

ANTICIPATED ACQUISITION BY NVIDIA CORPORATION OF ARM LIMITED

Issues statement

20 December 2021

Please note that [X] indicates figures or text which have been deleted or replaced for reasons of confidentiality.

The reference

1. On 16 November 2021, the Secretary of State for Digital, Culture, Media and Sport, in exercise of her powers under section 45(4) of the Enterprise Act 2002 (the **Act**), referred the proposed acquisition (the **Merger**) by NVIDIA Corporation (**NVIDIA**) of Arm Limited¹ (**Arm**) (together, the **Parties** and for statements referring to the future, the **Merged Entity**) for further investigation and report by a group of CMA panel members.
2. In exercise of its duty under section 47(4)-(6) of the Act, the CMA must decide:
 - (a) Whether arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation;
 - (b) If so, whether the creation of that relevant merger situation may be expected to result in a substantial lessening of competition (**SLC**) within any market or markets in the United Kingdom for goods or services; and
 - (c) Whether, taking account only of any SLC and the interests of national security², the creation of that situation may be expected to operate against the public interest.
3. In answering these three questions, we will apply a 'balance of probabilities' threshold to our analysis.³ That is,

¹ The proposed acquisition concerns the Intellectual Property Group business of Arm Limited. The IoT Services Group business of Arm Limited will be carved out before closing.

² The interests of national security being a public interest consideration specified in section 58(1) of the Act.

³ See [Merger Assessment Guidelines](#) (CMA129) (March 2021) (**Merger Assessment Guidelines**), paragraph 2.36.

- (a) For the competitive effects assessment, we will decide whether it is more likely than not that the Merger will result in an SLC;
- (b) For the national security assessment, we will decide whether it is more likely than not that the Merger will operate against the public interest on national security grounds;
- (c) Taking account only of any SLC and the interests of national security, we will decide whether it is more likely than not that the Merger will operate against the public interest.

Implications of COVID-19

- 4. We are publishing this issues statement during the Coronavirus (**COVID-19**) pandemic, which is having significant impacts on consumers and business across the world. The CMA has published a [statement](#) on its website on how it has adjusted its working arrangements in response and [guidance](#) on key aspects of its practice during the pandemic. Our approach to evidence-gathering will take into account the difficulties that the pandemic may be causing for market participants in this sector. If appropriate, we will also take into account the impact of the pandemic in our assessment of the competitive effects of the Merger, although we are required to look beyond the short-term and consider what lasting structural impacts the Merger might have on the markets at issue.

Purpose of this issues statement

- 5. In this issues statement, we set out the main issues we are likely to consider in reaching our Phase 2 decision. This does not preclude the consideration of any other issues which may be identified during the course of our investigation. Parties may notify us if there are any additional relevant issues which they believe we should also consider.
- 6. The CMA's phase 1 report (the **Phase 1 Report**)⁴ contains much of the detailed background to the competitive effects part of this issues statement. The Phase 1 Report is also relevant to certain aspects of our Phase 2 national security assessment as set out further in this issues statement. However, at Phase 1, it was not the CMA's role to undertake a review of the national security considerations.⁵ At Phase 1, Government departments provided

⁴ Proposed acquisition of ARM Limited by NVIDIA Corporation: Phase 1 report and Phase 2 reference under Section 45(4) of the Enterprise Act 2002 - GOV.UK (www.gov.uk)

⁵ The CMA summarised representations made to it at phase 1 (see [Guidance on CMA's Jurisdiction and Procedure](#) (CMA2) (December 2020) paragraph 16(7)(d)).

reports in relation to national security matters directly to the Department for Digital, Culture, Media and Sport (**DCMS**) (see further paragraph 53).

7. This issues statement is divided into two key parts, to set out our intended approach to:
 - (a) The competitive effects assessment; and
 - (b) The national security assessment.

Background

8. On 13 September 2020, SoftBank Group Capital Limited and SVF Holdco (UK) Limited (both ultimately owned and controlled by SoftBank Group Corp.) agreed to sell the share capital of Arm to NVIDIA for US\$40 billion.
9. The Merger is not yet complete. The Merger is being reviewed by a number of competition agencies, including the European Commission and the United States (**US**) Federal Trade Commission.

The Parties

10. NVIDIA is a US-based company that supplies semiconductors (primarily, graphic processing units (**GPUs**)) and computing platforms worldwide for a variety of fields of application. These include datacentre, automotive, gaming console and high performance internet-of things (**HP IoT**) applications, amongst others. NVIDIA also supplies enhanced network-interface controllers enabling the transfer of data in datacentres (**SmartNICs**).
11. Arm is a UK-based company that develops and licenses semiconductor intellectual property (**IP**) based on a specific instruction set architecture (**ISA**) to semiconductor suppliers on a worldwide basis. Arm is active upstream of NVIDIA's activities and licences semiconductor IP for the datacentre, automotive, gaming console and HP IoT fields of application, amongst others.

The Parties' products/services

12. NVIDIA and Arm are active at different levels of the global semiconductor technology industry. There are various non-horizontal relationships between the Parties, as Arm supplies semiconductor IP and NVIDIA supplies semiconductors downstream. Both Parties are important drivers of technological change in their fields.

Our inquiry

13. Below we set out some specific areas of our intended assessment in order to help parties who wish to make representations to us. However, these will not be the only areas for our assessment. For example, we will seek to assess how the industry operates, the appropriate counterfactual, including the counterfactual for the national security assessment as well as the counterfactual for the competitive assessment⁶, the rationale for the Merger and any other relevant issues.

Market definition

14. Market definition provides a framework for assessing the competitive effects of a merger.⁷ Within that context, the assessment of the relevant market(s) is an analytical tool that forms part of the analysis of the competitive effects of a merger and should not be viewed as a separate exercise.⁸
15. The boundaries of a market do not determine the outcome of the analysis of the competitive effects of a merger, as it is recognised that there can be constraints on merging parties from outside the relevant market, segmentation within the relevant market, or other ways in which some constraints are more important than others.⁹ We will take these factors into account in our competitive assessment. Furthermore, we may not find it necessary to conclude on the precise boundaries of some relevant markets, if they have no impact on the CMA's competitive assessment.
16. In the Phase 1 Report, the CMA considered the impact of the Merger by reference to the supply of:
 - (a) Central processing unit (**CPU**) IP for CPUs¹⁰ globally, both overall and by reference to each relevant application in its competitive assessment;
 - (b) CPU IP for SmartNICs used in datacentres globally;

⁶ [Merger Assessment Guidelines](#), section 4.3. We will assess the potential effects of the Merger on competition compared with the competitive conditions in the counterfactual situation (ie the competitive situation that would be likely to prevail absent the Merger). In the Phase 1 Report, the CMA found that the pre-Merger situation was the appropriate counterfactual. Our starting point for this Phase 2 investigation – in respect of the competition assessment - is that the relevant counterfactual is the prevailing conditions of competition between the Parties. We will consider whether this is still the appropriate counterfactual, taking account of any further information that comes to light. Our approach to the national security counterfactual is set out in that section of this issues statement.

⁷ [Merger Assessment Guidelines](#), Chapter 9.

⁸ [Merger Assessment Guidelines](#), paragraph 9.1.

⁹ [Merger Assessment Guidelines](#), paragraph 9.4.

¹⁰ This includes CPUs integrated in systems-on-chip (**SoCs**) and, in relation to SoCs for HP IoT applications, microprocessors integrated in SoCs. In Phase 1 the CMA referred to SoCs when assessing the Merger's impact in the: (i) automotive advanced driver assistance systems (**ADAS**)/infotainment and gaming console applications to denote CPUs integrated in SoCs; and (ii) the HP IoT applications to denote microprocessors integrated in SoCs.

- (c) GPU IP for GPUs¹¹ globally and IP for image signal processors (**ISP IP**) and ancillary IP (**System IP**)¹² for system-on-a-chip (**SoCs**) globally, as it applies to automotive advanced driver assistance systems (**ADAS**) and separately (excluding ISP IP), automotive infotainment applications;
 - (d) CPUs for datacentre applications (**Datacentre CPUs**) globally;
 - (e) SmartNICs for datacentre applications globally;
 - (f) GPUs for datacentre applications globally;
 - (g) SoCs for HP IoT applications globally;
 - (h) SoCs for automotive applications globally, in respect of:
 - (i) ADAS applications; and
 - (ii) Infotainment applications; and
 - (i) SoCs for gaming console applications (**Console SoCs**) globally.¹³
17. We will use the market definition adopted in the Phase 1 Report as a starting point for our analysis. In addition, we note that on product market definition:
- (a) In relation to GPUs for datacentre applications, the evidence available to us so far indicates that (i) more recently GPUs (in particular NVIDIA's) have been used for a wider range of workloads, in particular AI applications; and (ii) that these compete with specialist AI datacentre accelerators. For brevity, we will use the term **Datacentre GPUs** in our Phase 2 investigation to refer to, and explore the impact of the Merger on, both GPUs and specialist AI accelerators used in datacentre applications.
 - (b) There are differences across and within applications regarding whether NVIDIA's or other semiconductor suppliers' products are sold or marketed on (i) a standalone, or 'discrete' basis (eg the sale of discrete Datacentre CPUs); (ii) an integrated basis as a SoC (eg as a SoC for use in automotive applications); or (iii) further integrated as a SoC-based platform in which a SoC is used in conjunction with discrete processors, other hardware and/or software. Our starting point at Phase 2 will be to consider the products NVIDIA predominantly offers, or plans to offer, within each application and explore the constraints from suppliers with different approaches¹⁴ as relevant within our competitive assessment.

¹¹ Including GPUs integrated in SoCs for automotive ADAS and infotainment applications.

¹² Ancillary IP in this context being IP for use in automotive SoCs and interconnect fabrics.

¹³ Phase 1 Report, paragraph 6.16.

¹⁴ That is, different approaches as to how they sell or market their semiconductor products (ie on a discrete vs integrated basis, whether in a SoC or a SoC-based platform).

18. We will consider the evidence gathered at Phase 1 and any new evidence we receive which is relevant to the appropriate market definition for our assessment of the Merger. Irrespective of the market definition, where appropriate, we will consider the degree and/or any differences in the constraints on the Merged Entity.
19. Therefore, we plan to assess the competitive effects of the Merger on the following markets:
 - (a) CPU IP for CPUs globally, both overall and by reference to each application of relevance to our competitive assessment;
 - (b) CPU IP for SmartNICs used in datacentres globally;
 - (c) GPU IP for GPUs globally and ISP and System IP for SoCs globally as it applies to automotive ADAS and separately (excluding ISP IP) automotive infotainment applications;
 - (d) Datacentre CPUs globally;
 - (e) Datacentre GPUs¹⁵ globally;
 - (f) SmartNICs for datacentre applications globally;
 - (g) SoCs for HP IoT applications globally (sold standalone or as part of SoC-based platforms);
 - (h) SoCs for automotive applications globally (sold standalone or as part of SoC-based platforms), and specifically in respect of:
 - (iii) ADAS applications; and,
 - (iv) Infotainment applications; and
 - (i) Console SoCs globally.

Assessment of the competitive effects of the Merger

Theory of harm

20. The term 'theory of harm', in the context of a competition assessment, describes the possible ways in which an SLC could arise as a result of a

¹⁵ As noted above at paragraph 17(a), we will use the term Datacentre GPUs at Phase 2 to refer to both GPUs and specialist AI accelerators used in datacentre applications. At Phase 1, we used the term Datacentre GPUs to refer to the former (but not explicitly, the latter). Our use of the term 'Datacentre GPUs' in this Issues Statement denotes the Phase 1 meaning, when referring to our assessment at Phase 1, and our Phase 2 meaning, when looking forward to our assessment at Phase 2.

Merger. The theory of harm provides the framework for our analysis of the competitive effects of a merger.¹⁶ Identifying a theory of harm in this Issues Statement does not preclude an SLC from being identified on another basis following receipt of additional evidence or further analysis. We welcome views on the theories of harm described below.

21. As noted above, the Parties are active at different levels of the global semiconductor technology industry. Non-horizontal mergers of this type do not involve a direct loss of competition between the merger firms. Instead, they may result in non-horizontal effects - that is, the foreclosure of current or potential rivals if the merged entity is able to use its position in one market to harm the competitiveness of its rivals in the other. This would weaken the constraints that the merged entity faces and, as a result, harm competition and therefore customers. We focus on two types of non-horizontal effects in our assessment: firstly, vertical effects (in relation to each of the datacentre, HP IoT, automotive ADAS/infotainment and gaming console applications) and secondly, conglomerate effects (in relation to datacentre applications).
22. **Vertical** effects may arise when a merger involves firms at different levels of the supply chain, for example a merger between a firm and an upstream supplier or a downstream customer. In certain circumstances vertical mergers can weaken rivalry, for example when they result in foreclosure of the merged firm's competitors.¹⁷ This would weaken the constraints that the merged entity faces and, as a result, harm competition and therefore customers.¹⁸
23. Our assessment of the Merger's vertical effects in all applications focuses on 'input foreclosure' – specifically, on whether the Merged Entity could use its control of Arm semiconductor IP to harm rival semiconductor suppliers competing with NVIDIA downstream. The concern with an input foreclosure theory of harm is that the merged entity may use its control of an important input to harm its downstream rivals' competitiveness, for example by refusing to supply the input (**total foreclosure**) or by increasing the price or worsening the quality of the input supplied to them (**partial foreclosure**). In assessing an input foreclosure theory of harm, the CMA's approach is to consider whether three cumulative conditions are satisfied:
 - (a) Would the merged entity have the ability to use its control of inputs to harm the competitiveness of its downstream rivals?
 - (b) Would it have the incentive to actually do so, ie would it be profitable?

¹⁶ [Merger Assessment Guidelines](#), paragraph 2.11.

¹⁷ [Merger Assessment Guidelines](#), paragraph 5.6.5.

¹⁸ [Merger Assessment Guidelines](#), paragraph 7.2.

- (c) Would the foreclosure of these rivals substantially lessen overall competition?
24. The concern with a **conglomerate** theory of harm is that the merged entity may be able to affect the ability of its rivals to compete in one market using its strong position in another related market. The merged entity could do this through linking the sales of the two products in some way (eg through a technical tie), thereby encouraging customers to purchase these products together, at the expense of rivals. Alternatively, the merged entity could do this by affecting the interoperability between products in ways which favour the merged entity at the expense of rivals. The CMA will typically use the ability, incentive and effect framework to analyse this theory of harm.¹⁹
25. Subject to the evidence we obtain regarding the market definition (described above), we therefore intend to assess whether the Merger may be expected to result in an SLC as a result of non-horizontal effects in the following markets:
- (a) Datacentre CPUs globally;
 - (b) Datacentre GPUs globally;
 - (c) SmartNICs for datacentre applications globally;
 - (d) SoCs for HP IoT applications globally (sold standalone or as part of SoC-based platforms);
 - (e) SoCs for automotive applications globally (sold standalone or as part of SoC-based platforms), and specifically in respect of:
 - (i) ADAS applications; and,
 - (ii) Infotainment applications; and
 - (f) Console SoCs globally.
26. We will consider the evidence gathered so far and any new evidence we receive which is relevant to the theories of harm in our assessment of the Merger. We describe the specific theories of harm we are currently considering further below.

¹⁹ [Merger Assessment Guidelines](#), paragraphs 7.30-7.32.

Vertical and conglomerate effects in datacentres

Approach at Phase 1

Vertical effects

27. In the Phase 1 Report, the CMA considered whether, as a result of the Merger, the Merged Entity could harm NVIDIA's rivals and lessen competition in the supply of (i) Datacentre CPUs and (ii) SmartNICs. The CMA assessed whether the Merged Entity could do so by: (i) refusing to supply Arm's CPU IP for use in rival Datacentre CPUs and SmartNICs (total foreclosure) or (ii) by increasing the price or worsening the quality²⁰ of the CPU IP supplied to them (partial foreclosure).
28. At Phase 1, with regard to the ability to engage in foreclosure, the CMA found that the CPU ISA is a critical function of the operation of semiconductors (including Datacentre CPUs and SmartNICs). The CMA found that Arm controls this important input and has market power in the supply of CPU IP for:
 - (a) Datacentre CPU suppliers, including cloud service providers that are driving growth in the Datacentre CPU market. The CMA found that the use of Arm-based²¹ Datacentre CPUs has grown rapidly in the recent years, that Arm's CPU IP has technical proficiencies and a strong software ecosystem, and that the constraint posed by current or future alternative suppliers of CPU IP to third parties is weak.
 - (b) SmartNIC suppliers, with Arm-based SmartNICs comprising nearly 100% of downstream SmartNIC sales, and no credible alternatives.
29. The CMA found that the Merged Entity would be able to implement a total and/or partial foreclosure strategy. This could include targeting NVIDIA's rivals to restrict or downgrade future access, and/or develop or license IP in a way that favours NVIDIA.
30. With regard to the Merged Entity's incentive to engage in foreclosure, the Phase 1 Report found that the benefits of foreclosure are likely to outweigh the costs of such strategy. The CMA found that the Merger may create incentives to change Arm's open business model to favour NVIDIA and noted the rapid growth of the addressable Datacentre CPU and SmartNIC markets specifically.

²⁰ During Phase 1 the CMA considered a wide range of ways in which the quality of the CPU IP provided by Arm could be affected including changes in the support provided by Arm to licensees using its IP and Arm's decisions regarding which product developments to prioritise.

²¹ That is, based on Arm's CPU ISA.

Conglomerate effects

31. In the Phase 1 Report, the CMA found that Datacentre CPUs, Datacentre GPUs and SmartNICs perform complementary functions in datacentres. It therefore considered whether the Merger could give rise to conglomerate effects through the Merged Entity restricting or degrading the interoperability between Datacentre GPUs and Arm-based Datacentre CPUs and/or SmartNICs. The CMA considered whether the Merged Entity could leverage its positions in the supply of: (i) CPU IP to foreclose rival suppliers of Datacentre GPUs; and/or (ii) Datacentre GPUs, to foreclose rival suppliers of Arm-based Datacentre CPUs and/or SmartNICs.
32. At Phase 1, with regard to the ability to engage in foreclosure, the CMA found (as outlined above at paragraph 28) that Arm controls an important input and has market power in the supply of CPU IP for Datacentre CPUs and SmartNICs. The CMA also found that as the longstanding leading supplier with over 90% share of supply, NVIDIA also has market power in the supply of Datacentre GPUs. The CMA found that the Merged Entity could modify the interoperability between Datacentre GPUs and Arm-based Datacentre CPUs and/or SmartNICs, to enhance NVIDIA's products and undermine the operability of rivals' products, so as to de facto 'bundle' the supply of these products.
33. With regard to the incentives to engage in foreclosure, the CMA found that: (i) the above foreclosure strategies are consistent with NVIDIA's existing business practice to bundle certain products; and (ii) gains in Datacentre GPU, and Datacentre CPU and SmartNIC sales are likely to outweigh the costs of engaging in such a strategy.

Effects of vertical and conglomerate foreclosure strategies

34. Therefore, the Phase 1 Report found that there was a realistic prospect that the foreclosure strategies (or combination thereof) outlined above would substantially lessen competition in the supply of (i) Datacentre CPUs; (ii) SmartNICs; and (iii) Datacentre GPUs.

Approach at Phase 2

35. In making our assessment at Phase 2, we expect to consider evidence on the ability and incentive of the Merged Entity to pursue such foreclosure strategies and the impact that this could have on competition. We intend to consider evidence in relation to the following with respect to **vertical effects** in datacentre applications:
 - (a) Ability: (i) the importance of CPU IP as an input for (including as a driver of innovation by) rival Datacentre CPU suppliers and SmartNIC suppliers;

- (ii) Arm's market power upstream, and the extent to which there are credible alternatives to which Datacentre CPU/SmartNIC suppliers would be able to switch; (iii) the foreclosure mechanisms the Merged Entity could use to foreclose rival Datacentre CPU and SmartNIC suppliers.
 - (b) Incentives: (i) the current and future position of NVIDIA in the downstream markets for the supply of Datacentre CPUs and separately, SmartNICs; (ii) the benefits to NVIDIA's downstream market positions of the Merged Entity engaging in a total and/or partial foreclosure of Arm's CPU IP to NVIDIA's rivals, relative to the costs of such strategies (eg the risk that downstream customers might switch to non-Arm-based competitors).
 - (c) Effects: the impact of a foreclosure strategy on NVIDIA's rival Datacentre CPU suppliers and SmartNIC suppliers (including, on their ability to innovate), and on the competitiveness of these markets.
36. With respect to **conglomerate effects** in datacentre we intend to focus our assessment on potential foreclosure of competitors to NVIDIA's GPUs. We will not separately investigate conglomerate effects on rival Datacentre CPU and SmartNIC suppliers as effects on these competitor groups will be captured by our assessment of vertical effects on these suppliers (as outlined above). In assessing conglomerate effects, we intend to consider evidence in relation to the following:
- (a) Ability: (i) Arm's market power upstream (in supplying CPU IP for Datacentre CPUs and SmartNICs respectively); (ii) the foreclosure mechanisms the Merged Entity could use to limit interoperability between Arm-based CPUs/SmartNICs and Datacentre GPUs, or to engage in other bundling strategies; (iii) the importance of interoperability between Datacentre GPUs, Datacentre CPUs and SmartNICs, and whether, by employing the foreclosure mechanisms set out in (ii), the Merged Entity would affect rival Datacentre GPU suppliers' competitiveness.
 - (b) Incentives: (i) the current and future importance of NVIDIA in the downstream Datacentre GPU market; (ii) the benefits to NVIDIA's Datacentre GPU position of the Merged Entity engaging in foreclosure, relative to the costs of such strategies.
 - (c) Effects: the impact of a foreclosure strategy on NVIDIA's rival Datacentre GPU suppliers, and on the competitiveness of this market.
37. In making our assessment of vertical and conglomerate effects, we expect to consider, among other factors:
- (a) The evolution of Arm's CPU ISA and those of its competitors over time, and the importance of ecosystem competition built around a given ISA;

- (b) The evolution of NVIDIA's downstream market positions and those of its competitors;
- (c) Related to (a) and (b), the constraint that the x86 CPU ISA/x86-based processors would pose to the Merged Entity (i) if Intel were to license x86-based CPU IP to third parties; and (ii) as an alternative to Arm-based processors;²²
- (d) Evidence from the Parties' internal documents;
- (e) Evidence from third parties, including the Parties' competitors and customers;
- (f) Evidence on long-term characteristics and trends in the semiconductor sector, particularly in relation to (i) the significant costs and long development cycles the industry entails, and (ii) technological developments relating to artificial intelligence, edge computing, 5G and energy efficiency. We will explore the extent to which such characteristics and trends may affect the competitive dynamics in these sectors;
- (g) Arm's business model and the nature of its relationships with its licensees, including the extent of mutual collaboration and its role in driving innovation in downstream semiconductor supply markets; and
- (h) Any other relevant information.

Vertical effects in HP IoT, automotive and gaming consoles

Approach at Phase 1

38. In the Phase 1 Report, the CMA considered whether, as a result of the Merger, the Merged Entity could harm NVIDIA's rivals and lessen competition in the supply of:
- (a) SoCs for HP IoT applications;
 - (b) SoCs for ADAS and, separately, infotainment automotive applications; and
 - (c) Console SoCs.
39. At Phase 1, with regard to the ability to engage in foreclosure, the CMA found that the CPU ISA is a critical function of semiconductors (including SoCs for

²² In March 2021, Intel announced that it would begin to offer third parties access to x86 IP as part of its foundry strategy. Such access has, to date, been provided by Intel only to itself and to AMD, which also subsequently supplies x86-based processors.

all of these applications). The CMA found that Arm controls this important input and has market power in the supply of CPU IP for each of the applications listed above. Common factors attesting to the importance of Arm's CPU IP across all of these products included the technical advantages of Arm's CPU IP, the strength of Arm's software ecosystem and the lack of credible alternatives.²³ For the reasons outlined above at paragraph 29 in relation to datacentre, the CMA found that the Merged Entity would be able to implement targeted foreclosure at rival SoC suppliers.

40. At Phase 1, with regard to the incentive to engage in foreclosure, the CMA found that across each of these downstream markets, the benefits are likely to outweigh the costs of such a strategy. The CMA found that in particular, the HP IoT and automotive markets are nascent and growing, which gives NVIDIA a strong incentive to gain a first-mover advantage through a foreclosure strategy.
41. Finally, with regard to the effect of a foreclosure strategy, at Phase 1 the CMA found that there was a realistic prospect that a foreclosure strategy would substantially lessen competition in each of the downstream markets listed above.

Approach at Phase 2

42. In making our assessment at Phase 2, we expect to consider evidence on the ability and incentive of the Merged Entity to pursue such foreclosure strategies and the impact that this could have on competition. We intend to consider evidence in relation to the following in each of HP IoT, automotive ADAS, automotive infotainment and gaming console applications:
 - (a) Ability: (i) the importance of CPU IP as an input for (including as a driver of innovation by) rival SoC suppliers; (ii) Arm's market power upstream, and the extent to which there are credible alternatives to which SoC suppliers in these markets would be able to switch; (iii) the foreclosure mechanisms the Merged Entity could use to foreclose rival SoC suppliers.²⁴
 - (b) Incentives: (i) the current and future position of NVIDIA in the downstream SoC markets; (ii) the benefits to NVIDIA's downstream market positions of

²³ At Phase 1, the CMA also considered the importance of other forms of IP (GPU, ISP and System IP) for automotive ADAS SoC suppliers and infotainment SoC suppliers (for the latter, excluding ISP IP). The CMA found that Arm's other IP was an important input for some SoC suppliers, who had limited alternative options. The Phase 1 Report found that this importance may have an augmenting effect for these suppliers that are foreclosed primarily in relation to Arm's CPU IP.

²⁴ In relation to automotive applications, we will adopt a similar approach as at Phase 1 with regard to other forms of Arm IP (ie, consider the importance of these primarily in the context of whether these will augment a foreclosure strategy through Arm's CPU IP). This is because the vast majority of licensees for other non-CPU IP forms of Arm's IP in automotive applications are also CPU IP licensees.

the Merged Entity engaging in a total and/or partial foreclosure of Arm's CPU IP to NVIDIA's rivals, relative to the costs of such strategies.

- (c) Effects: the impact of a foreclosure strategy on NVIDIA's rival SoC suppliers (including, on their ability to innovate), and of the competitiveness of these markets.

- 43. In assessing these considerations, we will have regard to the evidence sources cited at paragraph 37 above.

Countervailing factors

- 44. For all theories of harm, we will consider whether there are countervailing factors which are likely to prevent or mitigate any SLC that we may find. We will also consider evidence to the extent relevant:

- (a) Evidence of entry and/or expansion by third parties and whether entry and/or expansion would be timely, likely and sufficient to prevent any SLC from arising as a result of the Merger.²⁵
- (b) Evidence in relation to countervailing buyer power.²⁶
- (c) Evidence in relation to efficiencies arising from the Merger.²⁷

- 45. We will incorporate our analysis of (a) and (b) into our assessment of each foreclosure theory of harm outlined above.

Assessment of the effects of the Merger on public interest, and national security grounds

Public interest considerations

- 46. We will consider whether, taking account only of any SLC and the admissible public interest consideration or considerations concerned, the Merger may be expected to operate against the public interest.
- 47. The public interest consideration specified by the Secretary of State in the intervention notice is the 'interests of national security'. The 'interests of national security' is not defined in the Act, nor in any accompanying

²⁵ [Merger Assessment Guidelines](#), paragraph 8.28.

²⁶ [Merger Assessment Guidelines](#), paragraph 4.20.

²⁷ [Merger Assessment Guidelines](#), paragraph 8.2. At phase 2, in order to form a view that claimed efficiencies will enhance rivalry such that a merger does not result in an SLC, the CMA must expect that the following criteria will be met: the merger efficiencies must (a) enhance rivalry in the supply of those products where an SLC may otherwise arise; (b) be timely, likely and sufficient to prevent an SLC from arising; (c) be merger-specific; and (d) benefit customers in the UK (paragraph 8.8).

guidance.²⁸ The concept of national security has been considered by the Courts of the United Kingdom²⁹ where it has been given a broad interpretation taking into account a wide range of factors. Ultimately the framing of the national security question will depend on the circumstances of each case, and the appraisal will be context-specific.

48. An SLC is also relevant to the assessment of the 'public interest'.³⁰ Anti-competitive outcomes are treated as being adverse to the public interest unless justified by a public interest consideration.³¹
49. Unlike the competition assessment, under which the loss of competition must be substantial, the Act does not specify the threshold of harm to be established.
50. In the specific circumstances of this case, we will consider whether the national security risk may operate against the public interest on the basis that:
 - (a) An SLC may lead to a national security risk that operates against the public interest; and/or
 - (b) Any other national security factor (unrelated to an SLC finding) may arise that operates against the public interest.
51. In relation to the above question we will focus on the specific national security matters referred by the Secretary of State, as set out below. As set out below, these cover issues relating to product security, cyber security more broadly (product security being a facet of cyber security), and national security considerations pertaining to the use of architecture IP.

The Secretary of State's Phase 2 reference

52. In referring the Merger to the CMA to investigate on national security grounds,³² the Secretary of State referred to the following issues:
 - (a) Market effects (generated by substantial lessening of competition) that may lead to reduced product security, through lower incentive to innovate or a reduction in diversity;
 - (b) Market effects that may impact the secure development of ISAs;

²⁸ National security includes 'public security' (s58(2) of the Act).

²⁹ See for example, *Secretary of State for the Home Department v Rehman* [2002] 1 All ER. 122.

³⁰ Section 47(5)(b) of the Act.

³¹ Section 45(6) of the Act.

³² [Proposed acquisition of ARM Ltd by NVIDIA Corporation: Consultation on Phase 2 Reference \(publishing.service.gov.uk\)](https://publishing.service.gov.uk).

- (c) Market effects that reduce neutrality in the market and further decreases the economic motivation to prioritise security and leads to de-prioritisation in security critical markets;
 - (d) Exposure to regulatory processes that could alter current governance structures of Arm subsidiaries and generate concerns about the provenance and therefore security of Arm IP; and
 - (e) Reduction of the UK's autonomy to develop, operate or support defence and security systems that utilise Arm IP.
53. We have used a Phase 1 report submitted by the National Cyber Security Centre (**NCSC**) to DCMS, and advice provided by the Ministry of Defence (**MoD**) to DCMS as a starting point for appraising each theory of harm.
54. We set out below, the focus of each theory of harm and our likely approach. For each of these, we expect to consider information and evidence from the Parties, market participants, stakeholders, and Government.
55. In assessing whether the Merger may operate against the public interest, we will assess each theory of harm individually. However, two or more of these theories of harm may also operate in conjunction with one another, and/or with the competition assessment such that, cumulatively, the Merger may operate against the public interest on national security and/or competition and national security grounds.
56. The question of whether a matter may operate against the public interest will require a context-specific and in-the-round assessment, which may include considerations of factors such as the materiality of the risk identified, the likelihood of it occurring and the scale of the potential impact that might result if it did so. We will apply these or any other factors to our assessment as appropriate to the context and the matter under consideration.

Theories of harm

57. [✂] [*The following section has been redacted at the request of the UK Government as it contains confidential information.*]

Countervailing factors

58. For all theories of harm, we will consider whether there are countervailing factors which are likely to prevent or mitigate any national security concern that we may find.

Possible remedies and relevant customer benefits

59. Should we conclude that the Merger may be expected to result in an SLC within one or more markets in the UK and/or to operate against the public interest on national security grounds, we will consider whether, and if so what, remedies might be appropriate.
60. In any consideration of possible remedies, we may in particular have regard to their effect on any relevant customer benefits that might be expected to arise as a result of the Merger and, if so, what these benefits are likely to be and which customers would benefit.³³

Responses to this issues statement

61. Any party wishing to respond to this issues statement should do so in writing, by **no later than 5 pm (UK time) on 6 January 2021** by emailing Nvidia.Arm@cma.gov.uk. Please note that, due to the ongoing COVID-19 pandemic, the CMA's offices across the UK are closed until further notice. We are no longer able to accept delivery of any documents or correspondence by post or courier to any of our offices.

³³ [Merger Remedies](#) (CMA87), paragraphs 3.4 and 3.15 to 3.24.