Telefónica

Robert Emson
Floor 3
Spectrum Group
Riverside House
2A Southwark Bridge Road
London SE1 9HA

By email

4 April 2017

Dear Robert

Ofcom's Consultation "Award of the 2.3 and 3.4 GHz spectrum bands: Competition issues and auction regulations"

Telefónica UK Limited ("O2") submitted a response to this consultation on 30 January 2017. The response comprised a covering letter ("the Covering Letter") and a report from NERA entitled "*The case for spectrum caps that support efficient and pro-competitive outcomes in the award of PSSR spectrum*" ("NERA"). Our submission, in addition to the responses of other parties, has been published on the Ofcom website. Subsequent to these submissions, there have been a number of developments relevant to Ofcom's decision on competition issues and auction regulations.

These include:

- **H3G's proposed acquisition of UK Broadband.** On 6 February, it was announced that H3G will acquire UK Broadband (UKB), including its spectrum holdings in the 3.4 GHz (40 MHz) and 3.6 GHz (84 MHz) bands. This spectrum is linked directly to the PSSR award: UKB's 3.4 GHz holdings are part of the band that will be auctioned; and UKB's 3.6 GHz holdings have been identified by Ofcom as potentially substitutable spectrum in the future.

- **The Government's 5G Strategy.** On 8 March, DCMS and HM Treasury published a report entitled "Next Generation Mobile Technologies: A 5G Strategy for the UK". This report sets out the Government's ambition that the UK should be a leader in broadband connectivity, and identifies the key role of 4G networks as a pathway to its 5G goals.

The purpose of this letter is to set out the implications of these developments for the PSSR award, and also to comment on some of the submissions from other parties.
These developments (and the submissions from other parties) serve to confirm the core reasons identified by O2 why Ofcom should adopt Ofcom's proposed variant to Option B alongside Option C:

- There is a clear risk of strategic bidding not only from BT/EE but also from Vodafone (Covering Letter §§ 53, 56). This supports the adoption of a variant to Option B, in conjunction with an overall cap. As we set out in Section III below, H3G's proposed acquisition of UKB will leave O2 uniquely vulnerable to strategic bidding in the PSSR

award. BT/EE has attempted to deny the general possibility of strategic bidding, but this is wrong, for the reasons we have previously described and set out below.

- O2 provided evidence strengthening the case for Option C (Covering Letter §§65-67), in particular that 100 MHz bands were not needed for 5G and that 5G would be an evolution from 4G. The consultation responses and the Government's 5G strategy have confirmed this. The MNOs have not provided evidence that 100 MHz bandwidths are needed for the development of 5G. The Government shares O2's view that 4G will be a path to 5G.

- Ofcom has underestimated Competition Concerns 1(i), 1(iii) and 2 because it underestimated the duration of the period of risk. More spectrum will not become available in time to address congestion on O2's network (see O2 Covering Letter at §§9, 18, 20-21, 42 and the cited passages of the NERA report). We understand that the only other technical response on this subject – from Analysys Mason – supports NERA's analysis of the Transition Periods, which confirms the correctness of O2's position that sufficient spectrum will not become available in time to address congestion on O2's network; see Section I below.

The remainder of this letter addresses the following key points that emerge from the developments:

I. **This auction will pave the way for 5G readiness by increasing 4G capacity.** The Government's 5G strategy confirms O2's position on the manner in which 5G will develop and the best approach to pave the way for 5G. O2 is committed to developing its 5G network for the benefit of consumers and businesses alike. Over the next four years, the main benefits to consumers from the use of the auctioned spectrum will come from deployment of increased 4G capacity. Beyond this timeframe, and building on the existing 4G capacity, we expect the auctioned spectrum (alongside other spectrum which has or will be released) to deliver further benefits through 5G deployment.

II. **The consultation has not generated sufficient evidence to support the notion that all players must have the potential to acquire large blocks of 3.4GHz spectrum.** As explained in the Covering Letter at §67, any notion that broad channel bandwidths will be important for 5G is speculative. The consultation responses have confirmed that large contiguous blocks are not needed in the next four years and it remains ambiguous how important they will be after that, given the potential to replicate many of the benefits of 5G through aggregation of non-contiguous spectrum. If necessary, this issue of large blocks can be addressed in the future through reconfiguration of holdings across the 3.4 GHz and 3.6 GHz bands, and should not be a policy priority for this award.

III. **H3G's acquisition of UKB's spectrum means that O2 is now uniquely vulnerable to strategic bidding.** [✂] In these circumstances, O2 is ready to bid aggressively to acquire more spectrum and defend its customers, brand and company in an auction undistorted by strategic bidding. We have presented substantial evidence that our rivals stand to gain hugely from blocking O2 from acquiring more spectrum. The UKB acquisition introduces a strategic value for H3G, in addition to Vodafone, to block O2 at 2.3 GHz, and leaves O2 as the sole focal point for strategic bidding by BT/EE and/or Vodafone at 3.4 GHz. Ofcom must act to preclude auction outcomes based on strategic bidding through appropriate spectrum caps, and thus safeguard the integrity of the auction.

IV. **BT and Vodafone have not demonstrated any near-term need for additional spectrum.** In fact, BT and Vodafone are sitting on a large volume of unused mobile spectrum. This contrasts sharply with the position of O2, which needs to deploy spectrum in

both these bands as soon as possible to enhance 4G capacity. This difference has important implications for Ofcom's assessment of the competition and efficiency impact of various levels of intervention. It implies that the risk of harm to consumers from stronger intervention measures are *de minimus*, as any unintended affects could be remedied through future spectrum releases. In contrast, if O2 is blocked from securing an efficient level spectrum owing to strategic bidding by rivals, consumers will suffer direct harm because O2 will be unable to deliver the quality of service or competitive products that its customers demand and expect. Importantly, O2 is not asking for an award of spectrum: just the opportunity to bid in a context undistorted by strategic bidding.

I. This auction will pave the way for 5G readiness by increasing 4G capacity

One of the most important messages in our consultation response is that, for the purposes of the auction and any proposed competition measures, both 2.3 GHz and 3.4 GHz should primarily be viewed as 4G capacity bands. It is widely recognised that 2.3 GHz will be used for 4G, given that it is already integrated into many handsets. In addition, the important role of 3.4 GHz spectrum in augmenting 4G capacity for those operators without significant holdings at 1800 MHz and 2.6 GHz should not be overlooked.

The initial outcome of this auction will be to increase 4G capacity. As explained in our consultation response and discussed below, increasing 4G capacity will pave the way to 5G readiness. Accordingly, to promote the pathway to 5G in line with the Government's strategy, Ofcom must consider how the auctioned spectrum will be used in the context of 4G services and structure the auction appropriately. That requires protecting the four MNO market and the risks to competition from asymmetry: absent measures to prevent strategic bidding, such as Ofcom's variant of Option B and Option C, there is a material risk that O2 will not win sufficient spectrum, and would thus run out of 4G capacity and cease to be a credible player in the 4G market and the eventual 5G market.

3.4 GHz is a 4G band and a pathway to 5G

We were pleased to observe that other operators also recognise the potential value of 3.4 GHz for 4G roll out:

- UK Broadband: "*There are significant 3.5 GHz LTE networks being deployed in Japan and well as networks in the UK, Bahrain and some other countries. This has driven the chip-set manufacturers to commit to having chip-sets available for all handsets by 2018. Industry forecasts already predict significant 4G use of the 3.5 GHz band before the advent of 5G. The 3.4-3.6 GHz spectrum will thus be useful from as early as 2018 onwards for deployment in 4G LTE networks to provide additional network capacity in areas of high customer demand for data services*."

- BT: "*… operators may use the 3.4 GHz spectrum as a path to 5G in order to increase capacity on their networks*." (BT/EE§74)

This confirms the position which O2 took in its response to the consultation that 2.3 GHz and 3.4 GHz are both going to be used for 4G, at least in the short to medium term. That is why we support Ofcom's Option C, with a 35% cap on spectrum usable in what NERA calls "Transition Period 2" (i.e. 2019-2020), combining 1400 MHz, 2.3 GHz, 3.4 GHz and existing mobile bands, but excluding bands such as 700 MHz which will not be usable until later. 3.4 GHz is a 4G band in the short-to-

medium term, and there is no economic rationale for excluding it from a global cap just because it will, in due course evolve into a 5G band.

It is also the case that, for those operators facing imminent capacity constraints, 3.4 GHz is no substitute for 2.3 GHz. If O2 acquires 2.3 GHz, it will be able to deploy that spectrum straight away, using it to carry traffic on the basis that there is already an established base of handsets with associated chip sets. With respect to 3.4 GHz, O2 would deploy such spectrum as soon as the equipment is ready, but even if that happens as soon as 2018, it will take longer to have an impact on the network, as O2 will need to distribute a significant number of new handsets into the market and this inevitably takes time. We note that Analysys Mason, on behalf of H3G, reach broadly similar conclusions to us regarding the timescales for usability of spectrum (H3G figure 32).

Both BT/EE and UK Broadband are wrong to imply that 2.3 GHz and 3.4 GHz can be treated the same from a competition perspective. The time gap in handset availability between those frequencies may be immaterial to BT/EE (and Vodafone), owing to their abundance of spectrum, but it is hugely important to O2's ability to maintain (and improve) quality of service for its customers. Accordingly, O2 remains firmly of the view that it is vital that, in addition to an overall cap (Option C), Ofcom also maintains separate competition measures to prevent BT/EE from bidding for 2.3 GHz and limit Vodafone to bidding for no more than 20 MHz at 2.3 GHz: i.e. the variant Ofcom has identified to Option B.

Competition measures should be shaped by the market for 4G, in order to optimise market conditions for 5G

The path to maximizing benefits for the UK from 5G is to promote sustainable competition in 4G services. As the Government says: "*5G is not yet fully developed, with definitive standards only due to be agreed in 2019 and incremental deployment expected over the following decade*." The reality is that we may be five years away from commercial deployment of a new 5G radio system. In the meantime, it is advances in 4G network deployment that will deliver real benefits for UK consumers and set the scene for the launch of 5G.

O2 is committed to harnessing the benefits of 5G for consumers and business alike. We note that many of the benefits associated with 5G can actually be realised using existing technology, especially 4G. The Government makes this point in several places in its 5G strategy:

> "*5G is an umbrella term used to describe the next generation of mobile communications technologies. … Unlike the generations of mobile networks that have preceded it, 5G is not just an extension of existing technologies but a "system of systems" that will bring flexibility to mobile, fixed and broadcast networks and support ever larger data requirements*."
>
> "*The evolution from 3G to 4G in the early part of this decade has brought forward applications that were unforeseen just ten years ago. However, the path to a 5G future is unlikely to replicate the linear progression from one mobile standard to the next that we have seen to date.* ***5G networks will work alongside and build on existing 4G networks, which will form the infrastructure spine for the next generation of mobile networks and support many of the things that we currently think of as 5G use cases.*** *However, the evolution towards 5G is likely to require greater alignment between wireless networks and fixed line networks. Providing the levels of connectivity and coverage required for 5G means having the best possible networks today. We need to take action now to ensure further improvements in our existing mobile network*." (emphasis added)

Accordingly, the best way that Ofcom can serve both consumers and Government policy and achieve 5G as soon as possible is to recognise and address the competition concerns in the 4G market. If all four operators leave the PSSR auction with a critical mass of spectrum for 4G, then all will be well placed to develop 5G offerings. If this does not happen, then the competitive pressure to invest in new services associated with 5G will be diminished. H3G make the same point in their consultation response. This means that Ofcom would be wrong to avoid adopting the Option C cap (which is needed to preserve the four MNO market and address competition concerns arising from asymmetry) on the grounds of 5G policy (see Covering Letter §67). The Government has confirmed O2's position that 5G policy will be served by an evolution from 4G. Taking the measures necessary to protect the 4G market and sustainable competition from the four MNOs in that market is the recognised route to 5G.

II. No immediate need for very large contiguous blocks for 5G

Ofcom recognised that if there were evidence that having large blocks of 3.4GHz spectrum was unlikely to be important for 5G services, the case for Option C would be stronger (Consultation §5.94). O2 has previously noted that while broader bandwidth allocations below 5 GHz are generally desirable, the benefits that they bring relative to aggregation of 20 MHz blocks are modest (see NERA Section 6.2). As explained below, the submissions to the consultation present a general consensus from mobile carriers that 100 MHz blocks are not currently perceived as having any particular importance for 5G services.

Moreover, if large blocks are needed (which has not been demonstrated by the consultation responses), this is an issue that does not need to be addressed until 5G is launched, by which time Ofcom intends to have made 3.6 GHz spectrum available. Therefore the objective of ensuring operators have contiguous allocations of up to 100MHz or more should be a low priority for Ofcom for this award when considering competition options. This strengthens the case for Ofcom setting a cap on spectrum including 3.4 GHz (Option C) in addition to a cap on immediately usable spectrum (Option A, or, as O2 suggests, Ofcom's variant to Option B).

Qualcomm and GSA favour broad bandwidths but fail to show real benefits

In their responses, Qualcomm and the GSA comment on the importance of broad bandwidths. However, they fail to make a convincing case that the associated benefits will deliver meaningful gains for consumers in the near term.

They identify the following benefits of larger blocks:

i. Increased data rates;

ii. Reduced terminal complexity;

iii. Reduced terminal power consumption; and

iv. Capacity is proportionally amplified by the large channel bandwidth.

We note that Qualcomm are for the most part comparing a single broad 100 MHz 5G carrier with the concept of aggregating up to 5 x 20 MHz LTE carriers. They suggest such a carrier can achieve average data rates of 780 Mbits/s and peak data rates of 3 Gbits/s. We agree with all of this. Nevertheless, the practical reality is that the occasions when users require data rates beyond

that delivered by a single 20 MHz carrier are limited and carrier aggregation can be used in these situations with minimal detriment. We note that handsets already have the ability to aggregate up to three carriers and hence terminal complexity is not a significant issue. For the foreseeable future, there is no reason to expect the increased data rates above, say, what can be delivered with 3 x 20 MHz aggregation to be of material value (5G would effectively increase average rates from around 500 Mbits/s to around 800 Mbits/s). At these data rates all currently conceivable downloads can be completed in less than a minute meaning that power consumption is also not an issue.

Qualcomm's numbers seem to suggest that channel capacity is proportional to bandwidth, as we would anticipate. Hence, whether a channel is available as multiple (possibly dispersed) 20 MHz carriers or a single 100 MHz carrier does not make any difference to capacity.

In light of this information, we maintain our view that broad contiguous allocations are marginally desirable but certainly not a priority for this auction as confirmed by the consultation responses from the other MNOs.

Mobile operators present no evidence for immediate need for large carriers

None of the mobile operators have put forward any evidence to suggest that they view having large carriers at 3.4 GHz as essential to their 5G strategy. O2's view is that the commercial case for such deployment will be weak or non-existent for the next 4 years, which is the relevant time period for competition and efficiency concerns associated with this auction. BT/EE implicitly makes a similar point when it voices support for Ofcom's observation that it is "*unlikely that very asymmetric shares of 3.4 GHz will arise from the auction*" (BT/EE§106). Meanwhile, Vodafone proposes a cap of 80 MHz at 3.4 GHz, also implying that it believes that no operator needs 100 MHz plus to deliver services to consumers in the near future.

This is fundamentally important because, in the consultation, Ofcom's provisional rejection of Option C was based partly on a concern that it should not block any operator from the potential to win 100 MHz or more of 3.4 GHz, in support of a business plan for early launch of 5G. The reality is that 5G business plans are highly uncertain, especially regarding timescales, because operators do not have solid information about equipment and consumer willingness to pay for services beyond enhanced 4G. Against this background, Ofcom need not have any concerns about deploying a global spectrum cap that prevents BT/EE from winning 100 MHz of 3.4 GHz and places modest restrictions on Vodafone and H3G. (In any event, under Ofcom's Option C, BT/EE would be able to win a large 85MHz block.)

This conclusion is reinforced by the availability of substitute and complementary spectrum in the future. At some point after 2020, 3.6-3.8 GHz will be made available. This spectrum could be linked up with holdings at 3.4 GHz to deliver wide bandwidths, if needed for 5G. In similar timescales, 700 MHz will be released. Both of these bands should be available before 5G becomes a commercial proposition. Alternatively, as we said in our consultation response and the Government says in its 5G strategy (page 50), operators may have the option to refarm existing spectrum.
BT/EE makes the same point in its response: "*it may be possible to re-farm existing bands ... from current 4G use to 5G, thereby providing an alternative route to 5G*" (BT/EE§109).[1] It identifies 900 MHz as an example of a band that could be refarmed. We agree that this is possible but two more obvious candidate bands for refarming are 1800 MHz, where BT/EE has a 2x45 MHz block of paired spectrum, and 2.6 GHz, where BT/EE has 2x50 MHz of paired spectrum and 20MHz of

[1] In its 5G strategy, the Government also highlights scope for refarming of existing spectrum for 5G, at p.50.

unpaired spectrum. Amongst all the operators, BT/EE is clearly by far the best positioned to refarm existing spectrum for 5G, as it has significantly larger holdings of spectrum than its rivals (much of which is currently unused) and this spectrum is already conveniently arranged in large contiguous blocks.

In conclusion, Ofcom should not assume that 3.4 GHz is an essential band for 5G. There will be alternatives. For O2, 3.4 GHz is an essential band for 4G, because there is not enough spectrum at 2.3 GHz to meet its capacity needs, and other spectrum will not be available soon enough. Ofcom's competition measures should reflect this to address the recognised asymmetry and the risk to the four MNO market.

Ofcom can take other action to promote access to larger carriers after 2020

In any event, if and when the 3.4-3.8 GHz does emerge as a leading band for 5G,if there is merit in reconfiguring holdings within these bands to promote frequency contiguity, this can be addressed at that time, for example in the design of the 3.6 GHz award including, if necessary, through a broader reconfiguration of the band. We note that the majority of spectrum that H3G will acquire from UKB is around the boundary of the 3.4 GHz and 3.6 GHz bands. Unless H3G is willing or is required to move these holdings, the position of this spectrum would make it impossible for any other bidder to unify future holdings of spectrum at 3.4 GHz and 3.6 GHz. For the reasons we have described above, this is of no immediate concern. However, we recognise that, if having larger contiguous blocks becomes more important, it could become an issue in the long term. However (as explained), there will be opportunities for Ofcom to address that issue at a later time in the event it does become important.

O2's vulnerability to strategic bidding

It is well understood and accepted that auctions can only deliver an efficient outcome if they elicit a full set of bids based on *intrinsic* value. It is therefore entirely proportionate to intervene through spectrum caps to eliminate sets of bids which likely have low intrinsic value if they are also associated with a risk of strategic bidding behaviour. Our view remains that Ofcom's preferred option A does not go nearly far enough in addressing this risk, and that strong intervention – namely Ofcom's variant to Option B combined with Option C – is required.

As we set out here, with H3G's acquisition of UKB, O2 is now uniquely vulnerable to strategic bidding in the PSSR award. The acquisition introduces a strategic value for H3G, in addition to Vodafone, to block O2 at 2.3 GHz, and leaves O2 as the sole focal point for strategic bidding by BT/EE and/or Vodafone at 3.4 GHz. [✂]. In these circumstances, we strongly dispute BT/EE's claims that it would be disproportionate to impose competition measures in this award. To the contrary, we continue to believe that Ofcom must take stronger action to eliminate the possibility of bids based on strategic value, thus creating a market in which bidders with the highest intrinsic values can secure the spectrum that they need.

Impact of UKB acquisition

H3G's acquisition of UKB spectrum primarily impacts the PSSR auction in a number of ways. Firstly, it entirely addresses H3G's medium-term needs for additional spectrum, and thus will diminish aggregate intrinsic demand in the auction. Secondly, it materially alters the balance of holdings of long term usable spectrum, which has implications for Ofcom's approach on spectrum

caps. Thirdly, it leaves O2 uniquely vulnerable to strategic bidding, which reinforces the need for competition measures so as to protect the sustainability of the four MNO market.

The acquisition almost certainly alleviates H3G's medium- and long-term capacity issues. We asked NERA to explore the impact of the transaction on H3G's intrinsic value for PSSR spectrum, using the model that they developed to support our submission. NERA's view is that H3G would still have meaningful value for up to 20 MHz of 2.3 GHz spectrum, as they could deploy this spectrum immediately to address 4G capacity constraints, but they would have no further value for 3.4 GHz spectrum for 4G. We have provided a copy of this model to Ofcom.

In our consultation response, we supported Ofcom's variant to Option B combined with Option C: we proposed two caps, one for Transition Period 1 (current spectrum plus 2.3 GHz) and one for Transition Period 2 (adding 1400 MHz and 3.4 GHz). The UKB acquisition leaves H3G in the odd position of still having a relatively modest share of usable spectrum through Transition Period 2, but having a much larger share of long-term usable spectrum, owing to its 84 MHz in the 3.6 GHz band. In theory, this opens the possibility of H3G exploiting the absence of a cap linked to 3.6 GHz to secure more than 50% of the combined 3.4 GHz and 3.6 GHz bands. We see this as a rather lower risk than BT/EE attempting to monopolise the 3.4 GHz band for strategic reasons. Nevertheless, such risk could be addressed by introducing a third cap on long-term spectrum, or imposing a band-specific cap of 80 MHz at 3.4 GHz (as Vodafone has proposed). We would support either measure, provided it is in addition to appropriate caps targeted at overall spectrum holdings in Transition Periods 1 and 2 for usable spectrum.

H3G's gain through the UKB acquisition is also a lost opportunity for O2 [✂].

It is our view that the acquisition leaves us more exposed to strategic bidding. It introduces a strategic value for H3G, in addition to Vodafone, to block O2 at 2.3 GHz. It also leaves O2 as the sole focal point for strategic bidding by BT/EE and/or Vodafone at 3.4 GHz. This situation should further focus Ofcom's attention on the need to set appropriate competition rules for this auction so as to prevent the possibility of an auction in which O2 is blocked inefficiently from winning spectrum as a result of strategic investment strategies by rivals.

[✂]

We believe this is fully set out in our response to the consultation document and in the NERA valuation model, which we are also supplying to Ofcom. The evidence takes a number of forms:

i. **Rising demand for data.** Average data use continues to grow at an exceptional rate, meaning that we will need to add significant capacity every year, for the foreseeable future, just to maintain current performance. Our modelling is based on what we believe are conservative assumptions regarding future data growth rates, as set out in Section 5.1 of the NERA report. We note that, in its response, Vodafone also reports exceptional growth in data traffic, so we consider this part of our submission uncontroversial.

ii. **Lack of alternative options for expanding capacity.** O2 has exhausted alternative options to spectrum for expanding capacity. We have invested and continue to invest heavily in refarming, in adding new cell sites and installing the latest technology. However, O2 faces exceptional challenges in accessing new urban sites, and the scope for performance gains is very limited without more spectrum to support investment in new technology. Furthermore, O2's experience in London, where it operates one of the most loaded LTE networks in the world, is that loaded LTE networks deliver lower capacity than

theory and vendors suggest. We have provided what we believe to be an exhaustive review of our options to expand capacity in Sections 5.2 through 5.4 of the NERA report. This work was led by Professor William Webb using information provided by our technical team. O2 and Professor William Webb are grateful for the meeting held with you on 30 March to answer questions you had about the analysis, and O2 will submit a separate response pertaining specifically to this meeting.

This is fundamentally important for Ofcom to understand. In the consultation, Ofcom has seriously underestimated the threat to O2 and, as a consequence, to the four MNO market. That is why we have gone to such lengths to set out our position and explain why our alternative options to expand capacity are so constrained. We understand that H3G has provided to Ofcom studies by Real Wireless and Qualcomm which also demonstrate the limitations of substituting sites for spectrum as a way to increase 4G network capacity. There is simply no evidence to support BT/EE's implicit allegation that we have under-invested in our network (BT/EE §96). Anticipating this baseless line of attack, evidence that our investment levels are equivalent to BT/EE and Vodafone is provided in both NERA Section 5.5 and the Enders Analysis report from December 2016 cited by BT/EE. Looking forward, O2's problem is not a lack of willingness to invest but a lack of options to generate sufficient capacity.

iii. **Leading indicators of network congestion.** [✂]

iv. **Subscriber-loss avoidance model.** In these circumstances, avoided cost models are largely irrelevant for assessing the value of spectrum. Instead, NERA has developed a high-level model that explores the commercial impact of shifts in market share resulting from networks becoming capacity constrained. It uses reasonable assumptions about traffic growth and spectrum availability for each of the networks to model capacity constraints over time. NERA have made further assumptions about how spectrum-induced capacity constraints could drive churn of customers from congested to uncongested networks. Specifically, they identify a pool of customers that would need to leave the network to remove congestion, and assume that 20% of this pool switch away each year. We think this is a conservative assumption; for example, it is smaller than the two percentage point per annum drop in market share experienced by Vodafone-Hutchison Australia (VHA) between 2011 and 2014 following network and branding problems.

NERA use the model to generate evidence regarding the likely intrinsic and strategic investment values for bidders for PSSR spectrum. We invite Ofcom to explore the model and vary assumptions. We believe that, under any reasonable set of assumptions, it demonstrates that O2 should have exceptionally high value for the first 40-60 MHz of spectrum, as compared to other operators, especially BT/EE and Vodafone. [✂]. For the same reasons, the commercial upside for our rivals if O2 is blocked, unduly constrained or substantially delayed in winning PSSR spectrum is enormous.

Proportionality of spectrum caps

BT/EE devotes a significant part of its response to arguments that imposing competition measures is somehow disproportionate given lack of evidence that asymmetric spectrum shares have to date caused any harm to downstream competition. We strongly disagree with BT/EE's position, for three reasons:

a) BT/EE's analysis looks backwards at what has happened, not forwards to what will happen if frequency-constrained operators cannot expand their spectrum holdings.

b) We believe we have supplied compelling evidence that bidders other than O2 may have an incentive to engage in strategic bidding.

c) Even if Ofcom considers that the evidence linking spectrum holdings to future competition is uncertain (which we say it is not), it would still be proportionate to set prudential caps that eliminate or make less likely outcomes that could potentially be inefficient and threaten competition.

a) **Analysis of competition impact must be forward looking.**

BT/EE makes the point, as Ofcom has done, that competition in the UK market over the last five years has been strong notwithstanding substantial asymmetries in spectrum holdings (BT/EE §8). We agree. This reflects the fact that capacity constraints have not bitten because the operators with the smallest holdings, O2 and H3G, have had sufficient spectrum and technical options to meet capacity. However, with rapidly rising data demand, the situation is not sustainable. For Ofcom, when considering competition and efficiency concerns, the relevant timeframe is not what has happened in the market up to now, but what may happen before alternative spectrum becomes available.

BT/EE also deliberately exaggerates the findings of the European Commission with respect to its conclusion that that H3G and O2 did not face material capacity constraints (BT/EE §20-23). The Commission's lack of concern about O2's spectrum deficiency was based in large part on an expectation that the situation could be addressed through future spectrum awards. As H3G highlights in its submission, Ofcom explicitly assured the Commission that it would continue to regulate as necessary to support a four MNO market (H3G section 1). The Commission also thought that smaller cells and other technology could play a major role in alleviating capacity constraints in the near term – but we have shown in our submission why this is not the case. Similarly, in the BT-EE merger decision, the CMA declined to address concerns expressed by third parties regarding the asymmetric distribution of the UK spectrum based on assurances from Ofcom that such concerns could be addressed through future spectrum awards. We understand it was also influenced by evidence from Ofcom that there were other technical measures that operators could deploy instead of spectrum. Again, we believe we have provided sufficient evidence to persuade Ofcom to revisit its provisional view on technical alternatives to spectrum.

In summary, the competition authorities did not conclude that spectrum asymmetry was not a concern. Rather they concluded that current asymmetry and any associated capacity concerns could be alleviated through alternative market mechanisms. The PSSR award is the most important of these mechanisms.

b) Response to BT/EE's position on strategic bidding

BT/EE criticises Ofcom for devoting significant attention to the potential risk of the auction outcome being distorted by strategic investment-based bidding (BT/EE §82). It further argues that Ofcom has not presented sufficient evidence to demonstrate a link between spectrum holdings and market share. We think these criticisms are self-serving and inappropriate given Ofcom's statutory duties to promote efficiency and competition.

We do not agree with BT/EE's conclusion that bidders "*do not have an incentive to bid on the basis of strategic value*". In our response, supported by the NERA model, we set out substantial evidence that the strategic value to rival operators from blocking O2 from acquiring additional spectrum is huge. We recognise and welcome that fact that Ofcom's auction design also creates risk for a bidder or bidders seeking to realise this strategic value. Nevertheless, the auction model does not eliminate this risk. We believe that a reasonable regulator must concede that strategic bidding is possible, and that it has a duty to foreclose this (subject to weighing any countervailing risk of foreclosing efficient outcomes).

There is an underlying inconsistency throughout BT/EE's submission. On the one hand, it puts forward a series of arguments as to why it should be allowed to bid for huge quantities of spectrum, far in excess of the holdings of any other operator in Europe. This is based on the notion that if its bidding is restricted, an efficient auction outcome might be precluded, which would cause "*substantial*" harm to consumers. On the other hand, it repeatedly pushes arguments that imply that any such harm must be small. In particular, it argues that very high speeds are not important (we agree), and that there are always viable technical alternatives to spectrum (we disagree, at least with respect to operators with smaller spectrum holdings). We submit that the real risk of harm comes from allowing BT/EE to bid for spectrum for which it has no near-term use case. We further discuss the strategic bidding incentives of other MNOs in the next section and in Section 7.5 of the NERA report.

c) The need for prudential caps

We believe that we have set out a convincing argument why O2, its customers and consumers in general would suffer great harm if O2's bids are out-competed by competitors bidding on the basis of strategic value (with further consequent harm to the market by reason of the asymmetry in spectrum shares and the loss of the four MNO market). However, even if Ofcom remains unconvinced about the risk of such behaviour (and O2's position is that Ofcom should be convinced of the incentives for strategic behaviour), it would still be proportionate to set prudential caps that eliminate or make less likely outcomes that could potentially be inefficient and threaten competition. Ofcom can safely do this because the risk of meaningful harm from constraining operators with large holdings is obviously small.

Importantly, we are not asking for measures that would give O2 special treatment, as BT/EE insinuates in its submission. Preferential treatment would involve either a set aside or caps set so low that they eliminate intrinsic-value bids that could plausibly set prices in the auction. These are types of measures that operators ask for when they do not have sufficient confidence in their business case to compete on a level playing field. We are entirely confident in our ability to compete in an open auction against bids based on intrinsic value. The caps we propose are designed to reduce and/or eliminate bids from operators that almost certainly have low *intrinsic* value but could have very high *strategic* value. They do not preclude any bids that are reasonably likely to win or set prices based on intrinsic value.

We note that H3G has asked for a reservation of 2.3 GHz and 3.4 GHz spectrum for itself. We find it very odd that they ask for a reservation and do not acknowledge this would also require Ofcom to offer a reservation to O2. It is clear from H3G's submission that it understands that O2 faces spectrum constraints that are more severe than H3G. For example, this is implicit from the results of its analysis of customer speed benefits from granting more spectrum to O2 and H3G, which (as we would expect) show a greater speed uplift for O2 customers than H3G customers (H3G section 5 and Table 5). Even before its acquisition of UKB spectrum, a finding that H3G should benefit from a reservation not available to O2 is obviously absurd. Our preferred approach continues to be for Ofcom not to use reservations but instead rely on spectrum caps that eliminate bids that may be based on strategic rather than intrinsic value.

Ofcom has proposed that its competition measures should preclude BT/EE from bidding for 2.3 GHz. This decision is obviously right. BT/EE has no obvious intrinsic value for this spectrum, given its current holdings and availability of other bands to meet both its short and long-term needs. BT/EE could, however, have a very high strategic value to bid to block O2 from acquiring this spectrum. Ofcom should go further in adopting a cap that precludes Vodafone from bidding for more than 20 MHz in this band. We refer you to Section 7.5 of the NERA report which details the strategic incentives of both BT/EE and Vodafone. This should also raise no efficiency concerns, as it is frankly implausible that Vodafone's intrinsic value for a second 20 MHz block could be either a winning or price setting bid. Constraining Vodafone in this way removes temptation for them to implement a strategic blocking strategy.

At 3.4 GHz, Ofcom must also introduce a cap to eliminate particularly asymmetric outcomes as discussed in §64 of the Covering Letter.

III. BT and Vodafone have not demonstrated any immediate need for more spectrum

One of the most striking features of the responses from BT/EE and Vodafone is their failure to spell out any meaningful use case for either 2.3 GHz or 3.4 GHz spectrum in the near term. With respect to 2.3 GHz, neither operator provides any evidence that if they acquired 2.3 GHz, they would deploy services in the band before 2020. Regarding 3.4 GHz, both BT/EE and Vodafone indicate that they would likely use the band to deploy 5G, but – as is to be expected given the nascent state of 5G standards – neither has a discernible business plan.

For the avoidance of any doubt, O2 is not asking for an award of spectrum. It is simply asking for an opportunity to bid for the spectrum which it needs in an auction undistorted by strategic bidding. However, this silence on actual use of the spectrum in the next four years contrasts with O2's submission, in which we provide extensive information regarding our plans to deploy additional spectrum for 4G. Specifically, we describe how we would deploy all 2.3 GHz spectrum that we acquire immediately to improve our 4G services, and further deploy 3.4 GHz spectrum to enhance capacity and speeds in congested areas. Once we have met the requirements of our customers for 4G capacity and enhanced services, we too (like BT/EE and Vodafone) have ambitions to roll-out a 5G network. We will do so as soon as 5G is available, which we anticipate will be after 2020.

This contrast in plans to deploy spectrum in the next four years is important because it speaks directly to the risk of harm to consumers from too great or too little intervention in the award, which – as BT/EE emphasises throughout its response – Ofcom must weigh. If Ofcom adopts a minimalist approach, and bidders with already large holdings exploit this through anti-competitive bidding to block rivals, then there is a high risk of inefficiency. Specifically, this may result in O2 customers receiving deteriorating services, while other operators stockpile unused spectrum. Competition would be diminished, as a result of O2's reduced ability to compete for customers owing to network congestion, which in turn would undermine the sustainability of the four MNO market. In contrast, if Ofcom adopts a strong interventionist approach, it is conceivable that this might diminish competition in the auction, but, significantly, there would be no meaningful detrimental impact on downstream mobile wholesale and retail markets. This is because no plausible set of caps would deny BT/EE or Vodafone (or, post acquisition, H3G) from acquiring spectrum that they actually need to deploy in a substantive way in the next four years. Thus, any associated efficiency concerns could be resolved by implementing the 700 and 3600 MHz auctions in a timely manner.

Without itself having a clear use case for spectrum in the next four years, BT/EE's argument that intervention may "*give rise to significant risk of unintended consumer harm*" (BT/EE §100) is nonsense. In contrast, the risk of harm to competition and to consumers from an outcome in which too little spectrum is won by operators with smaller holdings is clearly substantial. In our response, we provided very detailed evidence regarding the harm to our network from not winning more spectrum, and the lack of other options available to us to increase capacity. H3G also presents evidence that the risk of intervention is asymmetric. They are also correct to highlight the risk that Ofcom may "*have to make a bigger and more difficult intervention in the future if it does not act now*"(H3G section 8). It is O2's position that if Ofcom is to prevent harm to competition and consumers, Ofcom has to act in this auction: there is no obvious alternative open to Ofcom within the relevant timeframe.

Yours sincerely

Lawrence Wardle
Director of Regulatory Affairs