agrees that there are few opportunities where the Parties identify each other as competitors in relation to UXM-W and Octobox, the overall sample of opportunities for the UXM-W and Octobox is small and the CMA has considered the limitations of this data set in determining the weight to place on this evidence.

5.3.4.2.2.3 *Evidence from third parties*

270. The CMA asked third parties to identify alternatives to the Parties' Wi-Fi testing products.
271. Some third parties identified Keysight and Spirent as alternatives. For example, a few competitors identified Spirent as a competitor to Keysight in Wi-Fi lab

³⁷⁰ Competitive information was recorded for [REDACTED] of Keysight's [REDACTED] Wi-Fi lab testing opportunities, representing [0-5]% of the total. The sample of opportunities listing competitors for UXM-W is limited, partly due to the product's recent launch. As a result, the CMA has considered this evidence alongside other sources of evidence in assessing how closely the Parties compete relative to other suppliers. Parties' response to the CMA's RFI 6, Annexes 01 and 02.

³⁷¹ Spirent's opportunities data also shows material competition between its C50 and Keysight. However, the CMA has not placed weight on this evidence, as the C50 is a legacy product with limited and declining revenues. Parties' response to the CMA's RFI 6, Annexes 01 and 02; FMN, footnote 81.

³⁷² Parties' response to the CMA's RFI 6, questions 2 and 3.

testing.³⁷³ One competitor, which is not active in Wi-Fi testing solutions itself, identified Keysight as competing with Spirent's Octobox.³⁷⁴ A small number of Keysight customers responded to the relevant question and none of them identified Spirent as an alternative to Keysight's UXM-W, with some saying that Keysight's products support features that Spirent's lack.³⁷⁵ Similarly, none of the Spirent customers that responded to the CMA questionnaire provided a full response to what alternatives they had, although one said that Keysight's products are more expensive than Spirent's.

5.3.4.2.2.4 *WaveTest and UXM-W functionality*

272. The available evidence indicates that there had been competition between Spirent's Octobox and Keysight's Wavetest.
273. The Parties submitted that while there has historically been some competition between Keysight's WaveTest product and Spirent, it has now been discontinued and is no longer sold to customers.³⁷⁶ In line with the Parties' submissions, Keysight's internal documents confirm that it had pre-Merger plans to not upgrade Wavetest for Wi-Fi 7 from at least March 2023 and that this was communicated to customers from April 2023, well in advance of the Merger.³⁷⁷ Keysight confirmed the discontinuation to sales reps in July 2024 and stopped accepting Wavetest orders by late 2024.³⁷⁸
274. The CMA has considered the extent to which there will be future competition between the Parties if any Wavetest functionality has or will be incorporated into the UXM-W.
275. Internal documents indicate that Keysight planned to integrate Wavetest's functionality into the UXM-W (and UXM-P) for legacy standards and Wi-Fi 7, with the aim of migrating customers to this product.³⁷⁹ In addition, Keysight's pre-Merger internal documents also show that it had the intention to actively compete and win new business in this testing area.³⁸⁰ However, these documents also

³⁷³ Response to the CMA's questionnaire from a number of third parties, January 2025, question 37.

³⁷⁴ Response to the CMA's questionnaire from a number of third parties, January 2025, question 37.

³⁷⁵ Response to the CMA's questionnaire from a third party, January 2025, question 39.

³⁷⁶ Parties submission on Wi-Fi testing, 16 December 2024.

³⁷⁷ See, for example: Keysight Internal Document, KEYS-DOJ-00434305, March 2023; Keysight Internal Document, KEYS-DOJ-03459947, August 2023; Keysight Internal Document, KEYS-DOJ-03396451, '[X<]', July 2023; Keysight Internal Document, KEYS-DOJ-01909690, '[X<]', May 2023.

³⁷⁸ See, for example: Keysight Internal Document, KEYS-DOJ-02618438, July 2024; Parties' response to the CMA's RFI 6, question 13.

³⁷⁹ See, for example: Keysight Internal Document, KEYS-DOJ-01909690, '[X<]', May 2023, page 8; Keysight Internal Document, KEYS-DOJ-03396451, '[X<]', July 2023, page 9; Keysight Internal Document, KEYS-DOJ-03990315, '[X<]', July 2024, page 2; Keysight Internal Document, KEYS-DOJ-03459947, October 2023, page 2; Keysight Internal Document, KEYS-DOJ-03782781, April 2023, page 1; Keysight Internal Document, KEYS-DOJ-06259194, '[X<]', November 2024, page 19.

³⁸⁰ See, for example: Keysight Internal Document, KEYS-CMA-00006035, September 2023, page 43.

suggest that this future competition would be targeted primarily at third party competitors such as [REDACTED].³⁸¹

276. The Parties later submitted that, [REDACTED]. The Parties submitted that the documents cited by the CMA refer to documents created early in UXM-W's development [REDACTED]. Accordingly, the Parties submitted that [REDACTED].³⁸²
277. As evidence that customers do not view the UXM-W and Wavetest as substitutes, Keysight submitted internal documents from its sales team that outline recent customer feedback. These documents include feedback from [REDACTED].³⁸³
278. The Parties also submitted an internal email chain dated February 2025, which they claimed demonstrated significant limitations in incorporating WaveTest functionality into the UXM-W. The document indicates that at the time, the UXM-W's functionality was falling behind expectations, creating challenges in competing for business. [REDACTED].³⁸⁴

5.3.4.2.2.5 *Over-the-air testing*

279. The CMA notes that the Wavetest functionality, where the Parties may have a direct overlap, represents only a portion of the capabilities offered by the UXM-W (and UXM-P). The broader functionalities of the UXM products appear to be materially differentiated from Spirent's Octobox, primarily because the products focus on different types of testing at different levels of the Wi-Fi protocol stack.
280. Keysight's products test the radio frequency (RF) performance of Wi-Fi devices using a wired connection. By comparison, the Octobox tests the full Wi-Fi protocol stack and validates overall system performance using over-the-air Wi-Fi connections. As radio frequency performance issues affect all higher-level testing, understanding issues at this level may be necessary before conducting higher-level tests, suggesting there may be a degree of complementarity to the Parties products.
281. Consistent with this, third parties also indicated that the Parties' current products may be targeted at different stages of the Wi-Fi R&D lifecycle. For example:

³⁸¹ See, for example: Keysight Internal Document, KEYS-CMA-00006035, September 2023, page 43; Keysight Internal Document, KEYS-CMA-00012535, September 2023, pages 3 and 8.

³⁸² The Parties further submitted that, as a result, WaveTest customers typically did not purchase UXM-W following its introduction – of the [REDACTED] WaveTest customers over the period 2021 to 2024, only [REDACTED] eventually purchased UXM-W. Parties' response to the Issues Letter, 20 February 2025, paragraphs 148-152.

³⁸³ FMN, Annex 107; FMN, Annex 106.

³⁸⁴ Parties' response to the Issues Letter, 20 February 2025, paragraph 150.

- (a) One competitor told the CMA that the Parties' products are differentiated, noting that Keysight's product tests Wi-Fi protocol over a wired connection, while Spirent's Octobox is aimed at over-the-air testing.³⁸⁵
- (b) Another competitor said that the Parties' solutions test different layers with Spirent testing higher layers and Keysight more focused on front end testing. This competitor also said that despite competing with Keysight, it was unaware of the Octobox and its alternatives.³⁸⁶

282. While some third parties indicated that a degree of substitutability may exist when a wired solution is used in combination with a chamber, they generally did not view them as substitutes but rather as complementary solutions.³⁸⁷

5.3.4.2.2.6 *Product development and investment*

283. Spirent is continuing to invest in the Octobox. These investments have been focussed on various functionality [X].³⁸⁸ Spirent's internal documents emphasise that it is investing in [X]. In particular, its development plans indicate that it is aiming to fill current feature gaps in relation to [X] customers [X].³⁸⁹

284. Keysight is also continuing to make significant R&D investments in Wi-Fi testing.³⁹⁰ Keysight's internal documents indicate that, going forward, its development activity in Wi-Fi testing is largely focussed on the rollout of the UXM-W and developing its functionality.³⁹¹ As noted above, Keysight's product development roadmaps make several references to the development of [X] testing features and indicate that it is pursuing new business in this testing segment.³⁹² As noted above, however, some of these documents also suggest that the product would compete primarily with third parties other than Spirent.

285. The CMA considers that the Parties' planned future product development demonstrates their continued investment in Wi-Fi lab testing solutions and their likely ongoing market position as leading suppliers, though they are unlikely to become closer competitors in the future.

³⁸⁵ Note of a call with a third party, paragraph 20.

³⁸⁶ Note of a call with a third party, paragraph 43; Response to the CMA's questionnaire from a third party, January 2025, question 37.

³⁸⁷ Response to the CMA's questionnaire from a number of third parties, January 2025, question 38.

³⁸⁸ Spirent response to the CMA's section 109 Notice, 01 November 2024, Annex 1.

³⁸⁹ Spirent Internal Document, SPRNT_CMA-00055848, '[X]', April 2023, pages 36, 40 and 41.

³⁹⁰ [X]. FMN, Annex 145.

³⁹¹ See, for example: Keysight Internal Document, KEYS-DOJ-06259194, '[X]', November 2024; Keysight Internal Document, KEYS-CMA-00005972, September 2023, page 5.

³⁹² See, for example: Keysight Internal Document, KEYS-DOJ-06259194, '[X]', November 2024. [X] (Keysight Internal Document, KEYS-CMA-00006529, around February 2023, page 12).

5.3.4.2.3 *Alternative competitive constraints*

5.3.4.2.3.1 *R&S and Anritsu*

286. R&S and Anritsu each supply Wi-Fi testing solutions that, like Keysight's UXM-W and UXM-P, are capable of testing access points and devices/stations using a wired connection and also offer cellular testing functionality. As noted above, R&S and Anritsu hold a share of supply in Wi-Fi lab testing solutions of [10–20]% each.
287. Keysight's internal documents frequently identify R&S and Anritsu as competitors in Wi-Fi lab testing with some indicating that Keysight competes more closely with [X] and [Y] than with [Z].³⁹³ By comparison, [X] and [Y] are generally [Z] as competitors to Spirent in its internal documents.
288. Consistent with the evidence from internal documents, the majority of Keysight's UXM-W opportunities that specify a competitor identify R&S and Anritsu, whereas neither are identified in Spirent's opportunities data.³⁹⁴
289. This is also consistent with evidence from third parties:
- (a) As noted above, the CMA asked Keysight's customers about alternatives to Keysight's UXM-W, and while only a small number responded, all who specified an alternative identified R&S, with one also identifying Anritsu.³⁹⁵
 - (b) Several competitors also indicated that R&S and/or Anritsu's products were alternatives to the UXM-W, and one identified them both as an alternative to Wavetest.³⁹⁶
 - (c) R&S and Anritsu were not identified as alternatives to Spirent by third parties.
290. The CMA found no evidence suggesting that the competitive constraint from R&S and Anritsu is likely to weaken over time.³⁹⁷

³⁹³ The Parties submitted that this is due to both R&S and Anritsu offering wireless network emulator solutions similar to the UXM-W, targeting early R&D applications and primarily relying on wired connections. Parties submission on Wi-Fi testing, 16 December 2024. See: Keysight Internal Document, KEYS-CMA-00005972, June 2023, page 4; Keysight Internal Document, KEYS-CMA-00005733, March 2023, page 2; Keysight Internal Document, KEYS-CMA-00012535, '[X]', September 2023, pages 3, 6, 8, and 20; Keysight Internal Document, KEYS-CMA-00006529, around Q2 2024, page 8 and 12. Another Keysight internal document dated September 2023 that sets out Keysight's roadmap for its wireless testing business states [X] (Keysight Internal Document, KEYS-CMA-00006035, September 2023, page 43).

³⁹⁴ However, as noted above, the CMA notes that the sample of Spirent's opportunities identifying a competitor is limited. Parties' response to the CMA's RFI 6, Annexes 01 and 02.

³⁹⁵ Response to the CMA's questionnaire from a number of third parties, January 2025, question 39.

³⁹⁶ Four competitors identified R&S as an alternative to the UXM-W, two of which also identified Anritsu. Response to the CMA's questionnaire from a number of third parties, January 2025, question 36.

³⁹⁷ Response to the CMA's questionnaire from a third party, January 2025, question 35.

5.3.4.2.3.2 Teradyne (LitePoint)

291. Teradyne, through its subsidiary Litepoint, is a major supplier of Wi-Fi testing solutions. However, it does not provide signalling solutions and primarily supplies Wi-Fi testing solutions for manufacturing environments.³⁹⁸ While Teradyne supplies Wi-Fi TME in a lab-based setting, the available evidence indicates that only signalling Wi-Fi solutions impose a significant competitive constraint on the Parties' products.³⁹⁹
292. Keysight's internal documents acknowledge Teradyne's strong position in Wi-Fi testing, although these emphasise its presence in Wi-Fi testing for [X] where UXM-W also has capabilities, but Spirent does not.⁴⁰⁰ Given that Teradyne is not active in signalling tests, the CMA considers that these documents do not show that Teradyne will constrain the Merged Entity in respect of Wi-Fi lab testing solutions.
293. Additionally, Teradyne [X] appears in Keysight's UXM-W opportunities data [X], [X] in Spirent's internal documents, and no customers or competitors indicate that Teradyne's products are an alternative to the Parties products.⁴⁰¹
294. The CMA considered whether Teradyne's market position could enable it to enter and expand into signalling testing. However, several competitors have indicated that such an expansion would be costly, challenging, and could take approximately two to four years to achieve the necessary product development.⁴⁰²

5.3.4.2.3.3 Candela

295. Candela is active in Wi-Fi lab testing through its LANforge product, which supports both access point (including hotspot) and device testing for both the latest Wi-Fi standards. It is smaller than Spirent and Keysight with a share of [0-10]%.
296. Spirent consistently identifies Candela as a competitor in its internal documents, describing it as a main competitor in both access point and device/station testing.⁴⁰³ In contrast to Spirent's internal documents, Candela is generally not

³⁹⁸ Response to the CMA's questionnaire from a third party, January 2025, question 31.

³⁹⁹ See Market Definition, paragraph 78 above. See also: Note of a call with a third party, paragraph 20; [IQxel-M4W for Wi-Fi and Bluetooth® Testing - LitePoint](#).

⁴⁰⁰ A Keysight document dated 2023 notes that both the R&D and manufacturing segments of the WLAN testing market are dominated by LitePoint which has a [60-70]% share of supply. (Keysight Internal Document, KEYS-CMA-00006759, July 2023, pages 16 and 54). Another Keysight internal document also indicates that LitePoint is the [X] and [X]. (Keysight Internal Document, KEYS-CMA-00005772, July 2022, page 21). A third document suggests that the [X] will take market share from [X] (Keysight Internal Document, KEYS-CMA-00006035, September 2023, page 43). See also Keysight Internal Document, KEYS-DOJ-03386256, '[X]', March 2024, page 4.

⁴⁰¹ However, as noted above, the CMA notes that the sample of Spirent's opportunities identifying a competitor is limited. Parties' response to the CMA's RFI 6, Annexes 01 and 02.

⁴⁰² Response to the CMA's questionnaire from a number of third parties, January 2025, question 39.

⁴⁰³ See, for example: Spirent Internal Document 'Annex 001. [X]', May 2022, page 10; Spirent Internal Document, 'Annex 010. [X]', June 2023, page 19; Spirent Internal Document, SPRNT_CMA-00004479, '[X]', May 2024, page 50;

monitored as a competitor in Keysight's internal documents but is identified alongside Spirent in some internal documents.⁴⁰⁴

297. Consistent with the evidence from internal documents, Spirent's opportunities data most frequently identifies Candela as a competing supplier,⁴⁰⁵ but it is infrequently identified in Keysight's opportunities data for Wavetest and not at all for UXM-W.⁴⁰⁶
298. One large customer of both Parties identified Candela as an alternative to Spirent's Octobox.⁴⁰⁷ A few competitors also identified Candela as an alternative to Spirent, one of which also identified Candela as an alternative to Wavetest.⁴⁰⁸

5.3.4.2.3.4 Others

299. As noted above, Alethea holds a [0-10]% share in the supply of Wi-Fi lab testing solutions.
300. Spirent's internal documents also identify Alethea as a competitor, although it appears less frequently in internal documents that set out Spirent's competitors. For example:
- (a) one Spirent internal document identifies Alethea as a competitor [REDACTED].⁴⁰⁹
 - (b) Another internal document states that Alethea [REDACTED].⁴¹⁰
301. Alethea [REDACTED] and was identified by only one customer as an ineffective alternative to Wavetest.⁴¹¹ By comparison, two competitors said Alethea is an alternative to Spirent – one identifying it as a 'strong' competitor and the other identifying it as a 'weak' competitor.⁴¹²
302. Spirent's internal documents also regularly identify ChangeSelf as a competitor including for access point testing, though they suggest that ChangeSelf currently poses a competitive constraint only [REDACTED].⁴¹³ One Spirent internal document indicates that Spirent expects competition from ChangeSelf [REDACTED].⁴¹⁴ However, the

Spirent Internal Document, SPRNT_CMA-00057873, '[REDACTED]', April 2024, pages 21 and 27; Spirent Internal Document, SPRNT_CMA-00048910, '[REDACTED]', September 2022, page 6 Spirent Internal Document, SPRNT_CMA-00000126, '[REDACTED]', April 2023, page 2; Spirent Internal Document, SPRNT_CMA-00055848, '[REDACTED]', April 2023, page 34.

⁴⁰⁴ See, for example: Keysight Internal Document, KEYS-CMA-00012562, '[REDACTED]', August 2024, page 12; Keysight Internal Document, KEYS-CMA-00005503, December FY2023, page 10.

⁴⁰⁵ However, as noted above, the CMA notes that the sample of Spirent's opportunities identifying a competitor is limited.

⁴⁰⁶ Parties' response to the CMA's RFI 6, Annexes 01 and 02.

⁴⁰⁷ Response to the CMA's questionnaire from a third party, January 2025, question 39.

⁴⁰⁸ Response to the CMA's questionnaire from a number of third parties, January 2025, question 39.

⁴⁰⁹ Spirent Internal Document, SPRNT_CMA-00048910, '[REDACTED]', September 2022, page 6.

⁴¹⁰ Spirent Internal Document, '[REDACTED]', October 2022, page 3.

⁴¹¹ Response to the CMA's questionnaire from a third party, January 2025, question 39.

⁴¹² Response to the CMA's questionnaire from a number of third parties, January 2025, question 39.

⁴¹³ Spirent Internal Document, SPRNT_CMA-00015817, '[REDACTED]', February 2024, page 2; Spirent Internal Document, SPRNT_CMA-00048910, '[REDACTED]', September 2022, page 5; Spirent Internal Document, SPRNT_CMA-00057873, '[REDACTED]', 2024, page 21.

⁴¹⁴ Spirent Internal Document, SPRNT_CMA-00048910, '[REDACTED]', September 2022, page 6.

CMA has found no additional evidence in the Parties' internal documents to suggest that ChangeSelf is likely to impose a competitive constraint [§<]. Consistent with this, ChangeSelf [§<] in the Parties' opportunities data and was not named as an alternative by any third parties.

303. The CMA found limited evidence of other suppliers imposing a competitive constraint on the Parties. Only one additional supplier, CreCre, was identified as an alternative, but it does not appear regularly or prominently in either Party's internal documents or opportunities data.
304. Additionally, several competitors identified that it would be difficult for a supplier of non-signalling Wi-Fi testing solutions to develop and launch a signalling Wi-Fi testing solution.⁴¹⁵ For example, one competitor said it would be 'very challenging in practice' requiring approximately three to four years to catch-up with the Parties' products and investment of \$15-20 million overall.⁴¹⁶ More generally, as in other areas, the supply of Wi-Fi lab testing solutions is characterised by continuous product development and innovation, see paragraphs 53 to 62 above, which present a barrier to entry and expansion.

5.3.4.3 Conclusion

305. Based on the evidence outlined above, the CMA considers that the Parties are both leading suppliers of Wi-Fi lab testing and would account [40-50]% of the supply of Wi-Fi lab testing solutions globally.
306. The CMA believes there has been material competition between the discontinued WaveTest product and Spirent, which could, to some extent, continue given Keysight's plans to integrate at least some of WaveTest's functionality into the UXM-W (and UXM-P) and transition customers to these products. However, more generally, the CMA found that the Parties' Wi-Fi lab testing solutions are differentiated and generally target different stages of testing and in some cases may function as complements.
307. The available evidence indicates that that Keysight competes more closely and across a broader range of functionalities with R&S and Anritsu than with Spirent, while Spirent's closest competitor is Candela. In this respect, the evidence suggests that the Parties are more distant competitors across their full Wi-Fi lab testing portfolios and face strong competitive pressures from other suppliers, which will continue to constrain the Merger Entity going forward.

⁴¹⁵ Response to the CMA questionnaire from third parties, January 2025, question 39.

⁴¹⁶ Response to the CMA questionnaire from a third party, January 2025, question 39. Another competitor said that it would present 'significant challenges', requiring 25 engineers and one to two years to complete. Response to the CMA questionnaire from a third party, January 2025, question 39. A further competitor said it would be 'very difficult' involving development costs of more than \$20 million and take two to three years. Response to the CMA questionnaire from a third party, January 2025, question 39.

308. Therefore, on balance, the CMA believes that there are sufficient remaining alternatives to constrain the Merged Entity. Accordingly, the CMA found that the Merger does not give rise to a realistic prospect of an SLC as a result of horizontal unilateral effects in the supply of Wi-Fi lab testing solutions on a global basis.

5.3.5 Theory of Harm 5: Horizontal unilateral effects in GNSS testing solutions

309. Horizontal unilateral effects may arise from the elimination of future competition where, absent the merger, entry or expansion may have resulted in new or increased competition.⁴¹⁷ When considering whether a merger involving a potential entrant leads to a loss of future competition between the merging parties, the CMA will consider evidence on:⁴¹⁸

- (a) whether either party would have entered/expanded absent the merger; and
- (b) whether the loss of future competition brought about by the merger would give rise to an SLC, taking into account other constraints and potential entrants.

310. The CMA has considered whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC arising from the loss of future competition in the supply of GNSS testing solutions, in particular having regard to the fact that Keysight had plans to significantly expand in this market.

5.3.5.1 Parties' submissions

311. The Parties submitted that Spirent is a leading supplier of GNSS testing solutions and that it offers a broad range of GNSS and related solutions.⁴¹⁹

312. The Parties initially submitted that Keysight does not offer GNSS testing solutions⁴²⁰ and that it does not have a product line in this area.⁴²¹ Keysight submitted subsequently that it offers generic signal generators which can generate some rudimentary GNSS signals.⁴²²

313. The Parties further submitted that Keysight lacks meaningful GNSS experience and that it has no real and concrete possibilities to expand its GNSS offering either organically or in combination with another supplier.⁴²³ In that regard, Keysight submitted that it recently started offering its VXG signal generator package in

⁴¹⁷ [CMA129](#), paragraph 5.1–5.4.

⁴¹⁸ [CMA129](#), paragraph 5.7

⁴¹⁹ Spirent's products include the PNT X Simulation System; GSS7765 Interference Simulation System; SimGEN; SimINERTIAL SimXona; and the GSS9000 GNSS Simulator.

⁴²⁰ FMN, paragraph 186.

⁴²¹ FMN, paragraph 348.

⁴²² Parties' response to the Issues Letter, 20 February 2025, paragraph 159. Keysight also resells Safran's (**Orolia**) GSG-8 GNSS Simulator which is an add-on product that is occasionally sold with Keysight's S870xA system to provide location-based Conformance and Performance test solutions. FMN, paragraph 353

⁴²³ Parties' response to the Issues Letter, 20 February 2025, paragraph 159.

combination with Syntony's GNSS Constellator, but that this collaboration is not exclusive and limited in scope with Keysight having sold [REDACTED] VXG-Syntony packages to date.⁴²⁴

314. The Parties further submitted that Syntony does not have a strong GNSS testing solution offering and that there are various other suppliers continuing to compete in this market, including Orolia and R&S.⁴²⁵

5.3.5.2 CMA's assessment

315. At the outset, the CMA notes that the Parties' statement that Keysight is not active in GNSS or does not offer GNSS testing solutions is not supported by the evidence. Keysight's internal documents confirm that it is active in GNSS testing solutions.⁴²⁶ The evidence available also indicates that, absent the Merger, Keysight had plans to expand in this market, which will be discussed further below.

5.3.5.3 Shares of supply

316. Consistent with the Parties' estimates, the CMA's share of supply estimates for GNSS testing solutions in 2023, as shown in Table 5, indicate that Spirent is by far the largest supplier, holding a share of [40-50]%. The next largest supplier, Safran has a share of [10-20]%. By contrast, Keysight has a minimal presence, holding just [0-5]% of the market in 2023.

Table 5: Global shares of supply in GNSS testing solutions (2024)

Supplier	Share
Keysight	[0-5]%
Spirent	[40-50]%
Combined	[40-50]%
Safran	[10-20]%
Rohde & Schwarz	[10-20]%
SNR	[0-5]%
AutoHill	[0-5]%
Others	[20-30]%

Source: Based on revenue information gathered from the Parties and other suppliers.

Notes: Where third-party revenue data for specific competitors was unavailable, the CMA has relied on the midpoints of the Parties' estimates of their revenues in 2023.

317. Overall, these shares of supply show that Spirent holds a strong position in a concentrated market and faces competition from Safran, R&S, and to a lesser extent, a tail of smaller suppliers.

⁴²⁴ Parties' response to the Issues Letter, 20 February 2025, paragraph 159. [REDACTED].

⁴²⁵ Parties' response to the Issues Letter, 20 February 2025, paragraphs 178-186 and verbal submissions made during the Issues meeting.

⁴²⁶ See for example Keysight internal document, KEYS-CMA-00008672, '[REDACTED]', 26 February 2018, page 5-6. [REDACTED].

318. While this overall picture is broadly consistent with the shares of supply set out in the Parties' internal documents, Spirent's internal documents contain several references that it has a share of [redacted] [50-60]%.⁴²⁷

5.3.5.4 Closeness of competition

5.3.5.4.1 Current competition

319. The CMA considers that Keysight's standalone offering is not the closest competitor to Spirent, based on the following sources of evidence.

- (a) Keysight has a low share of supply of [0-5]% (see Table 1).
- (b) The Parties submitted opportunities data for GNSS testing solutions covering the period November 2020 (January 2021 for Spirent) to November 2024.⁴²⁸ That data indicates that while Keysight and Spirent were competing in a few instances,⁴²⁹ other competitors were mentioned more often.
- (c) The CMA has only seen a few instances in which Keysight is discussed in Spirent's documents in relation to GNSS testing solutions, and a few instances in which Keysight views Spirent as a competitor.⁴³⁰
- (d) Only a very limited number of customers identified the Parties as alternatives to one another. Also a number of competitors identified Keysight as being an alternative to Spirent⁴³¹ albeit that some said that Keysight's solution had less functionality. The majority told the CMA that Spirent is a very strong alternative to Keysight's GNSS testing solution.⁴³²

320. The CMA notes that the opportunities data and other sources of evidence above reflect instances and descriptions of past competition and may not reflect ongoing competition in R&D and/or innovation. In light of this, and the considerations on the reliability of the data outlined in paragraphs 124124 to 129129, these pieces of

⁴²⁷ See for example, Spirent internal document, Annex 074. [redacted], May 2021, page 2 and Spirent internal document, Annex 9, [redacted], June 2023, page 15

⁴²⁸ Keysight's opportunities dataset contained [redacted] opportunities with [5-10]% ([redacted]) of those opportunities identifying a competitor. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4. Spirent's dataset contained [redacted] opportunities with [0-5]% ([redacted]) of those opportunities identifying a competitor. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'. This data and its potential limitations are discussed in paragraphs 124 to 129.

⁴²⁹ Spirent was identified in [5-10]% ([redacted]) of Keysight's opportunities where a competitor was identified. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

Keysight was identified in [0-5]% ([redacted]) of Spirent's opportunities where a competitor was identified. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'.

⁴³⁰ For example, a 2023 Spirent document identifies Keysight as being a competitor among other suppliers with [redacted]. See Spirent internal document, SPRNT_CMA-00086778, [redacted], 19 June 2023, page 6.

A Keysight document from 2022 compares its GNSS offering against Spirent. See Keysight internal document, KEYS-CMA-00009122, [redacted], 24 March 2022

⁴³¹ Response to the CMA's questionnaire from a number of third parties, January 2025, question 54.

⁴³² Response to the CMA's questionnaire from a number of third parties, January 2025, question 53.

evidence are interpreted with caution and considered alongside other evidence, eg internal documents and third-party evidence.

5.3.5.4.2 *Future competition*

5.3.5.4.2.1 *Keysight's planned expansion in GNSS*

321. The CMA considers that a significant number of Keysight's internal documents show that it has made consistent efforts, at least until the contemplation of the Merger,⁴³³ to expand in this area of Communications TME.⁴³⁴ While Keysight considered both organic and inorganic options to expand, it ultimately chose a partnership with an OEM-GNSS testing solution supplier, first by selling Orolia products,⁴³⁵ and, since the end of 2022, via a collaboration with Syntony.
322. The Parties have argued that the collaboration with Syntony would not improve Keysight's own GNSS product. However, the relevant consideration is whether Keysight, absent the Merger, would have the ability and incentive to continue its efforts to expand in this market.⁴³⁶ A large volume of Keysight internal documents showing its ongoing development plans including in the months leading up to the merger show that this is the case, for example:
- (a) A February 2023 presentation explains that part of Keysight's rationale for investing in Syntony is because [redacted] of its 'strong GPS / GNSS technology [redacted]'.⁴³⁷ The document further states that Syntony's solution is for complex geo-location simulations and that Syntony focuses on AD customers⁴³⁸ where it competes with Spirent.⁴³⁹
 - (b) Keysight and Syntony entered a Joint Development and Supply Agreement (**JDSA**) in February 2023.⁴⁴⁰ The CMA considers that the JDSA stipulates that Syntony will create a product based on the Constellator for Keysight for resale by Keysight as part of a Keysight Global Navigation Satellite System

⁴³³ Spirent's capabilities in GNSS testing were also cited by Keysight as one of the rationales for the Merger (see paragraph 5 above). See Keysight internal document, '024_4(c)-24_[redacted]', 7 March 2024, which states that 'Sigma [Spirent] addresses critical technology gap with the leading GNSS portfolio.'

⁴³⁴ See for example Keysight internal document, KEYS-CMA-00008672, '[redacted]', 26 February 2018, page 11; Keysight internal document, KEYS-CMA-00009454, '[redacted]', 10 September 2020, page 1 which discusses a partnership with Spirent; Keysight internal document, KEYS-CMA-00006688, '[redacted]', June 2022, page 26

⁴³⁵ A January 2023 Keysight document states that, [redacted]. Keysight internal document, KEYS-CMA-00006891, '[redacted]', 8 January 2023, page 11. See also Keysight internal document, KEYS-CMA-00007421, '[redacted]', 21 November 2022, page 7. The CMA notes that these documents discuss some aspects of conformance and performance testing, [redacted]. The CMA considers that the Parties' reference to finding 'real and concrete possibilities' to expand/enter (see Parties' IL Response, paragraph 21, citing a discussion of potential competition in Antitrust 'pay for delay' cases in a [UK OECD paper](#)), is not the appropriate test to apply here.

⁴³⁶ See CMA129, paragraph 2.29(c), cited in the Parties' IL Response, paragraph 20. For example, see Provisional Findings Report, [Adobe Figma](#), paragraph 16 and paragraphs 6.13-6.15.

⁴³⁷ Keysight internal document, KEYS-CMA-00006826, '[redacted]', 3 February 2023, page 2

⁴³⁸ The CMA understands that the term 'AD customers' refers to Aerospace and Defence customers.

⁴³⁹ Keysight internal document, KEYS-CMA-00006826, '[redacted]', 3 February 2023, page 3

⁴⁴⁰ Keysight internal document, KEYS-CMA-00006831, 2 February 2023, page 1

Solution.⁴⁴¹ The CMA considers that the JDSA is therefore not a mere reselling contract as Keysight claims,⁴⁴² but intended to improve Keysight's GNSS offering.

- (c) A February 2024 slide deck prepared for the MWC conference in Barcelona sets out a joint Keysight and Syntony solution combining Syntony GNSS software and a Keysight VXG signal generator which was demonstrated at the conference as a Keysight solution.⁴⁴³
- (d) A Keysight document from February 2024 titled '[redacted]' discusses how Syntony technology would be combined with Keysight technology such as the VXG-C signal generator and the UXM Wi-Fi test product. The document includes an estimated timeline for bringing these products to market, indicates that the joint offering would have various use cases for several different types of customers, and also sets out that [redacted].⁴⁴⁴
- (e) A Keysight slide deck from March 2024 called '[redacted]' also sets out that the Keysight's growth in GNSS testing solutions should be in several sectors [redacted] with more advanced features being introduced later specifically mentioning the Constellator with the target of taking share from competitors.⁴⁴⁵ That document also compares Syntony's GNSS testing capabilities against other key competitors (eg Spirent, Orolia and R&S) indicating that Syntony has similar Satellite and Function coverage capabilities as Spirent and Orolia.
- (f) Another Keysight slide deck from March 2024 titled '[redacted]' notes that Keysight [redacted] with various workstreams in place to integrate the Keysight and Syntony products under an accelerated plan and new integration work between Keysight's UXM and Syntony's SDR.⁴⁴⁶ The same document also sets out [redacted].⁴⁴⁷

323. On the basis of the above evidence, the CMA considers that Keysight's investment in Syntony and the JDSA enabled Keysight to improve its GNSS testing solutions offering in order to expand in the GNSS testing solutions market, and that there is clear evidence that further enhancement of Keysight's offering was envisaged with further development of products with Syntony.

324. Contrary to the Parties' submission, the above evidence also indicates that the combination of the VXG and the Constellator were deemed to be an improved product combination by Keysight and it intended the combination to be deployed

⁴⁴¹ [redacted]. See Keysight internal document, KEYS-CMA-00006831, 2 February 2023, page 14, paragraph 18.6 of the JDSA

⁴⁴² See Parties' IL Response, paragraph 173

⁴⁴³ Keysight internal document, KEYS-CMA-00007349, '[redacted]', 21 February 2024, pages 41-44

⁴⁴⁴ Keysight internal document, KEYS-CMA-00009565.pptx, '[redacted]', 2 January 2024, pages 4-6, 15 and 16.

⁴⁴⁵ Keysight internal document, KEYS-CMA-00010373.pptx, '[redacted]', 7 March 2024. Slide 9

⁴⁴⁶ Keysight internal document, KEYS-CMA-00007222.pptx, '[redacted]', 22 March 2024, slide 4.

⁴⁴⁷ Keysight internal document, KEYS-CMA-00007222.pptx, '[redacted]', 22 March 2024, slide 5

with various customers and use cases. While the CMA acknowledges that not many sales of the combined products have taken place to date, the CMA considers that this fact needs to be placed in the context of the Transaction, which was in contemplation from at least March 2024. Keysight's incentives to actively market the combined products may have been dampened by the Merger and the prospect of obtaining Spirent's GNSS testing solutions.

325. Therefore, the CMA considers that, in the absence of the Merger, Keysight would have had the ability and incentive to expand in the GNSS testing solutions market.

5.3.5.4.3 Syntony

326. Evidence suggests that while Syntony is currently a smaller supplier in GNSS testing solutions (with a market share of 0-5%), [REDACTED] which is supported by the following evidence.
327. The CMA has seen various internal documents from both Parties that analyse Syntony and identify it as a key competitor, including wins in tenders.⁴⁴⁸
328. While the CMA acknowledges the Parties' arguments that Syntony may not have been among the most successful competitors in tenders and that its wins seem to have been concentrated on opportunities in India a while ago and more recently the Airbus tender in France, this nonetheless indicates that Syntony has been able to win significant tenders. Keysight's internal documents also show that Keysight views Syntony's capabilities as being comparable on a number of metrics to the market leader Spirent.
329. While the CMA also acknowledges that no customers identified Syntony as an alternative to Spirent, a few competitors identified Syntony as a strong alternative to Spirent.⁴⁴⁹ One third party also said that the combination of Keysight's and Spirent's products would enable these two parties to address new markets which would otherwise not be possible.

⁴⁴⁸ Spirent internal document, SPRNT_CMA-00081849.xlsx, '[REDACTED]', 16 April 2024; Spirent internal document, SPRNT_CMA-00081655.xlsx, '[REDACTED]', 20 July 2022; Spirent internal document, SPRNT_CMA-00082163.docx, '[REDACTED]', 9 February 2024; Spirent internal document, SPRNT_CMA-00089550.pdf, '[REDACTED]', 31 December 2023, page 5 and 7; Spirent internal document, SPRNT_CMA-00092313.pdf, '[REDACTED]', 6 October 2022, page 11; Keysight internal document, '[REDACTED]', 24 April 2024, page 4; Keysight internal document, KEYS-CMA-00010373.pptx, '[REDACTED]', 7 March 2024. [REDACTED] However, the CMA is currently minded to place very little weight on this document, as it has been drafted when the Merger was in contemplation and there are no particular reasons in the document which explain the lower rating. Spirent internal document, '[REDACTED]' which sees [REDACTED] as a direct competitor to Spirent (but rather in the PNT RPS space as opposed to the PNT simulation space. The CMA understands that RPS refers to Record and Playback System. However, the CMA currently understands that Spirent views this as a separate market, see [REDACTED], page 4, and that therefore, this is less relevant to the CMA's competitive assessment.

⁴⁴⁹ Response to the CMA's questionnaire from a number of third parties, January 2025, question 55.

5.3.5.4.4 *Alternative constraints*

5.3.5.4.4.1 *Safran/Orolia*

330. Safran (previously Orolia) is the second largest provider with a share of [10-20]%, see Table 5 above. Both Parties' internal documents regularly identify Orolia as a key competitor.⁴⁵⁰
331. Consistent with this it was identified as a competitor in [REDACTED] of Spirent's opportunities where a competitor was identified.⁴⁵¹ Safran was not identified [REDACTED].⁴⁵²
332. Safran was identified by only a few customers as an alternative to Spirent⁴⁵³ –one customer stating that it is a 'moderately' effective alternative⁴⁵⁴ and another as a 'slightly' effective alternative.⁴⁵⁵
333. Half of the competitors identified Safran as a strong competitor⁴⁵⁶ and the other half did not identify Safran at all.

5.3.5.4.4.2 *Rohde & Schwarz*

334. R&S is the third largest provider with a share of [10-20]%, see Table 5 above. The CMA currently considers that Parties' internal documents analyse R&S in some detail⁴⁵⁷ but there is mixed evidence on actual competition between R&S, with a

⁴⁵⁰ Spirent internal document, SPRNT_CMA-00089847.docx, '[REDACTED]', May 2022, page 9; Spirent internal document, SPRNT_CMA-00034724.pptx, '[REDACTED]', March 2023, page 4, 5, 11, 14 and 27 onwards; Spirent internal document, SPRNT_CMA-00086778.pptx, '[REDACTED]', 2023, page 6-7; Spirent internal document, SPRNT_CMA-00026716.pdf, '[REDACTED]', 11 April 2023, page 57; Annex 009. [REDACTED]; Spirent internal document, SPRNT_CMA-00089550 (1).pdf, 31 December 2023, page 5 and 7; Spirent internal document, SPRNT_CMA-00021418.xlsx, '[REDACTED]', July 2024, tab '[REDACTED]'. See Spirent internal document, SPRNT_CMA-00021418.xlsx, '[REDACTED]', July 2024, tab 'Risk Register - new'. Keysight internal document KEYS-CMA-00009122.pptx, '[REDACTED]', 24 March 2022

⁴⁵⁰ This includes [REDACTED] opportunities where Spectracom was identified as the CMA understands that Spectracom was acquired by Orolia in 2007. Spectracom Corporation Acquired by Orolia - Safran - Navigation & Timing last accessed 10 February 2025. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'

⁴⁵¹ This includes [REDACTED] opportunities where Spectracom was identified as the CMA understands that Spectracom was acquired by Orolia in 2007. Spectracom Corporation Acquired by Orolia - Safran - Navigation & Timing last accessed 10 February 2025. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'.

⁴⁵² Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

⁴⁵³ Response to the CMA's questionnaire from a number of third parties, January 2025, question 55.

⁴⁵⁴ Response to the CMA's questionnaire from number third party, January 2025, question 55.

⁴⁵⁵ Response to the CMA's questionnaire from a third party, January 2025, question 55.

⁴⁵⁶ Response to the CMA's questionnaire from a number of third parties, January 2025, question 55.

⁴⁵⁷ [REDACTED], see Keysight internal document KEYS-CMA-00009122.pptx, '[REDACTED]', 24 March 2022; [REDACTED]. Keysight internal document, KEYS-CMA-00010373.pptx, '[REDACTED]', 7 March 2024. [REDACTED] (KEYS-CMA-00009493.pptx, page 26) [REDACTED]. However, the CMA is currently minded to place very little weight on this document, as it has been drafted when the Merger was in contemplation and there are no particular reasons in the document which explain the higher rating. [REDACTED]. See Spirent internal document, SPRNT_CMA-00034724.pptx, '[REDACTED]', March 2023, page 4, 6, 10 and 14

2022 Spirent document indicating some interaction⁴⁵⁸ while others suggest there is no actual competition in 2024.⁴⁵⁹

335. Consistent with some monitoring of R&S, it identified as a competitor in [X] of Spirent's opportunities where a competitor was identified⁴⁶⁰ and [X] of Keysight's opportunities where a competitor was identified.⁴⁶¹
336. R&S was identified by only a limited number of customers as an alternative to Spirent⁴⁶² and a number of competitors said that R&S competed with the Parties.⁴⁶³

5.3.5.4.4.3 Labsat/Racelogic

337. The Parties estimated that Labsat/Racelogic has a share of supply of [0-5]%. Only a limited number of the Parties' internal documents analyse Labsat.⁴⁶⁴
338. Labsat was identified as a competitor in [X] of Spirent's opportunities where a competitor was identified⁴⁶⁵ [X].⁴⁶⁶
339. Only a very limited number of third parties identified Labsat as a competitor.⁴⁶⁷

5.3.5.4.4.4 Other competitors

340. Other competitors identified by the Parties were SNR, CAST, Anritsu and iFEN.
341. **SNR** is analysed in the internal documents to a limited extent, with Spirent noting that it is focused on China.⁴⁶⁸ SNR was identified as a competitor in [X] of Spirent's opportunities where a competitor was identified.⁴⁶⁹ [X]⁴⁷⁰ and it was not identified by any third party responding to the CMA's investigation.

⁴⁵⁸ See Spirent internal document, SPRNT_CMA-00089847.docx, '[X]', May 2022, page 9 which states that Spirent lost more opportunities [X].

⁴⁵⁹ Spirent internal document, SPRNT_CMA-00081849.xlsx, '[X]', 16 April 2024

⁴⁶⁰ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'.

⁴⁶¹ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

⁴⁶² Response to the CMA's questionnaire from a number of third parties, January 2025, question 55.

⁴⁶³ Response to the CMA's questionnaire from a number of third parties, January 2025, question 54.

⁴⁶⁴ Spirent internal document, SPRNT_CMA-00082163.docx, '[X]', 9 February 2024; Spirent internal document, SPRNT_CMA-00081849.xlsx, '[X]', 16 April 2024; Spirent internal document, SPRNT_CMA-00021418.xlsx, '[X]', July 2024, tab 'Risk Register - new'. Spirent internal document, SPRNT_CMA-00034724.pptx, '[X]', March 2023, page 4, 8 and 13. [X] see SPRNT_CMA-00012788.pptx, '[X]', 13 November 2023, page 4, [X]; Keysight internal document, '[X]', April 2022, page 9

⁴⁶⁵ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'.

⁴⁶⁶ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

⁴⁶⁷ Response to the CMA's questionnaire from a number of third parties, January 2025, question 54.

⁴⁶⁸ Spirent internal document, SPRNT_CMA-00034724.pptx, '[X]', March 2023, page 4, 7, 12 and 14. See also Spirent internal document, SPRNT_CMA-00021418.xlsx, '[X]', July 2024, tab 'Risk Register - new'.

⁴⁶⁹ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'.

⁴⁷⁰ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

342. **CAST** was identified by some competitors,⁴⁷¹ but no customers, and Spirent internal documents analyse CAST only to a very limited extent.⁴⁷²
343. **Anritsu** was identified as a competitor in [redacted] of Keysight's opportunities where a competitor was identified⁴⁷³ and [redacted].⁴⁷⁴ Anritsu was rarely, if at all, listed as a competitor in the Parties' internal documents and not considered as an alternative by any third party.
344. **iFEN** was identified by only one competitor⁴⁷⁵ and Spirent's internal documents analyse iFEN only to some extent.⁴⁷⁶
345. The Parties made no specific submissions regarding entry or expansion in the supply of GNSS testing solutions. Consistent with that, the CMA has not seen evidence of entry or expansion that would constrain the Merged Entity.

5.3.5.5 Conclusion

346. The CMA considers that Spirent is the clear market leader in GNSS testing solutions, being twice as large as the next biggest competitor (Orolia). The CMA considers that where one merger firm has a strong position in the market, even small increments in market power may give rise to competition concerns.⁴⁷⁷ The evidence also indicates that Keysight is active in this market today and has clear plans to significantly expand with the VGX/Constellator product combination that, in Keysight's documents is described as able to address various types of customers and applications. The constraints on the Merged Entity are limited to Orolia and to a much lesser extent R&S and some other competitors.
347. For the reasons set out above, the CMA believes that, absent the Merger, Keysight in collaboration with Syntony would have expanded in GNSS, which is a concentrated market. Accordingly, the CMA found that there is a realistic prospect that the Merger gives rise to an SLC as a result of the loss of future competition in the supply of GNSS testing solutions globally.

⁴⁷¹ Response to the CMA's questionnaire from a number of third parties, January 2025, question 53 and 54.

⁴⁷² Spirent internal document, SPRNT_CMA-00034724.pptx, '[redacted]', March 2023, page 4 and 14 and Spirent internal document, SPRNT_CMA-00082163.docx, '[redacted]', 9 February 2024

⁴⁷³ Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 4.

⁴⁷⁴ Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - GNSS (2024-12-12).xlsx'.

⁴⁷⁵ Response to the CMA's questionnaire from a third party, January 2025, question 53.

⁴⁷⁶ Spirent internal document, SPRNT_CMA-00082163.docx, '[redacted]', 9 February 2024. An analysis of opportunities in the financial year 2024 lists iFEN winning one out of 16 opportunities. Spirent internal document, SPRNT_CMA-00081849.xlsx, '[redacted]', 16 April 2024; Spirent internal document, SPRNT_CMA-00089550 (1).pdf, '[redacted]', 31 December 2023, page 5 and 7

⁴⁷⁷ [CMA129](#), paragraph 4.12.

5.3.6 Theory of harm 6: horizontal unilateral effects in location-based conformance and performance testing solutions

348. To assess whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in the supply of location based conformance and performance testing solutions on a global basis, the CMA has adopted the framework set out in paragraph 95 to 101 above.

5.3.6.1 *Parties' submissions*

349. The Parties submitted that they are not competitors in conformance and performance testing. In particular, the Parties submitted that:

- (a) Spirent's product is a dedicated location-only testing product for 4G/5G devices and competes with R&S.
- (b) Keysight offers broader conformance and performance testing and competes with Anritsu, R&S (which has both a broader product and a location specific product), and StarPoint. Keysight's location-based conformance features are limited (requiring customers to purchase an off-the-shelf Orolia product) and Keysight does not compete for customers that require a dedicated location-based conformance and performance solution like Spirent's 8100.⁴⁷⁸

350. The Parties further submitted that even if there were some competition between the Parties, there are several other competitors that, like Keysight, offer conformance and performance test products for multiple test cases or, like Spirent, offer conformance and performance test products for location-based testing.⁴⁷⁹

351. At the Issues Meeting, the Parties submitted that there would be no future demand for Spirent's 8100 Mobile Device Test System in the UK. The Parties submitted that the 8100 is primarily used for testing conformance with CTIA/E911 location-based services, which are only deployed in North America or relevant to mobile phone manufacturers not present in the UK. The Parties also submitted that Spirent made no UK sales of the 8100 in 2024. Accordingly, the Parties submitted that there is no competition between the Spirent 8100 and any Keysight product in the UK for location-based conformance testing, and thus no basis for concerns about a possible SLC affecting UK customers.⁴⁸⁰

⁴⁷⁸ FMN, paragraphs 670-675; Parties' response to the CMA's RFI 6, Annex 10; Parties' response to the Issues Letter, 20 February 2025, paragraph 188.

⁴⁷⁹ Parties' response to the CMA's RFI 6, Annex 10; Parties' response to the Issues Letter, 20 February 2025, paragraph 188.

⁴⁸⁰ Parties' response to the Issues Letter, 20 February 2025, paragraph 188.

5.3.6.2 CMA's assessment

5.3.6.2.1 Shares of supply

352. As noted above at paragraphs 106106 to 108107, while shares of supply can be a useful starting point for the analysis, the CMA considers it appropriate to consider evidence on shares of supply alongside other evidence, including development plans. This is particularly relevant for the supply of location-based conformance and performance TME, given that it is difficult to precisely attribute revenues solely to location-based testing, as some products also encompass broader conformance and performance testing functionality.
353. The CMA has considered shares of supply for location-based testing alongside shares of supply for the overall conformance and performance market to provide insight into both the broader position of suppliers and their specific market position for location-based testing.
354. The Parties estimated that Keysight holds a [20-30]% share of the overall conformance and performance market, while Spirent, as the fifth-largest supplier, accounted for only [0-5]%.⁴⁸¹ Table 6 below presents the CMA's supply share estimates for the supply of conformance and performance testing solutions in 2024 which are broadly consistent with the Parties' estimates.⁴⁸²

Table 6: Global shares of supply in conformance and performance testing solutions (2024)

Supplier	Share (%)
Keysight	[20-30]
Spirent	[0-5]
Combined	[30-40]
Anritsu	[30-40]
R&S	[10-20]
Starpoint	[5-10]
Teradyne	[5-10]
Comprion	[0-5]
Datang	[0-5]

Source: CMA estimates based on revenue data from the Parties and third parties.

Notes: Where third-party revenue data for specific competitors was unavailable, the CMA has relied on the midpoints of the Parties' estimates of their revenues in 2023. The Parties' 'Others' category has not been included as the evidence available to the CMA does not show that there are other suppliers who exert a competitive constraint on the Parties.

355. Table 6 shows that Keysight is the second largest supplier with a [20-30]% share and Spirent the sixth largest with a share of [0-5]%. In terms of other suppliers,

⁴⁸¹ The Parties estimates relate to the supply of conformance and performance in 2023. By comparison, The CMA's has updated these share estimates with information for 2024 where possible. Parties' response to the CMA's RFI 6, Annex 10.

⁴⁸² Contrary to the Parties' share estimates, the CMA has not included Orolia in its share of supply estimates, as there is no evidence that Orolia is a relevant supplier of location-based testing. Orolia's hardware cannot independently perform location-based testing, and according to the Parties, customers using the Orolia GNSS simulator as part of their location-based testing suite would generally not procure it independently of Keysight's conformance and performance testing solution. The CMA also notes that it has not included the Parties' estimates for unnamed others in its share estimates, as there is limited evidence of the Parties competing with these suppliers to a meaningful degree. Parties' response to the CMA's RFI 6, question 9.

Anritsu is the largest with a share of [30-40]% and R&S the third largest with a share of [10-20]%.

356. Based on the evidence available to the CMA, only Keysight, Spirent, Anritsu, and R&S are active in the supply of location-based conformance and performance testing. While the CMA has estimated shares of supply for this market, due to limitations in the way data has been allocated to location-based testing, these estimates are likely to significantly overstate the share of Anritsu.⁴⁸³ The CMA's estimate for Keysight includes only sales attributed to units sold with location-based testing functionality, along with its sales of the Orolia add-on and any associated location-based testing licenses.⁴⁸⁴
357. Table 7 below presents the CMA's supply share estimates for the supply of location-based conformance and performance testing solutions in 2024.

Table 7: Global shares of supply in location-based conformance and performance testing solutions (2024)

Supplier	Share (%)
Spirent	[20-30]
Keysight	[10-20]
Combined	[30-40]
Anritsu	[30-40]
R&S	[20-30]

Source: CMA estimates based on revenue data from the Parties and third parties

358. Table 7 shows that both Parties hold a material market position and that the Merged Entity would account for at least a [30-40]% share of supply.
359. Given the potential unreliability of these estimates, the CMA has also considered evidence from the Parties' internal documents, which suggest that Spirent may hold a more significant market position than indicated by the share estimates set out above. Specifically, Spirent views itself as the market leader in location-based testing and a Spirent internal document dated January 2024 estimates that Spirent is the largest supplier of location-based testing (with a share of around [X]), followed by R&S ([X]), Anritsu ([X]), and then Keysight ([X]).⁴⁸⁵ The Parties submitted that Spirent's estimates were incorrect due to a lack of access to actual sales data.⁴⁸⁶ However, the CMA considers Spirent's own estimates of its market position to be informative and, in any case, finds them consistent with the CMA's own assessment.

⁴⁸³ Response to the CMA's questionnaire from a third party, January 2025, question 40 and 41.

⁴⁸⁴ The Parties argued that this approach is erroneous however, the CMA has adopted it on a conservative basis, and acknowledges that it may overstate Keysight's market position. Parties' response to the Issues Letter, 20 February 2025, paragraph 191.

⁴⁸⁵ See, for example: Spirent Internal Document, SPRNT_CMA-00048746, '[X]', January 2024, page 18; Spirent Internal Document, SPRNT_CMA-00057873, '[X]', April 2024, page 21. Spirent Internal Document, SPRNT_CMA-00048746, '[X]', January 2024, page 4.

⁴⁸⁶ Parties' response to the Issues Letter, 20 February 2025, paragraph 192.

5.3.6.2.2 Closeness of competition

360. The CMA considers that both Parties are actively supplying location-based conformance and performance testing.⁴⁸⁷ The Parties' internal documents also indicate that they consider each other competitors and have some overlap in functionality, specifically in conformance and carrier acceptance testing.⁴⁸⁸
361. However, other evidence suggests that the Parties have differentiated offerings and that there is limited demand in the UK for the areas where they directly overlap.
362. First, Spirent's internal documents confirm that in 2020 it made a strategic decision to solely focus on the supply of location-based testing.⁴⁸⁹ By comparison, location-based testing constitutes a small part of Keysight's overall conformance and performance sales, with its products integrating both location-based and non-location-based testing into a single solution.⁴⁹⁰ Spirent acknowledges in its documents that it has a narrow focus, compared to [X] which it describes as 'traditional' suppliers of conformance and performance solutions.⁴⁹¹
363. Second, while they monitor each other to some extent in relation to location-based services, the internal documents of both Parties highlight weaknesses and limitations in Keysight's offering. For example, Spirent's internal documents indicate that its closest competitor is R&S, while Keysight is a weaker competitor, in part because Keysight focuses on conformance testing, whereas Spirent, while also supplying conformance testing, primarily focuses on performance testing.⁴⁹²
364. Moreover, in the UK this differentiation may lead to a lack of competition between the Parties. As noted at paragraph 351 above, the Parties submitted that there is no competition between them for UK customers as there is limited UK demand for location-conformance testing and Spirent does not supply location-conformance

⁴⁸⁷ See, for example: [Keysight and Orolia Advance 5G Location-Based Services Based on Global Navigation Satellite System Technologies | Keysight](#). See also: Keysight Internal Document, Annex 135 to FMN, page 14; Keysight Internal Document, KEYS-CMA-00000324, 'Communications Solutions Group Order Narrative', undated, page 20; Keysight Internal Document, KEYS-CMA-00005580, June 2023, page 25 and 31. See also: Spirent Internal Document, SPRNT_CMA-00077314, '[X]', October 2022, page 1.

⁴⁸⁸ See, for example: Keysight Internal Document, KEYS-CMA-00000324, '[X]', undated, pages 19, 24 and 31; Keysight Internal Document, KEYS-CMA-00000366, March 2023, page 8; Keysight Internal Document, Annex 135 to FMN, page 14; Spirent Internal Document, SPRNT_CMA-00077314, '[X]', October 2022, page 4; Spirent Internal Document, SPRNT_CMA-00061150, '[X]', September 2022, page 3.

⁴⁸⁹ In particular, Spirent appears to have a particular strength in location-based performance testing. Spirent Internal Document, SPRNT_CMA-00077314, '[X]', October 2022, page 1; Spirent Internal Document, SPRNT_CMA-00061150, '[X]', September 2022, page 3.

⁴⁹⁰ FMN, paragraph 670. Supporting this, a Keysight internal document describes location-based testing as [X], while another describes it [X]. Keysight Internal Document, KEYS-CMA-00000972, '[X]', undated, page 8 and 15; Keysight Internal Document, KEYS-CMA-00005580, June 2023, page 25.

⁴⁹¹ Spirent Internal Document, SPRNT_CMA-00054043, '[X]', May 2024, page 3; Spirent Internal Document, SPRNT_CMA-00062970, '[X]', March 2024, page 7.

⁴⁹² Spirent Internal Document, SPRNT_CMA-00077314, '[X]', October 2022, page 4. See also: Spirent Internal Document, SPRNT_CMA-00061150, '[X]', September 2022, page 3. This also appears to be reflected in the average selling prices of the Parties' solutions, as Spirent's 8100 is priced similarly to Keysight's S8704, despite the latter offering a broader range of functionality.⁴⁹² Parties' response to the CMA's RFI 6, Annexes 15 and 16. See also: Keysight Internal Document, KEYS-CMA-00018819, '[X]', undated, pages 79-87.

testing relevant to the UK. The CMA has not received any evidence to the contrary, nor any indication from UK customers of demand for Spirent's 8100 location-based testing features. In fact, the CMA notes that the Parties' internal documents suggest their competition in location-based testing may be focused on non-UK carrier acceptance testing.⁴⁹³ The CMA also found no evidence that Spirent planned to expand its functionality to serve UK-based customers.

365. Third, in the opportunities data provided (see paragraphs 124 to 129), Keysight [X],⁴⁹⁴ even if Spirent did identify Keysight in some of the very small number of opportunities where a competitor was identified.⁴⁹⁵ While this data covered all conformance and performance testing opportunities, it is consistent with the Parties differentiated offerings.
366. Fourth, the limited evidence from third parties is consistent with differentiated offerings and limited UK demand. None of the Keysight customers that responded to the CMA questionnaire identified Spirent as an alternative to Keysight's broader conformance and performance testing products (although none appeared to use Keysight products for location-based testing).⁴⁹⁶ While one non-UK based Spirent customer which responded identified Keysight as an effective alternative to the Spirent 8100,⁴⁹⁷ one competitor said that Spirent focuses on location-based testing whereas Keysight is weak in that area.⁴⁹⁸
367. Finally, there is limited evidence to suggest that the Parties' offerings were likely to become closer competitors in the future.
- (a) Keysight's documents [X].⁴⁹⁹ In addition, the available evidence indicates that Keysight's [X] in location-based testing is [X] and [X].⁵⁰⁰
- (b) There is no evidence Spirent plans to reposition its 8100 product line, [X].⁵⁰¹ After the Issues Meeting, the Parties further submitted that [X].⁵⁰²

⁴⁹³ Keysight Internal Document, KEYS-CMA-00005580, June 2023, page 31; Spirent Internal Document, SPRNT_CMA-00077314, '[X]', October 2022, page 1; Parties' response to the Issues Letter, 20 February 2025, paragraph 190.

⁴⁹⁴ Keysight's opportunities dataset contained [X] opportunities with [10-20]% of those opportunities identifying a competitor. FMN, Annex 140.

⁴⁹⁵ Spirent's dataset contained [X] opportunities with [0-5]% of those opportunities identifying a competitor. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1.

⁴⁹⁶ Response to the CMA's questionnaire from a number of third parties, January 2025, question 45.

⁴⁹⁷ Response to the CMA's questionnaire from a third party, January 2025, question 47.

⁴⁹⁸ Response to the CMA's questionnaire from a third party, January 2025, question 45; Note of a call with a third party, paragraph 31.

⁴⁹⁹ Keysight Internal Document, KEYS-CMA-00000521, '[X]', July 2022, pages 9, 10, 11, 22, 23 and 34. Keysight Internal Document, KEYS-CMA-00005580, June 2023, pages 25 and 31. Spirent Internal Document, SPRNT_CMA-00077314, 'Post Investment Review for 8100 Oct 2022', October 2022, page 6; Parties' response to the Issues Letter, 20 February 2025, paragraph 194.

⁵⁰⁰ Parties' response to the CMA's RFI 6, question 8.

⁵⁰¹ Spirent Internal Document, SPRNT_CMA-00004361, '[X]', September 2023, pages 4 and 9; FMN, Annex 145.

⁵⁰² Parties' response to the Issues Letter, 20 February 2025, paragraph 195.

5.3.6.2.3 *Alternative competitive constraints*

5.3.6.2.3.1 *R&S*

368. R&S supplies a range of products that support both location-based and non-location-based testing, including the CMX500 and the TS-LBS, which is a dedicated location-based testing solution.
369. In line with the Parties' submissions, Keysight's internal documents show that its solutions compete closely with R&S in the wider conformance and performance space, which includes location-based testing, and a range of non-location based testing.⁵⁰³ Consistent with this, R&S frequently appears in Keysight's opportunities data which includes all conformance and performance opportunities. Specifically, R&S was identified in [REDACTED] of Keysight's opportunities where a competitor was recorded, with its presence increasing over time.⁵⁰⁴ In addition, all Keysight customers identified R&S as an alternative to Keysight's S870xA product line.⁵⁰⁵
370. More specifically in relation to location-based testing, evidence shows that R&S is a close competitor to both Parties. Keysight's internal documents indicate that it competes closely with R&S in location-based testing functionality and that Keysight's product development in location-based conformance testing may be aimed at capturing business from R&S.⁵⁰⁶ Spirent's internal documents indicate that R&S is Spirent's closest competitor in location-based testing, consistent with it offering a comparable dedicated location-based solution.⁵⁰⁷ In line with this, all Spirent customers said that R&S were an alternative to Spirent's location-based testing functionality.⁵⁰⁸ One competitor said that R&S focuses on location-based testing.⁵⁰⁹

⁵⁰³ See, for example: Keysight Internal Document, June 2023, page 25; Keysight Internal Document, KEYS-CMA-00000521, '[REDACTED]', July 2022, pages 9, 10, 22, 23 and 24; Keysight Internal Document, KEYS-CMA-00002841, '[REDACTED]', October 2021, pages 4 to 16; Keysight Internal Document, KEYS-CMA-00005819, '[REDACTED]', October 2022, page 6; Keysight Internal Document, KEYS-CMA-00018819, '[REDACTED]', undated, pages 79-87.

⁵⁰⁴ The CMA notes that [REDACTED]. However, the CMA has placed very limited weight on this due to the small sample size and contrary documentary evidence. FMN, Annex 140; Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1.

⁵⁰⁵ Response to the CMA's questionnaire from a number of third parties, January 2025, question 47.

⁵⁰⁶ Keysight Internal Document, KEYS-CMA-00000324, '[REDACTED]', undated, pages 19, 24 and 31; Keysight Internal Document, KEYS-CMA-00005580, June 2023, page 25; Keysight Internal Document, KEYS-CMA-00018819, '[REDACTED]', undated, pages 79-87; Keysight Internal Document, Annex 135 to FMN, page 14; Keysight Internal Document, KEYS-CMA-00000521, '[REDACTED]', July 2022, pages 9, 10, 11, 22, 23 and 34.

⁵⁰⁷ See, for example: Spirent Internal Document, SPRNT_CMA-00077314, '[REDACTED]', October 2022, page 4; Spirent Internal Document, SPRNT_CMA-00057105, '[REDACTED]', March 2023, pages 7 and 8; Spirent Internal Document, SPRNT_CMA-00061150, '[REDACTED]', September 2022, page 3; Spirent Internal Document, SPRNT_CMA-00054043, '[REDACTED]', May 2024, page 27; Spirent Internal Document, SPRNT_CMA-00004672, '[REDACTED]', January 2024, page 11.

⁵⁰⁸ Response to the CMA's questionnaire from a number of third parties, January 2025, question 47.

⁵⁰⁹ Response to the CMA's questionnaire from a third party, January 2025, question 45; Note of a call with a third party, paragraph 31.

5.3.6.2.3.2 Anritsu

371. Anritsu supplies a range of conformance and performance testing solutions offering non-location-based testing. One of Anritsu's product lines supports location-based testing through the integration of Orolia's GNSS simulator.
372. In line with the Parties' submissions, Keysight's internal documents indicate that Keysight competes closely with Anritsu in the broader conformance and performance space.⁵¹⁰ Consistent with this, Anritsu is the most frequently identified competitor in Keysight's data and appears in [REDACTED] of Keysight's opportunities that identified a competitor.⁵¹¹ In addition, a few Keysight customers identified Anritsu as an alternative to Keysight's S870xA product line.⁵¹²
373. However, there is limited evidence that Keysight competes closely with Anritsu in location-based testing, as its documents discussing competition in this market primarily focus on R&S and Spirent as discussed above.
374. Spirent's internal documents acknowledge competition from Anritsu in location-based testing, depicting it as the fourth competitor in this market after Spirent itself, R&S, and Keysight. Spirent's internal documents also indicate that Anritsu offers more limited location-based functionality.⁵¹³
375. While one customer said that Anritsu is a 'fully effective' alternative to Spirent for conformance testing,⁵¹⁴ a few competitors stated that Anritsu is a weak competitor to Spirent's location-based test offering, with one explaining that Anritsu offers a more limited set of test cases.⁵¹⁵

5.3.6.2.3.3 Others

376. Keysight's internal documents indicate that the S870xA product line competes with Starpoint in the broader conformance and performance space. Its documents also indicate some limited competition with Datang.⁵¹⁶ However, Keysight and Spirent's internal documents do not identify these as suppliers of location-based

⁵¹⁰ See, for example: Keysight Internal Document, KEYS-CMA-00005580, June 2023, page 25; Keysight Internal Document, KEYS-CMA-00000521, '[REDACTED]', July 2022, pages 9, 10, 22, 23 and 24; Keysight Internal Document, KEYS-CMA-00002841, '[REDACTED]', October 2021, pages 4 to 16; Keysight Internal Document, KEYS-CMA-00005819, '[REDACTED]', October 2022, page 6; Keysight Internal Document, KEYS-CMA-00018819, '[REDACTED]', undated, pages 79-87.

⁵¹¹ FMN, Annex 140; Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1.

⁵¹² Response to the CMA's questionnaire from a number of third parties, January 2025, question 47.

⁵¹³ See, for example: Spirent Internal Document, SPRNT_CMA-00077314, '[REDACTED]', October 2022, page 4; Spirent Internal Document, SPRNT_CMA-00057105, '[REDACTED]', March 2023, pages 7 and 8; Spirent Internal Document, SPRNT_CMA-00061150, '[REDACTED]', September 2022, page 3; Spirent Internal Document, SPRNT_CMA-00004672, '[REDACTED]', January 2024, page 11.

⁵¹⁴ Response to the CMA's questionnaire from a third party, January 2025, question 45.

⁵¹⁵ Response to the CMA's questionnaire from a third party, January 2025, question 47.

⁵¹⁶ See, for example: Keysight Internal Document, KEYS-CMA-00002841, '[REDACTED]', October 2021, page 9; Keysight Internal Document, KEYS-CMA-00018819, '[REDACTED]', undated, pages 79-87; Keysight Internal Document, Annex 135 to FMN, page 14.

conformance and performance testing.⁵¹⁷ In line with this, these suppliers were not identified [3<] by customers of either party.

377. One competitor indicated that Keysight also competes against Teradyne.⁵¹⁸ However, the CMA notes that it has not seen any evidence indicating that Teradyne is a competitor in location-based conformance and performance testing solutions.⁵¹⁹
378. The CMA has seen no material evidence indicating that other suppliers impose a constraint in location-based testing solutions or in the broader supply of conformance and performance testing solutions.

5.3.6.3 Conclusion

379. Based on the evidence outlined above, the CMA considers that Spirent holds a market-leading position in the supply of location-based conformance and performance testing. The available evidence also indicates that Keysight is actively supplying location-based conformance testing solutions. Together, the Parties hold a significant position in the market, with a combined share of at least [30-40%] with a material increment arising from the Merger.
380. There is evidence of direct competition between the Parties, and the market is highly concentrated, with only four suppliers. In this context, while there is differentiation between the Parties' testing solutions, the Parties nonetheless appear to impose a competitive constraint on each other. The available evidence also suggests that the Parties compete closely with R&S but compete to a lesser degree with Anritsu.
381. Based on the evidence submitted by the Parties, the CMA believes that any loss of competition in the UK is likely to be limited, as there is little, if any, competition between the Parties for UK customers due to low demand for location-based conformance testing and Spirent not supplying location-based conformance testing relevant to the UK.
382. Given this, and noting the presence of other alternatives, the CMA found that the Merger does not give rise to a realistic prospect of an SLC as a result of horizontal unilateral effects in the supply of location-based conformance and performance testing solutions on a global basis.

⁵¹⁷ In any event, Keysight's documents also suggest that this competition may be limited and largely restricted to the Chinese market. See, for example: See paragraph 368 and Keysight Internal Document, Annex 135 to FMN, page 14. In relation to this, a competitor stated they see emerging competition coming from China but that they do not see notable emerging competition outside the Chinese market. Note of a call with a third party, paragraph 78.

⁵¹⁸ Response to the CMA's questionnaire from a third party, January 2025, question 45.

⁵¹⁹ In particular, see: Response to the CMA's questionnaire from a third party, January 2025, question 40 and 41.

5.3.7 Theory of Harm 7: Horizontal unilateral effects in HSE testing solutions

383. To assess whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in the supply of HSE testing solutions on a global basis, the CMA has adopted the framework and evidence types set out in paragraphs 95 to 101.

5.3.7.1 *Parties' submissions*

384. The Parties submitted that they offer similar HSE testing solutions, have a significant market presence and face limited competition.⁵²⁰

385. While the Parties submitted they offer similar solutions, they also submitted that Keysight and Spirent have different focuses – Keysight more on higher-end customers and Spirent on low- and mid-tier solutions.⁵²¹ Moreover the Parties submitted that there is competition from established vendors (Teledyne (Xena), Xinertel and CeYear) and new entrants/in-house solutions as customers increasingly use software-only, virtual, and cloud-based solutions or open-source software and standard hardware.⁵²²

5.3.7.2 *CMA assessment*

5.3.7.2.1 *Shares of supply*

386. As noted above at paragraphs 106 to 108, while shares of supply can be a useful starting point for the analysis, the CMA considers it appropriate to assess evidence on shares of supply alongside other evidence, including product development plans.

387. The Parties' estimated worldwide shares for HSE testing solutions indicate that in 2023/24 the Parties' combined share of supply was [70-80]% with a high increment of [30-40]% as a result of the Merger.⁵²³ The Parties' estimated shares of supply are consistent with some internal documents,⁵²⁴ and submissions that they face limited competition in HSE testing solutions.

⁵²⁰ FMN, paragraph 11.

⁵²¹ FMN, paragraph 552.

⁵²² FMN, paragraphs 541, 542, 543, 544 and 547.

⁵²³ FMN, paragraph 540. The CMA notes that Keysight reviewed the mapping of its products (and associated revenues) for each of the product areas considered by the CMA, providing updated revenue figures in the FMN. As a result of this, Keysight's latest revenue figure for HSE is significantly lower than the figure submitted to the CMA in response to RFI4, [redacted]. However, the CMA considers that this does not materially alter the results of its assessment. Parties' response to RFI4, Annex 'RFI 1 Annex 012_Shares of supply_v4'.

⁵²⁴ See for example '[redacted]', page 8 which shows that Keysight and Spirent have a combined share of [redacted]. The CMA notes that the segment for 10G and lower does not fall within the HSE product market, which is defined as 100G and above.

5.3.7.2.2 Closeness of competition

388. At the outset, the CMA notes that based on the Parties' submissions and the estimated shares of supply, the Parties are close competitors. This is confirmed by the Parties' internal documents and the opportunities data provided by the Parties.
- (a) The Parties' internal documents indicate they consider each other close competitors.⁵²⁵ For example, a Keysight internal document describes Spirent as an 'aggressive competitor' in HSE that has won customers from Keysight by competing on price,⁵²⁶ and a Spirent internal document describes Keysight as providing 'intense head-to-head competition' in HSE,⁵²⁷ while another identifies Keysight as Spirent's 'main competitor' in HSE.⁵²⁸
 - (b) The opportunities data for both Parties frequently identified the other as a competitor where such information was available – Spirent appearing in [in the vast majority] of Keysight's opportunities⁵²⁹ and Keysight appearing in [in the vast majority] of Spirent's opportunities.⁵³⁰
389. As in other testing areas, continuous product development – particularly for different network standards – is important for customers of HSE testing.⁵³¹ For example, Keysight submitted that it shares product roadmaps with its strategic customers [redacted],⁵³² while Spirent shares roadmaps every [redacted].⁵³³ Evidence provided on R&D spending and internal documents show that the Parties are both investing in their HSE testing solutions, including for [redacted] suggesting they will continue to compete closely going forward.⁵³⁴

⁵²⁵ For example, a Spirent internal document includes market share estimates and identifies Spirent and Keysight as the primary suppliers for 10G, 100G, 400G, and 800G Ethernet testing. In contrast, a Keysight internal document estimates shares of 'Network Test L2/3' and while Keysight and Spirent are identified as two of the three largest suppliers, [redacted] is also identified as a similar size to Spirent, despite not being identified as competitor by Spirent for HSE (see paragraph 393). Spirent's Internal Document, 'Annex 001. [redacted] May 2022, page 8. Keysight's Internal Document, KEYS-CMA-00007758, '[redacted]', page 21. Also see Spirent's Internal Document, SPRNT_CMA-00097072, '[redacted]', October 2023, page 3.

⁵²⁶ Keysight Internal Document, KEYS-CMA-00005503, 2023, page 11.

⁵²⁷ Spirent Internal Document, SPRNT_CMA-00001409, '[redacted]', 29 September 2023, page 5.

⁵²⁸ Spirent Internal Document, SPRNT_CMA-00094709, '[redacted]', 31 January 2024, page 25.

⁵²⁹ Keysight's opportunities data included [redacted] opportunities between 2020 and 2024 where competitors were identified, in this data Spirent were identified [redacted] times. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 1.

⁵³⁰ Spirent's opportunities data included [redacted] opportunities between 2021 and 2024 where competitors were identified, in this data Keysight were identified [redacted] times. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - HSE (2024-12-12)'.

⁵³¹ For example, one customer informed the CMA that the Ethernet market has been developing rapidly, and that it requires its testing equipment to keep up with these advancements in order to enhance the speed and quality of its products. Note of a call with a third party, paragraph 1; Submission from a third party dated October 2024, paragraphs 9 to 11.

⁵³² FMN, paragraph 493.

⁵³³ FMN, paragraph 499.

⁵³⁴ Spirent's response to the CMA's section 109 Notice, 1 November 2024, Annex I; Keysight's response to the CMA's section 109 Notice, 1 November 2024, Annex 1; Keysight's Internal Document, KEYS-CMA-00007758, '[redacted]', page 26. Keysight Internal Document, KEYS-CMA-00012238, '[redacted]', March 2024, pages 10 to 17 and 23; Spirent Internal Document, 'Annex 081. [redacted] July 2024', July 2024, page 11-20; Spirent Internal Document, SPRNT_CMA-00094767, '[redacted]', 3 April 2024, page 6.

390. The evidence received from customers also indicates that the Parties are each other's closest competitors in the supply of HSE testing. In particular, several customers that use both Parties' products consider Keysight and Spirent to be 'fully' or 'very' effective alternatives⁵³⁵ and one customer who only used Spirent considered Keysight to be a 'fully effective' alternative.⁵³⁶ One such customer noted that if the deal goes ahead, it is not clear where the incentive to innovate will come from.⁵³⁷ Other customers using both Parties' products also made statements consistent with them being each other's closest competitors⁵³⁸ or did not identify any other alternative suppliers.⁵³⁹
391. One competitor identified Keysight as a very strong competitor,⁵⁴⁰ while two others submitted that Spirent and Keysight are a 'duopoly',⁵⁴¹ with one of these noting that they have been the 'market leaders' in HSE testing solutions for the past 20 years.⁵⁴² This competitor identified both as 'very strong' competitors.⁵⁴³

5.3.7.2.3 *Alternative competitive constraints*

392. The Parties have submitted that they face limited competition in HSE.⁵⁴⁴ This is consistent with internal documents which indicate that competition is muted⁵⁴⁵ and that the Parties generally only monitor a small number of alternative competitors.
- (a) The Parties' internal documents generally only monitor the Parties' products vis-à-vis Viavi, Teledyne (Xena), Xinertel and EXFO.⁵⁴⁶
 - (b) Of these Viavi is identified by Keysight, but not Spirent, in its internal documents. One Spirent internal document highlights Xena as a smaller competitor across all segments and Xinertel as a smaller competitor in [REDACTED].⁵⁴⁷
393. The opportunities data for both Parties also rarely identifies alternative competitors where such information was available – alternative competitors appearing in at

⁵³⁵ Response to the CMA questionnaire from third parties, January 2025, questions 58 and 59.

⁵³⁶ Response to the CMA questionnaire from a third party, January 2025, question 58 and 59.

⁵³⁷ Note of a call with a third party, paragraph 9.

⁵³⁸ For example, one said that the Merged Entity would become a 'monopoly' in this segment and another said that they are the only suitable alternatives. Response to the CMA questionnaire from a third party, January 2025, question 58. Note of a call with a third party, paragraphs 20-24. Response to the CMA questionnaire from a third party, January 2025, question 59, 60 and 62.

⁵³⁹ Response to the CMA questionnaire from third parties, January 2025, question 58 to 61.

⁵⁴⁰ Response to the CMA questionnaire from a third party, January 2025, question 54 and 55.

⁵⁴¹ Response to the CMA questionnaire from a third party, January 2025, question 2, 54 and 56.

⁵⁴² Response to the CMA questionnaire from a third party, January 2025, question 54 and 56.

⁵⁴³ Response to the CMA questionnaire from a third party, January 2025, question 55.

⁵⁴⁴ FMN, paragraph 11.

⁵⁴⁵ For example, one Keysight Internal Document states [REDACTED]. Keysight's Internal Document, KEYS-CMA-00007758, '[REDACTED]', page 21.

⁵⁴⁶ Keysight Internal Document, KEYS-CMA-00006137, 17 February 2023, pages 24 to 27; Keysight Internal Document, KEYS-CMA-00002889, 2023; Keysight Internal Document, KEYS-CMA-00002886, March 2023, page 2; Spirent's Internal Document, 'Annex 001. [REDACTED]', May 2022, page 8.

⁵⁴⁷ Spirent's Internal Document, 'Annex 001. [REDACTED]', May 2022, page 8.

most [10-20]% of Keysight's opportunities⁵⁴⁸ and at most [5-10]% of Spirent's opportunities.⁵⁴⁹

394. The evidence received from customers also indicates that the Parties face limited competition in the supply of HSE testing. In particular:
- (a) Several customers that use both Parties products did not identify any other alternatives.⁵⁵⁰
 - (b) Viavi was identified by a few customers as 'fully effective'.⁵⁵¹ In contrast, several other customers identified Viavi as either a 'moderately' or 'slightly' effective supplier,⁵⁵² with one stating that while it is an emerging competitor it is not currently a viable alternative to the Parties.⁵⁵³
 - (c) Teledyne was identified by several customers⁵⁵⁴ with one identifying it as a 'moderately effective' alternative,⁵⁵⁵ another identifying it as 'not at all effective' as an alternative⁵⁵⁶ and another customer stating that while it is an emerging competitor it is not currently a viable alternative to the Parties.⁵⁵⁷
 - (d) EXFO was identified by several customers with one considering it a 'very effective' alternative⁵⁵⁸ and two others considering it a 'moderately effective' alternative.⁵⁵⁹
 - (e) Tektronix and Anritsu⁵⁶⁰ were both identified by the same two customers with one identifying them both as 'very effective'.⁵⁶¹ The other customer identified them both as 'not at all effective' stating that they do not offer a comprehensive solution across the full spectrum of functionality and even in

⁵⁴⁸ After [REDACTED], [REDACTED] [REDACTED] and [REDACTED] [REDACTED] were the next most identified competitors in Keysight's data. Keysight's opportunities data included [REDACTED] opportunities between 2020 and 2024 where competitors were identified, in this data alternative competitors were identified [REDACTED] times. This included a range of competitors and it was not possible to identify if some opportunities involved more than one alternative competitor. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 1.

⁵⁴⁹ Alongside [REDACTED] only [REDACTED] and [REDACTED] were the identified as competitors in Spirent's data. Spirent's opportunities data included [REDACTED] opportunities between 2021 and 2024 where competitors were identified, in this data alternative competitors were identified [REDACTED] times. This included two competitors and it was not possible to identify if some opportunities involved more than one alternative competitor. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - HSE (2024-12-12)'.

⁵⁵⁰ Response to the CMA questionnaire from a third parties, January 2025, question 58, 59 and 60.

⁵⁵¹ Response to the CMA questionnaire from a third parties, January 2025, question 58, 59 and 60.

⁵⁵² Response to the CMA questionnaire from a third party, January 2025, questions 59 and 60.

⁵⁵³ Response to the CMA questionnaire from a third party, January 2025, question 59; Note of a call with a third party, paragraphs 20-24.

⁵⁵⁴ Response to the CMA questionnaire from a third party, January 2025, question 59.

⁵⁵⁵ Response to the CMA questionnaire from a third party, January 2025, question 59.

⁵⁵⁶ Response to the CMA questionnaire from a third party, January 2025, questions 59 and 60.

⁵⁵⁷ Response to the CMA questionnaire from a third party, January 2025, question 59; Note of a call with a third party, paragraphs 20-24.

⁵⁵⁸ Response to the CMA questionnaire from a third party, January 2025, question 59.

⁵⁵⁹ Response to the CMA questionnaire from a third party, January 2025, question 59.

⁵⁶⁰ Anritsu was identified in the internal documents cited above in relation to HSE. [REDACTED]. Keysight's Internal Document, KEYS-CMA-00007758, '[REDACTED]', pages 21 and 22.

⁵⁶¹ Response to the CMA questionnaire from a third party, January 2025, question 59.

their areas of strength they have not kept up with Keysight's level of investment and frequency of new product rollouts.⁵⁶²

- (f) Apposite, GL Communications, R&S, VeEx, and Excentis were each identified by only one customer,⁵⁶³ with all but Apposite, VeEx and Excentis rated as either 'not at all effective' or 'slightly effective' as alternatives.⁵⁶⁴
- (g) Nearly all customers who provided views on in-house supply stated that it was not possible, viable or efficient to do so, or in-house supply can only be done for certain uses cases and could not replicate the offering of the Parties.⁵⁶⁵ One customer estimated that it would cost £80-160 million to develop new, dedicated testing equipment every time a new generation of Ethernet products is made available (i.e., every 12-18 months).⁵⁶⁶

395. Competitors who responded to the CMA identified Anritsu, Candela, EXFO, Rhode & Schwarz, Xinertel, Xena/Teledyne, Tektronix and VeEX. However, Candela, EXFO, Xinertel, Tektronix and VeEX were identified only once, and Candela, Rhode & Schwarz and Xinertel were rated as 'weak' competitors.⁵⁶⁷ One respondent also noted in respect of the competitors it listed that 'none of them had been successful at challenging the status-quo – the Parties having a 'duopoly''.⁵⁶⁸ In addition, one of the suppliers identified by competitors told the CMA that its products only test to speeds of up to 10Gbps whereas the Parties considered HSE to be testing on equipment running at 100Gbps or more.⁵⁶⁹
396. Additionally, all competitors indicated that it would be difficult for a supplier of another TME solution to enter and expand in the supply of HSE testing solutions.⁵⁷⁰ They pointed to factors including: (i) the need for 'customized hardware solutions and a sizeable sales force'⁵⁷¹; (ii) the impact of vendor specific scripting limiting switching;⁵⁷² (iii) the need for over \$40m USD and over three years of software development work;⁵⁷³ and (iv) the existence of 'competitors [who] dominate the market'.⁵⁷⁴

⁵⁶² Response to the CMA questionnaire from a third party, January 2025, question 59.

⁵⁶³ Response to the CMA questionnaire from a third party, January 2025, question 59.

⁵⁶⁴ Of these competitors only VeEx was identified in the internal documents cited above in relation to HSE [X]. Keysight's Internal Document, KEYS-CMA-00007758, '[X]', pages 21 and 22.

⁵⁶⁵ Response to the CMA questionnaire from third parties, January 2025, question 60.

⁵⁶⁶ Response to the CMA questionnaire from a third party, January 2025, question 60.

⁵⁶⁷ Response to the CMA questionnaire from a third party, January 2025, question 53 and 55.

⁵⁶⁸ Response to the CMA questionnaire from a third party, January 2025, question 54, 55 and 56.

⁵⁶⁹ Responses to the CMA questionnaire from third parties, January 2025, question 59. FMN, paragraph 198.

⁵⁷⁰ Responses to the CMA questionnaire from third parties, January 2025, question 63.

⁵⁷¹ Responses to the CMA questionnaire from third parties, January 2025, question 63.

⁵⁷² Responses to the CMA questionnaire from third parties, January 2025, question 62 and 63.

⁵⁷³ Responses to the CMA questionnaire from third parties, January 2025, question 63.

⁵⁷⁴ Responses to the CMA questionnaire from third parties, January 2025, question 63.

5.3.7.3 Conclusion

397. For the reasons set out above, the CMA considers that the Parties have a very high combined share of supply of HSE testing solutions and that they compete closely. The CMA also considers that the various sources of evidence (internal documents, opportunities data, shares of supply and third-party responses) consistently show that other third parties will exert only a very limited constraint on the Merged Entity.
398. Accordingly, the CMA considers that the Merger gives rise to a realistic prospect of an SLC as a result of horizontal unilateral effects in the supply of HSE testing solutions on a global basis.

5.3.8 Theory of Harm 8: Horizontal unilateral effects in network security testing solutions

399. To assess whether it is or may be the case that the Merger has resulted, or may be expected to result, in an SLC as a result of horizontal unilateral effects in the supply of HSE testing solutions on a global basis, the CMA has adopted the framework and evidence types set out in paragraphs 95 to 101.

5.3.8.1 Parties' submissions

400. The Parties submitted that they offer similar testing solutions, have a high combined market share and face limited competition.⁵⁷⁵

5.3.8.2 CMA assessment

5.3.8.2.1 Shares of supply

401. As noted above at paragraphs 106 to 108, while shares of supply can be a useful starting point for the analysis, the CMA considers it appropriate to assess evidence on shares of supply alongside other evidence, including product development plans.
402. The Parties' estimates indicate that in 2023/24 the Merged Entity would have a combined share of [30-40]% with a significant increment of [10-20]% as a result of the Merger.⁵⁷⁶ The Parties' estimated shares of supply are consistent with their

⁵⁷⁵ FMN, paragraph 11

⁵⁷⁶ FMN, paragraph 555. The CMA notes that Keysight reviewed the mapping of its products (and associated revenues) for each of the product areas considered by the CMA, providing updated revenue figures in the FMN. As a result of this, Keysight's latest revenue figure for network security is significantly lower than the figure submitted to the CMA in response to RFI4, reducing from [3<] in 2023. The CMA notes this is reflected in a significant difference from previous submissions that estimated the Parties' joint share at around [50-60]% with an increment of [10-20]%. However, the CMA considers that this does not materially alter the results of its assessment. Parties' response to RFI4, Annex 'RFI 1 Annex 012_Shares of supply_v4'.

submissions that they face limited competition in Network Security testing solutions.

403. The CMA has concerns about the reliability of the estimates provided by the Parties. The CMA notes that a Spirent internal document from 2022 indicates an even higher combined market share of more than [REDACTED] and an increment of around [REDACTED].⁵⁷⁷ Likewise, a 2024 Keysight document indicates that Keysight had a market share of [REDACTED] and Spirent a share of [REDACTED] in relation to its hardware products,⁵⁷⁸ while another Keysight document identifies Keysight as being the ‘#1 in the market’ with [REDACTED] market share of the serviceable addressable market in 2019.⁵⁷⁹ The CMA also notes that available revenue data from third party competitors indicates that the Parties have overstated the revenues generated by some alternative suppliers.⁵⁸⁰

5.3.8.2.2 *Closeness of competition*

404. At the outset, the CMA notes that based on the Parties’ submissions and the estimated shares of supply, the Parties are close competitors. This is confirmed by the Parties’ internal documents and the opportunities data provided by the Parties.
- (a) The Parties’ internal documents show that they consider each other close competitors. For example, the Spirent document identified in paragraph 402 above states that [REDACTED].⁵⁸¹ Likewise, a 2024 Keysight document states that [REDACTED]⁵⁸² which is supported by another document that [REDACTED].⁵⁸³
 - (b) The opportunities data for both Parties frequently identified the other as a competitor where such information was available – Spirent appearing in [in the vast majority] of Keysight’s opportunities⁵⁸⁴ and Keysight appearing in [in the vast majority] of Spirent’s opportunities.⁵⁸⁵
405. As in other testing areas, continuous product development is important for network security testing. Keysight submitted that it generally shares product roadmaps with customers [REDACTED],⁵⁸⁶ while Spirent submitted that roadmaps are [REDACTED].⁵⁸⁷ Evidence

⁵⁷⁷ Annex 001. [REDACTED], slide 11. This slide shows that combined shares range from [REDACTED] in the ‘Enterprise + Govt’ segment to [REDACTED] for the ‘Security NEMs’ segment.

⁵⁷⁸ Keysight internal document, KEYS-CMA-00006187, slide 3

⁵⁷⁹ Keysight internal document, KEYS-CMA-00003145, page 15

⁵⁸⁰ Responses to the CMA questionnaire from third parties, January 2025, question 58.

⁵⁸¹ Annex 001. [REDACTED], slide 11. See also SPRNT_CMA-00001409.pptx page 5, which notes that there is [REDACTED] and that [REDACTED].

⁵⁸² Keysight internal document, KEYS-CMA-00007758, page 21 for L2/3 and p. 23 for AppSecurity and p. 20 of KEYS-CMA-00003145 which [REDACTED].

⁵⁸³ Keysight internal document, KEYS-CMA-00006187, slide 4 which [REDACTED].

⁵⁸⁴ Keysight’s opportunities data included [REDACTED] opportunities between 2020 and 2024 where competitors were identified, in this data Spirent were identified [REDACTED] times. Keysight’s response to the CMA’s section 109 Notice, 10 December 2024, question 1, Annex 1.

⁵⁸⁵ Spirent’s opportunities data included [REDACTED] opportunities between 2021 and 2024 where competitors were identified, in this data Keysight were identified [REDACTED] times. Spirent’s response to the CMA’s section 109 Notice, 10 December 2024, question 1, Annex ‘s109 Spirent Q1 - HSE (2024-12-12)’.

⁵⁸⁶ FMN, paragraph 493.

⁵⁸⁷ FMN, paragraph 500.

provided in internal documents shows that the Parties are both investing in their network security testing solutions.⁵⁸⁸

406. The majority of customers view the Parties as alternatives.⁵⁸⁹ Of these, nearly all identified none or only one alternative to the Parties, except two customers who listed two alternatives to the Parties.⁵⁹⁰ The CMA therefore currently considers that the Parties are competing closely.
407. One competitor viewed the Parties as having a strong offering in Network Security testing solutions.

5.3.8.2.3 *Alternative competitive constraints*

408. The Parties' internal documents that monitor Network Security competitors focus mostly on each other.⁵⁹¹ Other competitors are identified much less frequently:
- (a) Viavi is discussed in the Parties' documents to a much lesser extent than Keysight or Spirent, and where it is identified it may be shown with a significantly lower share than the Parties,⁵⁹² or identified in 'other' competitors.⁵⁹³ One 2022 Spirent document also identifies Viavi as having a [REDACTED] solution.⁵⁹⁴
 - (b) Xena Networks is identified in some of the Parties' documents but is described as a 'low-end competitor'.⁵⁹⁵
 - (c) EXFO, Rohde and Schwarz and Empirix are identified in only one document.⁵⁹⁶
 - (d) Mobileum and Anritsu are identified as not having a network security solution by a Spirent document.⁵⁹⁷
 - (e) In-house solutions are discussed only rarely.⁵⁹⁸

⁵⁸⁸ Keysight Internal document, KEYS-CMA-00006187, 12 November 2024, page 4 and Keysight internal document, KEYS-CMA-00005479, November 2023, page 12

⁵⁸⁹ Response to the CMA questionnaire from a number of third parties, January 2025, question 63.

⁵⁹⁰ Response to the CMA questionnaire from a number of third parties, January 2025, question 63.

⁵⁹¹ See for example: Keysight internal document, KEYS-CMA-00002950, page 10, Keysight internal document, Keysight internal document, KEYS-CMA-00001903, slide 12; Keysight internal document, Keysight internal document, KEYS-CMA-00006187.pptx, slide 2-4; Spirent internal document, SPRNT_CMA-00004786.pdf, p. 26-27; Keysight internal document, KEYS-CMA-00020082.docx, p. 11; Keysight internal document, KEYS-CMA-00007758.pdf, p.23

⁵⁹² See for example Keysight internal document, Keysight internal document, KEYS-CMA-00006187.pptx, slide 3.

⁵⁹³ See for example Keysight internal document, Keysight internal document, KEYS-CMA-00007758.pdf, p.23.

⁵⁹⁴ 'Annex 001. [REDACTED]', slide 5.

⁵⁹⁵ See for example Keysight internal document, KEYS-CMA-00020082.docx, p. 12.

⁵⁹⁶ KEYS-CMA-00003145.docx, page 15 and 16 for EXFO and Empirix and 'Annex 001. [REDACTED]', slide 5 which identifies [REDACTED].

⁵⁹⁷ 'Annex 001. [REDACTED]', slide 5.

⁵⁹⁸ Keysight internal document, KEYS-CMA-00007758, p.23 and Keysight internal document, KEYS-CMA-00003145, page 15.

409. In the opportunities data, alternative competitors appear in around [5-10]% of Keysight's opportunities⁵⁹⁹ and around [5-10]% of Spirent's opportunities:⁶⁰⁰
- (a) In Keysight's opportunities the alternative competitors are identified as follows: Agilent ([redacted]); Cisco ([redacted]); Anritsu ([redacted]); Netscout ([redacted]); and Viavi ([redacted]).⁶⁰¹
 - (b) In Spirent's opportunities the competitors listed are Thakral and Viavi each for [redacted].
410. Customers rarely identified other alternatives to the Parties and more than half listed no alternatives to the Parties.⁶⁰²
- (a) Apposite, Black Duck, Cisco, Cybertestsystem NTG, Mobileum and Picus were identified once each.⁶⁰³
 - (b) In addition, Cisco, Cybertestsystem NTG, Mobileum and Picus, only received a moderately effective rating, while Black Duck was identified as a specialist provider for the bespoke requirements of that third-party customer.⁶⁰⁴
 - (c) Apposite was given a fully effective rating,⁶⁰⁵ but similar to Black Duck, Cybertestsystem NTG and Picus, it was neither identified in the Parties' internal documents in relation to Network Security nor in the opportunities data.⁶⁰⁶
411. Nearly half of customers that responded said that in-house supply would not be a feasible alternative.⁶⁰⁷ Of the remainder, more than half said that in-house supply would only be an option for parts of their network security needs,⁶⁰⁸ while the rest said that they would likely continue with third-party supply given the time and resource required to develop an in-house solution.⁶⁰⁹

⁵⁹⁹ Keysight's opportunities data included [redacted] opportunities between 2020 and 2024 where competitors were identified, in this data alternative competitors were identified [redacted] times. This included a range of competitors and it was not possible to identify if some opportunities involved more than one alternative competitor. Keysight's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 1.

⁶⁰⁰ Spirent's opportunities data included [redacted] opportunities between 2021 and 2024 where competitors were identified, in this data alternative competitors were identified [redacted] times. This included two competitors and it was not possible to identify if some opportunities involved more than one alternative competitor. Spirent's response to the CMA's section 109 Notice, 10 December 2024, question 1, Annex 's109 Spirent Q1 - HSE (2024-12-12)'.

⁶⁰¹ Others are listed only twice (Ametek, Gigamon) or once (Apcon, Arista, R&S and Teradyne).

⁶⁰² Response to the CMA questionnaire from a number of third parties, January 2025, question 63.

⁶⁰³ Response to the CMA questionnaire from a number of third parties, January 2025, question 63.

⁶⁰⁴ Response to the CMA questionnaire from a number of third parties, January 2025, question 63.

⁶⁰⁵ Response to the CMA questionnaire from a number of third parties, January 2025, question 63.

⁶⁰⁶ The CMA also notes that Apposite, Black Duck, Cisco and Picus were not identified by the Parties as competitors in Network Security testing solutions when asked to identify any competing third-party products. Parties' response to RF13, question 5, 'RFI 2 Annex 1 – Sub-categories of Overlapping Products_v2'.

⁶⁰⁷ Response to the CMA questionnaire from a number of third parties, January 2025, question 64.

⁶⁰⁸ Response to the CMA questionnaire from a number of third parties, January 2025, question 64.

⁶⁰⁹ Response to the CMA questionnaire from a number of third parties, January 2025, question 64.

412. While competitors that responded did identify other competitors to the Parties, only Mobileum, R&S and Anritsu were identified as moderately effective alternatives, with each identified only once.
413. Additionally, all competitors indicated that it would be difficult for a supplier of another TME solution to enter and expand in the supply of Network Security solutions.⁶¹⁰ They pointed to factors including: (i) the flat growth trajectory⁶¹¹; (ii) the need for a narrow expertise area in specialized network protocol;⁶¹² (iii) the need for over \$10-20m USD and around three years of investment work;⁶¹³ and (iv) the required reputation.⁶¹⁴

5.3.8.3 Conclusion

414. For the reasons set out above, the CMA considers that the Parties have a very high combined share of supply of Network Security testing solutions and that they compete closely. The CMA also currently considers that the various sources of evidence (internal documents, opportunities data, shares of supply and third-party responses) consistently show that other third parties will exert only a very limited constraint on the Merged Entity.
415. Accordingly, the CMA considers that the Merger gives rise to a realistic prospect of an SLC as a result of horizontal unilateral effects in the supply of Network Security testing solutions on a global basis.

6. ENTRY AND EXPANSION

416. The CMA will consider entry and/or expansion plans of rivals who do so in direct response to the merger as a countervailing measure that could prevent an SLC. Entry or expansion plans of rivals that would occur irrespective of whether the merger proceeds may be considered in the competitive assessment when appropriate.⁶¹⁵ In assessing whether entry or expansion might prevent an SLC, the CMA considers whether such entry or expansion would be timely, likely and sufficient.⁶¹⁶

⁶¹⁰ Responses to the CMA questionnaire from third parties, January 2025, question 68.

⁶¹¹ Responses to the CMA questionnaire from third parties, January 2025, question 68.

⁶¹² Responses to the CMA questionnaire from third parties, January 2025, question 63.

⁶¹³ Responses to the CMA questionnaire from third parties, January 2025, question 63.

⁶¹⁴ Responses to the CMA questionnaire from third parties, January 2025, question 63.

⁶¹⁵ [CMA129](#), paragraph 8.28.

⁶¹⁶ [CMA129](#), from paragraph 8.40.

6.1 Parties' submissions

417. The Parties have not made any submissions about entry or expansion that may occur in direct response to the Merger.⁶¹⁷
418. In respect of entry unrelated to the Merger, the Parties submitted that: (i) communications TME is a dynamic, innovation-driven segment with many potential entrants (including niche suppliers) and rapidly changing technology; and (ii) a shift from hardware to software centric solutions has reduced barriers to entry and expansion, including for customers to develop in-house and open-source solutions.⁶¹⁸

6.2 CMA's assessment

419. The CMA has not seen any evidence of entry or expansion being planned or occurring as a response to the Merger. Entry or expansion occurring irrespective of the Merger is considered above in the competitive assessment, where relevant.
420. For completeness, the CMA notes that the evidence received shows that barriers to entry and expansion remain high because of:
- (a) The high levels of R&D investment, technical expertise and innovation required to remain competitive in the relevant markets, as outlined in paragraphs 53-61 and within each theory of harm above. In line with this, third parties have also stated that there are material barriers to a supplier of one type of TME products entering or expanding into the supply of different types of TME.⁶¹⁹ When third parties were asked about their plans and anticipated market developments in the next five years, only one identified a move to software and/or cloud-based solutions as a relevant development, across all eight product areas considered.⁶²⁰
 - (b) Significant time required to enter and expand, including because of the time needed for development, testing, and market penetration of new products. Third party estimates for entering new TME segments in which they are not already active ranged from 18 months to five years.⁶²¹
 - (c) Barriers to switching. As detailed in paragraph 62, customers noted several barriers to switching, including the costs of migrating automated test

⁶¹⁷ FMN paragraph 843.

⁶¹⁸ FMN paragraphs 535-538.

⁶¹⁹ Response to the CMA questionnaire from third parties, January 2025, questions 12, 20, 38, 53 and 58: almost all respondents identified barriers to entry and expansion for providers of TME products to supply a product they are not active in.

⁶²⁰ Responses to the CMA questionnaire from third-parties, January 2025, questions 11, 18, 29, 35, 49, 52, 62 and 67.

⁶²¹ Responses to the CMA questionnaire from third-parties, January 2025, questions 12, 20, 38, 53 and 58.

scripts/frameworks to a new supplier, new hardware⁶²² and developing relevant technical expertise; dependencies on legacy or integrated technology; and trust in existing suppliers.⁶²³

421. As noted above, the CMA did not receive evidence from customers indicating that in-house solutions were a credible alternative to the tools offered by the Parties (or other third parties).⁶²⁴ Additionally, the CMA notes that in its experience, a customer self-supplying may be far less effective than a third party over time, especially if the self-supply activity is not the customer's core business and innovation is an important element of competition, as in this case.⁶²⁵ Therefore, the CMA considers that there is insufficient evidence that in-house supply would exercise a countervailing constraint on the Merged Entity.
422. For the reasons set out above, the CMA considers that entry or expansion would not be timely, likely or sufficient to prevent a realistic prospect of an SLC as a result of the Merger in any of the theories of harm considered above.

7. CONCLUSION ON SUBSTANTIAL LESSENING OF COMPETITION

423. Based on the evidence set out above, the CMA believes that it is or may be the case that the Merger may be expected to result in an SLC as a result of horizontal unilateral effects in relation to the global supply of channel emulation testing solutions, mobile core testing solutions, HSE testing solutions, network security testing solutions globally and as a result of a future loss of competition in relation to GNSS testing solutions.

8. EXCEPTIONS TO THE DUTY TO REFER

8.1 De minimis exception

424. Where the CMA's duty to refer is engaged, the CMA may, pursuant to section 33(2)(a) of the Act, decide not to refer the merger under investigation for a phase 2 investigation on the basis that the market(s) concerned is/are not of sufficient importance to justify the making of a reference (the de minimis exception). The

⁶²² Even among customers who stated that the introduction of cloud-based solutions may reduce barriers to switching, several still submitted that hardware-based solutions will remain important and/or that cloud-based solutions may also involve significant upfront costs to switch and integrate. Responses to the CMA questionnaire from third parties, January 2025, question 23.

⁶²³ These barriers to entry and expansion are evident in the Parties' internal documents. For example, a Keysight document from July 2024 states that, in relation to its Network Test segment, the threat from new entrants is low due to factors such as high knowledge requirements, economies of scale, highly differentiated products, switching costs, and rapid technological change. Keysight's Internal Document, KEYS-CMA-00007758, '[3<]', page 21.

⁶²⁴ See above paragraphs 79, 216, 394 and 411.

⁶²⁵ [CMA 129](#), paragraph 8.46.

CMA has considered below whether it is appropriate to apply the de minimis exception to the present case.

425. The CMA's starting point when considering whether to apply the 'de minimis' exception is the size of the market(s) concerned. The CMA considers that the market(s) concerned will generally be of sufficient importance to justify a reference (such that the 'de minimis' exception will not generally be applied) where the annual value in the UK of the market(s) concerned is more than £30 million in aggregate.⁶²⁶ The reason behind the £30 million threshold is that the benefits of a phase 2 reference, in terms of potential customer harm saved, would be expected to outweigh the public costs of a reference.⁶²⁷
426. Where the annual value in the UK of the market(s) concerned is £30 million or less, the CMA will consider a number of factors, in addition to market size, in order to determine whether to exercise its discretion to apply the 'de minimis' exception.⁶²⁸ These are:
- (a) The extent to which revenues are an appropriate metric to assess market size and whether the market is expanding or contracting;
 - (b) Whether the merger is one of a potentially large number of similar mergers that could be replicated across the sector in question; and
 - (c) The nature of the potential detriment that may result from the merger.

8.1.1 Parties' submissions

427. The Parties submitted a number of estimates of UK market sizes for overlapping products during the CMA's investigation. These estimates for 2023, as well as the estimates provided for 2024, are summarised in Table 8 below.

Table 8: UK market size estimates

<i>Testing solution</i>	<i>Initial estimates (2023)*</i>	<i>FMN estimates (2023)*</i>	<i>Final estimates (2023)</i>	<i>Final estimates (2024)</i>
Channel emulation	£[<] million	£[<] million	£[<] million	£[<] million
Mobile core	£[<] million	£[<] million	£[<] million	£[<] million
O-RAN	Not provided	£[<] million	£[<] million	£[<] million
Wi-Fi	Not provided	Not provided	£[<] million	£[<] million
GNSS	Not provided	£[<] million	£[<] million	£[<] million
Location-based conformance and performance	£[<] million**	£[<] million**	£[<] million	£[<] million
HSE	£[<] million	£[<] million	£[<] million	£[<] million
Network security	£[<] million	£[<] million	£[<] million	£[<] million
Total	£32.3 million	£43.4 million	£22.8 million	£30.0 million

⁶²⁶ CMA 64, paragraph 2.13.

⁶²⁷ CMA 64, paragraph 2.13.

⁶²⁸ CMA 64, paragraph 2.14.

Source: Draft Merger Notice submitted to the CMA on 17 July 2024, paragraphs 224, 231, 239, 257, 270 and 285, Annex to FMN 081_RFI 1 Annex 012_Shares of supply_v6_20250114, Annex 35 to the Parties' IL Response, Annex 35_De minimis paper - market sizes_v2.

Note: Initial estimates and FMN estimates converted from USD to GBP based on an exchange rate of 1.2434 as used by the Parties in their response to the Issues Letter. Annex 35 to the Parties' IL Response, Annex 35_De minimis paper - market sizes_v2. ** Initial and FMN estimates for location-based conformance and performance testing solutions were based on all conformance and performance products not just location-based conformance and performance products.

8.1.1.1 Initial submissions of relevant market sizes

428. The Parties initially submitted 2023 UK market sizes for channel emulation, mobile core testing, conformance and performance testing, HSE and network security that equated to over £30 million.⁶²⁹ The Parties did not initially provide an estimated UK market size for Wi-Fi.
429. The Parties initially submitted that the de minimis exception applied on the basis that taking HSE and network security together, the aggregate value was well below £30 million; and that even if the CMA were to find a realistic prospect of an SLC in some of the additional overlapping products in the UK, the aggregate value would still be below £30 million.⁶³⁰
430. The Parties did not initially identify O-RAN and GNSS as product overlaps. The UK market size of O-RAN was provided in response to a request for information in September 2024⁶³¹ and the UK market size of GNSS in response to a request in December 2024.⁶³²
431. At the time of the Final Merger Notice, the Parties' estimates for the total market sizes across the product overlaps identified by the CMA was over £40 million, excluding Wi-Fi lab testing, for which no estimate was provided.⁶³³
432. Even taking into account that the conformance and performance testing figure was not limited to location-based testing, the CMA calculates that the de minimis threshold would still have been significantly above £30 million based on the Parties' estimates in the Final Merger Notice, calculated as the aggregate of the other six product overlaps.

⁶²⁹ Draft Merger Notice submitted to the CMA on 17 July 2024, paragraphs 224, 231, 239, 257, 270 and 285. Converted to GBP based on an exchange rate of 1.2434 as used by the Parties in their response to the Issues Letter. Annex 35 to the Parties' IL Response, Annex 35_De minimis paper - market sizes_v2.

⁶³⁰ Parties' submission to the CMA, 14 August 2024, paragraphs 7 to 9.

⁶³¹ Parties' response to RFI 2, question 26.

⁶³² Parties' response to RFI 5, question 3

⁶³³ Across the original five product overlaps where estimates were provided, the estimates for HSE, network security and mobile core were the same as those initially submitted to the CMA. The estimate for channel emulation was revised down slightly from \$[><] million to \$[><] million and conformance and performance was revised up slightly from \$[><] million to \$[><] million. Annex to FMN, 081_RFI 1 Annex 012_Shares of supply_v6_20250114.

8.1.1.2 Revised market size estimations

433. In response to the Issues Letter, the Parties submitted revised market size estimates for 2023 (alongside estimates for 2024) that were substantially lower for channel emulation, mobile core, O-RAN, HSE and network security.
434. There were two main reasons for these revisions. First, the Parties revised their methodology⁶³⁴ to scale up their UK revenues for each product overlap by the CMA's estimate of the Parties' global share of supply in that product overlap.⁶³⁵ Second, the Parties identified lower revenues for Keysight, particularly in HSE and network security. While these lower revenues were included in the Final Merger Notice, they were not used to adjust UK market sizes in the Parties' de minimis submissions at that point.⁶³⁶
435. Overall, the Parties' revised estimates for UK market size of all the overlap markets was £22.8 million in 2023 and £30.05 million in 2024, with HSE and network security accounting for roughly £[3<] million in each year.
436. On the basis of these revised market sizes (which included estimates for Wi-Fi lab testing and location-based conformance and performance testing), the Parties submitted the Merger has minimal UK nexus and that the aggregate size of any markets in the UK in which there could be a realistic prospect that the Merger could give rise to an SLC is far below £30 million.

8.1.1.3 Parties' submissions on the de minimis exception

437. The Parties submitted that the CMA should apply the de minimis exception to the duty to refer the transaction for an in-depth Phase 2 investigation.⁶³⁷ The Parties submitted that this is particularly appropriate because, other than in HSE and network security, where the Parties have committed to divest,⁶³⁸ the Merger will have, at most, minimal effects on very small markets in the UK.⁶³⁹

⁶³⁴ Parties' IL Response, paragraph 211. The Parties submitted that their estimates of market sizes were based on initial estimates from salespeople with relevant experience which were then refined through an iterative process considering inputs from one or both Parties depending on the type of testing solution. The Parties submitted that this was necessary as company reports, market reports and data from third-party suppliers is not sufficiently granular to estimate shares of supply. Parties' response to the CMA's Request for Information, 4 December 2024 (RFI 5), question 1.

⁶³⁵ The CMA's market testing, which informed these shares, also revealed that the Parties had overstated the revenues attributable to a number of third-party suppliers, such that the CMA's market size estimates were lower, and thus the Parties' estimated shares higher, than the Parties' original estimates.

⁶³⁶ The market size for GNSS was slightly larger due to the identification of additional GNSS revenues for Spirent. Annex to FMN, 081_RFI 1 Annex 012_Shares of supply_v6_20250114; Annex 35 to the Parties' IL Response, Annex 35_De minimis paper - market sizes_v2.

⁶³⁷ Parties' IL Response, paragraph 196.

⁶³⁸ The CMA notes that in considering whether to exercise its discretion not to refer a merger for an in-depth investigation under the de minimis exception, it must include all markets on which it concludes there is a realistic prospect of an SLC: [CMA 64](#), paragraph 2.17. It cannot exclude markets on which prospective remedies may or may not occur from this aggregate figure.

⁶³⁹ Parties' IL Response, paragraph 197.

438. More generally, the Parties submitted that:

- (a) Demand does not fluctuate year-to-year with 2024 being higher than the average across the period 2022 to 2024⁶⁴⁰ and that there is also no evidence that the market sizes will grow substantially across most segments and in some it is likely to fall.⁶⁴¹ The Parties submitted that the current small market sizes in the UK are due to the main customers for these services (eg OEMs and cloud network operators) using the TME equipment in their manufacturing locations which are outside the UK.⁶⁴²
- (b) There will not be an indirect effect on the UK through the vertical supply chain as the Parties' products represent a small proportion of customers' costs and the customers are so strong that there is no basis to suggest there could be any price impact for UK customers.⁶⁴³ In addition, the Parties submitted there is no evidence to suggest that because some of the Parties' customers supply infrastructure of systemic importance to UK businesses, that any potential detriment would be felt more widely than the Parties' UK revenue would suggest.⁶⁴⁴
- (c) Market size estimates substantially overstate any conceivable effect on competition. For example, the Parties submitted it is misleading to include the total market size for mobile core as Keysight is incapable of competing for most demand in that market.⁶⁴⁵

8.1.2 CMA assessment

8.1.2.1 Market size estimation

439. The CMA took significant steps to identify the UK size of the markets in this investigation. This included multiple rounds of questions to confirm the existence and extent of overlaps, testing the robustness of the Parties' estimates and compiling estimates where the Parties did not provide them. As explained above, the information initially submitted to the CMA suggested that the de minimis exception was unlikely to apply.

⁶⁴⁰ Parties' IL Response, paragraph 197; Annex 35 to the Parties' IL Response, Annex 35_De minimis paper - market sizes_v2.

⁶⁴¹ The Parties submitted that the only exception to this is GNSS testing solutions where Parties expect demand to grow in the future. Parties' IL Response, paragraph 202.

⁶⁴² Parties' IL Response, paragraphs 200 to 202.

⁶⁴³ Parties' IL Response, paragraph 204.

⁶⁴⁴ Parties' IL Response, paragraph 207 and 208.

⁶⁴⁵ Parties' IL Response, paragraph 213.

8.1.2.2 Conclusion on aggregate market size

440. Based on its review of all available evidence, the CMA considers that it is appropriate to use the Parties' UK revenues as supplied in response to the Issues Letter and to scale them up to estimate UK market sizes based on the Parties' global shares of supply. This assumes that the Parties have a substantively similar position in the UK as they do globally. Whilst the CMA has not been able to fully validate this assumption, the CMA notes that the Parties' initial estimate suggested that they may have a smaller presence in the UK than globally.⁶⁴⁶
441. The CMA's estimate of the aggregate value of the five markets in which it considers that the Merger raises a realistic prospect of an SLC, applying this methodology, is significantly below £30 million.⁶⁴⁷
442. When assessing market size for de minimis, the CMA does not view the market statically, but will take into account any factors which indicate that the market may significantly expand or contract in the foreseeable future.⁶⁴⁸ The CMA notes that there is considerable difference in the spend between the UK market sizes 2023 and 2024 as can be seen from Table 8 and it has seen some evidence that the Parties' expect demand for at least GNSS⁶⁴⁹ and mobile core⁶⁵⁰ to grow. However, given that most of the Parties' customers testing requirements fall outside of the UK, the CMA considers it unlikely that any such growth would correspond to a sufficient expansion of UK demand in the foreseeable future such that the threshold would be met.

8.1.2.3 Replicability

443. The CMA does not consider that the Merger is one of a potentially large number of similar mergers that could be replicated across the sector in question. It is not, for example, a merger involving local markets in a sector where firms are acquiring multiple small local businesses over time.

⁶⁴⁶ See Parties' response to RFI 4, RFI 1 Annex 012_Shares of supply_v4.

⁶⁴⁷ The CMA's estimates are based on the Parties' and third parties' data. Specifically the CMA estimated the UK market size using the Parties' UK revenues and the global shares of supply set out for the relevant theories of harm above. The CMA notes that in considering whether to exercise its discretion not to refer a merger for an in-depth investigation under the de minimis exception, it cannot disregard revenues associated with anticipated divestments relating to relevant overlaps. [CMA 64](#), paragraph 2.17.

⁶⁴⁸ [CMA 64](#), paragraph 2.13.

⁶⁴⁹ The Parties submitted that they expect GNSS to grow. Parties' IL Response, paragraph 202.

⁶⁵⁰ The CMA notes the Parties' submission that the '[3<]' (See: Annex 127 to the FMN, 'Mobile Core White Paper', 29 July 2024, page 4). However, this is inconsistent both with the Parties making significant R&D investments in the lead up to 6G (see paragraph 181 above) and with internal documents. See eg a Keysight internal document, KEYS-CMA-00013071, '[3<]', 13 June 2024. This states that Keysight aims to be: '[3<]'. (page 4). The same document also states that: '[3<]' (page 7).

8.1.2.4 *Nature of the potential detriment*

444. The CMA is less likely to exercise its discretion to apply the ‘de minimis’ exception to mergers in markets which are connected to the key priorities set out in the CMA’s Annual Plan. In some circumstances, the CMA may also consider that it would not be appropriate to apply the ‘de minimis’ exception even in markets that have no direct connection to the priorities set out in the Annual Plan because of the nature of the potential detriment. For example, this may be the case where the products/services at issue are of systemic importance within the UK.⁶⁵¹
445. The CMA considers that the markets in which it considers that the Merger raises a realistic prospect of an SLC do not directly concern an area of priority identified in its 2024-2025 Annual Plan.⁶⁵²
446. The Parties’ customers do supply infrastructure of systemic importance to UK businesses and those customers have told the CMA that Communications TMEs are important to ensure they are able to bring innovative new products to market (see paragraphs 53 to 59 above). This means that any reduction in innovation that may arise following the Merger is likely to impact on the timeliness of downstream product releases.
447. Notwithstanding the above, given the overall size of the relevant UK markets is significantly below £30 million (which would indicate that the costs of a phase 2 investigation would be higher than the consumer detriment felt (see paragraph 413 above)), and the fact that most UK-based customers of the Parties that responded to the CMA had neutral or positive views of the impact of the Merger on competition,⁶⁵³ the CMA does not consider this is sufficient to exclude the application of the de minimis exception.

9. CONCLUSION ON THE APPLICATION OF THE DE MINIMIS EXCEPTION

448. Taking all the above factors into consideration, the CMA believes that the market(s) concerned in this case are not of sufficient importance to justify the making of a reference. As such, the CMA believes that it is appropriate for it to exercise its discretion to apply the de minimis exception.

⁶⁵¹ CMA 64, paragraph 2.14.

⁶⁵² CMA Annual Plan 2024/25, 14 March 2024, sections 5 and 6. The CMA’s key priorities are: (i) acting in areas where customers spend most of their money and time, particularly people that need help the most; (ii) helping emergent sectors, including digital markets, develop into high-growth, innovative and competitive markets; and (iii) ensuring the whole UK economy can grow productively and sustainably and accelerating transition to net zero. The CMA considered both the areas of focus and the medium-term priorities set out in the Annual Plan 2024/25 as part of its assessment.

⁶⁵³ Response to the CMA questionnaire from third parties, January 2025, question 8. Note of a call with a third party, November 2024, paragraphs 44 and 45; Note of a call with a third party, November 2024, paragraphs 25 and 26

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449. Consequently, the CMA believes that it is or may be the case that (i) arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation; and (ii) the creation of that situation may be expected to result in an SLC within a market or markets in the United Kingdom. However, pursuant to section 33(2)(a) of the Act, the CMA believes that the markets concerned are not of sufficient importance to justify the making of a reference.
450. The Merger will therefore not be referred under section 33 of the Act.

Sorcha O'Carroll
Senior Director Mergers
Competition and Markets Authority
13 March 2025