TELEFONICA UK LIMITED RESPONSE TO:

"Award of the 700 MHz and 3.6-3.8 GHz spectrum bands Revised proposals on auction design"

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I. INTRODUCTION

1. Telefonica UK Limited ("Telefonica") welcomes the opportunity to respond to Ofcom's consultation on its revised proposals for auction design for the award of the 700 MHz and 3.6-3.8 GHz spectrum bands.[1] This is the first of two consultations published on 28 October 2019 concerning this award. Our comments here should be considered together with our response to the second consultation on Ofcom's proposal to make regulations for the award.[2]

2. In our response to the previous consultation on award design published in March 2019[3], Telefonica proposed that Ofcom adopt an SMRA-based auction format for this award.[4] We also agreed that including a negotiation phase in the assignment stage, with options for both full and partial assignments, would be a huge improvement on Ofcom's original proposal only to run a standard second price sealed bid assignment process. We welcome Ofcom's decision to embrace these elements in its new auction design. Taken together, these measures reduce the vulnerability of the award outcome to being distorted by strategic bidding behaviour.

3. However, in Telefonica's view, the measures that Ofcom has introduced only reduce and do not eliminate the likelihood of a sub-optimal outcome that limits the ability of all mobile operators to offer the highest quality 5G services to UK consumers. Two related risks are not addressed. Firstly, there is a material risk that this award fails to enable defragmentation of the wider 3.4-3.8 GHz band, which would be a body blow to the UK's ambitions to be a global leader in 5G. Ofcom can and should use its powers to ensure all operators participate in a reconfiguration of the entire band, so that every operator has access to the larger blocks of contiguous spectrum needed for 5G. Secondly, Ofcom's new auction design, although in many ways quite robust to gaming, has one clear vulnerability.

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[1] Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands - Revised proposals on auction design*, 28 October 2019.
[2] Ofcom, *Notice of Ofcom's proposal to make regulations for the award of 700 MHz and 3.6-3.8 GHz spectrum*, 28 October 2019.
[3] Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, Ofcom, 18 December 2018.
[4] Telefonica UK Limited response to: Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, 19 March 2019.

The format maintains incentives for H3G to price drive at 3.6 GHz and/or pursue toehold allocations of 3.6 GHz for strategic reasons, including enhancing its veto power over band defragmentation. Ofcom needs to act, ideally with a cap of 140 MHz on holdings of 3.4-3.8 GHz, or at the very least, restrictions on switching between 3.6 GHz and 700 MHz, to constrain such behaviour.

4. Ofcom has statutory duties to further the interests of consumers, promote competition in the provision of mobile services, and secure the optimal use of the spectrum. It is also government policy that the UK should be a leader in the provision of 5G services. With this award design, Ofcom has moved closer to meeting its objectives, but it still falls materially short. If Ofcom proceeds with an auction on this basis, there is a real risk that one or more operators will end up with inefficiently small and/or fragmented 5G spectrum holdings, which will limit the quality of their 5G offerings and unnecessarily constrain their ability to compete for customers. This is obviously welfare destructive, as well as not being an efficient allocation of spectrum and contrary to Ofcom's statutory duties.

Full band assignment

5. In our responses to the last two consultations concerning this award[5], we made the case that Ofcom should adopt "full band assignment". This would involve each operator including their existing spectrum holdings in the assignment stage as part of their participation in the combined award of 700 MHz and 3.6 GHz. All licensees would then be guaranteed contiguous spectrum within the wider band after the award. Our most recent submission was supported by evidence explaining the benefits of defragmentation for citizen-consumers and the minimal costs for operators, including H3G, of reconfiguring their holdings.[6]

6. Our arguments in support of full band assignment were front and centre of Telefonica's responses to prior consultations. Based on those arguments, Telefonica invited Ofcom to adopt full band assignment immediately or, at the very least, to conduct a proper consultation and a full evidence-based assessment

[5] Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, 19 March 2019; and Ofcom, *Defragmentation of spectrum holdings in the 3.4-3.8 GHz band*, 11 June 2019.
[6] Telefonica UK Limited response to: *Defragmentation of spectrum holdings in the 3.6-3.8 GHz band*, 10 July 2019, Annex 1.

of the merits. It was pointed out that a failure to do so would constitute a breach of Ofcom's statutory and public law duties. We were therefore surprised to see that, whilst the present consultation purports to address defragmentation, it entirely ignores the issue of full band assignment, contrary to Ofcom's statutory and public law duties and without any explanation. There is no mention of full band assignment or Telefonica's submissions on it, still less any indication of Ofcom's position on the point. The only reasonable inference that we have been able to draw from this is that Ofcom is still considering its position on full band assignment.

7. We are aware that Ofcom had hoped that defragmentation could be achieved before now through secondary market negotiations, but it must now recognise that such discussions have not progressed and are unlikely to do so. It is now time for Ofcom and the industry to coalesce around full band assignment as the only approach that can guarantee defragmentation of the 3.4-3.8 GHz band. Without Ofcom's intervention, there is an acute risk of market failure, owing to the asymmetry in 5G spectrum positions between the operators and the resulting misalignment of incentives to negotiate between H3G and the other operators. BT, Telefonica and Vodafone all support Ofcom acting to defragment the entire 3.4-3.8 GHz band. The only operator that opposes this is H3G, which – owing to its pre-existing advantage in 5G spectrum – stands to benefit from preventing other MNOs from securing contiguous spectrum (because this would reduce their rivals' competitiveness in the downstream mobile market).

8. We request that Ofcom adopt full band assignment now and consult on a plan to implement this within the award. At the very least, Ofcom should conduct a proper consultation on Telefonica's proposal followed by a full evidence-based assessment of the merits. As we said in our response to the June consultation, a failure to do so would constitute a breach of Ofcom's statutory and public law duties and would in our view be amenable to legal challenge.[7] Further, the European Electronic Communication Code requires Member States, by the end of 2020, to "take all appropriate measures to… reorganise and allow the use of sufficiently large blocks of the 3,4-3,8 GHz band" to facilitate the rollout of 5G.

[7] Telefonica UK Limited response to: Ofcom, *Defragmentation of spectrum holdings in the 3.6-3.8 GHz band*, 10 July 2019, §11.

Protecting the integrity of the auction

9. Ofcom has also again failed to adequately assess the case for spectrum caps for this award, in particular at 3.4-3.8 GHz. The purpose of spectrum caps is not only to safeguard competition but also to prevent undesirable strategic bidding and preclude allocation outcomes that are likely to be inefficient. We believe that there is a compelling case on competition grounds alone for imposing a cap of 140 MHz on holdings of immediately usable 5G capacity spectrum at 3.4-3.8 GHz[8]. However, even if Ofcom is unconvinced by the competition case, it should recognise that a cap is necessary to preserve the integrity of the auction process. The absence of a cap is a de facto 'greenlight' to H3G to engage in gaming tactics and bid based on strategic rather than intrinsic valuations. This in turn invites retaliatory behaviour from other bidders. There is a material likelihood that this leads to a bad auction outcome in which spectrum in both the 700 MHz and 3.6 GHz bands is not allocated to the operators that have the highest intrinsic value to deploy it. Such an outcome could set back the development of 5G services in the UK for the next decade.

10. If Ofcom fails to implement the necessary 140 MHz cap on 3.4-3.8 GHz holdings, then it should revisit its approach to setting eligibility points so as to constrain or eliminate strategic switching between the (non-substitute) 700 MHz and 3.6 GHz bands. This could be done either by creating separate eligibility silos for the two bands, or by raising the ratio of eligibility points for 700 MHz FDD relative to 3.6 GHz.

11. In Telefonica's view, Ofcom's statutory duties under the Communications Act 2003 ("CA 03") and the Wireless Telegraphy Act 2006 ("WTA 06") require it to address both defragmentation and the threat that gaming behaviour poses to the efficiency of the auction allocation. Ofcom's current proposals fail to deal with either of them adequately, contrary to those statutory duties.

[8] This would prevent H3G from bidding for 3.6 GHz – 3.8 GHz spectrum. Such a cap could not realistically be said to constrain H3G, since it already holds more spectrum in the 3.4 GHz – 3.8 GHz band than any other operator in Europe, including in three player markets.

SMRA rules and implementation

12. In the following sections, we also set out our position supporting the SMRA format and make proposals for enhancements to the auction rules, including:

    a) **Eligibility points.** Changes to the eligibility points regime, so as to reduce both the scope for and pay off from price driving.
    b) **Reserve Prices.** We request that Ofcom set starting prices at the bottom end of its proposed ranges for 700 MHz and 3.6 GHz, so as to maximise the scope for price discovery.
    c) **Pricing rules.** Ofcom should switch to a uniform pricing rule, as this will improve auction efficiency at the margins. We also propose an approach that would ensure that bid increments do not get too large.
    d) **Information Policy.** Ofcom should publish aggregate demand in full for each band at the end of every round. In the context of this award, obscuring demand is not an effective tool to address concerns about strategic bidding.

Structure of our response

13. The remainder of our response is structured as follows:
    - Section II addresses Ofcom's failure to implement full band defragmentation at 3.4-3.8 GHz and the harm this could cause to the UK.
    - Section III addresses "*Question 1: Do you agree with our proposal to use an SMRA design for this award*?"
    - Sections IV through VIII address "*Question 2: Do you have any comments on the proposed detailed rules for our SMRA design*?"
        - Section IV addresses the risks to an efficient outcome from strategic bidding
        - Section V explores the case for spectrum caps
        - Section VI addresses Ofcom's approach to lot attributes, including eligibility points and reserve prices
        - Section VII discusses the Principle Stage rules, including the pricing rule

- Section VIII discusses the Assignment Stage rules, including the negotiation phase

- Section IX addresses "*Question 3: Do you have any other comments you wish to make on our proposals for this award*?"

II. FAILURE TO IMPLEMENT FULL BAND DEFRGAMENTATION AT 3.4 GHz - 3.8 GHz

14. In Telefonica's view, Ofcom's proposed approach fails to satisfy its statutory duty to secure the optimal use for wireless telegraphy of the electro-magnetic spectrum because it will not facilitate a full defragmentation of the wider 3.4 GHz - 3.8 GHz band. The rules that Ofcom has proposed for assignment of 3.6 GHz, while helpful (see our comments in Section VIII), are likely to facilitate, at best, only a *partial* defragmentation of the wider band. This is not good enough. For the reasons we set out here and in our previous response to the June consultation on defragmentation[9], Ofcom should adopt a full band assignment process that will ensure that all operators secure contiguous 5G spectrum at 3.4-3.8 GHz. This section is intended to supplement, and be read alongside, our response to the June consultation.

15. It is indisputable that the best outcome for development of 5G in the UK, and therefore for competition and consumers, would be one where all four operators have access to larger contiguous blocks of 5G spectrum. H3G, uniquely in the UK, already has this. Ofcom's revised rules provide a potential path for both BT and Telefonica to achieve this through a future spectrum swap, but this may only be *possible* if they win compatible quantities of spectrum in the award. This transparent constraint exposes both Telefonica and BT to the asymmetric risk of price driving by other bidders, especially H3G, as a significant proportion of our value may be associated with a single marginal lot. All other paths for BT, Telefonica and Vodafone to secure larger contiguous blocks require that H3G move its holdings. We fear that there is a significant risk that defragmentation will not happen because, in the absence of appropriate pressure from Ofcom, H3G will either not engage or seek to extract unreasonable rents from other operators.

16. Ofcom has missed several opportunities to address this problem. It twice missed an opportunity to propose a requirement on H3G to participate in a broader reconfiguration, first when the CMA reviewed the purchase of UK Broadband ("UKB") and second when Ofcom consulted on varying UKB's licence. It also pushed ahead with a conventional assignment of 3.4 GHz spectrum when it could and should have

[9] Telefonica UK Limited response to: Ofcom, *Defragmentation of spectrum holdings in the 3.6-3.8 GHz band*, 10 July 2019.

given winning bidders notice that they might be required to move their frequencies again when the rest of the wider band was awarded.

17. Ofcom does have the legal authority to reconfigure H3G's spectrum (see also further discussion at the end of this section). The precedent established by the variation of UKB's 3.6 GHz licence in December 2018 demonstrates that Ofcom can in principle reconfigure an operator's holdings. In this decision, Ofcom reasoned that the variation of H3G's UK Broadband licence so as to move the lower limit down from 3605 MHz to 3600 MHz and the upper limit down from 3689 MHz to 3680 MHz did not involve the award of any rights to use radio frequencies, but was a swap of spectrum with the same technical characteristics (§4.167).[10] That swap was desirable, in Ofcom's view, because among other things it gave H3G a 100 MHz contiguous block of spectrum without a less usable 5 MHz block in the middle. Even though [✂], Ofcom preferred a solution which decreased fragmentation (a solution which was to H3G's commercial advantage).

18. The same reasoning applies to post-auction variation of existing licences. To require an existing licensee to consent to such a variation in order to bid in the award is not to require them to consent to *surrender* any spectrum, but merely to consent to a *swap* of spectrum with the same technical characteristics. To adopt the metaphor of the 3.4-3.8 GHz band as a shared bookshelf: Ofcom would not be requiring bidders to give up the books they already own on that shelf, but to agree that those books can be rearranged in a sensible pattern on the shelf once the auction has been completed.

19. In this respect, it is relevant that the cost to H3G of shifting its holdings within the 3.4-3.6 GHz band would be minimal, and there would be no disruption to service. The process of moving frequencies within the same band is not complex. Existing equipment can be retuned remotely provided the revised frequencies are within the instantaneous bandwidth (typically 200 MHz) of the associated antenna. Also, as deployment of 5G has only just begun, there is very little equipment that will even need to be retuned.

[10] Ofcom, *Variation of UK Broadband's spectrum access licence for 3.6 GHz spectrum*, 14 December 2018, §4.167.

20. With Government support if necessary, Ofcom also has considerable "soft power" to encourage all operators to engage in a process that is manifestly in the broader national interest. In the same way that Ofcom previously proposed to use revenues from this auction to support coverage obligations, it could use them to offer compensation for the (minimal) costs of moving frequencies and (where appropriate) refund of 3.4 GHz assignment round fees from the PSSR auction.

21. Regulators across Europe and North America have recognised this problem and acted to ensure that their operators have access to large contiguous blocks of spectrum. In situations where there were incumbent licence holders, they have either been cleared or moved within the band to make room for the award of contiguous spectrum. In some countries, such as Spain, spectrum trading has contributed in transitioning spectrum from legacy use to 5G use – but the regulator recognizes that it will have to play a more direct role in facilitating defragmentation. It is notable that, at present, no other regulator in Western Europe and North America (not even the United States) plans to rely on the secondary market to defragment spectrum at 3.4-4.2 GHz.

22. Consider the following examples:
    - ***Canada:*** After consultation with incumbent license holders, the Canadian telecommunications regulator, ISED, modernised the 3.5 GHz band plan (3450-3650 MHz in Canada), while allowing incumbents to retain a portion of their existing licenses. Under the current allocation plan in consultation, ISED will auction between 40-200 MHz of 3.5 GHz spectrum in each region, with the remainder held by incumbents. To ensure contiguity, incumbent spectrum licenses are required to include their spectrum in the assignment stage and may be moved as necessary to ensure that all licence holders are assigned contiguous spectrum.[11]
    - ***France:*** After a public consultation that received some 150 responses, France's telecommunications regulator, ARCEP, decided to reshuffle regional licences within the 3.4-3.8 GHz band. Existing licences, all of which are due to expire by 2026, will be grouped in to the lower 3410-3490 MHz portion of the band. This will enable ARCEP to allocate the remaining 310 MHz to mobile operators

[11] https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11439.html

through a mixture of direct award and auction, with each operator to be guaranteed contiguous spectrum.[12]

- ***Portugal:*** Portugal's telecommunications regulator, ANACOM, approved a decision to amend the frequency rights in the 3.4-3.8 GHz currently held by Dense Air in certain regions of the country. The decision will require Dense Air to partake in a reconfiguration of the band, which will lead to a reduction of its spectrum holdings in Lisbon (from 168 MHz to 100 MHz) and relocation in all regions to the lower end of the band (3.4-3.5 GHz).[13] This plan will ensure that bidders in the forthcoming 5G auction can bid for larger contiguous blocks of nationwide spectrum.
- **Spain:** Following the country's 3.6 GHz auction, which resulted in three of the four operators having fragmented holdings, the Ministry indicated to the winning bidders that it tends to facilitate a defragmentation process, so that all four operators will have contiguous blocks of 80 MHz or more. In the recent public consultation on the National Frequency Allocation Table (CNAF in Spanish)[14], the Ministry specifically referenced Article 54 of the European Electronic Communications Code, which says that Member States should aim to ensure the reorganization of 3.4-3.8 GHz in order to provide access to broad sections of contiguous spectrum.
- ***United States:*** The FCC is currently developing plans to clear part of the 3.7-4.2 GHz band, which is used by satellite operators, and reallocate spectrum for terrestrial mobile services. The C-band Alliance, the group that represents three of the largest incumbent satellite operators, has proposed to clear up to 280 MHz of contiguous spectrum at the bottom of the band. In a recent letter to Congress, FCC Chairman Ajit Pai announced a plan to hold an FCC-led auction for this 280 MHz as soon as possible, while preserving 200 MHz for incumbent satellite operators.[15] We expect the FCC to adopt an approach that ensures the spectrum is assigned in contiguous blocks, consistent with the approach adopted for the 600 MHz auction in 2017 and the millimetre wave auctions in 2019.

[12] https://www.arcep.fr/uploads/tx_gsavis/19-1386.pdf
[13] https://www.anacom.pt/render.jsp?contentId=1493002
[14] https://avancedigital.gob.es/es-es/Participacion/Paginas/proyecto-orden-modifica-orden-cnaf.aspx, p2.
[15] https://docs.fcc.gov/public/attachments/DOC-360855A8.pdf

23. We are aware that Ofcom had hoped that defragmentation could be achieved before now through secondary market negotiations, but it must now recognise that such discussions have not progressed and are unlikely to do so. The central problem here is that H3G anticipates a competitive advantage in the downstream market if one or more other operators are unable to replicate its access to larger blocks of 5G spectrum. This introduces a barrier to successful negotiation that likely can only be overcome through some form of regulatory intervention.

24. Ofcom's faith in the secondary market to address fragmentation is misplaced in this case because it appears not to have considered the impact of the asymmetry in 5G spectrum positions between the operators and the resulting misalignment of incentives to negotiate between H3G and the other operators. In economics and law, the Coase Theorem affirms that "where there are *complete competitive markets with no transactions costs*, an efficient set of inputs and outputs to and from production-optimal distribution will be selected, regardless of how property rights are divided."[16] The critical assumptions for the theorem to hold, as emphasised in here, are competitive markets and no transaction costs. The market for 5G spectrum is not fully competitive because H3G has a large lead in holdings of 3.4-3.8 GHz, and the location of its frequencies creates a barrier to other operators making their own deals to defragment the band. Operators also face considerable uncertainty about the scale of the competitive benefits and losses to individual MNOs that may flow from partial or full defragmentation. This imperfect information has the same effect as high transaction costs in that it makes bargaining between MNOs difficult.

25. Our expectation is that the price that H3G will demand to participate in defragmentation will be based primarily on anti-competitive strategic value rather than intrinsic value. [✂] Operators also have a natural aversion to engaging in trades that will boost or subsidise a direct competitor.

26. We are also concerned that Ofcom's approach may [✂] Such a process would fail to address the fundamental problem of fragmented assignments with the 3.5GHz

[16] The original paper is Coase, Ronald (1960), "The Problem of Social Cost", Journal of Law and Economics, The University of Chicago Press, Vol. 3 (Oct., 1960). This summary is borrowed from https://www.investopedia.com/terms/c/coase-theorem.asp, emphasis added.

and may result in a worse outcome than the status quo, thereby causing further long-term harm to UK consumers.

27. In short, Ofcom's current approach of leaving defragmentation to the market risks relegating the UK to the 5G slow lane.

28. We also observe that Ofcom has not put forward reasons to justify its current approach by reference to its statutory duties. In this respect, it is notable that Ofcom's approach of relying on the market to address fragmentation is inconsistent with policy adopted by EU bodies and policy actions taken by countries across Western Europe (including Norway and Switzerland, which are not in the EU).

29. Further, the European Electronic Communications Code requires Member States to take all appropriate steps to reorganise and allow the use of sufficiently large blocks of the 3.4 GHz – 3.8 GHz spectrum band:

> **DIRECTIVE (EU) 2018/1972 (The European Electronic Communications Code), Article 54:** "*By 31 December 2020, for terrestrial systems capable of providing wireless broadband services, Member States shall, where necessary in order to facilitate the roll-out of 5G, take all appropriate measures to: (a) reorganise and allow the use of sufficiently large blocks of the 3,4-3,8 GHz band*;"[17]

30. Both the European Commission and the Radio Spectrum Policy Group ("RSPG") have emphasised the importance of Member States taking action to address fragmentation in the 3.4 GHz - 3.8 GHz band, and highlighting the advantage of operators ideally have access to larger blocks of spectrum of at least 80 MHz in this band

> **European Commission:** "*Taking into account Article 54 of the European Electronic Communications Code, Member States should aim at ensuring a defragmentation of the 3 400-3 800 MHz frequency band so as to provide opportunities to access large portions of contiguous spectrum in line with the*

[17] DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 establishing the European Electronic Communications Code, Article 54 (1) (a).

goal of gigabit connectivity. This includes facilitating trading and/or leasing of existing rights of use. Large contiguous spectrum portions of preferably 80-100 MHz facilitate the efficient deployment of 5G wireless broadband services, for example using Active Antenna Systems (AAS), with high throughput, high reliability and low latency in line with the policy objective of gigabit connectivity. This objective is of particular importance for a defragmentation."[18]

RSPG: "*Current discussion in 3GPP suggests that channels up to 80 MHz or 100 MHz, multiples thereof, or combination of narrower supported bandwidths will be used at 3.6 GHz. To ensure suitable contiguous spectrum in this primary band, Member States should address current fragmentation in order to prepare for the introduction of 5G*."[19]

31. In Table 1, we update the information that we previously provided to Ofcom setting out the policy of each country in West Europe with respect to awarding larger blocks of spectrum and awarding contiguous spectrum at 3.4-3.8 GHz. Based on the plans that have been announced to date we observe that, other than Italy, the UK is the only country not pursuing an approach that will enable every operator to secure a large contiguous block of 5G spectrum in this key band (and even Italy acted to ensure that MNOs have exclusively contiguous spectrum). We urge Ofcom to explain why it thinks it is acceptable to run an award in a way that could result in every single UK operator having discontiguous spectrum and only one (H3G) having a larger 5G block, when no other regulator in Western Europe intends to allow this. This would seem to be the very opposite of what harmonised European regulation was supposed to deliver.

[18] COMMISSION IMPLEMENTING DECISION (EU) 2019/235 of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3 400-3 800 MHz frequency band, §10.
[19] RADIO SPECTRUM POLICY GROUP, STRATEGIC SPECTRUM ROADMAP TOWARDS 5G FOR EUROPE, Second Opinion on 5G networks, 30 January 2018, RSPG18-005 FINAL, page 7.

Table 1: Survey of approaches to contiguous spectrum allocation at 3.4-3.8 GHz in Western Europe

Country	Prioritising contiguous spectrum?	# operators with ≥ 70 MHz contiguous	Comments
Austria	Yes	3	Allocation completed, 3 operators with at least 100 MHz contiguous
Belgium	TBD	TBD	Plans not yet announced
Denmark	TBD	TBD	Plans not yet announced
Finland	Yes	3	Allocation completed, 3 operators with 130 MHz contiguous each
France	Yes	TBD	Award in development; expected to prioritise contiguous assignment and the relocation of incumbent license holders
Germany	Yes	3	Allocation completed, 3 operators with 70-90 MHz contiguous
Ireland	Yes	3	Allocation completed, 3 mobile operators with at least 85 MHz (two smaller FWA operators have non-contiguous spectrum due to federal incumbent use)
Italy	Yes	2	200 MHz in 3.6-3.8GHz auctioned to MNOs; all MNOs have contiguous spectrum and 2 operators have 80 MHz contiguous
Luxembourg	Proposed	TBD	Regulator planning auction for 280 MHz of spectrum at 3420-3700 MHz band with contiguous allocations.
Netherlands	TBD	TBD	Plans not yet announced
Norway	Yes	TBD	In development; expected to prioritise contiguity within 300 MHz block
Portugal	Proposed	TBD	Auction process announced; consulting on proposal to require incumbent (Dense Air) to move to allow for contiguous assignments
Spain	In process	1 (expected to increase to 4)	3 of 4 operators have fragmented assignments but regulator is developing an industry plan for defragmentation
Sweden	Yes	TBD	Award in development; current plans ensure contiguous assignment
Switzerland	Yes	3	Allocation completed, 3 operators with at least 80 MHz contiguous
United Kingdom	No	1	Two-stage auction process which (absent trading will leave all operators with fragmented assignments. One operator, H3G has a licence for 3460-3500MHz and 3580-3680MHz

Notes: Column 2: Green - process guarantees contiguous spectrum; orange - in process or TBD (to be determined); red - no priority. Column 3: Green - 3 or more operators with 70 MHz+ contiguous; orange - 2 operators with 70 MHz contiguous or potential regulatory path to this; red indicates 1 or fewer operators with 70 MHz contiguous and no regulatory path.

32. In our response to Ofcom's consultation on defragmentation of spectrum holdings in the 3.4-3.8 GHz band, we provided evidence to Ofcom that the economic cost to UK consumers, operators and the economy at large could be substantial.[20] We explained that lack of access to larger contiguous blocks would mean lower speeds for the average consumer and delays to future 5G use cases, such as Industry 4.0 and the Internet of Things, as well as lower capacity and higher equipment costs. We also showed that technical solutions to address discontiguous spectrum will be delayed and will provide, at best, a partial and more expensive solution than having single contiguous blocks. Vodafone provided similar evidence.[21] It is hard to reconcile Ofcom's failure to analyse and respond to this evidence with its statutory duties.

33. Proceeding without a plan for full band defragmentation at 3.4-3.8 GHz would, in Telefonica's view, be contrary to Ofcom's statutory duties, including its principal duty to further the interests of citizens in relation to communications matters and to further the interests of consumers, where appropriate by promoting competition. In fulfilling these duties, Ofcom is required to secure amongst other things the optimal use of the spectrum. Ofcom should consult now with all four operators on how to ensure this award results in an outcome where all operators have access to larger contiguous 5G blocks. We think the best approach would involve all four operators including their existing holdings and any new spectrum won in the auction to a full band assignment process in return for a guarantee that they would receive contiguous spectrum with the same total bandwidth. If Ofcom is not comfortable facilitating this process alone, then it should enlist the assistance of the new Government.

[20] Telefónica UK Limited, *Response to: Defragmentation of spectrum holdings in the 3.4-3.8 GHz band*, Ofcom Consultation, 10 July 2019, Annex 1.
[21] Vodafone, *Vodafone Response to Ofcom Consultation: Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, p.13.

Legal framework for full band assignment

34. Telefonica proposes that Ofcom requires bidders, as a condition of participating in the combined award of 700 MHz and 3.6 GHz, to consent to a variation of the frequency ranges in any existing licences they hold for the 3.4 - 3.8 GHz band, so as to ensure the assignment of large contiguous blocks within that band.

35. In this section, we explain that Ofcom has:
    a) the power to impose such a condition in respect of applications for a licence to use spectrum; and
    b) the power to vary existing licences insofar as necessary.

36. With respect to the power to impose conditions, Ofcom may by regulations provide that applications for wireless telegraphy (WT) licences be made in accordance with a bidding procedure: s.14(1) WTA 06. The regulations may make provision with respect to (a) the grant of licences to which they apply; and (b) the terms, provisions and limitations subject to which licences are granted: s.14(2) WTA 06.

37. The regulations may in particular specify requirements which must be met by applicants for a licence: s.14(3)(d) WTA 06. Such requirement include, for example, technical requirements and requirements intending to restrict the holding of two or more WT licences by any one person. Section 14 thus empowers Ofcom to make regulations specifying requirements that must be met by applicants who wish to participate in an award.

38. This could, in principle, include a frequency variation requirement of the type that we propose:
    a) whilst s.14(3)(d) contains examples of the requirements that may be imposed, those examples are non-exhaustive. The power to impose requirements is not confined to requirements of any particular kind;
    b) the examples in s.14(3)(d) envisage that an applicant might be required to relinquish an existing licence (see the reference to requirements that restrict the holding of two or more WT licences by any one person). If

Ofcom is able to require an applicant to relinquish an existing licence, it must also be able to require an applicant to consent to a variation;

c) Ofcom (tacitly) accepts that it has the power to make an operator's participation in an award conditional on that operator including some or all of its existing spectrum holdings in the assignment stage.[22]

39. There are a series of statutory duties that apply when Ofcom decides to makes regulations for the award of radio spectrum. The duties that are most relevant in the present context are as follows.

40. Ofcom's general duties are set out in s.3 CA 03. Under s.3(1), it is the principal duty of Ofcom in carrying out its functions (a) to further the interests of citizens in relation to communications matters; and (b) to further the interests of consumers in relevant markets, where appropriate by promoting competition. In doing so, Ofcom is required under s.3(2) to secure, amongst other things, the optimal use of the spectrum; and the availability throughout the UK of a wide range of services.

41. In performing these duties, Ofcom must have regard, in all cases, to the principles under which regulatory activities should be, among other things, transparent, accountable and consistent: s.3(3) CA 03. Importantly, Ofcom must also have regard to the matters specified in s.3(4), including the desirability of encouraging investment and innovation in relevant markets; the desirability of encouraging the availability and use of high-speed data transfer services; and the different needs and interests of all persons who wish to make use of the spectrum.

42. In accordance with the EU Common Regulatory Framework, s.4 CA 03 requires Ofcom, when carrying out its functions, including its functions under WTA 06, to act in accordance with six Community requirements which give effect to, among other things, Art. 8 of the Framework Directive. These include the requirement to promote competition in relation to the provision of electronic communications networks and services; and the requirement to carry out its functions in a way which does not discriminate. In addition, "to facilitate the roll-out of 5G", as noted

[22] Ofcom, *Defragmentation of spectrum holdings in the 3.4-3.8 GHz band*, Consultation, 10 July 2019, §§2.10 – 2.11

above, the EECC requires by 31 December 2020 Member States to "*reorganise and allow the use of sufficiently large blocks of the 3,4-3,8 GHz band*".

43. In carrying out its radio spectrum functions under WTA 06, Ofcom must also have regard to the extent to which the spectrum is available for use, or further use, for wireless telegraphy; the demand for use of the spectrum; and the demand that is likely to arise in the future. Furthermore, it must have regard in particular to the desirability of promoting the efficient management and use of the spectrum; the economic and other benefits that may arise from the use of wireless telegraphy; the development of innovative services; and competition in the provision of electronic communications services: s.3(1)-(2) WTA 06.

44. When making regulations specifying the criteria to be considered in deciding whether, or to whom, to grant a licence, Ofcom must satisfy themselves that the criteria are objectively justifiable, non-discriminatory, proportionate and transparent: s.14(3B) WTA 06.

45. In circumstances where it would facilitate defragmentation, a frequency variation requirement in the regulations would be consistent with Ofcom's key duties as identified above. It is notable that, in its recent decision to vary UK Broadband's licence for 3.6 GHz spectrum, Ofcom concluded that, insofar as the variation would make a larger contiguous block available for use by other operators, it would have a positive impact on the optimal and efficient use of the spectrum.[23]

46. With respect to the power to vary WT licences, Ofcom has broad discretion: s.10 and sch. 1 WTA 06. Pursuant to sch. 1, a variation must be objectively justifiable, which it clearly would be in this case (§6A); it must comply with the procedure set out in the legislation (§7) (unless it is at the request of, or with the consent of, the holder); and it must be consistent with any restriction contained within the licence itself (§8). Ofcom has not suggested that a variation of the kind proposed by Telefonica would be inconsistent with the terms of any licence.

[23] Ofcom, *Variation of UK Broadband's Spectrum Access Licence for 3.6 GHz spectrum*, 14 December 2018, §§4.8, 4.33.

47. In its December 2018 Consultation on this award, Ofcom suggested that changing the frequencies to which a licence applies "could" amount to a revocation of the existing licence and the issue of a new licence.[24] However, our view is that, in this context, moving a block of spectrum held by an operator to a different frequency within the same band and with the same technical characteristics would constitute a variation rather than a revocation. Indeed, that is how Ofcom characterised the position in the UK Broadband decision, which concerned a request by UK Broadband to "shift its lower frequency block down by 5 MHz".[25]

48. Even if it would constitute a revocation, revocation is permissible at the request of, or with the consent of, the licensee. Thus, if an operator were, as a condition of participating in the award, prepared to consent to the revocation of its existing licence and the grant of a licence for an equivalent amount of spectrum elsewhere in the band (together with any additional spectrum acquired in the auction), this would, in principle, comply with the licence and sch. 1 WTA 06.

49. In deciding whether to vary a licence, Ofcom must comply with the statutory duties referred to above. We consider that a variation designed to facilitate defragmentation would be consistent with Ofcom's key duties.

III. PROPOSAL TO USE AN SMRA

50. Telefonica strongly supports Ofcom's plan to adopt a hybrid SMRA format, for this award, with rules that borrow from both traditional SMRA and clock auction designs. Ofcom's hybrid SMRA was the right format for the 2018 PSSR award and is the right format for this award. In particular, it is a much better choice than the combinatorial clock auction (CCA) format previously proposed by Ofcom. As explained further below, however, the proposed rules do not adequately address the risk that the auction will be distorted by strategic bidding. To address that risk, Ofcom should impose a band specific cap on 3.6 GHz or, at the very least, change the eligibility rules.

[24] Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, Ofcom, 18 December 2018, §§6.17 – 6.19.
[25] Ofcom, Variation of UK Broadband's Spectrum Access Licence for 3.6 GHz spectrum, 14 December 2018, §§1.3, 4.18, 4.165 – 4.167 and A1.5.

51. For this award, Ofcom's hybrid SMRA format offers multiple advantages over other formats:
    - **Efficiency.** Along with other types of clock auction, the hybrid SMRA is associated with predictable, intuitive outcomes. This contrasts with the CCA and its track record of peculiar allocation outcomes, often introducing large asymmetries in spectrum allocation between MNOs. With an SMRA, bidders have full clarity on the amount of spectrum they could win and the price they will pay before they place each bid. With the CCA, there is often high uncertainty on which package of spectrum a bidder can win and the amount a bidder will actually pay. With a CCA, there is a risk that a bidder would have chosen to bid differently once they know the auction outcome, a risk that is unlikely to arise with an SMRA.
    - **Fair pricing.** The format is associated with fair, (ideally) symmetric pricing, which contrasts with the high and asymmetric price outcomes associated with many CCA auction worldwide.
    - **Speed.** Compared to a standard SMRA, the clock-style pricing rules for categories of generic lots should facilitate a relatively rapid auction, even with modest bid increments.
    - **Robustness to strategic play.** The format is reasonably robust to gaming. In general, there is less scope for gaming than in the standard SMRA and the format is less vulnerable to price driving than the CCA. The format is more vulnerable to demand reduction than the CCA, but we view this risk as acceptable.
    - **Positive UK precedent.** The format is tried and tested in the UK context, having been used to award 2.3 GHz and 3.4 GHz spectrum. We consider the outcome of that award to be a big success: the auction supported good price discovery; winning bid amounts were substantial but fair; and the allocation outcome contributed to a reduction in spectrum asymmetry between operators. It contrasts very positively with the UK 4G auction (which used a CCA) where price discovery was subverted, and the allocation outcome deepened pre-existing asymmetries in spectrum allocation.
    - **Simplicity and ease of implementation.** Ofcom can substantially re-use pre-existing auction regulations, documents and bidding software,

making implementation more straightforward. MNOs have experience of using this format and have confidence in it delivering fair and reasonable outcomes. More generally, the auction rules are relatively simple to understand, especially when compared to a CCA.

52. Our position remains that CCA was never an appropriate format for this award. We understand that a package bid auction provides a mechanism for awarding coverage obligations simultaneously with spectrum. However, that would have been a case of the tail wagging the dog. The case for package bidding linked coverage obligations to 700 MHz and should never have been advanced as an approach for awarding 3.6-3.8 GHz. Indeed, there are also better ways to allocate coverage obligations, such as industry negotiations and reverse auctions, so package bidding was never needed, even for 700 MHz.

53. We take issue with Ofcom's comment at §2.26 that "[w]*e note that spectrum has been awarded* ***successfully*** *in CCAs around the world*" [our emphasis]. It would be more accurate to say that spectrum has been awarded using the CCA on multiple occasions. Whether or not the awards were a success is a matter for analysis. Ofcom should not fall into the trap of labelling an auction a success just because the available spectrum was sold. What matters is whether the spectrum was allocated reasonably efficiently and in a manner that will support effective downstream competition. As Ofcom well knows, there are many examples of awards using the CCA format that produced peculiar and controversial outcomes.[26]

54. We agree with the more general point that Ofcom should reserve the right to use a broad range of auction formats, potentially including the CCA, for future awards. In the consultation, Ofcom helpfully identifies three categories of risk – aggregation risk, substitution risk and strategic bidding – that are relevant when comparing different auction formats. We agree that these should be key considerations for Ofcom when designing auctions.

[26] These include exceptionally high prices for some or all bidders in Netherlands (2012), Austria (2013) and Canada (2014 and 2019), exceptionally symmetric prices in Switzerland (2012) and Canada (2019), and exceptionally asymmetric allocation outcomes in Netherlands (2012), Austria (2013), UK (2013) and Canada (2019).

55. In the following paragraphs, we consider the extent to which these risks are relevant to this award, and whether Ofcom's SMRA format provides a suitable framework for mitigating them. We conclude, on the basis of Ofcom's own analysis (§3.5, §3.6, §3.86), that aggregation and substitution risk, are not important concerns in this case. As set out in the following section, are much more concerned about the vulnerability of the auction to strategic bidding, especially price driving in the 3.6-3.8 GHz band. The SMRA design is less vulnerable than the CCA to price driving, but without further measures, there remains a real risk that the award will not deliver an efficient outcome.

Aggregation risk

56. The key test when determining if package bidding may be helpful is the degree of complementarity between available spectrum lots. If complementarities are strong, a standard (non-package) auction may unduly expose bidders to winning an unwanted subset of their demand (or having to overpay to avoid this). Package bidding eliminates this risk. For this award, there appears to be a broad consensus of opinion across Ofcom and stakeholders that aggregation risk is not material. Therefore, a simpler multi-round format, such as the hybrid SMRA, is a good choice for this award.

57. Aggregation risk may exist both between lots within bands (in band), and between spectrum in different bands (cross band). Ofcom has previously determined that "*cross-band synergies*" between 700 MHz and 3.6-3.8 GHz are "*limited*", and notes that stakeholders have also argued that there "*is little to no complementarity*" between the bands (§2.32). There are complementarities within bands, but once a critical mass of spectrum is achieved, incremental values should decline, so aggregation risk should not be a concern.

58. Both we and BT discussed the possibility that bidders may have a minimum requirement for spectrum in certain bands, in which case they may face aggregation risk if purchasing only small quantities. We pointed out that package bidding is not necessary to address this concern, as it may alternatively be addressed by using larger lot sizes and/or minimum requirements. Ofcom considered this form of aggregation risk but decided it was not important enough to merit special auction rules. Given the lack of interest in this issue in prior

consultation responses, we are inclined to agree with Ofcom that no special rules are required to address aggregation risk within bands when using an SMRA format for this award.

Substitution risk

59. The spectrum bands available in this award are weak substitutes at best. Ofcom notes that "[s]*ome stakeholders have suggested that, in their view, there is low substitution risk in this award, with limited substitutability between 700 MHz FDD and 700 MHz SDL, and no substitutability between 700 MHz and 3.6-3.8 GHz*." This assessment is supported by common sense, as the two bands are at extreme ends of the spectrum typically deployed at mobile base stations and have very different propagation properties. We note that no stakeholders have presented any evidence to contradict this viewpoint and that Ofcom also offers no analysis.

60. Notwithstanding the absence of evidence that the two bands are substitutes, Ofcom says "*we consider some bidders may still wish to substitute between bands at certain prices*." This is a rather weak rationale for running an auction with switching between bands. The questions that Ofcom should be asking itself are: why should a bidder want to switch between the bands; and is allowing this in the best interests of running an efficient auction? If switching is likely to be solely based on intrinsic value, or necessitated by budget constraints, then it should be allowed. However, if switching is likely to be abused for strategic reasons, then – in the absence of meaningful substitution risk – it would be prudent to restrict switching. In Sections V and VI, we set out measures that Ofcom could adopt to prevent or curtail undesirable switching.

61. As we explore below, Ofcom's auction format remains vulnerable to strategic bidding behaviour that could undermine the efficiency of the award. The main risk concerns bidding for 3.6-3.8 GHz, where one bidder, H3G, starts the process with an exceptional incumbency advantage. The current auction setup creates an obvious opportunity for H3G to use price driving in the 3.6 GHz band as a tool to encourage rivals to lower demand for 700 MHz FDD. Rules that allow bidders to switch between the two main bands facilitate such behaviour.

IV. STRATEGIC BIDDING

62. Ofcom identifies two types of strategic bidding behaviour which could impact the outcome of this auction: strategic demand reduction; and price driving. We particularly welcome Ofcom's recognition of risk of price driving in §3.11; this is a major issue in spectrum auctions and is too often overlooked. We agree with Ofcom's assessment that strategic demand reduction and price driving are generic risks when running a multi-band, multi-unit auction with a limited pool of bidders. When compared to a CCA, an SMRA is generally more vulnerable to demand reduction and less vulnerable to price driving. Price driving is, however, a serious risk in this case for the reasons given below.

63. When assessing the potential for gaming to affect an auction, it is important to consider the underlying motives for such behaviour:

    a) The rationale for **strategic demand reduction** is largely positive: bidders trying to avoid unnecessary costs and preserve shareholder value. Consequently, demand reduction often has no impact on efficiency, as if bidders have reasonably accurate expectations regarding the efficient outcome, then they will drop demand in a way that has the same impact on the outcome as straightforward valuation-based bidding.

    b) In contrast, the rationale for **price driving** is always negative. Bidders do not normally price drive in bands where they plan to buy a significant quantity of spectrum, as this would increase their own costs; instead, they drive prices in bands where they do not need spectrum or where they expect to buy only modest amounts relative to rivals. By driving prices, they hope to eat up their rival's budget or entice them to offer concessions in other bands. In this case, such behaviour is aimed at forcing rivals to deviate from strategies consistent with straightforward bidding and efficient outcomes.

64. Put differently, price driving creates incentives less desirable demand reduction. Absent price driving behaviour, bidders can be expected to compromise only on spectrum they do not expect to win – so the risk of inefficiency should be modest. However, with price driving, bidders may be pressured into larger concessions that

are inefficient. Given these differences, a regulator that is primarily concerned about efficiency (rather than revenues) should be focused most on removing direct incentives for price driving, which may lead to inefficient demand reduction, and less on addressing general incentives for demand reduction, which is typically not inefficient, absent other strategic concerns.

65. Price driving is more likely to occur in situations where there are asymmetries between the major bidders. This is because asymmetries introduce predictable differences in demand between bidders that can be exploited in an auction, such as the identification of bands where one bidder is more vulnerable than another to price driving. For this award, the situation at 700 MHz looks reasonably symmetric, with four strong bidders all likely to want more low-band spectrum; this should limit scope for price driving. In contrast, at 3.6-3.8 GHz, there is a huge asymmetry between the MNOs, as H3G already has surplus 5G spectrum, whereas the other three MNOs are all well below critical mass. This creates an obvious opportunity for H3G to exploit price driving tactics at 3.6 GHz, perhaps with the primary objective of tacitly 'persuading' its rivals to inefficiently reduce demand in the 700 MHz band.

66. In response to our previous comments on price driving, Ofcom put low weight on the risk that price driving could disrupt the final allocation:

> "*In its response O2 did not elaborate on specific strategic gaming concerns in a simultaneous award. One possible example might be a bidder hoping to increase its chances of acquiring 700 MHz spectrum or achieving a lower price for it, through adopting a bidding strategy as follows: first, engaging in price driving in 3.6-3.8 GHz to use up other bidders' budgets and/or to harm package and price discovery for them by hiding its own true demand for 700 MHz; and later switching its demand to 700 MHz. We do not consider this a substantial risk to the simultaneous award, as bidders would face material disincentives to adopting such a strategy. This strategy would put bidders at risk of not only inadvertently winning unwanted spectrum but also missing out on spectrum they could have won otherwise. We also consider the reduced information policy increases the risks to bidders of bidding in this way, as less information increases the likelihood a strategic*

bidder misjudges demand and inadvertently wins unwanted spectrum." (§2.28)

67. This opinion appears to Telefonica to be based on wishful thinking rather than substantive analysis. We see no evidence that Ofcom has actually explored potential behaviour in the auction based on realistic scenarios for bidder demands and valuations. This is a prerequisite for making an objective assessment of the vulnerability of an auction to price driving.

68. Our assessment is that the behaviour that Ofcom outlined in this passage is indeed a realistic strategy for H3G and, contrary to Ofcom's assessment, does not carry substantial risk for H3G for the following reasons:

    a) The three other MNOs (BT, Telefonica and Vodafone) have a predictable aggregate minimum demand [✂]. H3G is well aware of this and should be able to identify a substantial price level to which it can drive prices without much risk of inadvertently winning spectrum.
    b) For the same reason, H3G is well positioned to manage any risk that it finds itself unable to free up enough points to switch back to 700 MHz. A simple solution would be [✂].
    c) H3G's *intrinsic value* for incremental 3.6 GHz spectrum is almost certainly a fraction of the value for the three other MNOs as: (a) it already has 90-100 MHz additional 5G spectrum; and (b) it already has the largest amount of spectrum per customer of any UK operator (see Figure 2Figure 1). H3G may, nevertheless, [✂]

69. Ofcom should also keep in mind that if it proceeds with an auction setup that allows and potentially incentivises H3G to engage in abusive behaviour, then other bidders will be forced to explore options to retaliate. This might involve, for example, [✂]. Such behaviour would then further undermine price discovery and introduces a risk of a bizarre auction outcome in which multiple bidders inefficiently win spectrum in the 'wrong' bands.

70. Accordingly, we request that Ofcom revisit its analysis, considering realistic assumptions about demand and valuations from each MNOs. We also ask that Ofcom adopt additional rules to deter or eliminate the scope for price driving.

71. There are a number of amendments to the auction design that Ofcom could adopt to prevent the auction being disrupted by price driving:

    a) **Cap on immediately usable 5G capacity spectrum.** The best approach would be a cap that prevents H3G from bidding for additional spectrum in the 3.6 GHz band. As discussed in the next section, a 37% cap on 3.4-3.8 GHz holdings would be consistent with Ofcom's approach to the PSSR auction, and also in line with caps used in some other European countries.
    b) **Eligibility constraints.** A second-best solution would be to change the eligibility points regime, so as to reduce both the scope for and pay off from price driving. In Section VI, we set out to wo possible approaches:
        i. **Eligibility silos.** Ofcom could create two separate silos of eligibility for 700 MHz and 3.6 GHz, so bidders could not switch demand between the bands, even if the bands are sold in the same auction. While this would not stop H3G price driving at 3.6 GHz, it would prevent them from hiding demand outside the 700 MHz band in an attempt to control the price evolution. This would reduce the potential pay-off from such behaviour.
        ii. **Differentiated eligibility.** Ofcom could – as proposed by BT – set a much higher eligibility point threshold for 700 MHz FDD. This approach would still allow one-way switching from 700 MHz to 3.6 GHz, but (depending on the lot ratings) make it harder or impossible to park sufficient eligibility points outside the 700 MHz band to switch back later.

72. Ofcom has suggested that there is a further measure available to deter price driving: restricting information about aggregate demand (§2.28, footnote 18). We disagree. For the reasons we set out in Section VII under information policy, this approach will have no meaningful impact on H3G's incentive to engage in price driving. In addition, restricting information in this way may introduce undesirable information asymmetries between bidders.

V. SPECTRUM CAPS

73. Telefonica welcomes the fact that there is an overall cap in place for spectrum holdings. However, we consider the cap to be too high and we disagree with Ofcom's refusal thus far to impose a specific spectrum cap this award. As explained further below, we urge Ofcom to introduce a 140 MHz cap on holdings of spectrum that is immediately useable for 5G capacity.

74. Ofcom has a statutory duty to promote competition in the market for mobile services. However, its proposed rules permit allocation outcomes, both with respect to immediately usable 5G spectrum and all mobile holdings, that could give certain players exceptional advantages and fundamentally weaken the ability of other MNOs to compete for customers. Ofcom can and should be using spectrum caps *within* auctions as 'guard rails' to prevent such extreme and obviously undesirable outcomes.

75. In defence of its approach, Ofcom has said that very asymmetric allocation outcomes are "*highly unlikely*", so intervention is unnecessary to prevent them.[27] This argument is flawed. Firstly, if Ofcom does not expect extreme outcomes to happen, then having tighter caps would almost certainly be harmless. All the caps would do is prevent strategic bids for larger quantities of spectrum in intermediate rounds, which would have negligible impact on price discovery and no impact on efficiency. Secondly and most importantly, implementing the cap would eliminate the risk of a very bad outcome in a case where Ofcom has underestimated the scope for strategic bidding behaviour to distort the auction. As a general point, Ofcom should keep in mind that extreme outcomes often seem unlikely until they happen.

76. We urge Ofcom to revisit its approach to caps in relation to both access to 5G spectrum and mobile spectrum in general. Of these, action on 5G spectrum is the most important, because this is the more immediate threat to competition and allocative efficiency stemming from this award.

[27] For example, Ofcom said that it is "highly unlikely" that there will be significant asymmetry in "spectrum that can be used for 5G" after the 700 MHz and 3.6 GHz auction. Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, December 2018, Figure 5.1.

77. We recognise that, with an SMRA format, there are typically strong disincentives for bidders to pursue exclusionary bidding tactics in bands where they expect to buy significant quantities of spectrum because they would be driving their own price. The UK situation with 5G capacity spectrum is a special case, however, because one bidder (H3G) already has excess spectrum at 3.4-3.8 GHz, and there is barely enough spectrum being allocated to enable the other three operators to achieve critical mass. This means that H3G [✂]. In this situation, the usual incentives against price driving are reversed, as the price pressure on the potential aggressor [✂] is weaker than the price pressure on the potential victims (the other MNOs).

The case for a cap on 5G capacity spectrum

78. The core spectrum requirement for deploying 5G is having large blocks of contiguous capacity spectrum. The ideal carrier size is 100 MHz, and EU policy documents identify contiguous blocks 80-100 MHz as the best arrangement (see discussion in Section II). This is a significant change from 4G, where the maximum carrier size was only 20 MHz.

79. The 3.4-3.8 GHz band has emerged as the critical band for deployment of 5G services. It is the only band currently available to operators that is located in frequencies below 6 GHz suitable for deployment on macro cellular sites *and* is large enough to support multiple operators with 5G-size blocks of spectrum. It is also a global band, with overlapping frequencies available across leading markets in Asia, Europe and North America. As such, the band has already achieved and is expected to maintain a pre-eminent role in the 5G equipment ecosystem.

80. Looking forward, to maintain competitiveness in all segments of the market for mobile services, an operator must be able to provide a 5G service that is fast, reliable and competitively priced. In the near term, that means having a critical mass of 3.4-3.8 GHz spectrum. From a competition perspective, a 'good 5G service' is necessarily a relative concept. In the UK, H3G – which already has 140 MHz of spectrum at 3.4-3.6 GHz band, has set the benchmark. Other operators do not necessarily need to match H3G's ability to deploy a full 100 MHz 5G carrier, but they will need to be able to offer something sufficiently close.

81. At present, BT, Telefonica and Vodafone each have only 40-50 MHz of 3.4 GHz spectrum, i.e. 50% or less of what is needed for a full 5G carrier. This may be enough to launch a basic 5G service, but it is not nearly enough to offer an equivalent quality of service to H3G's 100 MHz carrier. The forthcoming auction provides a one-off opportunity for each of us to close the gap with H3G before 5G takes over from 4G as the dominant ecosystem. [✂]

82. It is apparent that H3G will have a substantial advantage in the nascent 5G market over any other operator that does not acquire a larger block of contiguous 5G spectrum. Over time, there are factors that could erode this advantage, such as the development of 5G in other bands and advances in carrier aggregation, but they do not necessarily apply to all operators. Accordingly, there is a real risk that any competitive advantage H3G has after the conclusion of the auction will endure through the medium term.

83. The following evidence supports this reasoning:

- ***Lack of suitable alternative frequency bands.*** Although 700 MHz is a 5G band, it does not provide much additional capacity. While this band will be valuable for extending coverage and in-building penetration, it is not a substitute for having a large block of contiguous 5G spectrum. Over time, 5G will be extended to other capacity bands, such as 1800 MHz, 2.1 GHz, 2.3 GHz and 2.6 GHz. However, this may not happen as quickly as Ofcom expects, given the global availability of the much larger 3.4-3.8 GHz band. [✂].
- ***Limitations of carrier aggregation.*** 5G carrier aggregation availability is uncertain and is an inferior substitute to contiguous spectrum. Carrier aggregation has been included in 3GPP's Release 16 which is expected to be finalised by June 2020. Once in the standard, it could be implemented in some devices by end-2020. Implementation in handsets is not a certainty, as intra-band carrier aggregation was standardised for the 900 MHz band, but was never implemented. Even if intra-band carrier aggregation was implemented in handsets, Telefonica estimates that the speed loss from carrier aggregation compared to contiguous spectrum would be between [✂]

- ***Direct impact on consumers.*** Fragmented 3.4-3.8 GHz holdings would place significant, unnecessary network build and investment requirements on operators including deploying duplicate equipment and extra new sites where existing sites do not have the physical capacity for the necessary extra equipment. This will materially delay 5G deployment for those impacted operator(s), leading to consumers having reduced choice in the critical time where 5G services are coming to market. Even after delay, customers will experience lower 5G throughputs and lower 5G network speeds. Further, if carrier aggregation is implemented in handsets, intra-band carrier aggregation will likely only be included in high-end devices and leave other users with less choice or an inferior service.

84. We see strong parallels between the situation with UK 5G spectrum going into this auction and with the availability of usable capacity spectrum going into the PSSR auction. In both cases, one or more operators faced being at a significant competitive disadvantage in the short term owing to lack of access to critical spectrum, and there was a risk that this disadvantage could have an enduring impact on competition. For the PSSR award, Ofcom acted to impose a cap on holdings of immediately usable spectrum that precluded the bidder with the largest holdings, BT, from bidding for 2.3 GHz spectrum. This eliminated the possibility that BT would bid tactically to block rivals from acquiring critical spectrum. We view that cap as a critical component of the auction design, facilitating a sufficiently level playing field between bidders and promoting intrinsic over strategic value bidding.

85. Accordingly, we urge Ofcom to introduce a 140 MHz cap on holdings of spectrum immediately usable for providing 5G capacity. For the purposes of the auction, this cap would apply only to holdings of spectrum in the 3.4-3.8 GHz band, as this is presently the only band suitable to providing larger blocks of 5G capacity in the UK. A cap of 140 MHz is also approximately 37% cap of the total 390 MHz available, so would be consistent with Ofcom's proposed cap for all mobile holdings.

86. The cap would have the effect of blocking H3G from bidding for any 3.6 GHz spectrum in the auction (although it would remain free to bid for 700 MHz spectrum), just as BT was blocked from bidding for 2.3 GHz spectrum in the PSSR

award. It would also impose constraints on BT and Telefonica (up to 90 MHz more each) and Vodafone (up to 80 MHz more), thus preventing any operator from acquiring all newly available spectrum in the band. Such a cap would therefore ensure that no single operator can, by itself, block another from acquiring a critical mass of 5G capacity spectrum.

87. We are confident that such a cap would be widely supported by stakeholders. In our responses to the previous consultation, Telefonica, BT and Vodafone all made the case for caps that would prevent any operator having more than 140 MHz. Both BT and Vodafone specifically advocated for a 37% cap on holdings of 3.4-3.8 GHz spectrum, and – like us – presented relevant evidence to support their arguments, evidence that Ofcom has largely and unreasonably disregarded in its consultation.

88. For example, Vodafone said that:

> "*We believe that Ofcom's analysis is guilty of under-estimating the importance of 5G, and confusing spectrum required for early 5G deployments with that which will be demanded for fully-fledged 5G services over coming years*."[28]

89. And BT said that:

> "*...the strategic advantage that could arise from H3G securing additional spectrum, limiting the ability of others to achieve wide contiguous bandwidths in the 3.4-3.8 GHz bandwidth is a clear concern that Ofcom needs to address*."[29]

90. Unsurprisingly, the only operator that does not advocate a cap is H3G. Contrary to the consensus amongst the other operators that having a critical mass of 3.4-3.8 GHz spectrum is important, H3G said that:

> "*Ofcom is right to find no competition concerns in relation to '5G spectrum', as there is no* prospect *of unmatchable advantages arising from the distribution of that spectrum*." [30]

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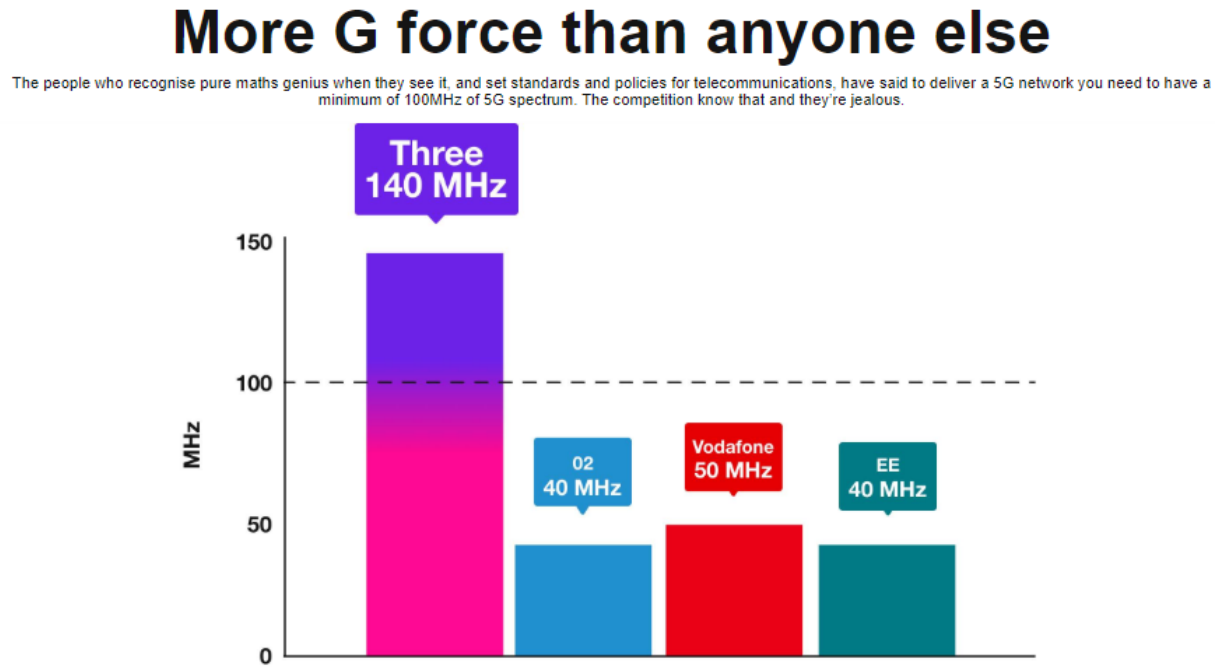
[28] Vodafone, *Vodafone Response to Ofcom Consultation: Award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, p.39.
[29] BT, *Award of the 700 MHz and 3.6 - 3.8 GHz spectrum bands: BT's response to consultation published on 18 December 2018*, 12 March 2019, §3.145.
[30] Three UK, *Three's response to Ofcom's consultation on the Award of the 700MHz and 3.6-3.8GHz spectrum bands (NON-CONFIDENTIAL)*, 12 March 2019, p.32.

91. However, this statement is directly contradicted by H3G's own marketing material, published on the Three website (see Figure 1), which boasts that:
    - "*to deliver a 5G network you need to have a minimum of 100 MHz*";
    - "*we're the only UK mobile operator to have this amount*";
    - "*we've got another 40 MHz on top of that*"; and
    - "*what's more 100 MHz of it's contiguous.*"

Figure 1: Three's marketing material highlighting the advantages of larger contiguous blocks in the 3.4-3.8 GHz band



Source: Screenshots from the Three website (http://www.three.co.uk/real5g) taken on November 14, 2019.

92. It is obvious from this that H3G does in fact believe it has a significant advantage in 5G stemming from its leading position in holdings of 3.4-3.8 GHz. With only 120 MHz of additional spectrum available in 3.6 GHz, it is impossible for more than two other operators to secure 100 MHz. Furthermore, absent a reconfiguration of the band involving H3G, at most one other operator could achieve a contiguous block of 100 MHz. In reality, it is unlikely that any other operator will achieve more than 80-90 MHz contiguous, even if the negotiation phase is fully successful which, as we have explained, is doubtful. Three's own claims thus directly contradict its assertion that "*there is no prospect of unmatchable advantages arising from the distribution of that spectrum*."

93. H3G may be somewhat exaggerating its case for marketing purposes. The claim that an operator must have 100 MHz to offer a true 5G service is dubious. In practice, it seems likely that other operators could offer a compelling 5G proposition with smaller contiguous holdings, say of around 80 MHz. However, [✂].

94. In determining whether a 140 MHz auction cap on 3.4-3.8 GHz holdings is appropriate, we urge Ofcom to assess and compare the clear upsides and

supposed downsides of such a cap. We consider the case for action to be overwhelming.

95. The upsides are substantial:
    a) ***H3G's ability to price drive 3.6 GHz is eliminated.*** If H3G cannot bid for 3.6 GHz, [✂]. This eliminates a major risk to the auction proceeding efficiently.
    b) ***Possibility that H3G inefficiently secures additional 3.6 GHz is eliminated.*** Likewise, a cap would prevent H3G [✂].
    c) ***Possibility that another operator tries to block access to 3.6 GHz is reduced***. The cap would also eliminate the possibility that another MNO tried to win all 120 MHz, with the strategic aim of weakening two rivals.
    d) ***Increased likelihood that all four operators will achieve critical mass of 5G capacity spectrum.*** With scope for bidding based on strategic rather than intrinsic values diminished, it is more likely that BT, Telefonica and Vodafone will all secure critical spectrum without H3G being deprived of a critical mass. This is almost certainly the best outcome for consumers.

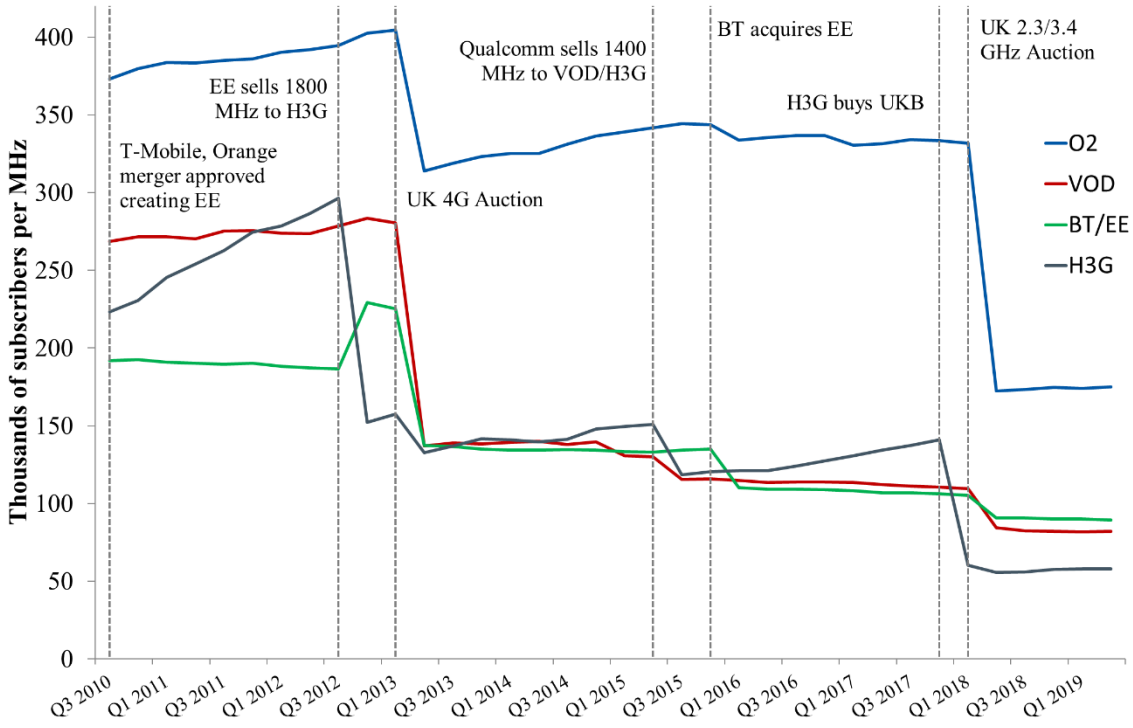
96. In contrast, the supposed downsides look small:
    a) ***No opportunity to market test outcomes in which***...
        i. ***.. H3G expands its 3.4-3.8 GHz holdings***. Clearly, this will not have any impact on H3G's ability to offer high-quality 5G services. H3G already has the largest holdings of 3.4 GHz -3.8 GHz of any operator in Western Europe[31]. By its own admission, H3G already has 40 MHz of spare capacity above the 100 MHz it says is needed for 5G. It would constrain H3G's ability to 'catch up' with BT's total spectrum holdings. However, H3G will have other opportunities to acquire spectrum, including at 700 MHz in the auction. In the meantime, as illustrated in Figure 2, H3G goes into this auction with the largest volume of spectrum per subscriber, by some margin, so has plenty of room to expand its customer base without experiencing network congestion.
        ii. ***.. other operators can expand holdings beyond 140 MHz***. Operators would be capped at either 90 MHz or 100 MHz, instead

[31] Including three player markets

of 120 MHz. This would still be enough to individually match H3G's existing holdings. BT, Telefonica and Vodafone all support a cap at this level (or below), so clearly none would view this as a meaningful constraint.

b) ***Hypothetical loss in efficiency if any of above were in fact the most efficient outcome***. In our view, there is no plausible business case where H3G's intrinsic value for more spectrum could exceed another MNO's value to increase their holdings to 80-100 MHz. Therefore, we consider this risk to be zero. Even if were wrong, any efficiency loss would likely be negligible.

Figure 2: Subscribers per MHz of usable spectrum for UK operators in 4G era



Source: Subscriber data from Telegeography Global Comms Database. Accessed November 2019.

97. In conclusion, not imposing a cap on immediately usable 5G capacity spectrum would, in our view, be inconsistent with Ofcom's approach for the PSSR auction with respect to immediately usable 4G spectrum. Given the magnitude of the

issue at hand, Ofcom should not be gambling with the UK's 5G future by failing to impose a specific spectrum cap for the forthcoming award and persisting with an overall spectrum cap that does not prevent harmful allocation outcomes.

Ofcom's overall approach to spectrum caps is too lax

98. From the UK 4G auction onwards, Ofcom has maintained an overall 37% cap on spectrum holdings for auctions. While we appreciate that there is benefit in consistency, it is long overdue for Ofcom to revisit its approach. The cap level is too high, and leaves operators with smaller holdings unduly vulnerable to strategic play, either in auctions or in the secondary market (where Ofcom's approach has been even laxer) by rivals aiming to push them below a critical mass of spectrum. We believe that Ofcom should set a lower overall cap, and also make greater use of band specific caps to eliminate undesirable asymmetric allocations.

99. From our perspective, there are three broad problems with Ofcom's approach:

    1. ***Overly focused on the big picture.*** Throughout the 4G-5G era, Ofcom has focused almost exclusively on total holdings of usable mobile spectrum. This is an important long-term metric and has become more relevant as mobile spectrum has become more fungible. However, focusing solely on the big picture obscures the shifting patterns is the usefulness of particular bands, as operators transition between technologies. Prior to securing 2.3 GHz spectrum in the PSSR auction, [✂]. This was due to a lack of spectrum in general and a lack of access to 4G spectrum in particular. Looking forward, [✂]. Ofcom partially recognizes this in its analysis of the long-term route to 5G for each operator, [✂]. It completely misses the reality that [✂].
    2. ***Too much focus on single operators.*** Much of the debate on whether a 37% cap is appropriate has focused on how a single operator could exploit the associated benefits. However, the more relevant issue is whether allowing such high caps is compatible with having four operators all with a critical mass of spectrum. Clearly, this is possible if only one party has 37% of all spectrum. However, if two parties held this amount of spectrum, then there would only be 26% left for the remaining two, implying that both other operators would lack a critical mass. A lower cap on individual operators would make it less likely that such undesirable situations could emerge in the future.

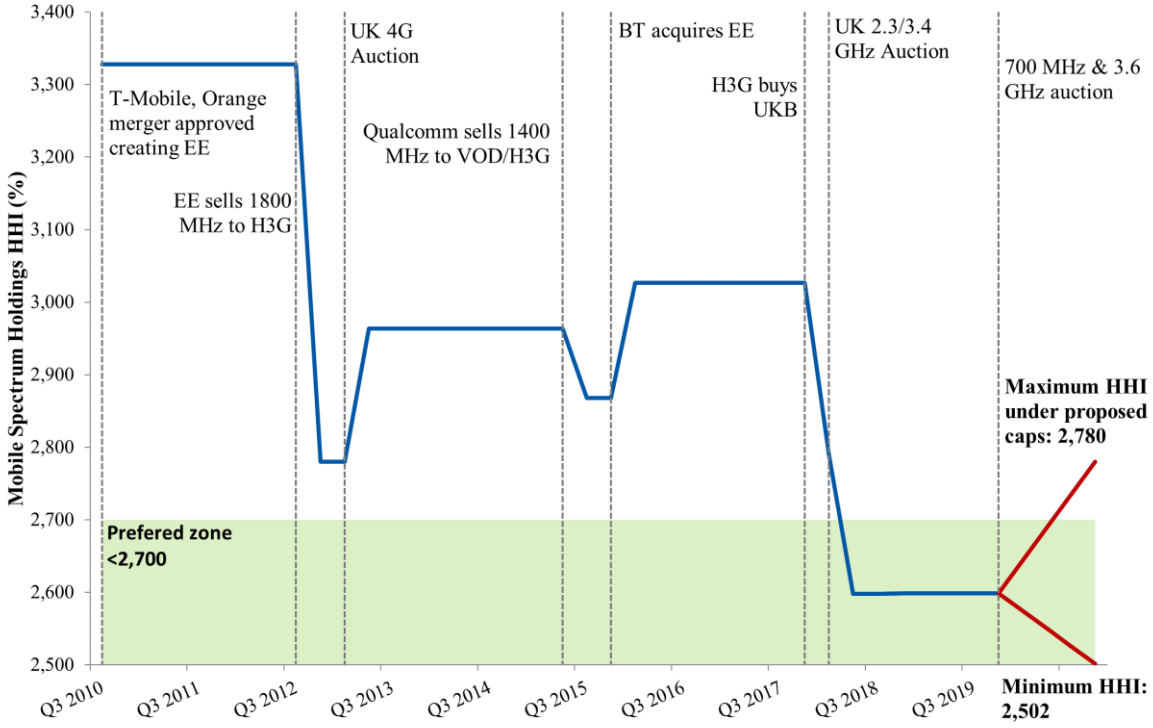
3. ***Static rather than dynamic assessment***. Ofcom's analysis has generally focused on simple percentage spectrum holdings. For example, it has argued that an operator may become unviable with less than 10-15% of spectrum. This is the wrong metric. The metric that matters most is the absolute quantity of spectrum, and the minimum viable quantity has been rising rapidly through the 4G and 5G eras. As an example, Telefonica's total spectrum holdings after the UK 4G auction (2013) were viable but by the time of the PSSR auction (2018) [✂]. Given that new spectrum comes available infrequently, Ofcom needs to adopt a forward-looking assessment when estimating minimums and keep this under regular review.

100. The Herfindahl-Hirschman index (HHI) is a helpful indicator for tracking the level of asymmetry in spectrum holdings. In a 4-player market, a score of 2,500 would correspond to a balanced market, where each operator has 25%. The HHI is currently at ~2,600, down from a high of over 3,000 as recently as 2017. As illustrated in Figure 3, the HHI is currently at the lowest level it has been in the 4-player era, following the rebalancing of spectrum holdings after the PSSR award.

101. In our view, if Ofcom is serious about maintaining a healthy 4-player market, it should consider establishing a target range for the HHI, as a guard against a return to dangerous levels of spectrum asymmetry. This could be used as a reference point when setting precautionary spectrum caps for new spectrum awards. We suggest an HHI range of 2500-2700 for a 4-player market. An upper bound of around 2,700 would allow for significant differences between operators both within and across bands but would preclude undesirably large asymmetries emerging.

102. For this award, as illustrated in Figure 3, Ofcom is proposing spectrum caps that could allow the HHI to climb to as high as 2,780 if the two operators with the largest holdings, BT and H3G, bought all available spectrum. We recognize that such an obviously undesirable outcome is unlikely, as Telefonica and Vodafone would resist. Nevertheless, a prudent regulator should adopt measures to stop this happening (or otherwise explicitly explain to the public why it thinks it could be in the public interest to allow the two largest spectrum holders to completely block out the other two players in a major auction).

Figure 3: HHI for UK mobile spectrum holdings in the 4-player market era



103. As an example, the following combination of caps could ensure the HHI cannot rise significantly above 2,700:

a) Band-specific caps of 2x20MHz at 700 FDD and 140 MHz @ 3.6 GHz; or
b) An overall spectrum cap of 35% and a band-specific cap of 140 MHz @ 3.6 GHz (with 10 MHz lots).

104. Observe that none of these caps are likely to weaken competition in the auction and they do not preclude outcomes where Telefonica wins nothing. What they do achieve, which is in our opinion is important, is to preclude outcomes where the two largest bidders can block both a third and fourth bidder from acquiring spectrum.

Implementing Ofcom's 37% cap on holdings

105. Ofcom proposes to implement a cap based on a 37% percentage share of spectrum. BT, Vodafone and Telefonica have all proposed an additional cap of 37% on immediately usable 5G capacity spectrum at 3410-3800 MHz. It is important that any such caps are implemented in a manner that is fair to all bidders and reasonably consistent with past precedent.

106. For the PSSR award, Ofcom set a cap of 340 MHz on total holdings of usable mobile spectrum. This was calculated as 37% of the amount usable spectrum (920.9 MHz) = 340.733 MHz **rounded down** to the nearest 5 MHz. One implication of this rule was that BT was restricted to winning a maximum of 85 MHz in the auction, which meant that its maximum holdings were capped at 340 MHz, which was 36.92% of the available spectrum, i.e. **below 37%**.

107. For this award, Ofcom proposes to set a cap of 416 MHz, which is 37.25% of total spectrum, i.e. above 37%. The implication of this change in approach to a higher cap is as follows:

a) BT could win 120 MHz instead of 115 MHz (under a strict 37% cap)
b) H3G could win 185 MHz instead of 180 MHz
c) Vodafone could win 190 MHz instead of 185 MHz

108. We strongly object to Ofcom's proposal to round up the spectrum cap, so as to allow bidders other than Telefonica to buy even more than 37% of total mobile spectrum. For the reasons set out above, we believe the cap is already too high and insufficient to protect bidders with smaller existing holdings. Rounding up the cap increases the risks materially and is also inconsistent with the precedent of the PSSR award, when BT was capped below 37%. Ofcom should implement a strict 37% cap of 413 MHz.

109. In this context, Ofcom's comment, in footnote 107 of its December 2018 consultation, that "[w]*e feel that it is not proportionate to restrict MNOs to holdings below 37%*" requires explanation. We urge Ofcom to explain why it does not consider this proportionate when it was comfortable imposing such a restriction in 2018. For example, on what grounds does Ofcom believe that any of these three bidders could have an intrinsic business case that would justify buying the extra 5

MHz? We contend that this approach of rounding up is, at best, lacking in justification and, at worst, an invitation for bidders to consider exclusionary bidding strategies. It is also a bad precedent for future awards.

Low frequency spectrum

110. Telefonica agrees with Ofcom that there is no strong competition rationale for a cap on holdings of low frequency spectrum. The success of BT and H3G in building wide coverage networks demonstrates that having significant sub-1 GHz spectrum holdings is not essential in this respect. Likewise, the success of these companies in building market share shows that any benefits O2 and Vodafone may enjoy with respect to indoor coverage, owing to their larger holdings of sub-1 GHz spectrum, are not a barrier to their success. It is also the case that BT and H3G have significant holdings of spectrum at 1500 MHz and 1800 MHz (which we do not) and these bands provide good coverage.

111. It would also be disproportionate to impose a restrictive cap on Telefonica at 700 MHz, given our modest overall holdings of mobile spectrum. We should be afforded flexibility to expand our total spectrum holdings. That said, we would have no objections to a precautionary cap on all bidders of 40 MHz across the 700 MHz band, as a 'guard rail' to protect against highly asymmetric allocation outcomes. Considering reasonable assumptions regarding the intrinsic demand of each MNO, we recognize that it is unrealistic for any bidder not following an exclusionary strategy to win more than 40 MHz.

VI. LOT ATTRIBUTES AND RESERVE PRICES

112. In deciding appropriate lot sizes for this SMRA award, Ofcom says that it has aimed "*to achieve a balance between mitigating the aggregation risk bidders face and providing bidders with the flexibility to acquire spectrum in the exact amounts they want*" (§3.17). We agree with this approach, although other risks associated with having very small lots, such as making it easier for certain bidders to engage in undesirable strategic play, are also relevant. We disagree, however, with Ofcom's proposal to use very small (5 MHz) lots for the unpaired bands. In these cases, Ofcom has attached undue weight to flexibility (without any evidence

that bidders need or even want this flexibility), and too little weight to the downside risks.

Generic lots

113. We support Ofcom's proposal to use generic lots in the Allocation Stage and assign specific frequencies on a contiguous basis in an Assignment Stage. This is a tried and tested approach that many regulators use.

Lot structure

114. We support Ofcom's proposal to offer six lots of 2x5 MHz lots for 700 MHz FDD. We do not think that larger lot sizes would be appropriate, given the possibility that bidders may wish to target either 2x5 MHz or 2x15 MHz. We share Ofcom's view that concerns about in-band aggregation risk are insufficient to justify applying a minimum requirement in this band.

115. For 3.6 GHz, we also request that Ofcom adopt 10 MHz lots rather than 5 MHz lots. In our responses, both BT and Telefonica argued for 10 MHz lots, on the basis that this is the appropriate base unit for 5G NR carriers, and equipment is unlikely to be available for multiples of less than 10 MHz. We also submitted a report by NERA, that presented a number of arguments why 10 MHz lots were superior to 5 MHz lots, especially in the context of an SMRA format.[32] Unless other stakeholders come forward with compelling arguments why they require the flexibility to bid for 5 MHz lots, Ofcom should adopt 10 MHz lots.

116. At §3.33-3.34, Ofcom highlights the risk that adopting 5 MHz lots in the 3.6 GHz band may make the auction more vulnerable to strategic bidding, including price driving. We agree that this is a real concern. As discussed above, we consider that price driving by H3G could prevent the revised auction design from delivering an efficient spectrum allocation. This risk can be addressed by Ofcom adopting a spectrum cap that precludes any party from owning more than 140 MHz of 3.4-3.6

[32] NERA Economic Consulting, *Auction format for the award of the 700 MHz and 3.6-3.8 GHz spectrum bands*, 18 March 2019, Section 3.1.

GHz spectrum. If Ofcom does not adopt this cap, then it should adopt 10 MHz lots as part of a package of measures to make price driving risky.

Eligibility points

117. Eligibility points are a key component of Ofcom's activity rules and influence the scope for bidders to switch between bands in the auction. Ofcom proposes a 4:1 ratio between paired and unpaired lots, which is equivalent to a 2:1 spectrum ratio. The underlying rationale for Ofcom's approach is that the 700 MHz FDD spectrum is inherently more valuable than the unpaired bands, so should have a higher eligibility weighting.

118. Our main concern with Ofcom's approach is that it makes switching back and fore between the 700 MHz bands and 3.5 GHz too easy. As Ofcom acknowledges, the bands are not close substitutes, so it is likely that switching will be driven by strategic rather than intrinsic value considerations. In particular, we are concerned that there is an obvious strategy available to H3G of [✂]

119. Ofcom could address our concerns about price driving by H3G by imposing a cap of 140 MHz on holdings of 3.4-3.8 GHz. If such a cap was imposed, then the risk [✂]would largely disappear. In this case, we would be comfortable with Ofcom's proposed eligibility ratios.

120. If Ofcom does not adopt a 140 MHz cap, then the next best measure to limit strategic bidding at 3.6 GHz would be to change the eligibility weightings so as to make it more difficult to and reduce the pay-off from price driving at 3.6 GHz. Ofcom could create separate eligibility silos for 700 MHz and 3.6 GHz, so as to entirely prevent switching between the two bands (this should be coupled with 10 MHz lots as explained above.) Alternatively, Ofcom could adopt the approach it used for the 4G auction which is to weight 3.6 GHz sufficiently low that it is only

possible to switch one-way from 700 MHz to 3.6 GHz.[33] With 10 MHz unpaired lots, a lot ratio of 13:1 or higher would achieve this objective.

121. We note that BT proposed a 4:1 spectrum ratio, twice as high as that proposed by Ofcom. This approach would make switching more difficult, so has some merit. However, we are concerned that it might tempt H3G to [✂].

122. Within the 700 MHz band, we think there should be scope for two-way switching between the FDD and SDL bands, given that SDL is likely a (very) inferior substitute. A 2:1 spectrum ratio between FDD and SDL is the maximum level at which switching would be feasible.

Reserve prices

123. Telefonica's view is that reserve prices should be set well below expected market price to minimise the risk that spectrum goes unsold and to allow for efficient price discovery. Telefonica generally supports Ofcom's "*conservative approach*" to setting reserve prices, and agrees that reserve prices should be set at a level that is "*materially lower*" than Ofcom's potential benchmarks.[34] For 700 MHz FDD and 3.6 GHz, we think it would be prudent for Ofcom to set the reserve price at the low end of the relevant ranges to remain conservative.

124. For 3.6 GHz, Ofcom proposes a price range of between £15-25m per 5 MHz block, which is approximately 40%-65% of the 2018 award price for 3.4 GHz. Figure 4 shows the UK equivalent market prices for the same spectrum across Europe.[35] We observe a wide variability in auction prices and even a large difference between awards in the same country (e.g. Latvia 2017 vs. Latvia 2018). Notably, there are multiple countries with prices that below Ofcom's £15-25m

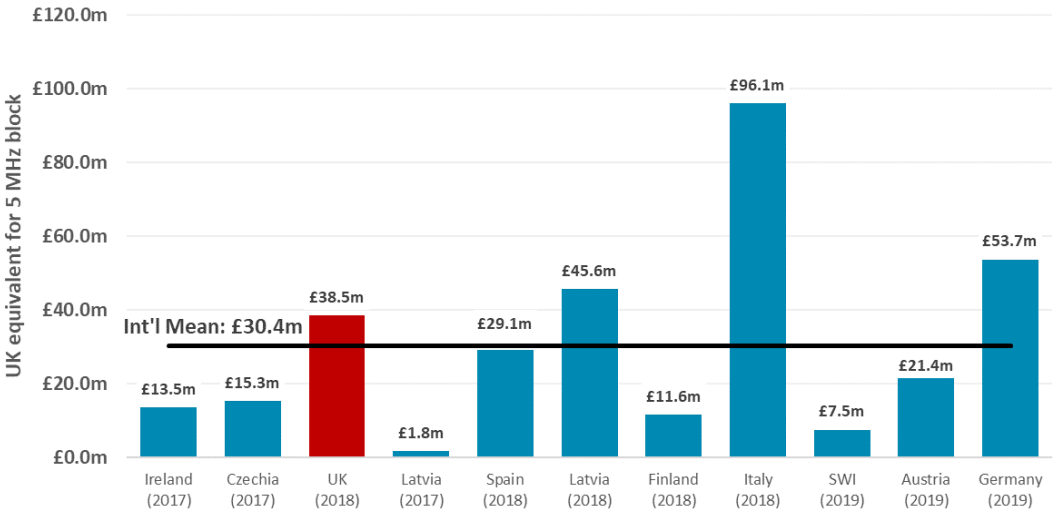
[33] Telefonica has previously noted that, in the context of a CCA with a relative cap rule, the large eligibility ratios set between 800 MHz and 2.6 GHz spectrum lots were a mistake. This is because they introduced undue uncertainty regarding potential bids for packages in the supplementary round. This concern does not apply here, as there is no supplementary round, so any switch from low to higher frequency band is committing.

[34] Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands: Revised proposals on auction design*, 28 October 2019, §3.147.

[35] The "UK equivalent" is calculated by taking the PPP adjusted price per MHz per pop in GBP multiplied by 5 MHz and the estimated population of the UK (World Bank).

range. Given these evidence points, we urge Ofcom to implement its conservative approach by setting the reserve price at the lower end of the range at £15m per 5 MHz block.

Figure 4: European 3.4-3.8 GHz award "UK Equivalent" price since 2017



Source: Regulator documents and press releases.
Notes: Prices are adjusted for PPP (IMF) license duration and include annual fees/delayed payment terms. Tiered payments, annual fees, and the licence duration adjustment use a 7.6% discount rate.

125. For 700 MHz FDD, Ofcom derives a particularly wide £100-240m range for the reserve price. It uses a relative value approach that compares prices of 700 MHz and 800 MHz in six countries that have sold both bands. Ofcom has previously opined on the limitations of such analysis when the sample size is small[36] and when prices are highly influenced by country-specific factors that may not be relevant to the UK.[37] Both concerns apply here.

126. We note that a number of Ofcom's benchmarks involve countries where the awards were not particularly competitive, and the reserve price rather than the market value may have played the lead role in setting price ratios across the bands:

[36] Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands: Revised proposals on auction design*, 28 October 2019, §3.152.
[37] Ofcom, *Award of the 2.3 and 3.4 GHz spectrum bands: Process guidance to potential applicants and bidders in the auction*, 31 January 2018, §7.234.

a. **Finland:** 800 MHz auction in 2013 sold for only 8% over reserve price, while 700 MHz finished at <1% over reserve price in 2016.
b. **Iceland:** Both the 800 MHz and 700 MHz bands sold at the same (per MHz) reserve price in the 2017 auction.
c. **France:** 700 MHz auction in 2015 finished only 12% over reserve price at a price that was ~6% over the price of 800 MHz in 2011.

127. Accordingly, we do not think the benchmark evidence is sufficient to make the case for setting the reserve price for 700 MHz based on the market value of 800 MHz in the UK. As with 3.6 GHz, we conclude that the appropriate implementation of Ofcom's conservative approach would be to set the reserve price for 700 MHz FDD at the low end of the relevant range, i.e. at £100m per block.

128. For 700 MHz SDL, we support Ofcom's proposal to set a low but non-trivial reserve price of £1m per lot. This band has no established ecosystem and its value is uncertain, so it is prudent to allow the market maximum freedom to set the price.

VII. PRINCIPAL STAGE RULES

129. We broadly support Ofcom's proposals for rules for the principal stage of the auction, except for the pricing rules and information policy, where there is scope for improvement.

Standing high bidders and ranking mechanism

130. Ofcom proposes to use the same approach to rank bidders and determine standing high bidders as for the PSSR auction. These rules worked well in 2018 and we expect them to work well for this auction.

Pricing rule and bid increments

131. It is a feature of Ofcom's proposed SMRA rules that, in each band, bidders could win spectrum at one of two price levels. This could lead to large differences in the amount paid by bidders for equivalent spectrum. The effect is magnified if bidders are buying multiple lots in a band, because the same price is applied to

every winning bid for the same bidder. Telefonica is concerned that this could result in payment differences between bidders that are sufficiently large that they constitute an unfair advantage to one bidder over another. This may be discriminatory.

132. At §3.47, Ofcom addressed the fact that Telefonica paid a higher price than other bidders for 3.4 GHz spectrum in the PSSR auction than other bidders. Ofcom said that this level of price discrimination was fair because "*all operators had an equal possibility of paying the higher price (O2 was randomly selected to face the higher price in the category first)*." We disagree. In fact, the rules ensure that the bidder that makes the final demand drop can never pay a higher price than its rivals. If bidders have different demand profiles, then the likelihood they set the clearing price and thus the likelihood they pay more or less than rivals can vary significantly.

133. For this award, Ofcom's failure to address reconfiguration has introduced predictable minimum demands of 40 MHz for O2 and BT. This makes it unlikely that we or BT will set the clearing price. In contrast, if H3G pursues a toehold strategy, it has complete flexibility to drop demand in 5 MHz increments and is thus much more likely to be a price setter. Ofcom's approach is inherently biased against bidders with less flexible demand and is therefore unfair.

134. Depending on Ofcom's approach to price increments, the absolute differences in payments could be very large. In Table 2, we show how total payments for a 50 MHz block could vary in the 3.6 GHz band depending on the price per block and bid increment. Suppose the lower auction price was £40 million per lot and Ofcom was using a 10% bid increment. The price difference is £40 million, equivalent to buying a whole extra block! Suppose the same bidder also bought 2x10 MHz at 700 MHz at a price of £200 million per lot + 10%. That would be another £40 million.

Table 2: Price premium that an "unlucky" bidder(s) buying 50 MHz (10 blocks) at 3.6 GHz could pay depending the price per block and percentage bid increment

		Price per block (£ millions)					
		£15	***£25***	***£35***	***£37.7***	***£40***	***£45***
Bid Increment (%)	***1%***	£1.5	£2.5	£3.5	£3.8	£4	£5
	5%	£7.5	£12.5	£17.5	£18.9	£20	£25
	10%	£15	£25	£35	£37.7	£40	£50
	15%	£22.5	£37.5	£52.5	£56.6	£60	£75
	20%	£30	£50	£70	£75.4	£80	£100

Notes: All figures are in £ millions and rounded to the nearest £100,000.

135. There are two potential approaches that Ofcom could adopt to address this problem:

a) Switch to a uniform price rule; and/or

b) Run the auction with modest absolute bid increments, so that the maximum price differences cannot be too large.

136. Ofcom rejected our proposal for the uniform price rule on the basis that switching from a pay-your-bid to uniform price rule might encourage non-straightforward bidding. However, the example it used to illustrate this, based on a bidder with value of 102 per lot deciding whether to raise its bid from 100 to 105, is flawed. Ofcom claims a uniform price rule might tempt this bidder to bid marginally above its valuation in the hope of winning at a lower price, and this could lead to an "*inefficient outcome*". We agree a bidder might bid in this way but probably only if there was some flexibility in their valuation. Ofcom is, however, wrong to claim that this outcome would necessarily be inefficient. To continue the example, suppose Ofcom's bidder with value of 102 per lot was competing against a bidder with a value of 100 per lot. If Ofcom's bidder dropped out, the spectrum would be inefficiently allocated to its weaker rival. Given that bidders with lower values should always be less likely to gamble on bidding up than a stronger bidder, a uniform price rule increases the likelihood of an efficient outcome at the margins.

137. Ofcom's example also shows the importance of using modest bid increments for this award. If a 2% bid increment instead a 5% increment was applied, then Ofcom's bidder would have been able to freely bid his maximum value of 102, as opposed to (a) having to drop out prematurely under Ofcom's price rule; or (b) facing the dilemma whether to modestly overbid under a uniform price rule.

138. Ofcom's proposed regulations give it wide discretion over how to set bid increments in each round. This is acceptable as a general approach but, to manage governance, bidders will require guidance regarding the potential range of bid increments that might be used and the circumstance in which particular levels may be applied. For the PSSR Award, Ofcom gave guidance to bidders that it expected to set price increments of no less than 2% and no more than 20% of the previous standing high bids.[38] A 20% price increment might initially be acceptable for 700 MHz SDL, given the low but non-trivial starting price. It would be much too high for 700 MHz and for 3.6 GHz, given the proposal to start with substantial reserve prices.

139. Very large absolute increments in any round are unacceptable, owing to the price differences they may introduce for bidders and the risk of inefficiency because bidders may be prevented from expressing their full values. For governance purposes, having too many substantial price increases in the same day is also undesirable, because it creates an unreasonable burden on the bid team to coordinate with management. As an example, if there are 7 rounds in a day and a 20% price increment, prices could triple in just one day.

140. We propose that Ofcom addresses these concerns by providing guidance that it intends to apply an absolute cap on price increases per round per category. We recommend the following caps on bid increments:

a) An absolute cap of £10m per lot per round in the 700 MHz FDD category; and
b) An absolute cap of £1.5m per lot per round in the 3.6 GHz category and in the 700 MHz SDL category.

[38] Ofcom, *Award of the 2.3 and 3.4 GHz spectrum bands: Process guidance to potential applicants and bidders in the auction*, 31 January 2018, §6.1.

These limits have been set to 10% of the (lower bound) reserve prices proposed by Ofcom for the two high-value bands in the auction. Adopting these limits would, in our view, strike a fair balance between effective price discovery and an acceptable auction pace.[39] Setting a maximum absolute increment rule also has the desirable effect of gently decreasing percentage bid increments towards the end of a competitive auction, thus promoting effective price discovery and limiting the risk of price overshoot.

141. Having guidance regarding a maximum increment in pounds sterling (as opposed to percentage terms) will provide clarity to bidders on the maximum increase in exposure over a day. We also request guidance regarding the likely number of rounds per day. In case Ofcom felt it necessary to try to speed up the auction, our strong preference is that Ofcom run more bidding rounds each day, rather than use larger increments. With only three categories in the auction, bid decisions on a round-to-round basis should be reasonably straightforward provided that absolute price increases are predictable and not too large. Therefore, round lengths and time gaps between rounds could, if necessary, be quite short.

Waivers, withdrawals, and minimum requirement

142. We support the inclusion of waivers. These will provide bidders with a safeguard against technical failure and some flexibility when deciding whether to bid to a new price level. We agree that three is the right number of waivers.

143. We strongly agree with Ofcom that no withdrawals should be allowed for this auction. Withdrawals are not necessary, would add needless complexity, and might be abused for price driving.

144. We agree with Ofcom's proposal not to allow bidders to specify a minimum requirement in any band. Both BT and Telefonica discussed minimum

[39] Under our proposed maximum absolute increments and a reserve price of £15m and £100m per block for 3.6 GHz and 700 MHz FDD respectively, the bid increment in percent terms would fall below Ofcom's prior minimum threshold of 2% only if there were 41 or more applied bid increments in either category. For reference, there were only 45 unique "bid prices" for 3.4 GHz in Ofcom's 2.3/3.4 GHz auction in 2018 and the reserve price started at 1/15th of our proposed reserve price. Therefore, our proposed approach should not raise any concerns about auction length.

requirements as a possible approach to address aggregation risk for smaller bidders who may be concerned about winning small subset of demand. Considering prior consultation responses and Ofcom's conclusion this is not a significant concern, we agree there should be no minimum requirements.

Information policy

145. During the auction, Ofcom proposes to reveal only limited information on excess demand at the end of each round. Ofcom says that "[t]*his is in the interest of maintaining a balance between mitigating the risk of strategic bidding, while still allowing sufficient information to make informed bidding decisions*" (§3.103). For the PSSR award, Ofcom also obscured aggregate demand, for the same purpose. For that award, we supported this approach. However, in light of our experience in the previous auction and considering the competitive environment for this award, we request that Ofcom revert to publishing aggregate demand in full for each band at the end of every round.

146. There are two very strong arguments why Ofcom should revert to publishing full information:

a) We do not believe that obscuring demand will deter price driving behaviour.

b) It may create informational advantages for some bidders over others. The bidder that is most likely to engage in predatory bid tactics in this auction, H3G, is predictably positioned to benefit more than others, owing to its advantageous starting position in the 3.6 GHz band.

147. In relation to our concerns about price driving in a simultaneous award, Ofcom said: "*We also consider the reduced information policy increases the risks to bidders of bidding in this way, as less information increases the likelihood a strategic bidder misjudges demand and inadvertently wins unwanted spectrum*" (§2.28). This analysis might partially stand up if the four MNOs were starting the auction on a level playing field. Unfortunately, that is not the situation going into this award, where H3G starts with a huge advantage. The risk that H3G inadvertently wins a substantial quantity of 3.6 GHz spectrum is very low, owing to the predictable demands of its three MNO rivals. H3G may be more at risk of

inadvertently winning small toehold quantities of spectrum, but here such risk is offset by the potential strategic upside of blocking its rivals from securing a critical mass of 5G spectrum and/or cementing its control over future secondary market efforts to defragment the band.

148. Furthermore, owing to the way standing high bids are determined in Ofcom's auction, the act of obscuring demand can never be fully effective. This is because in each round where there is excess demand, there will usually be a partial standing high bidder. That bidder may be able to identify the exact level of demand based on their number of standing high bids. A bidder that drops demand may also be able to infer the exact level of demand by observing whether or not their bid change has an impact on the reported demand. This, in turn, may introduce incentives for bidders to drop incremental small quantities of demand for strategic reasons. Also, obfuscation is likely to be ineffective at reducing incentives for strategic demand reduction. In the closing rounds of the auction, where only one bidder has to raise their bid in each round, obfuscation serves no purpose, as the bidder which is faced with the bid raising decision will be the bidder with partial standing high bids and will know exactly what the excess demand is, and what demand reduction is required to close the auction.

149. Ofcom clearly has some awareness of this issue, given its comment about the increased risk of strategic bidding if it adopts small 5 MHz lots at 3.6 GHz:

> "*With our limited information policy, there may also be more scope for bidders to bid in a non-straightforward way, in order to glean more precise information on excess demand. This is because bidders would be better able to drop their demand in small increments in an attempt to switch between increments of reported excess demand, particularly earlier in the auction when excess demand is high*." (§3.34)

We agree with this analysis. It is a good argument why Ofcom should revert to full information (and also use 10 MHz lots instead of 5 MHz at 3.6 GHz).

150. Ofcom should consider discussions on this topic in Austria and the Netherlands, where regulators propose to use the same SMRA format as Ofcom for forthcoming spectrum awards. In both countries, the regulator's advisor, DotEcon, has recommended publishing aggregate demand in full.

151. In the case of Austria, DotEcon has highlighted the risk that disclosing aggregate demand in steps could distort bidding behaviour:

> "*Another option would be to disclose aggregate demand in steps (as in the UK 2018 PSSR auction). However, this may provide incentives for bidders to try and gain further information by varying their bids in particular categories. Such strategic bidding aimed at probing levels of demand in individual lot categories could result in inefficient outcomes and we consider that these undesirable effects are likely to outweigh any benefit that limiting information about aggregate demand to broad steps might have*."[40]

152. A further rationale identified in both Austria and the Netherlands for not obscuring demand is that it may introduce informational asymmetries that may create (temporary) advantages for a subset of bidders:

> "*Moreover, a peculiarity of the SMRA Clock Hybrid is that if aggregate demand is not fully disclosed and only one bidder is randomly selected and partially awarded in each band, this bidder has an asymmetric information advantage. This asymmetry can be resolved by publishing at least aggregate demand in each round to all bidders*."[41] (Takon in Austria)

> "*Knowing total demand will also minimise any informational advantage that bidders with partial standing high bids could obtain in a specific round. Such bidders can place a lower bound on total demand based on the number of lots in their bid on which they have not been designated as standing high bidders, which is information that would not be available to bidders who have the entirety of their bid designated as standing high bids. Although our proposed random ranking of bidders does not bestow any systematic informational advantage on specific bidders, reducing the degree of any information asymmetry, however*

[40] DotEcon, May 2019, *Auction design proposals for the award of frequencies in the 700, 1500 and 2100 MHz bands*, available at: https://www.rtr.at/en/inf/konsult-700-1500-2100-mhz-2/Anlage_3_Report_DotEcon_Auction_Design.pdf

[41] Takon (working for RTR), *Comments on Auction design proposals for the award of frequencies in the 700, 1500 and 2100 MHz bands*, July 2019, available at: https://www.rtr.at/en/inf/konsult-700-1500-2100-mhz-2/Anlage_4_Report_Takon_Auction_Design.pdf

small and short-lived, would nonetheless seem to be desirable."[42] (DotEcon in the Netherlands)

153. Such informational asymmetries are particularly problematic in the context of the UK auction, owing to the privileged position of H3G. In failing to address full-band reconfiguration, Ofcom has created predictable focal points of demand for the other three MNOs, which will necessarily limit their flexibility to drop demand in steps. In contrast, H3G has huge flexibility to change demand at 3.6 GHz. As a result, H3G may be better positioned to benefit from information asymmetries. This is obviously inappropriate, given that H3G is the bidder best positioned to engage in price driving.

154. Ofcom's specific plan is to reveal excess demand rounded up to the nearest higher multiple of 20 MHz at 3.6 GHz and 700 MHz FDD, and the nearest higher multiple of 10 MHz at 700 MHz SDL. We have considered what impact rounding to smaller increments would have on our concerns. Our view is that this would modestly reduce information asymmetries but would otherwise make little difference. Therefore, we support full aggregate demand disclosure rather than an easing of Ofcom's restrictions.

155. In summary, Ofcom is mistaken to think that obscuring information about aggregate demand will lessen the vulnerability of the auction to price driving. In fact, it may advantage H3G, the bidder that has the strongest incentive to engage in such behaviour. The correct approaches to deter price driving are (a) to engage in full band reconfiguration, so that BT, Telefonica and Vodafone have more flexibility to express their demands and H3G has less to gain from blocking them; and (b) to cap holdings in the 3.4-3.8 GHz at 140 MHz band, which would prevent price driving.

156. Separately, Ofcom proposes to disclose the total number of qualified bidders and their identity before the auction (§3.102). We support this approach, which is consistent with past auctions.

[42] DotEcon, July 2019, *Recommended auction model for the award of 700, 1400 and 2100 MHz spectrum*, available at: https://www.rtr.at/en/inf/konsult-700-1500-2100-mhz-2/Anlage_4_Report_Takon_Auction_Design.pdf

Deposits during the Principal Stage

157. Ofcom proposes to adopt the same approach to deposits during the principal stage as for the PSSR award. This involves an initial deposit on application, additional deposits to determine eligibility and potential calls to top up deposits up to the level of a bidder's highest bid. We strongly support this approach which provides an appropriate mechanism to deter insincere bidding.

VIII. ASSIGNMENT RULES

700 MHz and 700 MHz SDL bands

158. Ofcom proposes to use the standard combinatorial sealed bid second price format to determine assignment of contiguous spectrum to winning bidders in the 700 MHz FDD and 700 MHz SDL categories. This approach aligns with international best practice and we support it.

159. Ofcom further proposes to run separate assignment rounds for the two 700 MHz bands. We previously put forward a proposal by NERA that would prioritise adjacent placement between the upmost SDL lot (753–758 MHz) and the lowest downlink FDD lot (758–763 MHz) in the case where one or more bidders won spectrum in both bands (§3.122). We still see merit in this approach.

160. If Ofcom does not want to mandate adjacency between the bands, it should consider combining the assignment rounds, so that any bidders that buy spectrum in both 700MHz bands have additional bid options for adjacent spectrum at the boundary of the two bands. A single winner and price determination could then be run for both bands. Given the modest number of lots in the two bands, this would be quite easy to implement and would only add at most one bid option for a subset of bidders.

3.6-3.8 GHz

161. Our comments here focus solely on the measures proposed by Ofcom for assignment of 3.6 GHz spectrum and are presented without prejudice to our position that Ofcom must act to support reconfiguration of the entire 3.4-3.8 GHz band by adopting full band assignment. The measures proposed by Ofcom provide

no guarantee that individual operators will be able to secure the large contiguous blocks of 5G spectrum that they need to provide the highest quality services to their customers. Ofcom's new proposals are very much a second-best solution; nevertheless, they are a significant improvement on Ofcom previous proposals.

162. Ofcom proposes to impose a restriction on winners of 20 MHz or less of 3.6-3.8 GHz spectrum to bidding for (and winning) either the top or the bottom of the band in the assignment stage of the auction. The threshold for the restriction has been raised from below 20 MHz to 20 MHz or less. In the context of Ofcom's approach, we strongly support this restriction and the increase in the threshold. As Ofcom says, it reduces the likelihood that a winner of a smaller quantity of spectrum could insert themselves between two larger winners in a strategic attempt to block them from concluding an efficient trade that would defragment the broader 3.-3.8 GHz band. This must outweigh any downsides associated with restricting the frequency placement options for small bidders.

163. Ofcom is also correct not to specify whether winners of 20 MHz or less be assigned to the top or bottom of the band. If H3G won spectrum, we anticipate they may have a preference to be at the lower end of their band, adjacent to their existing frequencies. However, it would be inappropriate to prioritise this in a situation where H3G is not willing to cooperate in moving its frequency holdings to allow other bidders to also secure contiguous spectrum in the wider 3.3-3.8 GHz band.

164. We note that the small bidder restriction was supported by BT, Telefonica and Vodafone, all bidders that require more than 20 MHz of spectrum in order to build a more competitive 5G portfolio. It is only opposed by H3G, who already has excess 5G spectrum. Ofcom should give less weight to H3G's views on this matter, as it has an obvious strategic rationale to try to block others from defragmenting spectrum though the auction which is contrary to the broader interests of the UK. Ofcom's proposal is a prudent measure to eliminate obviously bad assignment outcomes.

165. Ofcom further proposes a pause of up to four weeks before processing assignment stage bids, to allow a negotiation phase where bidders can agree the assignment of 3.6-3.8 GHz spectrum. During the first three-week period, bidders

will have the opportunity to agree unanimously in the assignment. If no agreement is achieved, there will be an additional week in which subsets of winning bidders can conclude an adjacency agreement. If any bidders agree to be assigned adjacent blocks of spectrum, their assignment stage bids would be reduced to zero, meaning they would not be able to express a preference for their location in the band. Again, in the context of Ofcom's approach, we strongly support all these measures, which should be implemented as a package. The proposal to allow partial adjacency is particularly important, given the possibility that H3G may win a small amount of 3.6 GHz spectrum and refuse to participate in a plan supported by other winners.

166. As Ofcom proposes, only bidders that win spectrum in the auction should have a right to participate in negotiations. No other party, including prior holders of spectrum at 3.4-3.77 GHz that do not win spectrum in the auction, should have an automatic right to participate in discussions. Such parties may be invited to join discussions but only at the discretion of one or more of the winning bidders. Only the position of winning bidders should be relevant to achieving unanimous or partial agreements.

167. We note that whereas BT and Telefonica supported allowing partial adjacency agreements, H3G and Vodafone opposed this. Again, Ofcom should give less weight to H3G's views on this matter, given its strategic rationale to try to block rivals from securing larger contiguous blocks. We have some sympathy with Vodafone's position, which we presume reflects the fact that they have no obvious path to achieving a large contiguous block without a deal involving H3G. However, absent the better alternative of full band renegotiation, allowing partial adjacencies is optimal, as it could help some MNOs without harming others. The further rule that prevents parties to a partial adjacency from selecting their frequency position also provides appropriate protection to winning bidders outside the agreement, who would consequently face less competition for residual frequency placements. Therefore, Ofcom should allow partial adjacency.

Publishing 3.6-3.8 GHz assignment stage bid data

168. Contrary to its standard practice of publishing all auction bid data alongside the results of the auction, Ofcom proposes not to publish any

assignment stage bid data for 3.6-3.8 GHz, owing to concern that it could affect post-auction trades. We support the principle that publication of sensitive bid data be delayed until such time that it is no longer relevant. In this case, this may require an embargo until such time as 3.4-3.8 GHz band defragmentation is concluded or the data is no longer considered sensitive. However, we do not support Ofcom's proposal not to publish the data.

169. Ofcom and its stakeholders often rely on bid data from spectrum auctions in the UK and elsewhere for the purposes of analysing and benchmarking spectrum prices and valuations. Such data is also used to support academic research into auctions. It would therefore be contrary to the public interest to indefinitely delay publication of bid data.

170. We further note that while Ofcom is proposing not to publish bid data, it is obliged to publish a breakdown of winning bids. From this, it may be possible to infer the values that certain bidders placed on losing assignment options. This underscores the broader point full band defragmentation would be a much better route for the UK than Ofcom's approach, as such information would in that case no longer be relevant. The information that Ofcom is concerned about releasing is only valuable because its approach cannot secure an efficient allocation but has positioned one operator (H3G) to attempt to extract windfall gains from rivals in return for facilitating the efficient allocation that Ofcom should have delivered in the first place.

IX. OTHER COMMENTS

171. We request that Ofcom confirms that it will prepare a document for bidders that provides guidance on how it expects to exercise its discretion with respect to auction parameters, such as bid increments, round duration and deposit calls. We comment further on this point in our separate consultation response on the regulations.

172. We welcome Ofcom's proposal at §A5.19 to make available a stand-alone version of the electronic auction software to applicants, a few days after application.

173. In its December 2018 Consultation on this award, Ofcom considers the evolution of the 3.6-3.8 GHz band and states that it has "...issued notices to revoke all fixed links licences, effective on 23 December 2022" and that "...spectrum will be available to enable future mobile services in the 3.6 GHz to 3.8 GHz band to be deployed in many areas from June 2020, but not necessarily nationwide before the end of 2022. Ofcom further states that it would "...aim for fixed links operations to migrate to alternative frequencies or technologies by June 2020 where possible." However, it also states that "Given the notice periods for the revocation of fixed link licences and variation of PES licences and grants of RSA, there may be some constraints on new use of this spectrum in some areas of high population, such as the south-east of England and parts of the Midlands in the intervening period following the award."

174. In the current consultation, Ofcom re-iterates this position by stating that the 120 MHz in the 3.6-3.8 GHz band "is currently being cleared of its fixed links and satellite uses, and should become available for mobile use across the country by June 2020. Some localised constraints may remain in place until the end of 2022." Telefonica requests that Ofcom provides clarification on this point and an update on the status and timing with regard to the clearance of all the fixed links in the band.

175. Ofcom says that it hopes to be in a position to start the auction by Spring 2020. We request that Ofcom provide an indicative timetable as soon as practically possible. To assist bidder preparations, we request that Ofcom indicate the earliest month in which each stage of the process might happen and avoid imprecise terms such as "Spring".