



Public Sector Spectrum Release (PSSR)

Competition and auction design issues for the
2.3 and 3.4 GHz spectrum award,
including reserve prices

Statement

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About this document

This document sets out Ofcom's decisions on outstanding issues connected with the award of the 2.3 and 3.4 GHz spectrum bands. In particular, it sets out our decision to proceed with an auction of all the newly available spectrum without imposing spectrum caps, and our decision on the reserve prices that will apply to spectrum awarded in the auction.

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Section 1

Executive summary

- 1.1 This statement sets out our final decisions in connection with the 2.3 and 3.4 GHz spectrum award.
- 1.2 The 2.3 and 3.4 GHz award bands has been released to Ofcom by the Ministry of Defence (MOD) as part of the Government's Public Sector Spectrum Release (PSSR) programme to make 500 MHz of spectrum available for civil use by 2020. A total of 190 MHz of new spectrum will be auctioned - 40 MHz of spectrum within the 2.3 GHz band (2350-2390 MHz) and 150 MHz of spectrum within the 3.4 GHz band (at 3410-3480 MHz and 3500-3580 MHz).
- 1.3 A further 40 MHz of spectrum in the 3.4 GHz band (3480-3500 MHz and 3580-3600 MHz) is currently held by concurrent licensees: UK Broadband Ltd and UKB Networks Ltd .Either of the concurrent licensees may apply for a replacement licence, in which case Ofcom will include those frequencies in the assignment stage of the auction. This would enable all users of the 3.4 GHz band to have contiguous spectrum holdings.
- 1.4 We expect the award frequencies to be of interest to mobile network operators (MNOs) and others involved with mobile broadband. The particular characteristics of the spectrum to be released, in terms of propagation and the penetration of signals, make it especially suitable for the latest long term evolution (LTE) mobile technologies. However, alternative uses will not be precluded if winning bidders have other plans (subject to compliance with technical parameters and consequent licence conditions).
- 1.5 The final decisions set out in this statement are, principally:
 - To auction all the newly available spectrum without imposing spectrum caps; and
 - To set a reserve price of £10m for a 10 MHz 2.3 GHz lot and £1m for a 5 MHz 3.4 GHz lot
- 1.6 The majority of decisions in connection with the award were set out in a statement published on 26 May 2015¹. This document should be read together with that statement, which includes the full reasoning for our decisions. However, for ease of reference, our decisions made previously are summarised here. Those decisions are:
 - To hold a combined auction of both the 2.3 GHz and 3.4 GHz bands using a simultaneous multiple-round ascending (SMRA) auction format, with two categories of generic lots, one for each spectrum band;
 - To auction the 3.4 GHz spectrum in 5 MHz lots, and the 2.3 GHz spectrum in 10 MHz lots;

¹ <http://stakeholders.ofcom.org.uk/binaries/consultations/2.3-3.4-ghz-auction-design/statement/statement.pdf>

- To make detailed auction design decisions, including:
 - To auction the spectrum in two stages, a principal stage, during which the total number of 2.3 GHz and 3.4 GHz lots each bidder wins is determined; and an assignment stage, during which the particular location of each of the lots won by each bidder will be determined;
 - To require bidders to bid for a number of lots at the given round prices in each round. There will be a random ranking rule to assign standing high bidders;
 - To allow bidders to withdraw their standing high bids in up to five rounds. Bidders risk being required to pay the full amount of the standing high bids withdrawn in certain circumstances;
 - To maintain a relatively limited information policy. We will publish the names of qualified bidders in advance of the auction, and we will release some limited information to bidders about the level of excess demand during the auction;
 - To allow bidders to express a minimum requirement of up to 20 MHz in the 3.4 GHz band;
 - To impose an eligibility rule whereby each 10 MHz lot in the 2.3 GHz band will be assigned four eligibility points, and each 5 MHz lot in the 3.4 GHz band will be assigned one eligibility point;
 - To allow bidders to use up to three 'waivers' which allow them not to place a bid but retain their eligibility;
 - To enable Ofcom to require bidders to match their level of deposits to their bids;
 - To allow UK Broadband to participate in the assignment stage with its existing 3.4 GHz spectrum in order to allow all licensees to obtain contiguous spectrum;
- Not to intervene in the market to provide additional UK-specific protection to users of licence exempt spectrum in the 2.4 GHz band or any other civil uses below the release band;
- To require coordination between services in the 3.4 GHz band and ground-based aeronautical radar. This is not necessary for maritime radar or permanent earth stations (PES), although cooperation may be required with a few PES locations on a case by case basis;
- To require coordination between services in the 2.3 and 3.4 GHz release bands and a number of MOD locations. The details are included in an Information Memorandum (IM) published alongside this document. The IM includes clarification of the locations required to protect Royal Navy systems, including additional locations around Portland and BUTEC (Applecross), as well as some airborne locations used by the Royal Air Force;

- To specify the licences to be auctioned, including the following technical and non-technical licence conditions:
 - For the 2.3 GHz band, to mandate full synchronisation and enable licensees to use the permissive block edge mask between adjacent licensees;
 - For the 3.4 GHz band, to mandate a TD-LTE frame alignment but not the frame structure; licensees using the specified frame structure can use the permissive block edge mask between adjacent licensees, but licensees using a different frame structure are required to use the restrictive block edge mask;
 - Indoor small cells in a domestic environment (or other indoor locations where harmful interference is not caused to another licensee) do not need to synchronise but may use the permissive mask between adjacent licensees;
 - Licences will be issued for an indefinite period with an initial term of 20 years;
 - Licences will be issued on a non-exclusive basis;
 - The 2.3 GHz licences will cover Great Britain², and the 3.4 GHz licences will cover the whole of the UK. Licences will exclude territorial seas and areas of adjacent inland waters, although individual requests for licensed use of the frequencies by other users (e.g. for wind farms) will be considered;
 - The newly available spectrum will be tradable under the provisions of the Mobile Trading Regulations;
 - There will be no coverage obligations or use-it-or-lose-it obligations

1.7 The decisions set out in our statement of 26 May 2015 and in this statement are given effect by regulations made under Section 14 of the Wireless Telegraphy Act 2006 (WTA). This statement is published alongside a Notice of our proposal to make such regulations (<http://stakeholders.ofcom.org.uk/consultations/notice-2.3-3.4-ghz-spectrum/>). We have also published a detailed Information Memorandum (<http://stakeholders.ofcom.org.uk/consultations/2.3-3.4-ghz-auction-design/statement-further-consultation/information-memorandum/>.)

² England, Scotland and Wales, but not Northern Ireland. In addition, exclusion zones will apply in The Outer Hebrides, Isle of Skye and The Small Isles

Section 2

Introduction

Decisions set out in this statement

2.1 This statement sets out Ofcom's decisions on outstanding issues for the 2.3 and 3.4 GHz spectrum award.

Competition issues (see section 3)

2.2 Our initial proposals on competition issues were set out in a consultation published in November 2014³ alongside proposals on a range of other matters related to the 2.3 and 3.4 GHz award, including non-technical licence conditions and auction design and process.

2.3 However, we did not include conclusions on competition when we published a statement in May 2015⁴ containing our decisions on the other matters on which we had consulted. Instead, we used part of the May 2015 document to consult on an alternative competition measure to that proposed in the November 2014 document.

2.4 This further statement reaches conclusions on competition issues having considered stakeholder responses to both the November 2014 and the May 2015 consultations.

Auction design, including reserve prices (see section 4)

2.5 The statement also sets out some further decisions in relation to auction design, including our decisions on reserve prices. Our November 2014 consultation noted a range of figures within which we said our reserve prices should fall. In our May 2015 document, we said the final figure should be determined as close to the auction as possible, in order to take account of current circumstances.

Legal framework

2.6 The legal framework within which we have taken our decisions was set out in the November 2014 consultation and summarised in the May 2015 consultation. The full detail is not repeated here. However, we highlight the following aspects:

Principal duties under the Communications Act 2003

2.7 Our principal duties under Section 3 of the Communications Act 2003 are:

- to further the interests of citizens in relation to communications matters; and
- to further the interests of consumers in relevant markets, where appropriate, by promoting competition.

2.8 In carrying out our functions, section 3(2) provides that we are required, amongst other things, to secure the optimal use for wireless telegraphy of the electromagnetic

³ <http://stakeholders.ofcom.org.uk/binaries/consultations/pssr-2014/summary/pssr.pdf>

⁴ <http://stakeholders.ofcom.org.uk/binaries/consultations/2.3-3.4-ghz-auction-design/statement/statement.pdf>

spectrum; and the availability throughout the UK of a wide range of electronic communication services.

- 2.9 Section 3(4) requires us, in carrying out our functions, to have regard to certain factors as appear relevant in the circumstances, including the desirability of encouraging investment and innovation in relevant markets; and the desirability of encouraging the availability and use of high speed data transfer services throughout the UK.
- 2.10 In performing our duty under Section 3 of furthering the interests of consumers, we must have regard, in particular, to the interests of those consumers in respect of choice, price, quality of service and value for money.

Duties under the Wireless Telegraphy Act 2006

- 2.11 Section 3 of the Wireless Telegraphy Act (WTA) imposes a number of further duties relating to spectrum management. Amongst other things, in carrying out our spectrum functions, we are required to have regard to the extent to which the spectrum is available for use; and to the demand, both current and future, for the use of the spectrum.
- 2.12 In carrying out those duties, Section 3(2) requires us to have regard to (amongst other things) 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; and the development of innovative services and competition in the provision of electronic communications services.

European Commission decisions relevant to the 2.3 GHz and 3.4 GHz bands

- 2.13 On 21 May 2008, the European Commission adopted a decision (Decision 2008/411/EC) which sought to harmonise the conditions for the availability and efficient use of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the EU. On 2 May 2014, the European Commission adopted Decision 2014/276/EU12, which amended Commission Decision 2008/411/EC, primarily in relation to the technical conditions in compliance with which the band should be made available. Any award of the 3.4 GHz band has to be compliant with the Commission Decision.
- 2.14 In relation to the 2.3 GHz band, ECC Decision (14)02 sets out harmonised technical and regulatory conditions for the use of the band 2300-2400 MHz for Mobile/Fixed Communications Networks. The ECC Decision is not mandatory, but in awarding the 2350-2390 MHz frequencies we are following the technical parameters agreed at the European Conference of Postal and Telecommunications Administrations (CEPT).
- 2.15 We had expected a final EC decision to have been issued before publication of this document, following the release earlier this year of a draft text. However, the Radio Spectrum Committee is awaiting the preliminary results of trials underway in Member States aimed at making the band available on the basis of licensed shared access (LSA).⁵ The Radio Spectrum Committee will also consider potential coexistence

⁵ Whilst the LSA trials are of interest to spectrum managers and users in an environment where sharing is sought (which is the case in some EU Member States) they are of little direct relevance to the spectrum to be released under the current proposals in the UK.

issues between 2.3 GHz LTE and Wi-Fi in the licence-exempt 2.4 GHz band. As a result, the Radio Spectrum Committee is not now likely to consider a draft harmonisation decision before the second half of 2016.

- 2.16 In respect to coexistence issues, we note the extensive work already carried out by Ofcom to investigate these matters. We have no reason to question the robustness of our analysis or our conclusion that the risk of interference to users of the 2.4 GHz band is very low. We also note that the UK award of the 2350-2390 frequencies within the 2.3 GHz band means there will be a 10 MHz gap between the top of any LTE use and the bottom limit of uses in the 2.4 GHz licence exempt band, which is not necessarily the case in other jurisdictions.

Granting licences

- 2.17 In accordance with Section 10 and Schedule 1 of the WTA, Ofcom may grant licences in accordance with procedures prescribed in regulations made by Ofcom. Where Ofcom decides to award licences by auction, it makes specific regulations for those purposes, in accordance with Section 14 of the WTA. The decisions set out in this statement and the statement published on 26 May 2015 are given effect to by such regulations and a Notice of our proposal to make such regulations is published alongside this statement.

Coexistence

- 2.18 We note that some respondents to the May 2015 statement and consultation submitted comments about the coexistence of LTE mobile services in the 2.3 GHz band with some licence exempt devices which operate in the nearby 2.4 GHz band (2400 to 2483.5 MHz), in relation to which we set out our decision in the May statement.
- 2.19 The majority of these submissions repeated points already made and considered previously. A confidential response included the results of some additional testing. However, we have seen no new evidence which would lead us to reconsider our own conclusions.

Next steps

- 2.20 As noted above, this final statement is published alongside a formal Notice of our proposal to publish auction regulations. Interested parties now have one month to make any comments or observations on the draft regulations. Please see the Notice document itself for further details (<http://stakeholders.ofcom.org.uk/consultations/notice-2.3-3.4-ghz-spectrum/>).
- 2.21 We currently expect applications for the auction taking place in December 2015 with initial deposits at that time. Further deposits will be required in January when eligibility points will be determined, with bidding commencing shortly thereafter.

Section 3

Competition issues

- 3.1 In this section, we consider the competition issues arising from the 2.3 and 3.4 GHz award and set out our decisions on whether we should apply caps on the amount of mobile spectrum a single operator can hold.
- 3.2 We have consulted on competition issues twice: first in November 2014, and then in May 2015.
- 3.3 In our November 2014 consultation we presented a competition assessment based on there being four national wholesale mobile network operators – EE, H3G, O2 and Vodafone. We proposed a spectrum cap for the 2.3 and 3.4 GHz award as a safeguard against very asymmetric holdings arising from the auction.
- 3.4 Then, in our May 2015 statement, we consulted on an alternative competition measure in light of two announcements of potential changes in the mobile market. First, on 5 February 2015, BT announced its intention to acquire EE. Then, on 24 March 2015, it was announced that Hutchison Whampoa (owner of the H3G network i.e. ‘Three’) had reached agreement to acquire O2 from its current owner Telefónica.
- 3.5 The remainder of this section considers each of our consultations in turn, and the responses of stakeholders, before setting out our decisions on competition issues for the award.

Our November 2014 consultation

- 3.6 The November 2014 consultation described the then current mobile market. We said the existence of four national wholesale suppliers was good for competition.
- 3.7 We identified a continuing growth in consumer demand for mobile broadband, and said that mobile network operators may need to expand their current capacity in order to remain competitive. One way to expand capacity was to acquire and use more spectrum.
- 3.8 We said that, in our view, there were no significant competition concerns which related only to the 2.3 GHz band and not the 3.4 GHz band. We therefore considered both the auctioned bands together in our competition assessment.
- 3.9 We said a certain degree of asymmetry in spectrum distribution could reflect beneficial differences in commercial strategy among operators e.g. by encouraging innovation. However, very asymmetric spectrum holdings could give rise to competition concerns and lead to significant consumer harm.
- 3.10 We said we would be concerned if one of the operators which already had a comparatively large share of mobile spectrum – EE or Vodafone – were to acquire all of the 2.3 and 3.4 GHz frequencies. However, we considered that an outcome with such a very asymmetric distribution was unlikely to result from the 2.3 and 3.4 GHz auction because of the large volume of spectrum available.
- 3.11 Instead, we said it was likely there would be several winners of spectrum in the auction. We noted that those operators with relatively low spectrum holdings were

likely to have the highest intrinsic valuations for additional frequencies and were therefore likely to succeed in acquiring sufficient volumes at auction.

- 3.12 We said it was unlikely a competitor with a lower intrinsic value would be willing to outbid the higher value bidder for strategic reasons - because of the large volume of spectrum being auctioned and the lack of certainty that such strategic bidding would reduce competition. Such a competitor would need to pay not only above its own valuation, but also above the market value – and, because of the large volume available, for a large amount of excess spectrum it did not actually need.
- 3.13 We considered whether it was necessary to impose any competition measures at all, given the large volume of spectrum available and the low likelihood of very asymmetric holdings actually arising.
- 3.14 However, on balance, we opted to set out proposals for a ‘safeguard’ cap to ensure there was no possibility at all that an outcome with very asymmetric holdings – and the consequent risk of consumer harm – might arise. Our preferred option was for a cap on overall holdings of relevant mobile spectrum of 310 MHz (about 37%). We said this was proportionate to guard against future potential competition concerns without going further than necessary.

Consultation responses

- 3.15 In response to the November 2014 consultation, some operators, notably H3G and Telefónica/O2, expressed support for our proposed spectrum cap or suggested there should be tighter caps. Vodafone also supported a cap. Other stakeholders, including BT and EE, said caps were not needed.
- 3.16 BT argued that asymmetric holdings were not a primary concern in the current auction. The large volume of spectrum available meant it should be possible for those with the greatest need for spectrum to be able to acquire it without the need for spectrum caps.
- 3.17 Orange said auction constraints should only be enforced if there was clear evidence to indicate a significant risk of undesirable outcomes. It noted that Ofcom considered the risk to competition to be low, and argued that a spectrum cap therefore seemed illogical.
- 3.18 EE similarly argued that an overall spectrum cap (or any other competition constraint) was unjustified and disproportionate to the competition concerns identified in the consultation. It submitted that Ofcom had not presented sufficient evidence to justify the need for a cap.
- 3.19 In contrast, H3G’s response expressed full support for the idea of a spectrum cap – and said it should be set at an even tighter level than 37%. It suggested a level of 33% was more appropriate. H3G pointed to evidence of “bad outcomes” from spectrum auctions elsewhere in the world where no caps were set or caps set too high, such as the USA.
- 3.20 UK Broadband also said a cap of 37% was too high and that it would not ensure sufficient spectrum would be guaranteed to new entrants and/or for innovative or specialist services. It said future market developments might mean spectrum reservation was actually the most appropriate approach.

- 3.21 Telefónica/O2 suggested spectrum shares were already too asymmetric and said Ofcom did not appear to appreciate the threat to downstream competition if the current asymmetries were perpetuated. The PSSR award presented an opportunity for Ofcom to intervene in the primary market to secure downstream mobile competition across all segments in the short-to-medium term. It proposed additional spectrum caps on particular bands in addition to the overall cap proposed by Ofcom.

Our further consultation of May 2015

- 3.22 Following publication of our November 2014 consultation, BT announced its proposed acquisition of EE (in February 2015) and H3G announced its intention to acquire the O2 business from Telefónica (in March 2015). Our May 2015 consultation considered competition issues afresh in light of these developments and restated our objective to bring the 2.3 and 3.4 GHz spectrum into use as quickly as possible, in line with our duties to further the interests of consumers and consistent with our duty to secure the optimal use of spectrum.
- 3.23 However, we said it may be much less appropriate for us to use a spectrum cap mechanism to address competition concerns in a scenario where the market (and consequently spectrum holdings) may change at short notice - and possibly at the same time as the auction. We therefore sought the views of stakeholders on an alternative approach.
- 3.24 We said our objectives in respect to spectrum would be best achieved by having as many regulatory tools as possible at our disposal to address future competition concerns, should they arise. Accordingly, we proposed to give ourselves the *option* of withholding some of the 2.3 and/or 3.4 GHz spectrum from the auction - and awarding it instead at a later date. We said there would be no spectrum caps in these circumstances.

Consultation responses

- 3.25 Eleven stakeholders submitted responses addressing the question of holding back some of the 2.3 and 3.4 GHz spectrum, four of them in confidential responses. Non-confidential responses were received from BT, EE, H3G, Intel, Samsung, Telefónica/O2 and Vodafone. All of those respondents who addressed the proposal giving us the option of withholding spectrum from the award expressed opposition to the idea. Some respondents submitted detailed arguments, but a common theme was that an award of the spectrum in two stages risked distorting the auction and creating perverse outcomes.
- 3.26 One stakeholder identified a substitution risk across the two awards. Another, Vodafone, said there was a risk of creating artificial scarcity if the award was split, driving up the price. Conversely, potential bidders could hold back from bidding, in the knowledge that further spectrum would be released subsequently.
- 3.27 No stakeholder expressed any support for the proposal.
- 3.28 While we did not seek views on the timing of the award, many stakeholders commented on this. While some stakeholders supported our intention to proceed as planned, the majority submitted that in light of the proposed BT/EE and H3G/O2 transactions, we should delay the award. They submitted that proceeding with the award as planned risked leading to an inefficient outcome, because some parties may not be able to take part in the auction and because it would be difficult to value the spectrum in the face of current market uncertainty. Some argued for a delay until

decisions by the competition authorities were known, whereas others argued we should wait for the resolution of the transactions.

Assessment of competition issues

- 3.29 In light of stakeholder responses to our November 2014 and May 2015 consultations we now need to consider how best to proceed with the 2.3 and 3.4 GHz spectrum award and whether any competition measures should be imposed.
- 3.30 We note the uncertainties in the market caused by the proposed BT/EE and H3G/O2 transactions, and that this could affect the spectrum holdings of three of the four national wholesalers, plus BT.
- 3.31 We also note that final decisions on the proposed transactions are not a matter for Ofcom to determine, but for the relevant competition authorities. In reaching their decisions, it is up to those competition authorities to consider the impact of any mergers on competition in terms of relative market positions, including spectrum holdings.
- 3.32 We have given further consideration to both our November 2014 proposal for a spectrum cap and our alternative proposal set out in the May 2015 consultation. We have assessed whether either approach remains appropriate against the background of the potentially changing market conditions.
- 3.33 We note the divided opinions of respondents to the November 2014 consultation on the question of asymmetry in the distribution of spectrum and the need for spectrum caps. Those with comparatively low current spectrum shares had the greatest concerns about asymmetry and so supported the application of caps at or below the level we proposed (37%). Other respondents argued there was no need for competition measures at all.
- 3.34 We continue to believe that operators do not need to have the same, or close to the same, shares of spectrum in order for there to be strong competition. This is because spectrum is not the only way of adding capacity and because it is in any case not necessary for national wholesalers to have the same capacity in order for all to be capable of being a competitive constraint on rivals.
- 3.35 That said, very asymmetric spectrum holdings could still give rise to competition concerns. In particular, operators with low volumes of spectrum could face higher costs in increasing capacity.
- 3.36 The proposal for a cap, set out in the November 2014 consultation, was based on the circumstances prevailing at the time, with four national wholesalers. In that scenario, we said the award could give rise to very asymmetric spectrum holdings if certain companies acquired all of the newly available spectrum. As noted above, we believed this was unlikely to happen in reality. However, the minimal downsides of applying a 'safeguard' cap were outweighed by the potential upsides of guarding against very asymmetric holdings, however unlikely this was to arise.
- 3.37 The market circumstances are now more uncertain than when we proposed the safeguard cap. We therefore need to consider whether a cap is still the most appropriate approach.
- 3.38 There are a number of alternative scenarios that might arise in the short to medium term. It is now possible that the market (and certain spectrum holdings) may become

more consolidated, subject to decisions by the competition authorities. In those circumstances, the risk of very asymmetric holdings arising would be reduced even further because spectrum other than 2.3 GHz and 3.4 GHz would be likely to be more evenly distributed – although we cannot know the outcomes for sure.

- 3.39 We need to conduct the 2.3 and 3.4 GHz award in a way that is, on balance, best suited across a range of possible scenarios. In some scenarios - e.g. if proposed market consolidations are approved and spectrum holdings are more evenly distributed as a result - a cap could prove to be both overly restrictive and unnecessary as a competition measure. For example, a cap could prevent the operator most constrained by the cap from obtaining a large block of contiguous spectrum which may be required to deliver very fast download speeds. Such services may be highly valued by some consumers in future, although current demand is uncertain. In circumstances where spectrum holdings may change shortly before or even during the auction process, there may also be practical difficulties in applying a cap.
- 3.40 We continue to believe that an award of all the newly available frequencies means bidders with higher intrinsic valuations will have the opportunity to acquire appropriate amounts of spectrum, for the reasons outlined above.
- 3.41 Additionally, we believe the likelihood of a single bidder outbidding all the other bidders in the auction, or acquiring a very large volume of spectrum, is lower as a result of decisions set out in our May 2015 statement. These included the choice of a simultaneous multiple-round ascending auction (SMRA) as the format for our award.
- 3.42 In our SMRA design, the price for lots within each band will be the same – or very similar⁶. In order to outbid all the other bidders, or to acquire a very large amount of the spectrum, a bidder would need to keep on bidding on a large amount of the lots available. This in turn would have the effect of increasing the price for all the spectrum in that band available in the auction. Such a strategy could however fail, and the bidder might end up winning a smaller amount of the spectrum at a high price – potentially a price that exceeds the bidder's valuation for that smaller amount of spectrum.
- 3.43 Finally, we note that 40 MHz of mobile spectrum in the 1.4 GHz band held by Qualcomm at the time of our consultations has now been sold to other operators. 20 MHz has been acquired by H3G and 20 MHz by Vodafone⁷.

Our decisions

- 3.44 We have noted the universal opposition among respondents to our May 2015 proposal to retain the option of withholding some spectrum from the 2.3 and 3.4 GHz award.
- 3.45 We acknowledge that the concerns expressed by stakeholders about the negative impact on the current award may be valid. In particular, we agree that uncertainty about the conditions on which we would make the spectrum held back available in the future could introduce further challenges to bidders. Bidders who perceived the

⁶ Under the particular rules for our award, the final lot prices within each lot category may differ by a price increment.

⁷ On 22 September 2015, we set out a decision to grant consent to the two trades. The decision is available at <http://stakeholders.ofcom.org.uk/binaries/consultations/mobile-trading-regs-apr-15/statement/trade-of-frequencies-statement.pdf>

spectrum held back to be a substitute or a complement to the spectrum available in the first award might need to formulate assumptions about the conditions and the outcome of a potential second award. If these assumptions turned out to be wrong, the outcome of the first award could be less efficient. On balance, and taking account of stakeholder views, we have therefore decided against proceeding with our May 2015 proposal. Instead, we will proceed with an award of all the newly available spectrum, without holding back any of the frequencies.

- 3.46 We turn now to the question of spectrum caps. Given the finely balanced nature of the arguments that led us to propose a cap in the first place we believe the arguments in its favour are now sufficiently weakened to tip the balance in favour of an award without caps. We also note that circumstances may change such that there is greater risk of a spectrum cap leading to an inefficient outcome (because it may be too restrictive), and there may be practical difficulties in enforcing a cap.
- 3.47 We have therefore decided to proceed with an auction of all the available spectrum without applying competition measures.
- 3.48 We recognise that the proposed mergers currently create uncertainty in the market and that there is a risk that this uncertainty has an impact on the award. The competition authorities will make a decision on the BT/EE merger towards the end of November (subject to any statutory extension, which may delay the decision by up to eight weeks). H3G notified its proposed acquisition of O2 to the European Commission on 11 September. Consideration of this transaction by the European Commission may take until May 2016 or later. Approval of either transaction could be subject to remedies, which may either delay completion of the transaction or take further time to implement following completion of the transaction, thereby sustaining the uncertainty. The merger decisions could also be appealed.
- 3.49 We recognise that there may be some benefits to delaying the auction until there is more certainty in the market, in particular in considering competition measures. However, because we consider that proceeding without a spectrum cap is appropriate as set out above, and for the reasons set out below, we do not think we should delay the auction.
- 3.50 Delaying the award carries risks, and on balance we believe that we should proceed with the auction as planned. We have taken this decision in light of our statutory duties, in particular our duty to secure the efficient management and use of the spectrum, having regard to the availability for use of and demand for spectrum, and the benefits for innovation.
- 3.51 In this respect, we consider that spectrum efficiency is usually best achieved by bringing available frequencies into use as soon as possible for the benefit of consumers – spectrum is a valuable and scarce resource and it is rarely efficient to leave it unused. We also note the continuing growth in demand for mobile broadband services and the need for spectrum capacity to address that demand. Further, while availability of equipment which can use the band may be relatively limited, we consider that clarity around the award and the availability of spectrum will provide additional momentum to the development of the equipment ecosystem.
- 3.52 We note that companies operate in an ever-changing market environment and often have to take decisions, including strategic decisions, in light of ongoing uncertainty. We have taken this into account in deciding how to proceed.

- 3.53 Our current intention is to open applications for the auction during December, and for bidding to start early next year.

Section 4

Auction design including reserve prices

4.1 This section of the document sets out our final decisions on reserve prices for the auction. It also covers some other details of the auction process.

Reserve prices - background

4.2 In the November 2014 consultation we proposed reserve prices for the auction of £1 million per 5 MHz lot for the 3.4 GHz band and in the range of £2.5 million to £5 million per 5 MHz lot for the 2.3 GHz band. We said reserve prices set at this level would provide room for relevant price discovery, while still addressing concerns about gaming in the auction – although some specific additional factors were relevant for each band.

4.3 However, in our May 2015 statement and consultation, we said we should set the final level of reserve prices as close to the actual auction as possible. This would allow us to take account of the latest market information and any changes in market conditions. Based on the responses we had received to the consultation, we could see no reason to vary the proposals set out in the November 2014 consultation.

4.4 In the May 2015 statement and consultation we also noted that on 16 February 2015⁸ we published a provisional decision and further consultation on annual licence fees for 900 MHz and 1800 MHz spectrum. This included a more refined analysis of auction prices and opportunity costs from the 2013 auction for the unpaired (TDD-compatible) 2.6 GHz band (as a by-product of further analysis of the 800 MHz and paired (FDD-compatible) 2.6 GHz bands).

4.5 These showed generally higher figures for prices and opportunity costs of unpaired 2.6 GHz than we reported in the November 2014 award consultation. We noted that this tended to strengthen the case for the reserve prices we proposed, including prices at the top end of the range for the 2.3 GHz band.

Comments on Statement

4.6 Telefónica/O2 was the only respondent to submit comments on the level of reserve prices. It expressed concern about our approach of setting 'high' reserve prices. It saw the risk of collusion as low (assuming we proceed with a combined award after the two merger processes are resolved), given the evidence of strong demand for PSSR spectrum. It also noted that Ofcom has proposed other measures, such as limited transparency, which make tacit coordination more difficult. It believed such measures were sufficient to ease concerns regarding strategic demand reduction. It said there was no case for setting higher reserve prices than those proposed in our first PSSR consultation.

Our assessment

4.7 We have decided to proceed with reserve prices of £1 million per 1 MHz in the 2.3 GHz band and £200,000 per 1 MHz in the 3.4 GHz band; that is £10 million per 10

⁸ <http://stakeholders.ofcom.org.uk/consultations/annual-licence-fees-further-consultation/>

MHz lot in the 2.3 GHz band and £1 million per 5 MHz lot in the 3.4 GHz band. We believe this is an appropriate approach for the following reasons:

- The top end of our proposed range for the 2.3 GHz spectrum is more in line with the evidence on the relevant auction prices and opportunity costs in our 2013 auction, as we explain above;
- We remain of the view that very low reserve prices may provide incentives for bidders to attempt to bring the auction to an earlier end, thereby acquiring the spectrum at a significant discount to its true market value;
- We also remain of the view that reserve prices have a role to play in making gaming less likely.

We note that these reserve prices are no higher than those proposed in our November 2014 consultation.

Additional auction issues

Price increments

4.8 In its response to our May 2015 statement, Telefónica/O2 argued in favour of small price increments between principal rounds in the auction. No other respondent commented on price increments. Telefónica/O2 proposed the following caps on price increments:

- No more than 5% of the previous round price; and
- No more than 10% of the reserve prices.

4.9 Telefónica/O2 presented two reasons for favouring these limits:

- Standing high bidders, under our rules, may not bid for fewer lots than the number of lots where they are standing high bidders. Telefónica/O2 believes this may be very constraining, unless price increments are kept at a reasonable level.
- The auction could end with some bidders having all their winning bids priced at the current round price, and others having all their winning bids priced at the previous round price. Whether or not Ofcom maintains the pay-as-bid pricing rule or switches to uninformed pricing, as suggested by Telefónica/O2, it considers that this reinforces the argument that Ofcom should commit to using small price increments.

4.10 We agree with Telefónica/O2 that price increments should be set cautiously. Whilst we think the ability to control the pace of the auction is an important tool for the auctioneer, we also recognise there are good reasons to provide a degree of predictability to bidders.

4.11 In the May 2015 statement, we said we expected to set price increments of no less than 2% and no more than 20% from one round to the next.

4.12 The proposal put forward by Telefónica/O2 – to set an absolute limit based on a fixed proportion of the reserve price – seems to us unduly restrictive. While this might be appropriate in the early rounds, when the price is close to the reserve price, in a

round with a higher price it may unduly restrict the ability of the auctioneer to influence the pace of the auction.

- 4.13 While we are not imposing an absolute limit on the level of the price increment, we think it is unlikely that we will increase prices by more than 10% from one round to the other, and it would not be our intention to do so. We note, for example, that a 10% increment over five successive rounds would result in prices being approximately 60% higher than in the first round. However, we cannot at this stage know what the level of demand will be and we do not therefore intend to fetter our discretion in the way suggested by Telefónica/O2.
- 4.14 Neither will we commit to a lower limit for the price increments. There might be sound reasons to reduce increments to less than 2% during the principal stage. This is particularly relevant as, in the SMRA format we have adopted, bidders may only respond to round prices, and not bid prices of their own choosing. In order to reduce the risk of price overshooting⁹, we may need to set low price increments in later rounds.
- 4.15 In any case, we will choose the relevant price increment with caution and taking into consideration the particular circumstance of each round.

Deposits

- 4.16 A deposit of £100,000 will be required at the time of application. Additional deposits can be made before Ofcom determines the eligibility limits applicable to each bidder in the first round of the principal stage of the auction. During the principal stage we will require, at the end of each day, that bidders have on deposit with Ofcom sufficient funds to cover their commitments, or a proportion of those commitments to be notified by Ofcom. Bidders will be allowed one working day to increase their deposits if necessary and, if they fail to have the required amount on deposit, will not be able to make any new bids.
- 4.17 At the end of the principal stage, bidders will be required to have on deposit an amount sufficient to cover all their commitments, before proceeding to the assignment stage. If they fail to have sufficient funds on deposit at this point they will have a zero bid entered in the assignment stage for all the assignment options applicable to that bidder. Following the assignment stage round, bidders will need to increase their deposit so that it covers the highest bids made in the assignment stage round; if they do not, their assignment stage bids will be reduced to zero.
- 4.18 Following the qualification period we will refund deposits as soon as possible to those not qualified and those who withdrew during the period allowed for such withdrawals. There will be no other refunds until the end of the grant stage.

Assignment stage – restrictions on adjacency

- 4.19 In its response to the May 2015 consultation, Telefónica/O2 also presented a suggestion related to particular assignment options in the assignment stage.
- 4.20 The company supported our proposal for a sealed bid, single round format with a second price rule for the assignment stage - as well as our proposal regarding the

⁹ By price overshooting, we mean a circumstance where we set a price which exceeds the highest price bidders would be willing to bid on. If some or all of the bidders would be willing to bid at a price higher than the previous round price but lower than the final price set by us, then the final result might not be the most efficient.

placement of unsold lots, and our approach for including UK Broadband 3.4 GHz holdings in the assignment stage.

- 4.21 However, Telefónica/O2 suggested that Ofcom should consider amending the assignment rules such that bidders winning smaller amounts of spectrum are placed adjacent to each other. As an example, Telefónica/O2 noted that in the 2.3 GHz band, if the spectrum is split 20:10:10, there is a possibility that the two bidders each winning 10 MHz may want to trade or share the spectrum in the future. If Ofcom does not guarantee adjacency of smaller amounts of spectrum, Telefónica/O2 believed there was a possibility that a winner of 20 MHz could have strategic value to bid in order to place itself in the middle, and block such trading or sharing arrangements by the other winners.
- 4.22 Having considered the arguments, we do not think we should restrict assignment stage options to those where particular bidders are adjacent to each other. We understand there are many possibilities where particular bidders might wish to trade or share their spectrum holdings, and we do not believe there are sufficient grounds to rule out particular ones. In the example provided by Telefónica/O2, whilst it is true that two bidders who acquire 10 MHz each may want to trade with each other, it is also plausible that a bidder who acquires 10 MHz may wish to trade its licence to the one that acquires 20 MHz. We therefore will not change our provisions for the assignment stage in this regard.

Assignment stage – multiple split assignments

- 4.23 In accordance with the policy set out in the May 2015 statement, we now wish to make it clear that in the event that we cannot include the frequencies currently held by UK Broadband Ltd and UKB Networks Ltd in the 3.4 GHz band in the Assignment Stage, we will rule out assignment options where a bidder would have its frequencies split in more than two blocks.
- 4.24 This is incorporated in the draft Regulations we publish alongside this statement.

Information during the auction

- 4.25 In the illustrative auction procedures which we published as an annex to our May 2015 statement, we included a preliminary list of information to be made available to bidders during the course of the auction.
- 4.26 We have now included a comprehensive list of the information to be made available to bidders in the draft regulations which we publish alongside this statement.
- 4.27 At the end of the principal stage, we will publish on our website the total financial liability of all bidders including both the base price for the lots won and any payments related to withdrawals. During the principal stage, we intend to publish on our website, for each spectrum band:
- The round price in the last principal stage round of the day; and
 - The level of excess demand in multiples of 20 MHz (as more fully described in the draft regulations).
- 4.28 At the end of the auction, we will announce which specific frequencies were won by which bidders and the total price paid. In due course, we will publish the individual bids in every round.