



**Award of available spectrum:  
2500-2690MHz,  
2010-2025MHz**

**Consultation on auction rules, procedures and draft  
Regulations**

**Consultation**

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## Section 1

# Executive Summary

- 1.1 Spectrum in the 2.6GHz and 2010MHz bands in the UK is expected to play an important role in the development of advanced mobile data services and is of particular interest to operators looking to adopt the next generation of wireless data technologies such as LTE<sup>1</sup> and WiMAX.<sup>2</sup>
- 1.2 Making this spectrum available will support the introduction of innovative mobile services and foster competition in the provision of these services in the UK. This has the potential to deliver substantial benefits for consumers and the UK economy as a whole, as well as enabling the UK to remain in the vanguard of European mobile development and deployment.
- 1.3 We have previously set out our proposals to auction this spectrum on a technology neutral basis, using a flexible auction approach to allow different potential uses to compete efficiently for spectrum.<sup>3</sup> These proposals drew a substantial number of comments from stakeholders on a wide variety of issues, including the timing of the award, the technical and non-technical licence conditions that should be applied, the approach to spectrum packaging as well as the auction rules and procedures themselves. We expect to be in a position to make a Policy Statement in respect of all these matters in early 2008, and (subject to that Statement) to invite applications to participate in the award in spring 2008, with the auction itself able to take place in summer 2008.
- 1.4 This is the same timetable for making the regulations, and holding the award, as previously advised, though we have decided to hold a non-statutory consultation on the draft regulations before proceeding to the statutory consultation. This will allow interested parties an additional opportunity to comment on the draft rules, and will allow us to take account of developments in relation to the Radio Spectrum Committee.
- 1.5 In light of the stakeholder feedback on the August 2007 Discussion Document, and drawing on comments and questions raised in a workshop on auction rules and procedures that we held on 29 November 2007, we are now in a position to:
  - present further detail and, where relevant, updated proposals for the rules and procedures for the auction of the 2.6GHz and 2010MHz bands; and
  - demonstrate how these rules and procedures can be translated into the form of draft auction regulations.
- 1.6 The specific changes and additions to the auction rules and procedures are summarised in the following table.

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<sup>1</sup> Long Term Evolution, the planned successor to 3G/UMTS technology

<sup>2</sup> Worldwide Interoperability for Microwave Access, a family of fixed, nomadic and mobile communications technologies based on IEEE 802.16 standards.

<sup>3</sup> A Consultation Document in December 2006

(<http://www.ofcom.org.uk/consult/condocs/2ghzawards/>) and a Discussion Document in August 2007 (<http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/>)

<b>Subject Area</b>	<b>New / updated proposal</b>
<i>Auction information policy</i>	<p>In addition to the information release proposed in the Discussion Document:</p> <ul style="list-style-type: none"> <li>• release to bidders at the end of each primary round information on bids made on an anonymised basis.</li> <li>• announce publicly the base prices paid by each winner at the end of the Principal Stage</li> </ul> <p>Provide bidders with information on all possible permutations of how the winning bids at the end of the Principal Stage can be accommodated in the 2.6GHz band.</p> <p>Publish summary auction information e.g. at the end of each bidding day</p>
<i>Changes to eligibility for unpaired lots</i>	<p>Change (reduce) the eligibility points associated with bids for unpaired spectrum to account for the lot(s) with restricted usage rights:</p> <ul style="list-style-type: none"> <li>▪ the eligibility associated with n unpaired contiguous lots is n-1; and</li> <li>▪ the eligibility associated with n unpaired lots in two contiguous blocks (in a split bid) is n-2.</li> </ul>
<i>Pricing algorithms and winner determination</i>	<p>Minor changes to the pricing algorithm used in the Assignment Stage.<sup>4</sup></p>
<i>Deposits and bidder default</i>	<p>Set deposits in the Principal Stage to no more than 50% of a bidder's highest bid value, with refinements to the rules and penalties for bidder default.</p> <p>Deposits for participation in the Assignment Stage remain at 100%.</p>
<i>Bidder association</i>	<p>Allow an entity that holds a material interest in several applicants or bidders to "opt out" of the relevant bidder groups under certain conditions designed to safeguard the integrity of auction process so as to comply with the requirement that an entity cannot be an associate of more than one bidder group.</p>
<i>Spectrum cap</i>	<p>Adopt a spectrum cap that is equivalent to 80MHz of unrestricted spectrum in the 2.6GHz band (i.e. up to 90MHz in the case of a split, unpaired assignment that contains two restricted lots). This brings the cap into line with the revised treatment of eligibility points in respect of unpaired lots.</p>

*Question 1: Do you agree with Ofcom's proposals for changes to the rules and procedures for the award of the 2.6GHz and 2010MHz bands or have any other comments on the contents of this document?*

- 1.7 A number of other suggestions were made by stakeholders for changes or additions to the rules and procedures which we are presently not minded to implement. We explain our reasoning in these cases and set out questions which give stakeholders an opportunity to comment further if they wish to do so. In addition, stakeholders raised some points on the technical conditions for use of the 2.6GHz spectrum which

<sup>4</sup> Note that, in the calculation of base prices, modified bids can be negative.

we are still considering and which could potentially alter details of the auction approach. However, for reasons explained in Section 2, the potential for such changes does not dilute the value of consulting on the revised auction rules set out in this document.

- 1.8 The effects of the changes in the above table are captured in a revised description of the auction rules and procedures presented in Annex 6 of this document. These revised rules and procedures are then expressed in the form of draft auction regulations in Annex 7. We expect these to resemble closely the draft of auction regulations on which we will hold a statutory consultation at the time that we publish our Policy Statement for this award. Accordingly, we invite stakeholder comments on whether the draft auction regulations presented in Annex 7 provide an accurate representation of the auction rules and procedures set out in Annex 6 and whether there are any ways in which they could or should be adjusted. This feedback will help to increase the effectiveness of the subsequent statutory consultation process.
- 1.9 This consultation marks an important step forward in the award of these bands. However, we have not taken any decisions at this point, either on the timing of the award, on the precise form of the award or on the conditions attaching to the licences which will be awarded. However, as noted above, we expect to be in a position to make a Policy Statement in the first months of 2008.
- 1.10 A number of responses to our August 2007 Discussion Document commented on the relevance of European regulatory discussions on technical conditions for mobile bands taking place under a mandate from the European Commission. The CEPT regulatory group SE42 has recently completed its report under this mandate on spectrum masks for the 2.6GHz band. The publication of this consultation document provides us with the opportunity to summarise the SE42 spectrum masks which we are proposing to apply for the 2.6GHz award in the UK. Whilst there are some differences to the masks proposed in our Discussion Document we do not believe that their adoption will require any change to the proposals for auction design and spectrum packaging.

## Section 2

# Introduction

- 2.1 Spectrum in the 2500–2690MHz band (the “2.6GHz band”) and the 2010–2025MHz band (the “2010MHz band”) is expected to play an important role in the deployment of advanced mobile data services in the UK.
- It is the only spectrum band which is likely to be made available in the near term in the UK which provides sufficient spectrum to cater for the larger bandwidths likely to be supported by LTE<sup>5</sup> (e.g. 10 and 20MHz) and to support the use of WiMAX in 10MHz and 20MHz blocks.
  - These larger channel sizes should support a number of performance gains for LTE and WiMAX and will potentially lower the cost of network rollout compared to smaller channel sizes or the combination of a number of blocks at different frequencies. Channels of more than 5MHz width are not available in the near term at other frequencies identified internationally for mobile use.
  - 2.6GHz is the band for which WiMAX services have been developed for deployment on a global basis so as to support roaming and economies of scale in equipment manufacture. This is because 2.6GHz is the only band which is available internationally for new uses in the near term, although WiMAX profiles may be developed for other frequency bands that may become available for mobile services in future.
  - For similar reasons, 2.6GHz is a strong candidate band for the realisation of the benefits of LTE, particularly through the use of large channel widths. As for WiMAX, 2.6GHz is one of the main bands for which large economies of scale could be realised for LTE.
- 2.2 We expect the use of the 2.6GHz and 2010MHz spectrum to drive the introduction of innovative mobile services and foster competition in the provision of these services, resulting in substantial benefits for consumers. Given the importance of the 2.6GHz award, in particular the scope for new competition and innovation through large scale investments in innovative technologies, we remain keen to progress the decision making process that will allow the award of these bands to take place as soon as practical.

## Role of this consultation on draft auction regulations

- 2.3 Ofcom has carried out two previous rounds of consultation on this award. We published a Consultation Document in December 2006 (the “December Consultation”),<sup>6</sup> along with a further Discussion Document on 1 August 2007 (the “Discussion Document”)<sup>7</sup> both of which invited stakeholders to comment on a wide range of issues relating to the award of the 2.6GHz and 2010MHz bands. The Discussion Document set out proposals for the auction design and described the auction rules and procedures that would give effect to this auction design in Annex 11.

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<sup>5</sup> The Long Term Evolution standard being developed by 3GPP

<sup>6</sup> Available at <http://www.ofcom.org.uk/consult/condocs/2ghzawards/>

<sup>7</sup> Available at <http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/>

- 2.4 We received a number of comments on the detail of the auction rules and procedures in responses to the Discussion Document and we held a workshop on 29 November 2007<sup>8</sup> to explore the issues raised. This consultation document now moves forward the process of stakeholder engagement with two purposes in mind.
- To present updated proposals for the rules and procedures in light of the comments and suggestions received in responses to the Discussion Document and made at the workshop on 29 November. We provide the opportunity for stakeholders to make further comments on the detailed proposals if they wish to do so in response to specific questions in Section 3.
  - To demonstrate the way in which these updated rules and procedures might be expressed in the form of draft regulations for the auction. We invite comments from stakeholders on whether the way in which these auction rules have been expressed in the form of draft regulations, may affect their position in respect of the award.
- 2.5 The proposed amendments to the auction rules and procedures set out in this document are made against the auction design and proposed rules and procedures set in Annex 11 of the Discussion Document. As explained below, we are still considering some aspects of the auction design in light of feedback on the Discussion Document, for example in respect of comments on the potential for interference between paired (FDD)<sup>9</sup> and unpaired (TDD)<sup>10</sup> uses within the 2.6GHz band. We therefore note that the updated rules and procedures set out in this consultation document do not represent decisions on auction design. A statutory instrument made by Ofcom will set out, and give effect to, the final auction rules and procedures. A consultation on this statutory instrument will be published at the same time as our Policy Statement on this award; stakeholders will have the opportunity to comment on the auction regulations through that statutory consultation process. However, we are keen to provide an opportunity now for interested parties to consider how the statutory instrument would capture the rules and procedures which we have been developing through consultation. For example, it would be valuable to receive feedback from stakeholders on whether the process defined in the attached draft regulations captures the right balance between facilitating participation by a wide range of parties, while managing the risk of such issues as default on payments.
- 2.6 We anticipate that this consultation will increase the efficiency and effectiveness of the statutory consultation on draft regulations, which we intend to hold in early 2008.

## Responses to the Discussion Document

- 2.7 We received 29 responses to the Discussion Document.<sup>11</sup> These raised a wide range of issues relevant to the proposed award of the 2.6GHz and 2010MHz bands. In

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<sup>8</sup> The presentation slides are available at [http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award\\_2010/workshop291107.pdf](http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award_2010/workshop291107.pdf)

<sup>9</sup> Frequency Division Duplex, two-way communication where the uplink and the downlink take place at different frequencies at the same time.

<sup>10</sup> Time Division Duplex, two-way communication where the uplink, from handsets to base station, and downlink, from base station to handsets, take place at the same frequency, but are separated by timeslots i.e. a burst of uplink followed by a burst of downlink.

<sup>11</sup> In addition to the 35 received to the December Consultation. Non-confidential responses are available on the Ofcom website. See



terms of their relevance to this consultation document on auction rules and procedures, they can be grouped into three broad types.

- 2.8 The first group of comments relates to issues which are very important in their own right with regards to the award of the 2.6GHz and 2010MHz bands, but the resolution of which will not have implications for auction design. For example, some stakeholders requested that we take account of developments in the consultation on the liberalisation of 2G mobile spectrum when deciding on the timing of the 2.6GHz award, and that we reassess the scope for alleged discrimination against holders of 3G licences because of differences in non-technical licence conditions, in particular roll-out obligations. However, as these issues do not affect the auction rules and procedures it is not necessary to consider them in this consultation document. We will, of course, give full consideration to these important matters in reaching decisions that we will set out in our Policy Statement on the award of the 2.6GHz and 2010MHz bands.
- 2.9 The second group of issues concerns comments on the auction rules and procedures as set out in Annex 11 of the Discussion Document and on which we are consulting in this document. This list includes:
- auction information policy;
  - offering more bid options for the additional supplementary bids round and in the Assignment Stage;
  - changes to eligibility for unpaired lots;
  - switching and price ratios;
  - the definition of the activity rule;
  - pricing algorithms and winner determination;
  - deposits and bidder default;
  - bidder association;
  - rounds per day/speed of price increases; and
  - spectrum cap.
- 2.10 These issues, along with proposed changes to the auction rules and procedures are discussed in detail in Section 3. A revised version of the auction rules and procedures is set out in Annex 6. These updated rules and procedures are, in turn, translated into draft regulations which are included in Annex 7.
- 2.11 A third group of issues relates to suggestions made by stakeholders which could lead to a change in aspects of the auction design and, hence, could lead to differences in the auction rules and procedures to those described in this document. These include suggestions to:

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<http://www.ofcom.org.uk/consult/condocs/2ghzawards/responses/> and  
<http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/responses/>.

- i) introduce contingent bidding dependent on whether or not unpaired spectrum is present at the top of the 2.6GHz band (with this suggestion being linked to a proposal that WiMAX use outside of the central portion of the CEPT<sup>12</sup> band plan<sup>13</sup> could deploy a half-duplex FDD profile);
  - ii) adopt a staggered approach to the award for the 2.6GHz band with only the central 50MHz being awarded in the first instance;
  - iii) include a facility to enable the external pairing of spectrum in 2570-2620MHz with other spectrum bands (such as the existing TDD holdings of the 3G operators); and
  - iv) base the auction design on the use of specific lots rather than on the use of generic lots.
- 2.12 We are still considering aspects of these suggestions and the decisions that we make will be set out in our Policy Statement in early 2008. However, our ongoing consideration of these points does not dilute the value of the consultation in this document. As we explained in the Discussion Document, the effect of contingent bidding would be to run two parallel sub-auctions, each of which would be very similar in form to the auction design described in this document. In the case of a staggered award, the auction rules and procedures for an initial award of 50MHz would be a subset of the rules and procedures described in this document.
- 2.13 The subjects of external pairing and use of specific, rather than generic, lots were addressed in detail in the Discussion Document (see Paragraphs 5.33–5.53 and Paragraphs 5.9–5.14 respectively). Whilst we received comments that continued to express general concerns in these areas, these did not challenge the rationale that we put forward in the Discussion Document as to why we considered it inappropriate to implement what would need to be a substantially different auction design. Neither did the respondents make any proposals for the form that a different auction design might take.
- 2.14 Stakeholders also commented on aspects of the technical analysis relating to the scope for interference within the band and with adjacent bands. For the most part, these issues are not addressed in this document where the focus is on auction rules and procedures. However, a number of responses to the Discussion Document argued that we should take account of the progress of the CEPT's SE42 working group on developing minimal technical conditions for the 2.6GHz band. In December 2007 SE42 submitted a draft report containing its proposals for taking forward a common approach on the 2.6GHz band, including proposals for block edge masks. This publication provides us with an opportunity to give a summary of these proposals; we do this in Section 5, and also provide a summary of the new block edge mask proposals in Annex 9.

## Outline of document

- 2.15 The remainder of this document is set out as follows.

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<sup>12</sup> European Conference of Postal and Telecommunications Administrations, which includes the Electronic Communications Committee (ECC). See <http://www.cept.org/>.

<sup>13</sup> See ECC Decision (05)05, available at <http://www.ero.dk/documentation/docs/docfiles.asp?docid=2056&wd=N>.

- Section 3 discusses a range of issues raised by stakeholders in respect of the auction rules and procedures and explains where we are proposing to change or add to the rules and procedures as set out in Annex 11 of the Discussion Document.
- Section 4 introduces the updated description of the auction rules and procedures which are set out in Annex 6 (essentially an updated version of Annex 11 of the Discussion Document) and introduces the draft of the auction regulations themselves which are set out in Annex 7.
- Section 5 provides a summary of the recommendations made in the SE42 draft report on the technical conditions for the 2.6GHz frequency band, with a summary of the new block edge mask proposals given in Annex 9.
- Section 6 sets out the anticipated next steps in the award process.

### Section 3

## Proposed changes to auction rules and procedures

- 3.1 We received a range of comments from stakeholders in response to the details of the proposed auction rules and procedures contained in Annex 11 of the Discussion Document. Stakeholders had a further opportunity to comment on these proposals, as well as hearing our current thinking on a number of these issues, at a workshop held by Ofcom on 29 November 2007.<sup>14</sup> This section contains our updated proposals for the auction rules and procedures based on this feedback and on our own further work.
- 3.2 We have grouped the issues raised by stakeholders into a number of subject areas as set out in Table 1 below.

**Table 1: Main auction design issues raised in responses to the Discussion Document**

<b><i>Subject area</i></b>	<b><i>Comments made</i></b>
<i>Auction information policy</i>	The amount of information given to bidders during the auction (the 'transparency' of the auction) should be increased.
<i>Offering more bid options</i>	In the supplementary bids round, the auction should be modified to allow bidders for a split unpaired assignment to specify where each part of the split award is located (i.e. in the central or upper part of the band). In the Assignment Stage, a bidder should have the opportunity to make bids contingent on who actually occupies spectrum neighbouring its own.
<i>Changes to eligibility for unpaired lots</i>	Eligibility points as set out in the Discussion Document may limit a bidder's ability to switch between their preferred packages in response to price changes as they may not be able to maintain the required amount of eligibility.
<i>Switching and price ratios</i>	Bidders could have scope to behave strategically and frustrate price discovery by hiding true demand in the primary bid rounds. Clarity was requested on whether the ratio between the clock prices of paired and unpaired could be lower than 2:1. There should be a link between clock prices for lots in the 2.6GHz band and the 2010MHz lot.

<sup>14</sup> Slides from this workshop are available at: [http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award\\_2010/workshop291107.pdf](http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award_2010/workshop291107.pdf)

<i>Potential change to a value-based activity rule</i>	In light of the comments from stakeholders regarding the potential risks associated with switching between paired and unpaired lots, we have considered the possibility of using a value-based activity rule in preference to a quantity-based activity rule. <sup>15</sup>
<i>Pricing algorithms and winner determination</i>	Proof of the existence and uniqueness of base prices was requested, along with a deterministic procedure for the calculation of base prices. It was suggested that additional prices during the Assignment Stage could be indeterminate. Clarity was requested on whether “modified bids” could be below the reserve price (or less than zero) in the Principal Stage.
<i>Deposits and bidder default</i>	A deposit level of 100% is too onerous given the potentially high value of the lots. There should be a fixed rule for when deposits should be increased based on the ratio of existing deposits to prices.
<i>Bidder association</i>	Further clarity was requested on the exchange of information between bidders (for example, during potential national roaming negotiations between a MNO and another bidder in advance of or during the auction). Investors should be allowed to hold a material interest in more than one bidder provided that the investor’s receipt of confidential information and involvement in any decisions concerning the award are limited to one bidder at most.
<i>Rounds per day/speed of price increases</i>	The number of primary bid rounds should be limited to one per day in the later stages.
<i>Spectrum cap</i>	The spectrum cap should not include restricted unpaired blocks so that bidders for unpaired spectrum would effectively be able to bid for the same amount of usable spectrum as bidders for paired spectrum

3.3 This section provides an analysis and discussion of the issues listed in Table 1 and explains where, as a result, we are proposing changes to the auction rules and procedures from those that were set out in Annex 11 to the Discussion Document.

### **Auction information policy**

3.4 A number of responses to the Discussion Document urged Ofcom to make more information available during the auction than we proposed in the Discussion Document either through disclosing to bidders or making public. The Discussion Document suggested:

- disclosing to bidders the aggregate demand (only) at the end of each primary round;

<sup>15</sup> This option was not raised directly in responses to the Discussion Document but we feel it is worth considering in this document.

- disclosing to bidders the identities of the winning bidders and the packages they had won (only) at the end of the Principal stage and in the case of each bidder its base price;
- publishing at the end of the Principal stage the identities of the winning bidders and the packages they had won; and
- publishing details of all valid bids made on the Principal and Assignment stages after the conclusion of the award.

3.5 In response to these proposals, stakeholders suggested that:

- a) details of all bids should be revealed on an anonymous basis at the end of each primary round;
- b) all Principal Stage bids should be published before the Assignment Stage commences, with the rationale being given that, without this information, the winning bidders would not have a clear idea of why they have to pay the amount required or, in some cases, why they are being awarded paired rather than unpaired spectrum.

3.6 One response also commented that full details of all assignment options should be published in the Assignment Stage as it was believed that the identity of neighbouring operators would affect the valuation of a particular frequency assignment and that a knowledge of the potential identity of neighbours for each of the frequency positions offered would allow the Assignment Stage to run more efficiently. This response went further and suggested that bidders could be offered the opportunity to make their bids in the Assignment Stage contingent on who actually occupies neighbouring spectrum.

3.7 We note that, in practice, bidders should be able to work out for themselves how the winning bids can be organised within the 2.6GHz band (see Figure 6 and Figure 7 in Annex 11 for examples). This is because winning bidders will have the information on how much spectrum of each type each successful bidder has won. Nevertheless, to ensure that no bidder is disadvantaged through being unable to work this out, and since there is no disadvantage to making this information directly available to bidders, we plan on doing so.

3.8 The further suggestion that we offer bidders the opportunity to make their bids in the Assignment Stage contingent on who actually occupies neighbouring spectrum is discussed in Paragraphs 3.27–3.30 below.

3.9 One response also commented that Ofcom should publish details of winning bids (i.e. which bidders have won and what packages they have won) prior to the Assignment Stage. This is indeed what we intend to happen as was set out in the Discussion Document (see Paragraph A11.109 of the Discussion Document, repeated in Paragraph A6.109 in Annex 6 of this document).

### **Extent of information disclosed to bidders at the end of each primary round**

3.10 Before the start of the first primary bid round, we will have published the identity of all the bidders.<sup>16</sup>

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<sup>16</sup> As defined in the draft regulations – see regulation 2.

- 3.11 The next question is what information should be disclosed to bidders at the end of each primary bid round. We have considered this matter further in the light of the responses we received asking for more information to be disclosed. Our view is that there is likely to be little harm in disclosing anonymised details of bids made at the end of each primary round to bidders. There is likely to be common value uncertainty as well as uncertainty over the types of bids/demand a bidder is competing against (i.e. bidders will not know whether they are competing against a small number of other bidders each of which is bidding for a large amount of spectrum or against a large number of other bidders each of which is bidding for a small amount of spectrum). Therefore disclosing these details is likely to aid bidders in refining their valuation (price discovery) and bidding strategy. At the same time, anonymising the bid information should be sufficient to minimise the risk of creating opportunities for strategic behaviour.
- 3.12 A further question is whether we apply a consistent set of bidder labels to the disclosure of primary round bids or whether we do not label the bids whatsoever (the former would allow the bidding actions of a particular bidder to be tracked through the auction, the latter would not). Our view is that labelling bids in a consistent way would enable bidders to attempt to identify who the anonymised bidder actually is and could expose the auction to a risk of strategic bidding. Not applying these labels (and simply providing a summary of which packages have been bid on and how many bidders have bid on them) would still satisfy the aim of providing bidders with as much relevant and useful information as possible while minimising the risk of strategic bidding.
- 3.13 We are therefore proposing to amend the auction rules so that, at the end of each primary round, we will disclose the following to bidders:
- aggregate demand per category per lot; and
  - details of which packages have been bid on (and how many bidders have bid on them).

### **Information published during the primary bidding phase of the auction**

- 3.14 We have considered further whether to publish summary information of primary bids at certain points during the primary bid phase of the auction. This is not necessary in order to achieve an efficient outcome, but we believe that it would help to make the process more transparent and therefore might be appropriate. We propose to publish on a daily basis some summary information of the activity which has occurred during that day. For example, it might be desirable to publish on Ofcom's website details of aggregate demand for each category of lot at the end of each day of bidding.

### **Disclosing details of all Principal Stage bids to bidders before the Assignment Stage**

- 3.15 We believe that disclosing details of all Principal Stage bids to bidders before the Assignment Stage could have an adverse consequences on the subsequent Assignment Stage as it may enable bidders to work out other bidders' budget constraints and so allow them to bid strategically on this basis.
- 3.16 Moreover, our judgement is that information on Principal Stage bids is very unlikely to contain relevant information for bidders in developing their valuations for the purpose of the Assignment Stage. This is because Principal Stage bids are for quantities of

each category of lot, whereas Assignment Stage bids are based on the relative value of different frequency assignments of a winning package (i.e. different in nature).

- 3.17 Responses to the Discussion Document also commented that not having the full details of Principal Stage bids could make it difficult for successful bidders to explain to their Boards/budget holders precisely why their base price is as it is. However:
- i) this insight is not required to inform a Board decision as the successful bidder will already have made the decision to pay at least the base price;<sup>17</sup> and
  - ii) all bid information will be made public after the award is complete so the participants will, at that stage, be able to replicate the analysis to verify the base prices.
- 3.18 Accordingly, our judgement is that we should **not** disclose details of Principal Stage bids to bidders before the Assignment Stage. On a related issue, we understand that bidders will need confidence that the winner determination algorithm works as intended and has been applied correctly. Ofcom will put in place suitable processes in order to provide the appropriate level of confidence, for example through third party scrutiny. These processes will, of course, be complemented by the fact that all necessary information will be publicly available following the conclusion of the award and that this will allow all bidders (and, indeed, any other interested parties) to carry out their own review to establish that the outcome of the award aligns with the auction regulations.
- 3.19 We have also considered whether it would be desirable/necessary to disclose the base price for each bidder at the end of the Principal Stage (in addition to the identities of the winning bidders and the packages they have won). Our current view is that it would be desirable to make public the base prices at the end of the Principal Stage once winning bidders have increased their deposits to 100% of the base price.
- 3.20 In summary, our proposals for the release of information during the auction are as follows:
- at the end of each primary round, to disclose to bidders the aggregate demand per category per lot and details of which packages have been bid on (and the number of bidders that have bid on these packages);
  - during the primary bid rounds, to publish some anonymised information about aggregate demand and possibly round prices from time to time, e.g. at the end of each bidding day; and
  - at the end of the Principal Stage and before the Assignment Stage, to publish the name of each winning bidder, the amount of spectrum in each category won by each winning bidder and the base price for each winning bidder.

*Question 2: Do you agree with Ofcom's proposed changes to the auction information policy?*

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<sup>17</sup> Otherwise it would not have submitted its winning bid and the base price could potentially be lower than its winning bid.



## Offering more bid options

- 3.21 Responses suggested two amendments to the auction rules and procedures to provide bidders with more bidding options in the supplementary bids round and in the Assignment Stage.
- In the supplementary bids round, it was suggested that the auction be modified to allow bidders for a split unpaired assignment to specify where each part of the split award is located (i.e. in the central or upper part of the band).
  - In the Assignment Stage, it was suggested that we offer bidders the opportunity to make their bids contingent on who occupies spectrum neighbouring its own. At the workshop on 29 November, it was commented that the potential for different bidders potentially being interested in using the spectrum in different regions of the UK was also an argument for allowing this type of bidding.

## Supplementary bids for split unpaired assignments

- 3.22 One stakeholder argued that we should allow bidders to make supplementary bids for either (or both) permutations of a split of unpaired spectrum (i.e. to express a preference for the number of lots in the central and upper areas of the band). There are a number of reasons why we do not consider this necessary or desirable.
- 3.23 The Discussion Document<sup>18</sup> summarised our analysis that the differences in the value of unpaired spectrum between the upper and central areas are unlikely to be sufficiently material as to require them to be treated as separate categories of generic lot during the Principal Stage. Accordingly, the auction design does not allow bids for contiguous unpaired spectrum to specify whether they are bids for spectrum in the central or upper part of the band. The same rationale applies when considering the permutations for how bids for split unpaired spectrum might be distributed between the central and upper parts of the band.
- 3.24 By the same logic, if there was a case to allow split assignments to distinguish between central and upper band locations, then it would be rational to allow bids for contiguous unpaired lots to distinguish between central and upper band locations as well. In practice, this would require the creation of two types of unpaired lot which would add considerable complications to the auction design as it would no longer be easy to define a meaningful concept of “aggregate demand for spectrum in the 2.6GHz band” during the primary bid rounds.
- 3.25 In addition, a change of this nature would make it more difficult to fit combinations of bids into the available spectrum when there are split supplementary bids (i.e. some potential combinations of bids could be rejected even though in total they add up to the amount of spectrum available in the band). This may therefore increase the chances of unsold spectrum.
- 3.26 Therefore, we are proposing **not** to allow bidders to make supplementary bids for either (or both) permutations of a split of unpaired spectrum.

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<sup>18</sup> See Section 3 Paragraphs 3.143–3.156.

## Allowing bids to be contingent on the identity of the owners of neighbouring spectrum

- 3.27 The proposal to allow bids for specific frequencies in the Assignment Stage to be contingent on the identity of neighbours has significant drawbacks.
- 3.27.1 Allowing such contingent bids would create opportunities for some bidders to very directly influence which spectrum their competitors would receive. Bidders could therefore try to prevent their competitors from receiving the frequencies which they are likely to be seeking. This is undesirable as it may cause the auction to fail to secure optimal use of the spectrum.
- 3.27.2 We also need to consider the effect of such a change on the complexity of the auction should the option to bid on who holds neighbouring spectrum be included. Even in the case where paired spectrum and unpaired spectrum are treated separately in parallel and independent auctions, the number of options to consider could be very large. For example, in the case where there are 5 winners of paired spectrum, the number of permutations would be very large indeed (it would be  $5! = 120$ ). The complexity would be further increased, and significantly so, if the two auctions for specific paired and unpaired frequencies were linked, so that paired bidders could make bids contingent on who the unpaired bidders at the paired/unpaired adjacencies are and vice versa (e.g. separate bids for the unpaired assignment which includes block 23 according to the identity of the occupier of the paired assignment that includes block 25).<sup>19</sup>
- 3.28 Our judgement is that the above difficulties are likely to significantly outweigh any benefits that such an approach could deliver.
- 3.29 As noted above, it was suggested that regional use of the spectrum could be an additional argument for allowing Assignment Stage bids to be made contingent on who the owners of neighbouring spectrum are. However, it is likely that a more efficient use of the spectrum on a regional basis would be achieved if (different) regional users of the spectrum were to use the same frequencies (rather than adjacent frequencies, i.e. different frequencies).
- 3.30 We are therefore **not** proposing to amend the proposed rules. Our proposal for the Assignment Stage remains to:
- run two parallel and independent single-round auctions, one for the specific paired frequencies and one for the specific unpaired frequencies; and
  - let each bidder make bids for the specific frequencies available to them in each category consistent with their winning bid – these will not be contingent on who the neighbours are.

*Question 3: Do you agree with Ofcom's proposals **not** to include additional bidding options for split supplementary bids and **not** to allow Assignment Stage bids to be made contingent on the identity of prospective neighbours?*

<sup>19</sup> For example, if there were 5 winners of paired spectrum and 3 winners of unpaired spectrum then the paired auction would have 120 unique combinations and the unpaired could have up to 6. If these were combined into a linked auction then the number of combinations could be up to 720.

## Change to eligibility for unpaired lots

- 3.31 A response to the Discussion Document raised a concern that bidders may be constrained in their ability to adjust the composition of their preferred package between rounds. This was because of an effective difference in the way that eligibility was established for paired and unpaired lots as a result of the rule whereby a restricted unpaired lot carries the same eligibility requirement as an unrestricted unpaired lot.
- 3.32 The proposals in the Discussion Document on eligibility points were that:
- a bid for  $n$  contiguous unpaired lots (contingent on no split award) would carry  $n$  eligibility points, i.e.  $n$  eligibility points for  $n-1$  lots with standard usage rights plus 1 lot with restricted usage rights (given that each unsplit unpaired assignment includes one restricted lot at the lowest end of its frequency range);
  - a bid for  $n$  unpaired lots split between two contiguous assignments would carry  $n-1$  eligibility points, i.e.  $n-1$  eligibility points for  $n-2$  unpaired lots (in two different ranges) with standard usage rights plus 2 unpaired lots with restricted usage rights (as the lowest lot in each of the split ranges).
  - a bid for  $n$  paired lots would carry  $2n$  eligibility points, all with standard usage rights.
  - bidders would be unable to increase eligibility points round-by-round.
- 3.33 The constraint that these eligibility rules could create are best explained by an example. Consider a bidder who places equal value on acquiring either 2 paired lots or 5 unpaired lots (both of which might be considered to have broadly the same amount of effective spectrum after taking into consideration the additional restricted lot in the unpaired case). When the price ratio between paired and unpaired lots is fixed at 2:1 (as happens when demand for unpaired lots is 9 or more), then the bidder might bid on paired lots with an eligibility of 4 points (as this package would be cheaper than bidding on 5 unpaired lots). However, if the demand for unpaired lots dropped below 9 and if the price ratio subsequently changed to more than 2.5:1, then the bidder might look to switch to unpaired lots (which would now offer the cheaper package). Under the rules proposed in the Discussion Document, the bidder would be unable to do this as it would involve an increase in eligibility points.
- 3.34 The only way the bidder could enable itself to freely switch between paired and unpaired lots would be to bid initially for 3 paired lots (since bidding on one unpaired lot is not allowed<sup>20</sup> which means that the bidder would be unable to bid on 2 paired lots and 1 unpaired). However, this would involve the bidder bidding for more spectrum than it wished to acquire, which would be inefficient.
- 3.35 In recognition of this issue, we are proposing to change the eligibility points associated with unpaired lots to account for the lot(s) with restricted usage rights as follows:
- the eligibility associated with  $n$  unpaired contiguous lots is  $n-1$  (or, phrased from the bidder's perspective, a bidder with  $n-1$  eligibility points can bid for  $n$  unpaired lots); and

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<sup>20</sup> The requirement to include an additional restricted block in unpaired bids means that the minimum number of unpaired lots a bidder can bid on is 2.

- the eligibility associated with  $n$  unpaired lots in two contiguous blocks (in a split bid) is  $n-2$ .
- 3.36 Making these adjustments has knock-on effects for the specification of the deposits arrangements and for the definition of the spectrum cap. These are covered at the relevant points later in this section.

*Question 4: Do you agree with Ofcom's suggested changes to the number of eligibility points associated with unpaired spectrum?*

### Switching and price ratios

- 3.37 In the Discussion Document, Ofcom proposed allowing bidders to switch eligibility between categories (paired and unpaired) in the primary and supplementary bid rounds.
- 3.38 Comments from stakeholders on this subject fell into three categories (in addition to the issue concerning the eligibility points associated with restricted unpaired lots discussed above):
- a) concern that bidders could have scope to behave strategically and frustrate price discovery by hiding true demand;
  - b) a question asking whether the ratio between paired and unpaired could be lower than 2:1;<sup>21</sup> and
  - c) a suggestion that there should be a link between clock prices for lots in the 2.6GHz band and the 2010MHz lot.

### Scope for strategic behaviour with switching

- 3.39 Some responses to the Discussion Document were concerned that bidders could leverage the ability to switch between paired and unpaired lots. It was felt that bidders could behave strategically and frustrate price discovery in the primary bid rounds by bidding on paired lots when their true demand was for unpaired lots. The bidder could then switch to unpaired lots in the supplementary bids round. It was suggested that this risk could be removed by constraining uncapped supplementary bids so that, for example, a bidder could not switch from paired lots in the final primary bid round to unpaired lots in the supplementary bids round (i.e. any uncapped supplementary bid would have zero fungibility).
- 3.40 We recognise that allowing switching could, in theory, create potential for strategic behaviour. However, so long as the demand for unpaired spectrum remains above 9 lots, the price ratio between paired and unpaired lots will remain locked at 2:1. In this case, whether a bidder bids for paired or unpaired spectrum makes no difference to price discovery. In addition, there would appear to be a low risk of the behaviour described above taking place: if the prices of paired and unpaired lots became delinked as a result of low demand for unpaired lots, then a strategy of hiding demand for unpaired lots by bidding on paired lots could become even more risky and would not seem rational. It would also be expensive to maintain eligibility on paired lots with a view to bidding on unpaired lots in the supplementary bids round.

<sup>21</sup> The Discussion Document considered that the ratio could be 2:1 or higher in the case where demand for unpaired falls below 9 lots.

- 3.41 Moreover, the suggested remedy of zero fungibility for uncapped bids could cause potentially serious constraints as bidders can only submit one bid in each primary round. Accordingly, it is important that they are able to express all their preferences in the supplementary bid round in order to maximise the scope for an efficient outcome. Removing the possibility of switching for uncapped bids might not be overly problematic if bidders knew in advance that the next round was going to be the last primary round. In this case, they could ensure their bid reflected their most preferred paired / unpaired combination at this point. The problem, however, is that no one knows in advance if the next primary bid round is going to be the final one.
- 3.42 For the above reasons, Ofcom is proposing **not** to constrain the switching of bids between paired and unpaired lots in the supplementary bid round for uncapped bids.
- 3.43 Another response considered that the existence of the supplementary bids round could allow bidders to hide demand and so make it difficult for other bidders to determine their strategy and assess their position during the auction. The respondent proposed limiting the use of supplementary bids to the single purpose of distributing any unsold lots from the primary bid rounds.<sup>22</sup>
- 3.44 We do not consider that the risk raised by the respondent is material. Firstly bids made during the primary round are binding commitments. Therefore there is always a risk from strategic bidding in the primary rounds that the bidder ends up with a package of lots that they do not want. Secondly, the rules that apply to supplementary bids means that they are significantly constrained by the primary round bids.<sup>23</sup> This means that it would be hard for a bidder to behave in a way which was designed to hide their demand. In this context, it is important to note that a key purpose of the primary rounds is to promote price discovery in respect of the value of the 2.6GHz lots whether demand is for paired or unpaired lots; the fungibility between paired and unpaired lots means that the particular mix of demand between paired and unpaired lots is not a key factor in the price discovery process. The proposed auction design promotes efficient price discovery even though it does not gather information on all packages that each bidder would be interested in acquiring at each given primary round price level.
- 3.45 In fact, it would be impractical and unwieldy to attempt to gather information on all packages that each bidder would be interested in acquiring at each given primary round price level. A fundamental purpose of the supplementary bids round is therefore to receive information on this more detailed set of bids from bidders. For example, if a bidder bids on 7 unpaired lots in round  $r$  and reduces its demand to 5 unpaired lots in rounds  $r+1$  because of the price increase, it will not have had an opportunity to make bids for 6 unpaired lots when it may be happy to receive that number of lots. Another example would be that of a bidder who would like to receive both paired and unpaired spectrum and bids on 3 paired lots and 3 unpaired lots. That bidder may equally be happy to bid on 2 paired lots and 5 unpaired lots at the same round prices, but would not have the opportunity to make that bid without the supplementary bids round. The supplementary bids round therefore plays an essential role in revealing the value that bidders attach to a more detailed range of

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<sup>22</sup> The proposal therefore suggested having two sequential auctions: a combinatorial clock auction for the whole band and a combinatorial sealed bid auction for any unsold lots from the first auction.

<sup>23</sup> More specifically, the bids that a bidder makes (or does not make) in the primary bid rounds create constraints for the supplementary bids rounds by defining both minimum and maximum amounts that a bidder can then bid as part of its supplementary bids for certain packages. For any supplementary round bid on a package that is consistent with a particular eligibility level, the bidder cannot bid more than the amount that would be associated with that package using the prices prevailing in the last primary round at which the bidder's eligibility dropped below that level.

possible packages and we are **not** proposing to limit its use to distributing unsold lots from the primary bids round.

*Question 5: Do you have any comments on Ofcom's proposals **not** to make changes to the ability of bidders to switch between paired and unpaired spectrum, and **not** to change the arrangements for the supplementary bids round, as set out in the Discussion Document?*

### **Potential lowering of ratio of prices between paired and unpaired lots**

- 3.46 One response to the Discussion Document noted that the proposed auction design specified that the ratio of prices between paired and unpaired lots would be fixed at 2:1, or higher if demand for unpaired lots falls below 9. The response asked whether this ratio could be lowered to less than 2:1 towards the end of the primary bid rounds to potentially sell lots to marginal bidders.
- 3.47 We note that this approach would not be required to address any issue of shortfall of demand. Any bidder can make supplementary bids to reveal their willingness to acquire smaller numbers of lots, to the extent that they have not already done so during the primary rounds. Moreover, since it is not meaningful to talk about deficient demand for paired lots (in the way that a demand of less than 9 unpaired lots could be described as deficient) then there is no rationale for allowing the ratio of paired to unpaired prices to fall below 2:1.

### **Introduction of a link between clock prices at 2.6GHz and 2010MHz**

- 3.48 A response to the Discussion Document questioned the absence of links between clock prices at 2.6GHz and 2010MHz. The respondent proposed a fixed ratio for 2010MHz relative to 2.6GHz based on the quantity of spectrum (a price for 2010MHz of 3 times the price for a single unpaired 2.6GHz lot and  $3/2 = 1.5$  times the price of a paired 2.6GHz lot).
- 3.49 The 2010MHz lot is, by definition, different to the 2.6GHz lots and could attract a price which is materially different to, and probably lower than, the 2.6GHz lots (on a per MHz basis). As such, it is not necessary, and probably not desirable, to link the clock prices during the primary rounds. Note that this is fundamentally different to the case for linking the clock price for paired and unpaired lots in the 2.6GHz band where the flexibility in allocation between paired and unpaired lots within this band means that they should have the same opportunity cost at the margin.
- 3.50 We note that if we did link the clock price for the 2010MHz lot to the 2.6GHz lots in the early primary rounds as suggested above, then it is likely that excess demand for 2010MHz lots would disappear before excess demand for the 2.6GHz lots (on the likely assumption that the value of the 2010MHz lot is less than the value of 2.6GHz lots). Under these circumstances the price for the 2010MHz would become frozen whilst the 2.6GHz lot price continued to rise. Hence, the price of the 2010MHz lots could quickly become delinked from the price of the 2.6GHz lots anyway. Although we do not consider this to be a significant issue, we consider that the 2010MHz lot should be priced as set out in the Discussion Document (based on demand for that lot, with a separate clock price that can progress at a different pace to the 2.6GHz clock price).

*Question 6: Do you have any comments on Ofcom's proposals **not** to introduce a link between clock prices at 2.6GHz and 2010MHz?*

## Potential change to a value-based activity rule

- 3.51 The currently proposed activity rule is based on the use of eligibility points which gives a quantity-based approach to managing activity between rounds. This places restrictions on the total quantity of spectrum a bidder can bid on in a given primary bid round based on the quantity that it bid in the previous primary bid round.<sup>24</sup> It also constrains the supplementary bids that a bidder can place based on the bids it placed in the primary bid rounds.
- 3.52 The eligibility points approach, as is the case with all activity rules, is intended to encourage honest bidding. In particular, the use of eligibility points is common in open, multi-unit auctions; it will be used for the 10-40GHz auction and has been used in most of the US FCC spectrum auctions. This approach is simple to implement. However, its effectiveness is somewhat dependent on how the eligibility points are set and it is important that the ratio of eligibility points between lots is broadly reflective of the relative value of the lots. If this is not the case, then bidder behaviour in the auction could become distorted. Specifically, in each round of the auction there would be an incentive for bidders to choose packages that preserve eligibility relatively cheaply rather than simply bid for their highest value package. This could distort price discovery in that activity becomes focused on certain categories of lot.
- 3.53 Given this, and the comments raised in responses to the Discussion Document which relate to the eligibility points rule, we have considered the possibility of adopting an alternative, value-based activity rule, drawing on advice we have received from specialist auction design experts. Part of the reason for considering this alternative approach is that it could provide a way to address some of the comments from stakeholders regarding the potential risks associated with permitting bidders to switch between unpaired and paired spectrum in their bids under the eligibility points activity rule contained in the auction rules in Annex 11 of the Discussion Document. The way in which a value-based activity rule might work is summarised in Annex 8. This value-based activity rule approach is also being considered for the L-band award.
- 3.54 In the case of the 2.6GHz and 2010MHz award, we are minded to retain the eligibility based approach, rather than switch to the value-based activity approach, for the following reasons:
- the challenge of setting appropriate eligibility point weights is much simpler than in many other auctions with multiple categories of lots. This is because the relative prices of paired and unpaired lots are fixed in a 2:1 ratio (unless demand for unpaired falls to 9 lots or less) and there is flexibility within the auction over the split between the two categories. As a result, the quantity-based, and value-based, activity rules should have broadly equivalent effects on behaviour. Although the relative value of the 2010MHz lot is more uncertain, this is only one lot so there is little risk of distortion to bidder behaviour;
  - the quantity-based eligibility approach is easier to understand for stakeholders who do not have the time to familiarise themselves with the auction theory behind value-based activity rules (even though this approach becomes intuitively appealing once understood); this may be a relevant consideration for bidders when explaining the auction to their Boards as part of their internal governance process; and

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<sup>24</sup> Specifically, it does not allow the total amount of spectrum (excluding restricted blocks) to increase from one round to the next.



- we have already explained why we do not consider stakeholder concerns over switching between paired and unpaired lots to be material.
- 3.55 We would only consider moving to a value-based activity rule (such as the relaxed revealed preference rule discussed in Annex 8) if stakeholders draw our attention to reasons, of which we are currently unaware, why this would be materially better than the eligibility based activity rule.

*Question 7: Do stakeholders consider that there are strong reasons why a value-based activity rule (a relaxed revealed preference rule in particular) would be materially better than an eligibility points based activity rule for this particular award?*

## Pricing algorithms and winner determination

- 3.56 Three responses to the Discussion Document commented on the pricing algorithms and winner determination.
- 3.57 One response requested proof of the existence and uniqueness of base prices at the end of the Principal Stage, and asked that Ofcom set out a deterministic procedure for the calculation of base prices. A second response questioned whether the description of additional prices during the Assignment Stage in the Discussion Document was such that they could be indeterminate. Both these points are addressed through an explanatory note which we have published in relation to the 10-40GHz award.<sup>25</sup> The demonstration contained in Section 4 of that note equally applies to the calculation of base prices and additional prices under the proposed award of the 2.6GHz and 2010MHz bands.
- 3.58 A third response requested clarification of the calculation of base prices in the Principal Stage, asking if the calculation of the “modified bids” in the algorithm presented in the Discussion Document was constrained so that they were above the reserve price (or above zero). In fact, these “modified bids” (which are a computational device within the pricing algorithm) can be below the reserve price and may even be negative (although the base prices, and hence the modified winning bids, may not) and this is clarified in Paragraph A6.104 of the updated auction rules.
- 3.59 There are some minor differences between the Principal and Assignment Stages in the way that “modified bids” are constrained. Since the Discussion Document, we have clarified the algorithm for determining additional prices in the Assignment Stage in the following way:
- “modified assignment bids” are required to be greater than or equal to 0<sup>26</sup> (see Paragraph A6.150);
  - in calculating the opportunity cost for a winning Assignment Stage bid, the winner's assignment bids will be set to zero in the modified winner determination<sup>27</sup> (see Paragraph A6.152).

<sup>25</sup> Available at

[http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award\\_10\\_40/licencefees/](http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award_10_40/licencefees/)  
 “Award of spectrum: 10 GHz, 28 GHz, 32 GHz and 40 GHz - Notes on determination of licence fees payable by bidders in relation to the award of the 10, 28, 32 and 40 GHz spectrum bands”

<sup>26</sup> Note that, in the calculation of base prices, modified bids can be negative.

<sup>27</sup> In the calculation of opportunity costs for a winning Principal Stage bid, the winner's bids are simply disregarded in the modified winner determination.



*Question 8: Do you have any comments on Ofcom's analysis of the pricing algorithms and winner determination?*

## **Deposits and bidder default**

- 3.60 The Discussion Document proposed that the 2.6GHz auction would use a 100% deposit rule (as will be used in the 10-40GHz auction), with the auctioneer obliging all bidders to top up their deposits to cover 100% of their highest bid at certain points during the auction.
- 3.61 Responses to the Discussion Document and questions raised at the 29 November workshop raised four issues:
- a) on the level of deposit, several stakeholders felt that a deposit of 100% was too onerous given the potentially high value of the lots;
  - b) one response proposed that there should be a fixed rule for when deposits should be increased, based on the ratio of existing deposits to prices (this issue was also raised during the auction rules and procedures workshop);
  - c) another response questioned whether interest would be paid on cash deposits held by Ofcom (this issue was also raised during the auction rules and procedures workshop); and
  - d) a separate question was asked whether bank guarantees would be acceptable in lieu of cash deposits.
- 3.62 The remainder of this section sets out our current proposals which, in summary, are:
- the amount of money bidders place on deposit with Ofcom before the first primary bid round will still determine a bidder's eligibility in the first round of the auction;
  - during the primary bid rounds phase bidders will no longer be required to increase their deposits to 100% of their highest bid on demand from Ofcom. Ofcom will instead specify a percentage on each occasion, which will in every case be no greater than 50%;
  - in the supplementary bids round, bidders will generally no longer be required to have on deposit with Ofcom an amount equal to their highest primary round bid or supplementary round bid. Ofcom will specify a percentage on each occasion, which will in every case be no greater than 50%;
  - at the end of the Principal Stage, the provisional winning bidders will be required to increase their deposit so that its amount is at least equal to their base prices; and
  - in the Assignment Stage the 100% deposit rule will remain as originally proposed.

## **Level of deposit**

- 3.63 On the first issue, we agree that a 100% deposit is unlikely to be appropriate for this particular award and we are, accordingly, proposing to reduce the requirement in the manner outlined below. In assessing the appropriate level of deposit it is important to consider the aims in having deposits which are to:

- provide a disincentive for default;
- avoid discouraging participation in the award (especially by smaller players); and
- avoid excessively frequent topping up of deposits.

3.64 The level of deposit has an impact on all three of the objectives listed above. Our revised proposals are to combine a deposit requirement of less than 100% with a new policy concerning when a deposit top up is required, as summarised in the table below.

**Table 2: Summary of proposed deposit requirements**

<b><i>Award Stage</i></b>	<b><i>Timing of deposit</i></b>	<b><i>Deposit requirement</i></b>	<b><i>Consequences of failing to meet the deposit requirement</i></b>
Application	By the end of the day on which applications are due	£100,000	Excluded from award process
Prior to first primary bid round	By end of day specified by Ofcom (in practise likely to be at least 1 business day before the scheduled first round)	Additional sum to determine extent of bidder's eligibility in round  Each eligibility point = £50,000  Minimum required is £100,000	Eligibility limited to that eligibility consistent with the minimum requirement  Excluded from award process and lose any deposit if less than £100,000
During primary bid rounds	By the end of the day specified by Ofcom which shall be at least 1 business day after Ofcom gives notice of a requirement to increase deposit	Sums on deposit to be increased to up to 50% of the value of the highest primary bid up to the time of the notice.  Ofcom to specify the required % in its notice	Eligibility reduced to zero from the first round after which the deposit was due.  Bidder bids up to that point remain valid.  Bidder may submit supplementary bids subject to constraints consistent with having dropped eligibility to zero in particular primary bid round and subject to a 100% supplementary bids round deposit requirement described below.

Supplementary bids round	By the end of the day on which the supplementary bids round takes place	<p>Bidders who have complied with deposit requirements in primary bid rounds must increase their deposit to up to 50% of their highest primary bid or supplementary bid. The % required to be specified by Ofcom in the notice.</p> <p>Bidders who have failed to comply with deposit requirements in the primary bid rounds must increase their deposit to 100% of their highest primary bid or supplementary bid.</p>	<p>Excluded from the award process</p> <p>Lose deposit.</p>
End of Principal Stage	By the end of the day specified by Ofcom, likely to be no less than 5 business days after Ofcom has announced the winners of the Principal Stage and the base prices to bidders	Winners must ensure they have on deposit an amount no less than 100% of their base prices	<p>Excluded from award process</p> <p>Lose deposit</p>
Assignment round	By the end of the day on which the assignment round takes place	Bidders must (where relevant) increase their deposit so that it is no less than 100% of the sum of base price and the highest assignment round bid	None of their assignment round bids are valid, so they are treated as if they made zero bids in this round

### Fixed rules for triggering deposit increases

- 3.65 We are not proposing to use a fixed rule for triggering deposit payments as this may cause an unnecessarily high number of requests for top-ups which could disrupt the efficient running of the auction process. Instead, our intention is to provide guidance on indicative trigger levels in terms of current highest bid compared to the amount on deposit. This should provide bidders with appropriate information to prepare for deposit top-ups during the auction.

## **Guidance on the percentage likely to be required for topping up of deposits**

3.66 We will provide guidance in the Information Memorandum regarding the level of the required percentage for deposits which we will use during the primary bid rounds. We expect to indicate that:

- the percentage will decrease gradually as the primary rounds progress;
- during earlier rounds, the percentage is likely to be higher (e.g. in the range of 35–50%);
- during later rounds, the percentage is likely to be lower (e.g. in the range of 20–35%); and
- the percentage adopted will be the same for all bidders at the time the deposit calls are made.

3.67 We will also provide guidance in the Information Memorandum regarding the level of the required percentage in the supplementary bids round. We expect to indicate that it will be the same as that used in the later primary bid rounds (e.g. in the range of 20–35%).

## **Default at end of the Principal Stage**

3.68 One consequence of moving away from a 100% deposit rule is that this opens up the possibility that winning bidders could default.

3.69 If one of the winners at the end of the Principal Stage fails to ensure that they have on deposit with Ofcom 100% of their base price, that bidder will be excluded from the award process and lose the sums it has on deposit. The quantity of spectrum that was to be awarded to that bidder will not be assigned to any bidder through this award process so the associated lots are treated as unsold for the purposes of the Assignment Stage.

3.70 An alternative approach would be to exclude all the bids of the bidder who has defaulted on its base price payment and then re-calculate the auction result. This would lead to a new set of winners and new base prices (i.e. different winners and/or different amounts of spectrum and/or different base prices). Whilst some bidders might win the same number of lots, or more lots, than previously, it is also possible that bidders who were successful before the default might find that they were unsuccessful, or won fewer lots, following the re-calculation. Re-calculation has a number of undesirable features:

- a) It could become very complicated to introduce additional restrictions into the specification of the winner determination and pricing algorithms so as to capture a set of “no worse off” requirements in order to avoid bidders who were successful before the default then being awarded a package that they found less desirable; and
- b) It could, under certain circumstances, create an incentive for a bidder to default deliberately where this has the effect of denying a rival bidder from receiving spectrum that they would otherwise have won.

3.71 On the basis of the approach we propose, there would appear to be a strong disincentive to bid through to the end of the Principal Stage and then default. Indeed,

it could prove very expensive for the defaulting bidder even where the deposit level was well below 100%. Given the low likelihood of default in these circumstances we consider the simple approach that we propose to be appropriate.

- 3.72 We note that there is no equivalent issue of default at the Assignment Stage as we propose that 100% deposits are required for this stage of bidding.

### **Interest on deposits**

- 3.73 Some stakeholders raised the issue of whether Ofcom would pay interest on the deposits that Ofcom will hold. Ofcom has not paid interest on deposits held during spectrum auctions to date. However, it is possible that the amounts on deposit, and the duration of the award, might make the levels of interest more material in the case of the 2.6GHz and 2010MHz award. However, an indicative analysis suggests that the amounts of interest earned on deposit are likely to be less than the costs that Ofcom will have incurred in preparing this award, including the cost of developing the auction software. Since we are not proposing to charge any administrative fee for participation in the award we are proposing not to return interest on deposits.

### **Bank guarantees**

- 3.74 In preparation for its programme of spectrum awards, Ofcom has investigated the practicality of using bank guarantees rather than cash deposits as a means to protect against default. We reached the judgement that, in order to achieve an appropriate level of protection against default, we would have to impose the terms of the bank guarantee and also use specific criteria concerning the banks that could provide the guarantee. On balance, our judgement was that this would not be practical for applicants and bidders as:
- they may find it difficult to find guarantees under Ofcom's terms rather than their bank's terms; and
  - the framework could have a different impact on different persons because of the required selection of banks for the issuance of guarantees.

### **Refunds**

- 3.75 At the end of the Principal Stage Ofcom will refund deposits (subject to compliance with activity rules) to:
- applicants who had not qualified;
  - applicants who withdrew; and
  - bidders who were not winners.
- 3.76 At end of the award process (subject to compliance with activity rules) Ofcom will refund the deposits of winners which are in excess of the licence fees.

*Question 9: Do you have any comments on Ofcom's proposals for deposits, defaults and refunds?*

## Bidder association

- 3.77 A respondent to the Discussion Document requested further clarity on how we would deal with a situation in which an MNO was asked to enter into a national roaming agreement with a potential bidder while also intending to bid on its own. In such a situation, it is likely that technical information would be exchanged in negotiating the roaming agreement. This information might be viewed as confidential and the respondent considered that it was unclear whether this could be a breach of the activity rules regarding bidder association.
- 3.78 Other respondents raised the issue of the difficulty in providing funding to a number of potential bidders under Ofcom's typical association rules. In particular, those respondents considered that the rules could have a negative impact on competition by limiting the ability of potential bidders to raise funding. Respondents considered that Ofcom should allow investors to hold an interest in more than one bidder provided that they do not receive confidential information, and are not involved in any decisions concerning the award, in respect of all but one bidder.
- 3.79 On the first point, we believe that the activity rules as set out in the Discussion Document provide an appropriate approach to the balance between the desirability of allowing stakeholders to hold legitimate commercial discussions, while preserving the integrity of the auction by placing restrictions on the exchange of confidential information. Ofcom needs to retain the scope to apply penalties on applicants or bidders, including exclusion, depending on the exact nature of the information they may have exchanged. In principle, it is possible for two parties to hold discussions on possible roaming agreements that could be struck post-award without breaching the activity rules set out in the draft auction regulations. Equally, such discussions could very well lead to the exchange of information between two potential applicants that would affect their decisions in relation to the award process, and would materially affect the outcome of the award process. However, it is not possible to express a more specific view in the abstract. To do so would require a detailed assessment of a variety of hypothetical circumstances. This is why the draft regulations include provisions for Ofcom to receive and assess the necessary information as part of the award process (see regulations 7 and 69 to 71). Ofcom therefore is not proposing to make a specific exemption relating to roaming agreements. Bidders<sup>28</sup> should therefore exercise caution in this regard both before and, more importantly, during the auction and take their own advice as appropriate.
- 3.80 On the second point, Ofcom is proposing to revise the auction regulations. These modifications are intended to allow a person holding a material interest (i.e. an "associate" as defined the regulations) in several applicants or bidders to "opt out" of being a member of the respective bidder groups under certain conditions designed to safeguard the integrity of auction process. The intention would be to allow them to remain a member of (at most) one bidder group without causing disqualification. The "opting-out" associate would need to provide suitable guarantees, for example that:
- a) it has not, and will not, receive any Confidential Information in respect of the bidder group(s) it is opting out of;
  - b) none of its Directors or employees have taken or will take part in any discussions / activities etc. relating to the bids of bidder group(s) it is opting out of (including Board members absenting themselves from any relevant Board discussions etc.); and

<sup>28</sup> See regulation 2 in the draft regulations.

- c) it will ensure that all directors or employees that might have contact with the bidder(s) it is opting out of (in the course of business that is not related to the award) are aware of this requirement.
- 3.81 We would also require similar guarantees from the applicant or bidder whose group the associate is opting out of.
- 3.82 The requirement remains that there can be no overlap between bidder groups (i.e. a person cannot be a member of two bidder groups). However, having opted out of some bidder groups, a person can be part of one bidder group only while holding a material interest in other bidders (subject to the conditions summarised above).
- 3.83 Note that the draft legal provisions relating to this require further work and so are *not* reflected in the current version of the draft regulations set out in Annex 7.

*Question 10: Do you agree with Ofcom's suggestion to amend the rules on bidder association for the award of the 2.6GHz and 2010 MHz bands?*

### Rounds per day/speed of price increases

- 3.84 One respondent proposed that the number of primary bid rounds should be limited to one per day in the later stages in order to allow bidders to have sufficient time to re-evaluate bidding strategy or secure financial approval.
- 3.85 Ofcom can control the “speed” of the auction through both the number of rounds per day and the level of price increases between rounds. Other multiple round auctions have shown that bidders are able to put arrangements in place so that they can anticipate when budget constraints are likely to be reached and consult on further finance accordingly. Prices in the later stages of the primary bid rounds are unlikely to be increasing so fast that it would be difficult for bidders to predict when their limits are likely to be breached.
- 3.86 Accordingly, our judgement is **not** to place any restrictions so that only one primary bid round can take place per day. We also note that the proposed rules restrict price increases so that the price for a category of lot in one round can not increase from the price in the previous round by more than 100%. We plan to provide further guidance in the Information Memorandum on how we are likely to manage price increase, from larger increments in the early primary rounds to smaller increments in later rounds.

### Spectrum cap

- 3.87 One respondent proposed that the spectrum cap should not include restricted unpaired blocks so that bidders for unpaired spectrum would effectively be able to bid for the same amount as for paired. We consider this to be a fair point. The proposal to change the treatment of eligibility for unpaired lots (Paragraph 3.31–3.36) provides a simple way of dealing with this issue. In particular, with this change in eligibility for unpaired lots, we are proposing that the spectrum cap being modified so that it is equivalent to 16 eligibility points. This is equivalent to:
- 90MHz of unpaired spectrum for bids including split unpaired spectrum;
  - 85MHz of unpaired spectrum for bids including contiguous unpaired spectrum;
  - 80MHz of paired spectrum for bids including only paired spectrum; or

- equivalent combinations of paired and unpaired lots.
- 3.88 This specification has the effect of reducing the cap on unrestricted blocks of spectrum in the 2.6GHz band from 90MHz to 80MHz. In coming to this proposal we note that a number of respondents commented that the cap need not be set significantly larger than 60MHz, the largest plausible business case requirement of which we were then aware. We consider that an effective cap of 80MHz still gives an ample margin of security over this 60MHz example.
- 3.89 In this context, one respondent requested that bidders be allowed to obtain enough spectrum to run two separate networks, each of 60MHz giving a total of 120MHz. Our current view is that this would not be a desirable outcome although we are interested in any views stakeholders may have on this question.

*Question 11: Do you agree with Ofcom's amended specification of the spectrum cap?*

## Summary

- 3.90 This section has presented our analysis of a range of issues raised by stakeholders on the auction rules and procedures. We have listed a set of specific questions to stakeholders on which we welcome feedback.
- 3.91 In a number of cases we have proposed changes to the auction rules and procedures and these changes are summarised at the beginning of Section 4 as a guide to the revised description of auction rules and procedures set out in Annex 6.



## Section 4

# Auction rules and procedures and draft auction regulations

4.1 Section 3 described a number of changes that we are proposing to make to the auction rules and procedures. These are summarised in Table 3 below.

**Table 3: Summary of proposed changes to auction rules and procedures**

<b>Subject Area</b>	<b>New / updated proposal</b>
<i>Auction information policy</i>	<p>In addition to the information release proposed in the Discussion Document:</p> <ul style="list-style-type: none"> <li>• release to bidders at the end of each primary round information on bids made on an anonymised basis;</li> <li>• announce publicly the base prices to be paid by each winner at the end of the Principal Stage.</li> </ul> <p>Provide bidders with information on all possible permutations of how the winning bids at the end of the Principal Stage can be accommodated in the 2.6GHz band.</p> <p>Publish summary auction information e.g. at the end of each bidding day</p>
<i>Changes to eligibility for unpaired lots</i>	<p>Change (reduce) the eligibility points associated with bids for unpaired spectrum to account for the lot(s) with restricted usage rights:</p> <ul style="list-style-type: none"> <li>▪ the eligibility associated with n unpaired contiguous lots is n-1; and</li> <li>▪ the eligibility associated with n unpaired lots in two contiguous blocks (in a split bid) is n-2.</li> </ul>
<i>Pricing algorithms and winner determination</i>	<p>“Modified assignment bids” (as defined as a computational device within the pricing algorithm – see Paragraph A6.150) must be greater than or equal to 0 in the Assignment Stage.<sup>29</sup></p> <p>In calculating the opportunity cost for a winning Assignment Stage bid, the winner’s assignment bids are set to zero in the modified winner determination.<sup>30</sup></p>
<i>Deposits and bidder default</i>	<p>Set deposits in the Principal Stage to no more than 50% of a bidder’s highest bid value, with refinements to the rules and penalties for bidder default.</p> <p>Deposits for participation in the Assignment Stage remain at 100%.</p>

<sup>29</sup> Note that, in the calculation of base prices, modified bids can be negative.

<sup>30</sup> In the calculation of opportunity costs for a winning Principal Stage bid, the winner’s bids are simply disregarded in the modified winner determination.

<i>Bidder association</i>	Allow an entity that holds a material interest in several applicants or bidders to “opt out” of the relevant bidder groups under certain conditions designed to safeguard the integrity of auction process so as to comply with the requirement that an entity cannot be an associate of more than one bidder.
<i>Spectrum cap</i>	Adopt a spectrum cap that is equivalent to 80MHz of unrestricted spectrum in the 2.6GHz band (i.e. up to 90MHz in the case of a split, unpaired assignment that contains two restricted lots). This brings the cap into line with the revised treatment of eligibility points in respect of unpaired lots.

- 4.2 We have updated the auction rules and procedures from those contained in Annex 11 of the Discussion Document in line with the above changes. This updated description of the auction rules and procedures is contained in Annex 6. We would welcome stakeholder comments on the revised auction rules and procedures, as well as any comments on the analysis for each of the individual issues raised in response to the Discussion Document. We would ask that comments on our analysis include suggestions for amendment to the auction rules where suitable and are supported by the respondent’s own analysis.

*Question 12: Do you have any comments on the updated detailed auction rules and procedures for the 2.6GHz and 2010MHz award, as contained in Annex 6?*

- 4.3 In order to proceed with an award the auction rules and procedures need to be captured in the form of a statutory instrument which defines the auction regulations. It is these auction regulations that have legal force governing the award. It is important that the auction regulations capture accurately the intention behind the auction rules and procedures. Accordingly, we have translated the updated auction rules and procedures set out in Annex 6 into a draft of the auction regulations for the 2.6GHz and 2010MHz award, which can be found in Annex 7. We invite comments from stakeholders on whether the way in which these auction rules have been expressed in the form of draft regulations could affect their position in respect of the award.

*Question 13: Do you have any comments on the draft regulations contained in Annex 7?*

- 4.4 Whilst we invite comments on the draft auction regulations at this point, we stress that we will issue a statutory notice as part of a formal consultation on the auction regulations at the same time that we issue the Policy Statement for this award. Hence, this consultation does not represent the only opportunity that stakeholders will have to comment on the auction regulations.

## Section 5

# European regulatory developments

- 5.1 A number of responses to the Discussion Document commented that Ofcom should take full account of the on-going European regulatory work that is relevant to the 2.6GHz band. We of course remain fully engaged in European regulatory discussions and are actively contributing to the debate and analysis. These discussions have made material progress since the publication of the Discussion Document and this consultation provides an opportunity to update stakeholders on these developments.
- 5.2 In November 2005, the Radio Spectrum Policy Group (RSPG) published an opinion on Wireless Access Policy for Electronic Communications Services (WAPECS)<sup>31</sup>. Subsequently, on 5 July 2006 an EC mandate was issued to CEPT, “To develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS”<sup>32</sup>.
- 5.3 The mandate addressed a number of bands including 2500–2690MHz and 2010–2025MHz.
- 5.4 Specifically, the mandate asked CEPT the following:
- “to the extent possible, to identify future common and minimal (i.e. least restrictive) technical conditions across frequency bands listed above, in the spirit of article 1 of the Authorisation Directive, to become ultimately applicable throughout the Community and to justify any deviations from the long term policy goals contained in the RSPG opinion on WAPECS.”
- 5.5 CEPT asked its SE42 project team to develop a response to this mandate. SE42 has now completed this and has drafted a CEPT Report which the ECC chairman submitted to the European Commission (the “EC”) in December 2007. The EC forwarded the report to the Radio Spectrum Committee (RSC) for its consideration at its meeting on 12-13 December 2007.
- 5.6 At the RSC meeting in December 2007, the EC outlined its proposals for taking forward a common approach to the 2.6GHz band within the European Community. The EC noted that there was a limited window of opportunity to develop a binding harmonisation decision on the 2.6 GHz band and made a proposal to finalise work on such a decision, embodying the output of the CEPT report, at the RSC meeting in April 2008. At the meeting, Member States expressed clear support for the CEPT report prepared by SE42. On that basis, Member States and the EC agreed to start work on a draft decision, which the EC plan to make available in January so that RSC members can consider it at a meeting in early February. Several Member States, including the UK, reinforced the EC’s point that, if the RSC is to make a decision on the 2.6GHz band, then the RSC should complete its work on this on this EC decision in time for the April RSC meeting.

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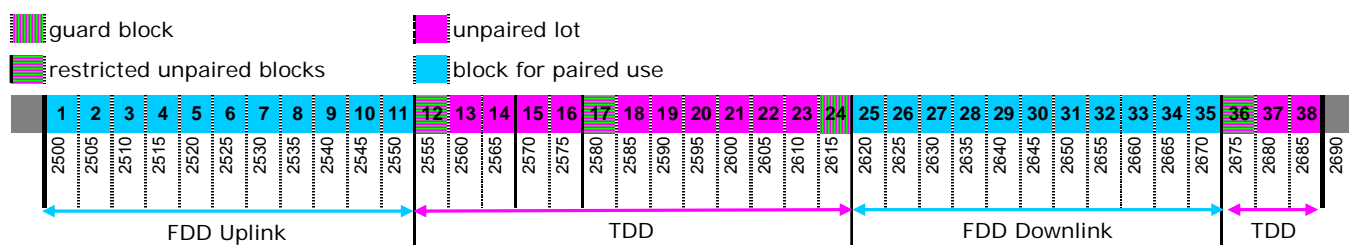
<sup>31</sup> See [http://rspg.ec.europa.eu/rspg\\_opinions/index\\_en.htm](http://rspg.ec.europa.eu/rspg_opinions/index_en.htm).

<sup>32</sup> See [http://ec.europa.eu/information\\_society/policy/radio\\_spectrum/activities/rsc\\_work/mandates/index\\_en.htm](http://ec.europa.eu/information_society/policy/radio_spectrum/activities/rsc_work/mandates/index_en.htm).

- 5.7 After the meeting of the RSC, CEPT's ECC will hold a plenary meeting from 17-21 December which will consider the draft CEPT report on WAPECS prepared by SE42. If the draft report is approved the ECC will submit the document to the EC as the formal response to the WAPECS mandate. The ECC will also publish the report for comments within a minimum two month period, i.e. by the end of February. It is expected that the ECC will ask SE42 to consider the comments at its meeting on 4-5 March and to report to the following ECC plenary meeting on 10-14 March. The result of this process will be an overview of comments which, if approved by the ECC, will be submitted to the European Commission.
- 5.8 The CEPT Report contains proposals for block edge masks (BEMs) for use in the 2500–2690 MHz band. These BEMs, whilst similar in concept and in much of their detail to the transmitter spectrum masks that Ofcom has consulted on (see the December Consultation and Discussion Document), are different in several respects to those previously proposed by Ofcom, including some important differences. However, Ofcom is satisfied that the BEMs contained in the CEPT Report are technically justified and provide a robust mechanism for managing interference between different licensees within the 2.6GHz band. We therefore propose that they should be adopted as the basis for the technical licence conditions for the award of the 2.6GHz band in the UK.
- 5.9 A summary of the main differences between the BEMs contained in the CEPT report and the technical conditions which we proposed in the Discussion Document are as follows:
- both mobile/terminal and base station masks extend across the entire 2500–2690MHz band – the previous Ofcom masks stopped at  $\pm 10$ MHz from block edges;
  - in-block power is specified for an integration bandwidth of 5MHz – the previous Ofcom proposal was 1MHz;
  - in-block base station power for unrestricted blocks (both TDD and FDD) is 61dBm/5MHz – equivalent to the previous Ofcom proposal of 54dBm/MHz;
  - in-block base station power for restricted blocks (the 5MHz TDD block between FDD uplink and unrestricted TDD blocks or between two unrestricted TDD blocks) has been reduced to 25dBm/5MHz – this is equivalent to a 10dB reduction from the previous Ofcom proposal of 28dBm/MHz (this is in line with the 10dB reduction proposed in the Discussion Document);
  - a significant reduction in out-of-block emissions from unrestricted base station blocks for offsets greater than 5MHz from block edges to protect base station receivers (both FDD and TDD) down to  $-45$ dBm/MHz – reduced from the original Ofcom proposal of  $-22$ dBm/MHz (this is necessary to allow uncoordinated deployment of macro base stations for distances of 100 metres and above);
  - in-block mobile/terminal station power is 31dBm/5MHz TRP (total radiated power) – equivalent to the previous Ofcom proposal of 24dBm/MHz EIRP. In addition, a slight increase in terminal station power to 35dBm/5MHz was agreed for fixed/installed terminals;
  - out-of-block mobile/terminal station powers have been adjusted but overall we do not consider this to be a significant change to the previous Ofcom proposals.

- 5.10 A complete description of the new BEM proposals is contained in Annex 9. Where there are options or further parameters that Administrations may decide on under the draft CEPT Report, we have included our proposals for what these should be in the UK in Annex 9.
- 5.11 On the basis of the information available to us, adopting the BEMs contained in the CEPT report under the WAPECS mandate will not require any changes to our proposals for auction design and spectrum packaging from those contained in the Discussion Document and in this consultation.
- 5.12 It should, however, be noted that the tightened out-of-block requirements for unrestricted base station transmissions at the boundary between paired (FDD) and unpaired (TDD) blocks would require or imply significantly improved filtering requirements for transmitters on one side and for receivers on the other side of the adjacency, relative to default base station parameters as defined in current 3GPP standards. We believe that the corresponding filtering performance is challenging, for both transmitters and receivers, but it is likely to be achievable at relatively low cost given the economies of scale expected to result from common requirements across Europe.
- 5.13 Using the illustrative assignment plan in Figure 1 below, these additional filtering requirements apply to:
- the highest FDD block at the paired (FDD uplink)/unpaired (TDD) boundary – see block 11 in Figure 1;
  - the lowest unrestricted TDD block at the bottom of an unpaired range, including at the paired (FDD uplink)/unpaired (TDD) boundary – see blocks 13, 18 and 37 in Figure 1;
  - the highest unrestricted TDD block at the top of an unpaired assignment including at the unpaired (TDD)/paired (FDD downlink) boundary – see blocks 16, 23 and 38 in Figure 1;
  - the lowest FDD block at the unpaired (TDD)/paired (FDD downlink) boundary – see block 25 in Figure 1; and
  - the highest FDD block at the paired (FDD downlink)/unpaired (TDD) boundary – see block 35 in Figure 1.

**Figure 1: Illustration of the adjacencies in the 2.6GHz band**



- 5.14 This ensures that, in accordance with the principles developed by SE42, all transmissions from base stations are treated consistently across the 2.6GHz band.

## Section 6

# Next steps

- 6.1 Following Ofcom's new consultation guidelines,<sup>33</sup> this consultation will last for 6 weeks so as to take account of the Christmas holiday period. In opting for a short consultation period we are mindful that:
- the consultation is limited in scope, being concerned with amendments and additions to the auction rules and procedures which were already elaborated in some detail in the Discussion Document;
  - the issues addressed in this consultation were discussed in a workshop on auction rules and procedures on 29 November 2007; and
  - this is not a statutory consultation on the auction regulations. If stakeholders have further points that they wish to raise after the closing date for this consultation then they will have an opportunity to do so during the subsequent statutory consultation process.
- 6.2 In light of this, we are inviting responses to this consultation by 1 February 2008.
- 6.3 Subject to consideration of the responses to this Consultation Document and further analysis of a range of issues including those identified at Paragraph 2.11, the proposed next steps for the award of the 2.6GHz and 2010MHz bands are set out below.

### **Publication of a Policy Statement, an Information Memorandum and draft Regulations for statutory consultation in Q1 of 2008**

- 6.4 We will complete our assessment of the issues raised in responses to our consultations on the award of the 2.6GHz and 2010MHz bands with a view to publish policy decisions covering all aspects of the award in the first quarter of the 2008 calendar year. In order to prepare the corresponding decisions, we will participate in and review discussions that are relevant to the 2.6GHz and 2010MHz bands in regulatory groups, specifically the ECC and the RSC.
- 6.5 Any decision which Ofcom ultimately makes to authorise use and to hold an auction of licences for the use of the 2.6GHz and 2010MHz bands will be given effect by a statutory instrument comprising regulations made under Ofcom's powers under the Wireless Telegraphy Act 2006.
- 6.6 Therefore at that point, subject to the nature of our decisions, we also plan to publish:
- a) an Information Memorandum for the award, i.e. a document designed to give potential bidders as much information as possible so that they can decide whether to enter the award process and how to prepare for participation;
  - b) the draft regulations on the award process for statutory consultation; and
  - c) other draft regulations for statutory consultation (relating to spectrum trading, the spectrum trading register and limitations on the number of licences in the bands).

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<sup>33</sup> Available at: [http://www.ofcom.org.uk/consult/consult\\_method/ofcom\\_consult\\_guide](http://www.ofcom.org.uk/consult/consult_method/ofcom_consult_guide)

- 6.7 The draft regulations on the award process for statutory consultation will be an updated version of the draft included in Annex 7, based on responses to this consultation and further analysis by Ofcom.
- 6.8 After publication of our decisions, we plan to hold one or more mock auctions so that interested parties can familiarise themselves with the implementation of the auction design as well as the electronic auction system and provide feedback on its use.

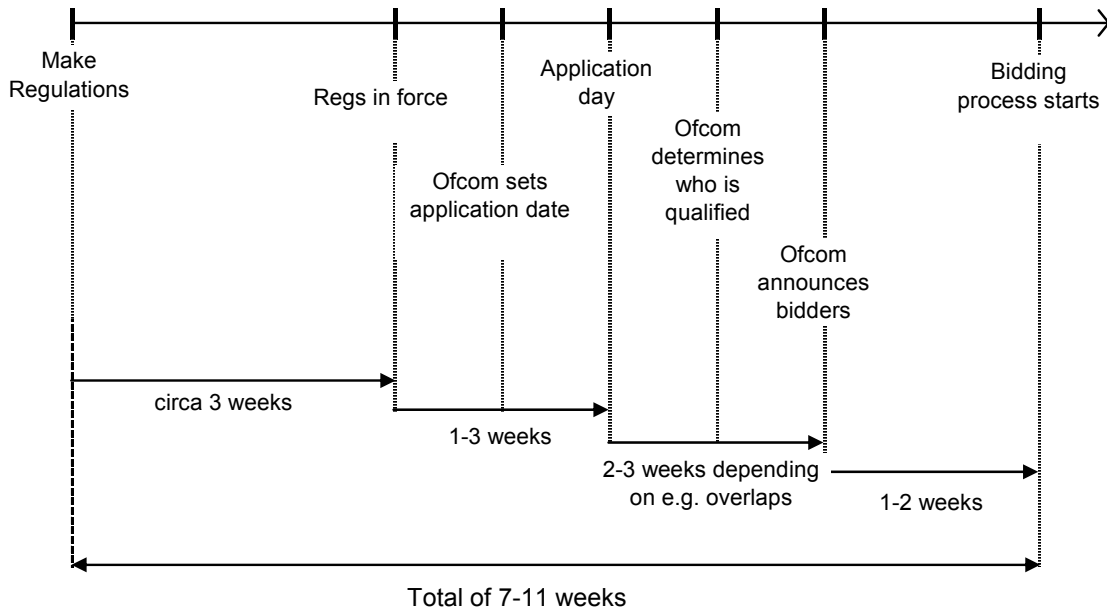
### **Making of the Regulations and entry into force**

- 6.9 The statutory consultation on draft regulations referred to above will last for no less than a month, in accordance with statutory requirements. After analysis of responses, we will finalise the drafting of each statutory instrument so that Ofcom can make the regulations.
- 6.10 We will also publish a statement setting out our decisions for the final form of the regulations. At the same time, we will announce the provisional date for submission of applications to take part in the award process of the 2.6GHz and 2010MHz bands.
- 6.11 From the day when they are made, we would anticipate a period of approximately 3 weeks before the regulations come into force. Based on our current plans, we expect that the regulations could come into force by the end of the first quarter of 2008/09.
- 6.12 Shortly after the award regulations come into force, we will announce the day for submission of applications.

### **Start of the award process and time to bidding**

- 6.13 We expect the date for submission of applications to be approximately two to three weeks from the date of entry into force of the regulations, i.e. one and a half to two months from the making of the regulations.
- 6.14 From then, the processes from receipt of application to the start of the first bidding round (assuming there is more than one bidder) are likely to take approximately three to five weeks, depending on potential issues such as overlaps between bidder groups.
- 6.15 This timeline is summarised in Figure 2 below.

**Figure 2: Timeline from making of regulations to bidding**



6.16 The indicative timeline is summarised in the following table. It is dependent on a number of considerations which could turn out to be different from current expectations.

**Table 4: Indicative timeline to the proposed award**

1 February 2008	Closing date for responses to this Consultation Document
February/March 2008	Decisions on the award. Subject to those decisions, Ofcom will publish a Statement, Information Memorandum and draft regulations  Start of statutory consultation period on draft regulations  Mock auction(s) with interested parties
March/April 2008	End of statutory consultation on draft regulations  Making of regulations  Publication of a statement on the final regulations
April/May 2008	Start of the award process with application date
July 2008	First bidding round (if there is more than one bidder)



## Annex 1

# Responding to this consultation

## How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 1 February 2008**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <http://www.ofcom.org.uk/consult/condocs/2ghzrules>, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email [2GHzawardsconsult@ofcom.org.uk](mailto:2GHzawardsconsult@ofcom.org.uk) attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.
- Brice Le Cannu  
Floor 3  
Spectrum Policy Group  
Riverside House  
2A Southwark Bridge Road  
London SE1 9HA
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

## Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Brice Le Cannu on 020 7783 4503.

## Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk), ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether

all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

### Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in the fourth quarter of Ofcom's financial year 2007/08.
- A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: [http://www.ofcom.org.uk/static/subscribe/select\\_list.htm](http://www.ofcom.org.uk/static/subscribe/select_list.htm)

### Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at [consult@ofcom.org.uk](mailto:consult@ofcom.org.uk) . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Vicki Nash, Director Scotland, who is Ofcom's consultation champion:

Vicki Nash  
Ofcom  
Sutherland House  
149 St. Vincent Street  
Glasgow G2 5NW

Tel: 0141 229 7401  
Fax: 0141 229 7433

Email [vicki.nash@ofcom.org.uk](mailto:vicki.nash@ofcom.org.uk)

## Annex 2

# Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

### Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

### During the consultation

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened version for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will normally allow ten weeks for responses to consultations on issues of general interest.

A2.6 There will be a person within Ofcom who will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organizations interested in the outcome of our decisions. This individual (who we call the consultation champion) will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why. This may be because a particular issue is urgent. If we need to reduce the amount of time we have set aside for a consultation, we will let those concerned know beforehand that this is a 'red flag consultation' which needs their urgent attention.

### After the consultation

A2.8 We will look at each response carefully and with an open mind. We will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

## Annex 3

# Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk).
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at [www.ofcom.org.uk/consult/](http://www.ofcom.org.uk/consult/).
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

## Cover sheet for response to an Ofcom consultation

### BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing

Name/contact details/job title

Whole response

Organisation

Part of the response

If there is no separate annex, which parts?

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

### DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

## Annex 4

# Consultation questions

- A4.1 Ofcom would welcome comments or views on any aspect of the auction rules, procedures and draft regulations in this consultation document, and in particular in response to the following questions.

*Question 1: Do you agree with Ofcom's proposals for changes to the rules and procedures for the award of the 2.6GHz and 2010MHz bands or have any other comments on the contents of this document?*

*Question 2: Do you agree with Ofcom's proposed changes to the auction information policy?*

*Question 3: Do you agree with Ofcom's proposals **not** to include additional bidding options for split supplementary bids and **not** to allow Assignment Stage bids to be made contingent on the identity of prospective neighbours?*

*Question 4: Do you agree with Ofcom's suggested changes to the number of eligibility points associated with unpaired spectrum?*

*Question 5: Do you have any comments on Ofcom's proposals **not** to make changes to the ability of bidders to switch between paired and unpaired spectrum, and **not** to change the arrangements for the supplementary bids round, as set out in the Discussion Document?*

*Question 6: Do you have any comments on Ofcom's proposals **not** to introduce a link between clock prices at 2.6GHz and 2010MHz?*

*Question 7: Do stakeholders consider that there are strong reasons why a value-based activity rule (a relaxed revealed preference rule in particular) would be materially better than an eligibility points based activity rule for this particular award?*

*Question 8: Do you have any comments on Ofcom's analysis of the pricing algorithms and winner determination?*

*Question 9: Do you have any comments on Ofcom's proposals for deposits, defaults and refunds?*

*Question 10: Do you agree with Ofcom's suggestion to amend the rules on bidder association for the award of the 2.6GHz and 2010 MHz bands?*

*Question 11: Do you agree with Ofcom's amended specification of the spectrum cap?*

*Question 12: Do you have any comments on the updated detailed auction rules and procedures for the 2.6GHz and 2010MHz award, as contained in Annex 6?*

*Question 13: Do you have any comments on the draft regulations contained in Annex 7?*

## Annex 5

# Impact Assessment

### Introduction

- A5.1 The analysis presented in this annex represents an impact assessment, as defined in section 7 of the Communications Act 2003 (the Act).
- A5.2 You should send any comments on this impact assessment to us by the closing date for this consultation. We will consider all comments before deciding whether to implement our proposals.
- A5.3 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Act, which means that generally we have to carry out impact assessments where our proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in Ofcom's activities. However, as a matter of policy Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of our policy decisions. For further information about our approach to impact assessments, see the guidelines, Better policy-making: Ofcom's approach to impact assessment, which are on our website:  
[http://www.ofcom.org.uk/consult/policy\\_making/guidelines.pdf](http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf)

### The citizen and/or consumer interest

- A5.4 The 2.6GHz and 2010MHz bands have a variety of different potential uses. Ensuring that the spectrum goes to the users which value it the most is usually the best way of seeking to maximise the benefits which go to consumers in the absence of concerns about market failures. For example, the provision of some services may have associated external effects which increase the overall value to society of allocating spectrum to these services. If the intensity of competition in different downstream markets varies, this can also lead to divergences between the value to bidders and the value to consumers. In the case of the award of the 2.6GHz and 2010MHz band, we have not identified any such risks and our proposals to auction rights to use these bands are designed to promote competition and innovation for the benefit of consumers.
- A5.5 Ofcom believes that, overall, its proposal to auction this spectrum on a technology neutral basis is the approach most likely to secure the greatest benefit for consumers. Ofcom's research has shown that awarding this spectrum in a flexible way that allows the different potential uses to compete is likely to increase competition and innovation through large scale investments in new technologies. Such a flexible award is also likely to create considerable benefits for consumer welfare as a result of the competition and innovation effects, with more choice, new services and better prices. In addition to these benefits, the spectrum could also enable existing mobile telephony and broadband wireless providers to reduce their costs in providing existing services and much of these savings are likely to be passed onto consumers, given likely levels of competition. We do not consider consumer interests separately in this impact assessment because they are only affected indirectly as a result of the proposals we are considering. For example, by improving the auction efficiency and/or promoting competition and innovation in

downstream markets we would indirectly improve the outcome for consumers and citizens. Hence, our analysis focuses on potential bidders.

### Ofcom's policy objective

- A5.6 We have set out our objective for this spectrum award in Section 6 of the December Consultation<sup>34</sup> and, consistent with our statutory duties, they relate primarily to ensuring optimal use of the spectrum. For that purpose, we have prepared proposals with a view to provide the relevant degree of flexibility for the market to determine optimal use. In terms of award design, our objective is to prepare a process that is as efficient as reasonably practicable in ensuring that the rights to use spectrum are granted to those who value them most.
- A5.7 Ofcom considers that regulatory intervention is necessary to define and implement appropriate processes to authorise use of spectrum that is available.

### Analysis of issues

- A5.8 The Impact Assessment in the December Consultation considered the following issues and options for the award of the spectrum in light of Ofcom's policy objectives:
- how the available spectrum should be offered for use – through an auction, “first come, first served” or comparative selection processes;
  - when the available spectrum should be offered for use – as soon as practicable or at some later date;
  - what provisions there should be in respect of technologies to be used – technology neutral or technology specific approach;
  - packaging the available spectrum to facilitate an efficient award process – relevant sizes and types of lots;
  - whether the relevant licensing conditions should include roll-out obligations;
  - whether there should be a limit on the amount of spectrum any one bidder could acquire licences for in the proposed awards;
  - what auctions designs are appropriate for the available bands – sealed bid or open multi-round processes and detailed associated processes.
- A5.9 The Impact Assessment in the Discussion Document<sup>35</sup> discussed areas where Ofcom was making new proposals in the Discussion Document or where substantive new issues had been raised in response to the December Consultation. These issues were as follows:
- whether to specify technical licence conditions in terms of spectrum usage rights (SURs) or block edge masks;
  - changes in the proposed auction design

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<sup>34</sup> Available at <http://www.ofcom.org.uk/consult/condocs/2ghzawards/>

<sup>35</sup> Available at <http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/>



- to take account of potential interference issues raised by stakeholders – in particular blocking between TDD and FDD terminals if unpaired spectrum is allocated in the top part of the band;
- whether to include a specific condition on inefficient hoarding in 2.6GHz licences;
- whether to proceed with an auction of the spectrum as soon as practicable
  - in particular whether certain potential bidders suffer greater private value uncertainty as a result of unresolved decisions under the control of Ofcom;
- whether relevant licensing conditions should include rollout obligations
  - in particular the argument that not imposing rollout obligations on new entrants would lead to a distortion of competition.

A5.10 This consultation focuses on issues of auction rules and procedures. This Impact Assessment therefore considers areas of the auction rules and procedures where we are making new proposals or where responses to the Discussion Document raised new issues of substance. The issues considered in this Impact Assessment are therefore as follows:

- whether to increase the level of information disclosed to bidders and made public during the auction process;
- whether to provide more bidding options for the additional supplementary bids round and in the Assignment Stage;
- whether to adjust the auction rules and calculation of eligibility points with regards to switching between paired and unpaired spectrum and price ratios;
- whether to use a value-based activity rule rather than a quantity-based rule;
- whether to reduce the level of deposits required during the auction from 100%;
- whether to amend the rules for bidder association; and
- whether to limit the number of primary bid rounds per day.

### **Auction information policy**

A5.11 We have considered a number of options for increasing the level of information disclosed to bidders and made public during the auction process above compared to that proposed in the Discussion Document. Paragraphs 3.4–3.20 sets out our analysis of the different options for making the right amount of information available to bidders and in the public domain so as to enhance efficiency while avoiding the creation of risks. In carrying out these analyses, and in-line with our policy objective of ensuring optimal use of the spectrum, we have considered the balance between the release of additional information:

- reducing common value uncertainty among bidders (i.e. facilitate price discovery) and allowing bidders to refine their valuations and bidding strategies; and
- increasing the risk of strategic behaviour in the auction through the (undesirable) release of too much information to bidders.

A5.12 Comments in response to the Discussion Document focussed on the level of information to be released during the primary bid rounds and also at the end of the Principal Stage (before the Assignment Stage). There was also a further comment that we should provide bidders with full bid options in the Assignment Stage (i.e. all possible combinations of how the winning bids could be accommodated).

#### Option to provide bidders with full bid options in the Assignment Stage

A5.13 The costs of this option are likely to be low because bidders would be able to establish this themselves so it would not increase the amount of information available to bidders.

A5.14 The benefits of this option are that it would remove the (small) risk that some bidders would be unable to determine this information themselves.

#### Options for the level of information to be released during the primary bid rounds

A5.15 Based on comments in responses to the Discussion Document, we have considered the following options for the information to be released to bidders at the end of each primary bid round (with the list ordered by increasing amount of information revelation):

- aggregate demand for spectrum only (as proposed in the Discussion Document);
- anonymised bids which are not labelled in any way; and
- anonymised bids which are labelled consistently through the primary bid rounds.

A5.16 Table 5 below summarises the benefits and costs of each of these options.

**Table 5: Options for information release at the end of each primary bid round**

<b>Option</b>	<b>Benefits</b>	<b>Costs</b>
Aggregate demand only	Allows bidders to track demand for spectrum and will aid in price discovery.  However benefits from reducing common value uncertainty will not be as high as providing anonymised bids without labels.	Bidders are very unlikely to be able to use this information to bid strategically so costs will be low (if any).
Anonymised bids without labels	Aids in price discovery to a greater degree than simply publishing aggregate demand.	There are unlikely to be any costs with this option because the potential for bidders to use this information to bid strategically is very low.
Anonymised bids with labelling	Labelling bids would enable participants to track the actions of bidders round by round on an anonymised basis, so they could understand better the behaviour of individual bidders.	Would enable bidders to attempt to identify who the anonymised bidder actually is and could expose the auction to a risk of strategic bidding.

- A5.17 In our view, providing details of anonymised bids without labels at the end of each primary bid round would provide sufficient information to aid in price discovery (to a greater degree than publishing only aggregate demand for spectrum). Providing additional information (through labelling of bids) would open the auction up to risks of strategic bidding without aiding in price discovery to any greater degree than providing information without labels.
- A5.18 On balance, our preferred option for releasing information at the end of each primary bid round is to provide details of anonymised bids which are not labelled in any way. In our view, this option provides the best balance between potential benefits and costs.
- A5.19 We have also considered whether to publish summary information on primary bid rounds at the end of each day (or at some other intermediate point in the auction). In our view, this is likely to help manage communication around the award process without any material costs. As such, we are minded to publish such summary information.

Options for the level of information to be released at the end of the Principal Stage (before the Assignment Stage)

- A5.20 Responses to the Discussion Document suggested that we should release the following at the end of the Principal Stage and before the Assignment Stage:
- details of all Principal Stage bids; and
  - the base price for each bidder (in addition to the identities of the winning bidders and the packages they won).
- A5.21 Regarding the publication of details of all Principal Stage bids before the Assignment Stage, our view is that this has the benefits of enabling bidders to check the winner determination and providing bidders with additional information to draw on when explaining the outcome of the award up to the Assignment Stage to financial decision makers.
- A5.22 However, publishing such information could have adverse consequences on the subsequent Assignment Stage as it may enable bidders to work out other bidders' budget constraints and bid strategically on this basis.
- A5.23 Furthermore, our view is that information on Principal Stage bids should not be of any use to bidders in developing their valuations for the purpose of the Assignment Stage and that this information should not be required to inform a Board decision as the successful bidder will already have made the decision to pay at least the base price (and all bid information will be made available following the completion of the award).
- A5.24 Therefore, our current view is that the potential costs of providing details of all Principal Stage bids before the Assignment Stage would outweigh the potential benefits (noting that we are proposing to publish details of all bids following the completion of the auction process).
- A5.25 We have also considered the option to publish the base price for each bidder at the end of the Principal Stage, along with details of the identity of the winning bidders and the packages they won. In our view, this would help to manage communication to bidders and the public during the award process. Releasing this information is

unlikely to introduce risks of strategic bidding although it may risk causing some degree of confusion in the market as the final prices paid for spectrum may be higher than the base prices. However, this risk is manageable and, in our view, the benefits of publishing base prices outweigh the costs and we are inclined to publish this information once winning bidders have increased their deposits to 100% of the base price.

### **Provide more bidding options for the additional supplementary bids round and in the Assignment Stage**

- A5.26 Ofcom has considered options which would provide bidders with more bidding options in the supplementary bids round and in the Assignment Stage.
- In the supplementary bids round, we have considered the option to modify the auction to allow bidders for a split unpaired assignment to specify where each part of the split award is located (i.e. in the central or upper part of the band). The benefit of this would be to allow bidders to express their preferences more exactly for unpaired lots in the upper and lower unpaired areas.
  - In the Assignment Stage, we have considered the option to offer bidders the opportunity to make their bids contingent on who actually occupies spectrum neighbouring its own. This would benefit bidders by letting them express how their valuations would be affected by the externalities between them and their neighbours.
- A5.27 As discussed in Paragraphs 3.22–3.26, our view is that making the first change would make it more difficult to fit combinations of bids into the available spectrum when there are split supplementary bids (i.e. some potential combinations of bids could be rejected even though in total they add up to the amount of spectrum available in the band). This is because of the way in which paired spectrum is organised with blocks separated by 120MHz forming part of pairs; as a result unpaired spectrum also has to be organised in a particular way. The proposed approach could increase the chances of having unsold spectrum. An auction outcome which includes unsold spectrum need not be inefficient in economic terms if it takes account of all packages (combinations of lots in different categories) that bidders might be prepared to acquire. The danger, however, is that as the complexity of the auction increases and the number of potential packages on which bidders could bid increases, then there is a greater chance that not all bidders will submit bids on all packages in which they might potentially have an interest. As a result, there is an increased risk of the auction outcome resulting in a sub-optimal use of the spectrum.
- A5.28 Additionally, changing the auction to include this option would require the creation of two types of unpaired lot which would add considerable complications to the auction design e.g. it would be more complicated to define a meaningful concept of “aggregate demand for spectrum in the 2.6GHz band” during the primary bid rounds because of the difficulty of fitting combinations of bids into the available spectrum.
- A5.29 Finally, our view is that the differences in value of unpaired spectrum between the upper and central areas are likely to be sufficiently small that they can be treated as one category of generic lots.
- A5.30 Therefore, our current view is that any potential benefit of including the option for bidders for a split unpaired assignment to specify where each part of the split award

is located (i.e. in the central or upper part of the band) would not outweigh the additional costs and we are proposing not to make this change.

- A5.31 On the option of allowing bidders in the Assignment Stage to make bids contingent on who actually occupies the neighbouring spectrum, our view is that including this facility would create opportunities for some bidders to influence which spectrum their competitors would receive. This is undesirable and creates undue risks to the optimal use of the spectrum and is in itself a potential competition issue. Further, this change would significantly increase the complexity of the auction.
- A5.32 Our view is therefore that any potential benefit of amending the auction to allow bidding contingent on who owns the neighbouring spectrum would not outweigh the cost and we are not proposing to make this change.

### **Rules for switching between paired and unpaired lots and for price ratios**

- A5.33 The Discussion Document proposed allowing bidders to switch eligibility between categories (paired and unpaired) in the primary and supplementary bid rounds.
- A5.34 We received a number of comments on the ability of bidders to switch between paired and unpaired spectrum and the activity rule which governs this ability (in the Discussion Document, this takes the form of a quantity-based activity rule which uses eligibility points).
- A5.35 In particular, comments from stakeholders covered two major areas, namely that:
- bidders may be limited in their ability to switch between their preferred packages in response to price changes as a result of a difference in the way that eligibility was established for paired and unpaired lots, with restricted unpaired lots carrying 1 eligibility point (i.e. the same as a standard, non-restricted, unpaired lot);
  - allowing switching of demand could enable bidders to behave strategically and frustrate price discovery by hiding true demand, specifically by switching demand in the supplementary bids round.
- A5.36 Additionally, stakeholders also questioned whether the ratio between paired and unpaired could be lower than 2:1, and whether there should be a link between clock prices for lots in the 2.6GHz band and the 2010MHz lot and suggested a fixed ratio for 2010MHz relative to 2.6GHz based on the quantity of spectrum (a price for 2010MHz of 3 times the price for a single unpaired 2.6GHz lot and  $3/2 = 1.5$  times the price of a paired 2.6GHz lot).
- A5.37 Considering the potential for the ratio of prices between paired and unpaired spectrum to fall below 2:1, our view is that the supplementary bids round is sufficient to allow bidders to fully express their preferences in this case and that allowing this ratio to fall below 2:1 would not bring any additional benefits. We are therefore not proposing to allow the ratio to fall below 2:1.
- A5.38 Concerning the option to link the clock prices of the 2.6GHz and 2010MHz awards, we note that the 2010MHz lot is, by definition, different to the 2.6GHz lots and could attract a price which is materially different to, and probably lower than, the 2.6GHz lots (on a per MHz basis). As such, if we did link the clock price for the 2010MHz lot to the 2.6GHz lots in the early primary rounds, it is likely that excess demand for 2010MHz lots would disappear before excess demand for the 2.6GHz lots. Under

these circumstances the price for the 2010MHz would become frozen whilst the 2.6GHz lot price continued to rise. Hence, the price of the 2010MHz lots could quickly become delinked from the price of the 2.6GHz lots anyway. Therefore, the potential costs of this option (through the potential risk of linking the 2010MHz lot price to the 2.6GHz prices using a ratio which does not accurately reflect the different per MHz values) outweigh any potential benefits. We are therefore not proposing to introduce such a link.

- A5.39 For the two main issues raised in responses, we have considered the following options for the quantity-based activity rule to be used in the auction:
- a) a quantity-based activity rule with no change (compared to the Discussion Document) to eligibility points for unpaired lots;
  - b) a quantity-based activity rule with a change to eligibility points for unpaired lots; and
  - c) a quantity-based activity rule with restrictions on switching in the supplementary bids round.
- A5.40 Option a) above is as contained in the Discussion Document, with Option b) addressing the issue raised by responses that bidders may be limited in their ability to switch between paired and unpaired. Option c) addresses the potential risk of bidders using switching to hide true demand.
- A5.41 All of the above options provide the benefit that bidders are able to switch their demand between paired and unpaired spectrum during the auction and also limit the risk of strategic bidding by differing degrees by constraining the bids bidders are able to make based on bids in previous rounds.
- A5.42 As discussed in detail in Paragraphs 3.31–3.36, we agree that the proposals as set out in the Discussion Document (as covered under Option a)) could limit the ability of bidders to switch between categories of lots, which could result in a loss of efficiency in the award and we have considered changes to the eligibility points to remove this potential efficiency loss (see Paragraph 3.35 for details of the proposed revisions). Therefore, our view is that Option b) is preferable to Option a) as it has a comparable potential benefit and lower cost.<sup>36</sup>
- A5.43 Option c) is considered in detail in Paragraphs 3.39–3.45. We agreed that allowing switching between paired and unpaired lots could, in theory, create potential for undesirable strategic behaviour which could result in a sub-optimal assignment and use of the spectrum. However, our view was that it would be risky for a bidder to hide demand through use of the supplementary bid rounds as it would, *inter alia*, be constrained in its supplementary bids by the bids it made in the primary bid rounds and would also run the risk of winning spectrum it did not actually want. Our view was therefore that the likelihood of a bidder attempting to hide demand through the use of the supplementary bids round is low.
- A5.44 We have considered a number of options for restricting switching in the supplementary bids round and our view is that they would run the risk of preventing bidders who bid truthfully in the auction from expressing their full range of preferences in the supplementary bids round.

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<sup>36</sup> The changes to eligibility points which are part of Option b) have a knock-on effect on the spectrum cap, which is discussed in Section 3.

- A5.45 As such, our view is that the costs of restricting switching in the supplementary bids round (potentially limiting the ability of bidders to express their full range of preferences) outweigh the benefits (removing the low risk that a bidder could attempt to hide demand through use of the supplementary bids round). On balance, our preference is therefore to use a quantity-based activity rule with a change to eligibility points for unpaired lots (Option b)).
- A5.46 Below, we also consider a more radical option (the use of a value-based activity rule) to change the rules in order to further promote price discovery and efficiency of the auction and which relates to switching arrangements.

### **Change to a value-based activity rule in place of a quantity-based activity rule**

- A5.47 Given the comments from stakeholders regarding the potential risks associated with permitting bidders to switch between unpaired and paired spectrum, we have considered the possibility of adopting an alternative activity rule.
- A5.48 The eligibility points rule is a quantity-based activity rule which constrains the total amount of spectrum a bidder can bid on in a given primary bid round based on the amount it bid in the previous primary bid round, and also constrains the bids a bidder can make in the supplementary bids round based on bids it placed during the primary bid rounds. However, as discussed in Paragraph 3.52, there is a risk with the eligibility points rule that bidder behaviour could become distorted should the ratio of eligibility points between lots not be broadly reflective of the relative value of the lots. This could distort price discovery as a result of activity becoming focused on certain categories of lot.
- A5.49 We have therefore considered a value-based activity rule, under which bidders are constrained in making bids in a given round based on the value (clock price multiplied by the number of lots) of bids made in previous rounds. In effect, this type of rule would force bidders to bid consistently throughout the auction with regards to the value they attach to each lot. In doing so, it could help address the potential issues raised by respondents regarding switching between paired and unpaired under the previous specification of the eligibility points rule, as well as being more effective than a quantity-based activity rule in aiding price discovery and promoting truthful bidding. However, this advantage is more relevant in awards where the eligibility points associated with different categories of lot, under the quantity based activity rule, might become a poor reflection the relative value of different lots. This is unlikely to be the case in the 2.6GHz band because of the direct substitutability between paired and unpaired spectrum in the Principal Stage of our auction design although it could be more of an issue when considering the relative value of the 2010MHz lot and the 2.6GHz lots. A value-based activity rule, while addressing some of the potential issues with the eligibility points rule, would come at the cost of an increased level of complexity: bidders may find it more challenging to explain to their internal stakeholders (e.g., their Boards); and it will increase the effort required to design and test the auction rules and software. Furthermore, the relaxed revealed preference approach in particular requires the auctioneer to make additional decisions (on the size of the relaxation parameter) during the course of the auction.
- A5.50 On balance, our view is that the additional complexity and costs associated with design and testing of a value-based activity outweigh the benefits it could bring through aiding price discovery and encouraging truthful bidding compared to a quantity-based rule in the case of the 2.6GHz and 2010MHz award. We are therefore inclined to not use a value-based activity rule for this award.

## Deposits and bidder defaults

- A5.51 The Discussion Document proposed that the 2.6GHz auction would use a 100% deposit rule (as will be used in the 10-40GHz auction), with the auctioneer obliging all bidders to top up their deposits to cover 100% of their highest bid at certain points during the auction.
- A5.52 Responses to these proposals raised two issues:
- a) several respondents felt that a deposit of 100% was too onerous given the potentially high value of the lots;
  - b) one response also proposed that there should be a fixed rule for when deposits should be increased based on the ratio of existing deposits to prices.
- A5.53 Ofcom has therefore considered the following options for the deposit rule:
- A. to maintain the level to which deposits should be topped up at 100% for both the Principal Stage and Assignment Stage;
  - B. to maintain the level of deposits at 100% for the Assignment Stage and at the end of the Principal Stage, and during the primary and supplementary bids rounds to either:
    - i. set the level to which deposits should be topped up at a lower level during the primary bid rounds and supplementary bids round (e.g. fixed at 50%); or
    - ii. set the level to which deposits should be topped up at less than or equal to 50% during the primary bid rounds and supplementary bids round and for Ofcom to retain flexibility to vary this level; and
  - C. to set the level of deposits at less than 100% for the Assignment Stage and at the end of the Principal Stage, and during the primary and supplementary bids rounds to either:
    - i. set the level to which deposits should be topped up at a lower level during the primary bid rounds and supplementary bids round (e.g. fixed at 50%); or
    - ii. set the level to which deposits should be topped up at less than or equal to 50% during the primary bid rounds and supplementary bids round and for Ofcom to retain flexibility to vary this level.
- A5.54 Our aims in having deposits are to: provide a disincentive for default; avoid discouraging participation in the award (especially by smaller players); and avoid excessively frequent topping up of deposits.
- A5.55 In addition to the options listed above, we have also considered whether to apply a fixed rule for when deposits should be increased based on the ratio of existing deposits to prices, rather than using the option proposed in the Discussion Document of Ofcom announcing, from time to time, a deadline by which bidders must have topped up their deposit.
- A5.56 The use of a fixed rule would provide bidders with sufficient information to prepare for deposit top-ups during the auction. However, it may result in an unnecessarily high number of requests for top-ups which could disrupt the efficient running of the



auction process and could also place an additional administrative burden on bidders.

A5.57 The alternative (of maintaining the proposals in the Discussion Document to request top-ups from time to time) would potentially reduce the overall number of requests for top-ups and, hence, the administrative burden on bidders, but potentially could not provide sufficient advance warning for bidders to prepare. We are therefore minded not to adopt a fixed rule for when deposits should be topped up although we are proposing to use a third option which is to provide guidance on indicative trigger levels in terms of the current highest bid compared to the amount on deposit to balance the risks and benefits of the two options.

A5.58 In our view, the use of this option will mean that deposits will not require excessively frequent topping up. We assess the 5 options for the level of deposits (as set out in Paragraph A5.53) in terms of our two remaining aims in Table 6 below.

**Table 6: Assessment of options for deposit levels**

<b>Option</b>	<b>Provide a disincentive for default?</b>	<b>Encourage participation?</b>
A	Yes	100% deposit could be difficult for bidders to raise in advance of acquiring the asset.
B.i.	Yes, especially at the end of the Principal Stage and Assignment Stage when default could be most damaging to the award process	Bidders could find it difficult to raise large deposits towards the end of the auction (when bid values are high).
B.ii.	Yes, especially at the end of the Principal Stage and Assignment Stage when default could be most damaging to the award process	Flexibility allows Ofcom to adjust the level of deposits based on the clock prices.
C.i	Yes, but not as effectively as Options A and B as there is a risk that a winning bidder could default without 100% of the base price on deposit.	Bidders could find it difficult to raise large deposits towards the end of the auction (when bid values are high).
C.ii	Yes, but not as effectively as Options A and B as there is a risk that a winning bidder could default without 100% of the base price on deposit.	Flexibility allows Ofcom to adjust the level of deposits based on the clock prices.

A5.59 Based on the assessment above, our preference is for Option B.ii. Further details on this option, along with guidance on the percentage of deposit likely to be required at different stages, is available in Paragraphs 3.63–3.76.

### **Bidder association**

A5.60 Ofcom's typical auction rules place restrictions on the exchange of confidential information and also restrict entities to being a member of only one bidder group.

- A5.61 Responses to the Discussion Document asked for clarity on the situation in which an MNO was asked to enter into a national roaming agreement with a potential bidder while also intending to bid on its own and whether technical information which would be exchanged in negotiating the roaming agreement could be a breach of the activity rules regarding bidder association.
- A5.62 Responses also raised the possibility of an entity being part of two (or more) bidder groups and it was requested that Ofcom consider amending the rules on bidder association for this award to take into account a particular version of this situation.
- A5.63 We set out our consideration of these issues in Paragraphs 3.77–3.83 and we have considered the following options with regards to bidder association:
- a) Maintain the proposals as set out in the Discussion Document;
  - b) Make a special exemption for national roaming agreements; and
  - c) Allow entities holding a material interest in more than one bidder to “opt out” of bidder groups and participate in at most one bidder group
- A5.64 The bidder association rules set out in the Discussion Document (see Paragraph 6.58) restrict the flow of confidential information between bidder groups and are designed to maintain the integrity and efficiency of the auction. However, as pointed out by responses to the Discussion Document, these provisions may come at the cost of potentially restricting the ability of interested parties to participate.
- A5.65 In considering the option to make a special exemption for national roaming agreements, we note that the balance we need to strike is between encouraging legitimate discussions and agreements between potential participants and protecting the integrity of the auction. The exchange of information during discussions on roaming does not have to, but could conceivably, affect the decisions of the negotiating parties in the award process which could materially affect the auction outcome. In our view, the costs arising from the exchange of confidential information outweigh the potential benefits in enabling bidders to refine their valuation. We are therefore inclined not to make a special exemption for national roaming. Parties considering such discussions should take their own advice as to their impact in respect of the proposed rules, in light of their specific circumstances.
- A5.66 We now turn to the issue of entities holding a material interest in more than one bidder. If we did not adjust the regulations outlined in the Discussion Document relating to bidder groups then there could be circumstances where this would reduce the number of bidder groups able to participate in the award. If a greater number of bidder groups were able to participate in the auction without undermining the integrity of the auction process (by, amongst other things, preventing the exchange of confidential information between bidder groups) then we would expect this to lead to a more efficient award. The main cost of the change would be that the bidder groups which had been “opted out” of could be unable to draw on the same level of expertise and advice as would be available should all of their original bidder group be present (assuming that the withdrawn entity was able to provide suitable advice in any case). It is our view that the benefits from the participation of a higher number of bidders outweigh the costs from a potentially smaller information base for some bidder groups.

## **Rounds per day/speed increases**

- A5.67 One respondent proposed that the number of primary bid rounds should be limited to one per day in the later stages in order to allow bidders to have sufficient time to re-evaluate bidding strategy or secure financial approval.
- A5.68 As detailed in Paragraphs 3.84–3.86, Ofcom can control the “speed” of the auction through both the number of rounds per day and the level of price increases between rounds. Given Ofcom’s control, prices in the later stages of the primary bid rounds are unlikely to be increasing so fast that it would be difficult for bidders to predict when their limits are likely to be reached. As such, our view is that the benefits from making this change (rather than maintaining the proposals as set out in the Discussion Document) are minimal, whilst placing any restrictions on the number of primary bid rounds per day as this could unnecessarily lengthen the duration of the auction. We are therefore inclined not to make such a change.

## **Evaluation of the auction design**

- A5.69 We plan to carry out an evaluation of the auction process after the completion of the award. We will consider whether the design and rules have-
- a) appropriately encouraged participation in the auction;
  - b) allowed participants to express fully their value for the spectrum they were seeking to get access to;
  - c) sufficiently restricted the opportunities for strategic behaviour by bidders that could ;
  - d) appropriately protected the integrity of the auction from the risk of default;
  - e) not included processes that were too cumbersome on participants; and
  - f) not created undue risks of unsold spectrum.
- A5.70 Furthermore, we plan to evaluate whether our policy had been successful after the auction itself. For example, Ofcom’s duty to promote optimal use of spectrum endures beyond the actual award and we will monitor spectrum use to see if there are any signs of market failure. However we note that the spectrum will be tradable and licensees will be free to request licence variations, both of which should promote the efficient use of spectrum and reduce the likelihood of intervention by Ofcom.

## Annex 6

# Rules and procedures for the 2.6GHz and 2010MHz auction

A6.1 This annex provides a description of the proposed rules and procedures for Ofcom's combined auction of spectrum in the 2.6GHz and 2010MHz bands for our preferred design. These rules are currently work in progress and may change. They are presented at this stage to assist stakeholders in understanding the preferred format. Following this consultation, which includes a first version of the auction regulations at Annex 7, Ofcom will hold a statutory consultation on the draft statutory instrument that transcribes the auction process into regulations.

### Overview

A6.2 There are 38 blocks of 5MHz available in the 2.6GHz band, which will be awarded as paired or unpaired spectrum, or as guard blocks. The number of lots in each category will be determined in the auction. There is also one lot of unpaired spectrum at 2010-2025MHz. A description of the lots available in the auction is provided in Table 7.

**Table 7: Description of lots available in the auction**

<b><i>Band and category</i></b>	<b><i>Number of lots</i></b>	<b><i>Spectrum endowment</i></b>	<b><i>Eligibility points associated with lots</i></b>	<b><i>Reserve price per lot</i></b>	<b><i>Minimum bid size (in lots)</i></b>
2010-2025MHz – Unpaired	1	1 x 15MHz	2 points per lot	£100,000	1
2.6GHz – Paired	Between 0 & 14	2 x 5MHz	2 points per lot	£100,000	1
2.6GHz – Unpaired	Between 9 & 38	1 x 5MHz	for $n$ contiguous lots, eligibility is $n - 1$ points for $n$ lots split across 2 contiguous assignments, eligibility is $n - 2$ points	£50,000	2
2.6GHz – Guard blocks <sup>†</sup>	Between 0 & 2	1 x 5MHz	NA	NA	NA

<sup>†</sup> Bidders do not bid for guard blocks in the Principal Stage of the auction; rather the number of guard blocks is determined by the outcome of bidding for the other three categories of lots. Guard blocks are made available to bidders in the Assignment Stage.

A6.3 The auction proceeds in five stages:

- **Application Stage.** Prospective bidders submit their applications to participate in the award process, including initial deposit.
- **Qualification Stage.** Ofcom determines which applicants are qualified to bid. The determination is based on a check of the applications and initial deposits, and assessment of bidder groups. Ofcom announces the number and identity of the qualified applicants. If there is only one bidder, the bidder will be entitled to select the frequency blocks it wishes to purchase and the award will then progress directly to the Grant Stage. If there is more than one bidder, then a bidding process is required.
- **Principal Stage.** There are two phases of bidding, which determine the identity of the winning bidders, the number and type of spectrum lots that they will receive and the allocation of spectrum between paired and unpaired lots within the 2.6GHz band.
  - **Primary bid rounds.** The first phase consists of primary bid rounds, which follow a clock auction format. Bidders make a single bid each round for a package of lots across the three categories in response to a set of prices notified to them by Ofcom (one price per lot for each category of spectrum). Note that guard blocks do not count as a category and are not available as lots for the purpose of bidding in the Principal Stage.

In the primary bid rounds, any bid for packages containing unpaired lots within the 2.6GHz band is contingent on all unpaired lots in that bid being contiguous. This has the implication that if such a bid was successful, any unpaired lots awarded to a particular bidder must be located either in the lower unpaired area (i.e. below block 24) or the upper unpaired area (i.e. from block 38 downwards), and not split across the two areas.

For unpaired 2.6GHz lots, prices are increased in the next primary bid round if there is excess demand for the 2.6GHz band as a whole and demand for unpaired 2.6GHz lots exceeds nine. For paired 2.6GHz lots, prices increase whenever there is excess demand for the 2.6GHz band as a whole or demand for paired 2.6GHz lots exceeds 14. For the unpaired 2010-2025MHz lot, the price increases whenever there is excess demand for this lot. The primary bid rounds continue until (a) there is no excess demand in any category and (b) it would be possible to accommodate all demand for unpaired lots without a split award. During the primary bid rounds, bidders may be required to top up their deposits in order to continue bidding in subsequent primary bid rounds.

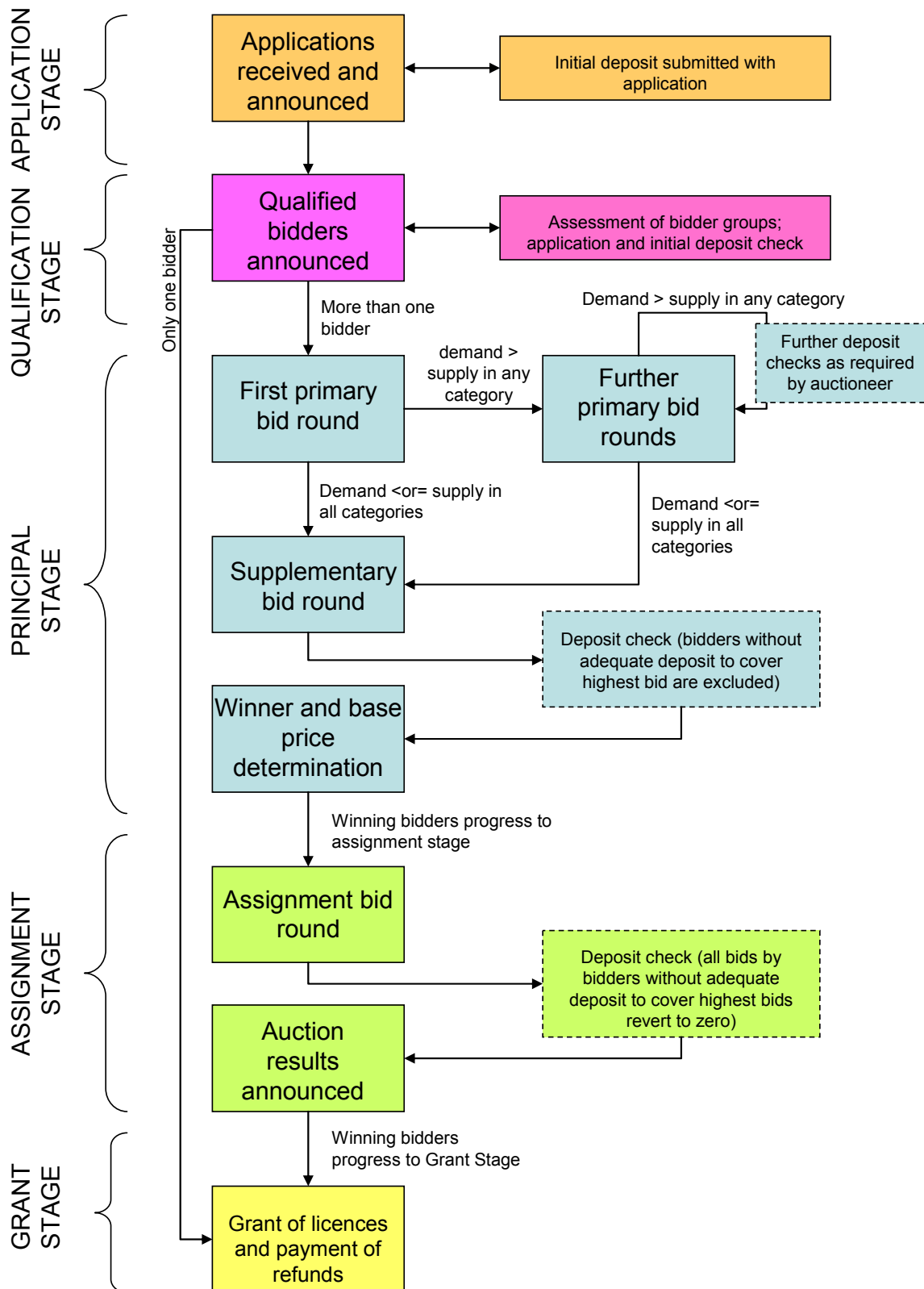
- **Supplementary bids round.** The second phase is the supplementary bids round, which always follows the primary bid rounds. This is a single round sealed bid process, in which bidders have the opportunity to make multiple, mutually exclusive bids for packages of lots across categories, subject to constraints created by their primary round bids. In the case that bidders have submitted a primary bid that included unpaired lots or include a supplementary bid that contains unpaired lots, they will also be allowed to submit further bids for the same packages contingent on unpaired spectrum being split between the upper and lower areas. Before the supplementary bids round closes, bidders must top up their deposits, such that they have on deposit a specified proportion (not required to be greater than 50%) of their highest bid made across both the primary bid rounds and the supplementary bids round.

Ofcom then identifies the highest value combination of bids that can be accommodated, drawing on all valid bids from the primary and supplementary bids rounds and taking at most one bid from each bidder in that combination. This determines the number of lots in each category that each bidder will win. A 'base price' for each winning bid is also identified. The outcome determines the allocation of lots between paired and unpaired in the 2.6GHz band, whether there are split awards for unpaired lots and the number of guard blocks, if required.

- **Assignment Stage.** This stage determines how the available frequencies within the 2.6GHz band that are assigned to paired, unpaired and guard blocks are distributed amongst the winning bidders from the Principal Stage (the winner of the 2010-2025MHz lot having already been determined). Bidders participate in two parallel, sealed bid auctions for the paired lots and unpaired lots, and can make 'assignment round bids' for particular ranges of frequencies compatible with the number of lots that they won in the Principal Stage. The guard blocks, if there are any, are included in selected bid options. Ofcom then identifies the highest value combination of bids that can be accommodated, subject to all bidders being assigned contiguous paired and contiguous unpaired frequencies (or two blocks of contiguous unpaired frequencies in the case of a split award). A final price for each bidder is also identified, which combines the base price and any additional prices arising from the Assignment Stage.
- **Grant Stage.** After the conclusion of the Assignment Stage, the award progresses to the Grant Stage, in which payments are finalised, licences are granted and the auction results are published.

A6.4 The flow chart in Figure 3 provides an overview of the whole process. In the following sections, we explain how the usage rights in the 2.6GHz band are determined, and describe the auction rules and procedures for each stage in detail.

Figure 3: Flow chart showing key stages in the auction process



### Usage rights in the 2.6GHz band

A6.5 All lots in the 2.6GHz band are available for award. Depending on the outcome of the Principal Stage, each lot could be allocated for paired use ('paired 2.6GHz lot'), for unpaired use ('unpaired 2.6GHz lot') or as a guard block.

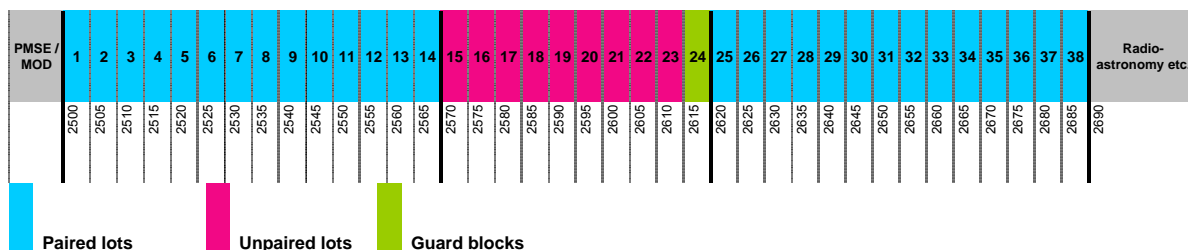
A6.6 Table 8 shows the feasible trade-offs between paired 2.6GHz lots, unpaired 2.6GHz lots and guard blocks in the 2.6GHz band.

**Table 8: Trade off between unpaired and paired lots in the 2.6GHz band**

Outcome	Unpaired lots (1x5MHz)					Paired lots (2x5MHz)			Guard blocks (1x5MHz)
	Total no. of lots	Lower area		Upper area		Total no. of lots	Uplink	Downlink	No. of lots
		No. of lots	Frequencies	No. of lots	Frequencies				
1	9	9	2570-2615	0	-	14	2500-2570	2620-2690	1
2	10	10	2565-2615	0	-	13	2500-2565	2620-2685	2
3	13	11	2560-2615	2	2680-2690	12	2500-2560	2620-2680	1
4	15	12	2555-2615	3	2675-2690	11	2500-2555	2620-2675	1
5	17	13	2550-2615	4	2670-2690	10	2500-2550	2620-2670	1
6	19	14	2545-2615	5	2665-2690	9	2500-2545	2620-2665	1
7	21	15	2540-2615	6	2660-2690	8	2500-2540	2620-2660	1
8	23	16	2535-2615	7	2655-2690	7	2500-2535	2620-2655	1
9	25	17	2530-2615	8	2650-2690	6	2500-2530	2620-2650	1
10	27	18	2525-2615	9	2645-2690	5	2500-2525	2620-2645	1
11	29	19	2520-2615	10	2640-2690	4	2500-2520	2620-2640	1
12	31	20	2515-2615	11	2635-2690	3	2500-2515	2620-2635	1
13	33	21	2510-2615	12	2630-2690	2	2500-2510	2620-2630	1
14	35	22	2505-2615	13	2625-2690	1	2500-2505	2620-2625	1
15	38	24	2500-2620	14	2620-2690	0	-	-	0

A6.7 For example, Figure 4 illustrates outcome 1 from Table 8 in which the spectrum is allocated as nine unpaired 2.6GHz lots (blocks 15-23), 14 paired 2.6GHz lots (uplink blocks 1-14 and downlink blocks 25-38) and one guard block (block 24).

**Figure 4: Outcome 1 from Table 8 (9 unpaired lots and 14 paired lots)**



A6.8 If demand for unpaired 2.6GHz lots in the auction is sufficient to displace some of the paired lots, the lower boundary between paired and unpaired 2.6GHz lots shifts downwards. Additional unpaired spectrum is created at the expense of paired uplink



spectrum. This also frees up the corresponding paired downlink spectrum at the top of the band, which creates further unpaired spectrum.

- A6.9 Typically, for each paired 2.6GHz lot (uplink and downlink) that is removed, an additional two unpaired 2.6GHz lots can be created, one in the lower area and one in the upper area. There are two exceptions to this rule:
- In the case that 13 paired lots are allocated (blocks 1-13 paired with blocks 25-37), only one additional unpaired lot will be created (block 14) since there is insufficient spectrum at the top of the band to create the required 5MHz separation between paired and unpaired use (see below). In this case, block 38 will also be designated as a guard block.
  - In the case that all spectrum is allocated as unpaired lots, then there is no longer a requirement for a guard block between paired and unpaired 2.6GHz lots. In this case, an additional unpaired 2.6GHz lot (block 24) can be allocated.
- A6.10 In order to prevent undue interference between adjacent unpaired applications, and between adjacent unpaired and paired applications, it is necessary to have a 5MHz separation in each of these cases. This is achieved in two ways:
- For each unpaired winner, the lowest frequency lot that they are awarded will be subject to specific usage restrictions designed to protect adjacent unpaired or paired use. In the case that a bidder wins unpaired lots split into two contiguous blocks, one in the lower unpaired area and one in the upper unpaired area, then the lowest frequency lot in both blocks will be subject to restrictions.
  - Up to two of the 38 lots will be designated as guard blocks and will not be available in the Principal Stage of the auction:
    - Block 24 (in all cases, except where all spectrum is awarded as unpaired lots);
    - Block 38 (only in the case that exactly 10 unpaired lots are awarded in the lower unpaired area and 13 paired lots are awarded).
- A6.11 For example, Figure 5 illustrates selected outcomes from Table 8. Outcome 2 illustrates the case where there are 13 paired 2.6GHz lots and 10 unpaired 2.6GHz lots, in which case a guard block is required in block 38, as well as block 24. Outcome 7 illustrates the case where there are 8 paired 2.6GHz lots and 21 unpaired 2.6GHz lots, in which case the only guard block is block 24. Finally, outcome 15 illustrates the case where all 38 blocks are allocated to unpaired 2.6GHz use, in which case there are no guard blocks.



group are also associates of another applicant. Ofcom will itself consider whether any members of one bidder group are also members of another bidder group.

A6.17 Where Ofcom identifies such common membership it will notify the applicants concerned and specify a date by which all the common memberships must be resolved. We also plan to update the rules in order to allow an associate to 'opt out' of a bidder group, subject to Ofcom's consent, provided that the associate and that bidder group's bidder undertake that:

- they have not exchanged, are not exchanging and will not exchange any confidential information; and
- the associate, its Directors and employees have not been, are not and will not be involved in any decisions concerning the award, in respect of that bidder.

A6.18 Ofcom will next determine which applicants are qualified to bid in the auction. An applicant may not qualify if a member of its bidder group is also a member of another bidder group. Ofcom will also take into account a number of other matters, i.e. whether:

- the grant of a licence to an applicant would be likely to prejudice national security;
- the applicant is a fit and proper person to hold a Licence;
- the applicant has submitted false or misleading information;
- the applicant or any member of its bidder group has colluded or attempted to collude or is colluding or attempting to collude with any other person to distort the outcome of the award process, or has acted or is acting to distort the outcome of the award process;
- the applicant or any member of its bidder group, or any person to whom confidential information has been disclosed, has disclosed, or is disclosing or attempting to disclose or has incited or is inciting another person to disclose confidential information to anyone other than to a member of its bidder group, Ofcom, a provider of finance (where the disclosure was for the purpose of raising finance for the application), or a person considering whether to join the bidder group of the applicant;
- the applicant or any member of its bidder group has received or is obtaining or attempting to obtain confidential information relating to another applicant;
- the applicant or any member of its bidder group is receiving or attempting to receive services in relation to the award process from anyone who has provided or is providing services to Ofcom in relation to the award process (for these purposes the advisers are Allen & Overy LLP, DotEcon Ltd, Professor Peter Cramton of the University of Maryland and Dr Ian Jewitt of Nuffield College); or
- any member, or director or employee of a member of the applicant's bidder group who is also a director or employee of a member of another applicant's bidder group is taking part in the preparation of both bidder groups for participation in the award process or receiving confidential information relating to both bidder groups.

- A6.19 Ofcom will notify each applicant of whether it has qualified to bid in the auction and of the last day on which applicants who have qualified may withdraw their application without forfeiting their initial deposit.
- A6.20 After the last day for withdrawal, Ofcom will publish on its website the names of all applicants qualified to participate in the auction who have not withdrawn and announce the procedure it will follow for award of the licences (depending on the number of bidders).

### **If there are no bidders**

- A6.21 If there are no bidders, there will be no auction and Ofcom will consider an alternative award process.

### **If there is only one bidder**

- A6.22 If there is only one bidder, there will be no auction and the bidder will be entitled to select the frequency lots it wishes to purchase from a defined set of options. Ofcom will send the bidder a licence selection menu and notify the date and time by which the completed menu must be returned.
- A6.23 In the completed menu the bidder must indicate the number of frequency lots it wishes to purchase in each of the three categories. Its menu may comprise:
- one unpaired lot covering the frequencies 2010-2025MHz; and/or
  - between one and nine contiguous paired 2.6GHz lots immediately above 2500MHz (and corresponding blocks immediately above 2620MHz); and/or
  - between two and twenty unpaired 2.6GHz lots immediately below 2615MHz (and possibly immediately below 2690MHz).
- A6.24 The total amount of lots selected across all three categories must have an associated number of eligibility points between 1 and 16 points inclusive. If the bidder selects paired 2.6GHz lots, it will be awarded the contiguous frequencies immediately above 2500MHz and 2620MHz corresponding to the number of lots that it selected. If the bidder selects between two and eleven unpaired 2.6GHz lots, it will be awarded the contiguous frequencies immediately below 2615MHz corresponding to the number of lots that it selected. It will also be awarded the guard block at block 24.
- A6.25 If the bidder selects more than eleven unpaired 2.6GHz lots, it will receive a split award consisting of one contiguous range of frequencies in the lower unpaired area and one contiguous range in the upper unpaired area. The lowest 5MHz lot in each unpaired range will be subject to usage right restrictions. Specifically, depending on the number of lots selected, the bidder will either be allocated a specific set of frequencies or given a choice between two specific sets of frequencies, as follows<sup>37</sup>:
- if 12 lots, the blocks 14-23 (2565-2615MHz) and blocks 37-38 (2680-2690MHz), with additional restrictions on blocks 14 and 37;

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<sup>37</sup> In all cases, again the bidder will also be awarded lot 24.

- if 13 lots, the blocks 13-23 (2560-2615MHz) and blocks 37-38 (2680-2690MHz), with additional restrictions on blocks 13 and 37;
- if 14 lots, either the blocks 12-23 (2555-2615MHz) and blocks 37-38 (2680-2690MHz), with additional restrictions on blocks 12 and 37; or the blocks 13-23 (2560-2615MHz) and blocks 36-38 (2675-2690MHz), with additional restrictions on blocks 13 and 36;
- if 15 lots, the blocks 12-23 (2555-2615MHz) and blocks 36-38 (2675-2690MHz), with additional restrictions on blocks 12 and 36;
- if 16 lots, either the blocks 11-23 (2550-2615MHz) and blocks 36-38 (2675-2690MHz), with additional restrictions on blocks 11 and 36; or blocks 12-23 (2555-2615MHz) and blocks 35-38 (2670-2690MHz), with additional restrictions on blocks 12 and 35;
- if 17 lots, the blocks 11-23 (2550-2615MHz) and blocks 35-38 (2670-2690MHz), with additional restrictions on blocks 11 and 35;
- if 18 lots, either the blocks 10-23 (2545-2615MHz) and blocks 35-38 (2670-2690MHz), with additional restrictions on blocks 10 and 35; or blocks 11-23 (2550-2615MHz) blocks 34-38 (2665-2690MHz), with additional restrictions on blocks 11 and 34.

A6.26 The licence fee will be the sum of the reserve prices for each frequency lot comprised in the licence.

A6.27 The bidder must pay the licence fee into Ofcom's bank account and return the completed licence selection menu by the date and times notified. Where the bidder has not forfeited its initial deposit this will be offset against the licence fee.

A6.28 After Ofcom receives the completed licence selection menu and relevant licence fee, it will grant the bidder a licence for the frequency range or ranges selected. If the selection menu has not been completed in accordance with the paragraphs above or is unclear or illegible Ofcom will ask the bidder for confirmation of the bidder's intentions.

A6.29 If the bidder fails, by the date and the times specified, to return the completed licence selection menu to Ofcom or to pay the licence fee, it will forfeit its initial deposit and not be entitled to the grant of a licence.

### **If there is more than one bidder**

A6.30 In the case that there are two or more bidders the award progresses to the Principal Stage.

A6.31 Prior to the Principal Stage, Ofcom will supply bidders with the digital certificates, usernames and passwords necessary to access the electronic auction system (described below). Bidders will be supplied with a user manual for the electronic auction system. Bidders will also receive a set of one-time passwords for authenticating any communication they may initiate with Ofcom during the auction (see later).

## The Principal Stage

A6.32 The Principal Stage consists of one or more primary bid rounds followed by a supplementary bids round.

### The primary bid rounds

A6.33 The primary bid rounds follow a clock auction format. The auction proceeds in discrete rounds, with all bidders making bids within the same fixed time window (subject to the provisions for extensions, described further below). In any given primary bid round, a single bid for a single package of lots can be made by each bidder, at the prevailing round prices. Bids for packages containing unpaired 2.6GHz lots are contingent on these lots being fully contiguous within either the lower or upper unpaired areas. Bidders complete an electronic bid form specifying the number of lots they demand in each category at the prevailing round prices (the number of lots cannot exceed the total available for each category and the total number of lots demanded across all categories must have an associated eligibility of no more than 16). This bid is for a package of lots; it will only be considered in its entirety and will not be subdivided.

A6.34 In the first round, bidders must bid for at least the one 2010-2025MHz lot or one paired 2.6GHz lot or two unpaired 2.6GHz lots. If, in any subsequent primary bid round, a bidder decides that it does not wish to continue bidding it should submit a bid for zero lots in each category; this will avoid the bidder being given an unnecessary extension by the electronic auction system (see further details below).

### Scheduling primary bid rounds

A6.35 Primary bid rounds are scheduled at Ofcom's discretion. There is no minimum or maximum round length. However, Ofcom does not anticipate running primary bid rounds of less than 10 minutes or greater than 2 hours. The rounds will be scheduled between 10am and 5pm on UK business days. There is no upper bound on the number of rounds per day, although Ofcom does not anticipate running more than 12 rounds in a single day.

A6.36 Bidders must be notified of the start time of a round at least 15 minutes before it starts. With the next round start time, each bidder will also be given information about:

- the duration of the round;
- the round prices that will apply to lots in each category;
- their eligibility to bid in the round (expressed as a number of eligibility points); and
- their number of remaining extension rights.

### Primary bid round prices and price increases

A6.37 In the first primary bid round, the price per lot for each category will be set equal to the reserve price for that category. In subsequent rounds:

- For unpaired 2.6GHz lots, the primary round price per lot will be increased if there is both (a) excess demand for the 2.6GHz band as a whole and (b) demand for

unpaired lots exceeds nine. If either of these conditions does not hold, the round price will remain unchanged.

- For paired lots, the primary round price per lot will be increased if there is excess demand for the 2.6GHz band as a whole or if demand for paired lots exceeds 14. If neither of these conditions hold, the round price will remain unchanged. These rules are designed to ensure that whenever demand for unpaired 2.6GHz lots exceeds nine, the primary round price for a paired 2.6GHz lot is always twice the price of an unpaired 2.6GHz lot.
- For the unpaired 2010-2025MHz lot, the primary round price per lot will be increased if there is excess demand for that lot. If this condition does not hold, the round price will remain unchanged.

A6.38 For the 2.6GHz band as a whole, excess demand means a combined demand for paired 2.6GHz and unpaired 2.6GHz lots that exceeds the total supply of lots in the case that no split award of unpaired lots is possible.<sup>38</sup>

A6.39 It is not possible for the price of lots in any category to fall during the primary bid rounds.

A6.40 The amount by which prices increase from round to round for each category, subject to paragraph A1.37, will be at Ofcom's discretion. A maximum increase of 100% of the previous round price shall apply for each category, with one exception described below. All bid amounts will be in units of a thousand pounds.

A6.41 In practice, we expect to use this discretion to set larger price increases for categories where there is a greater level of excess demand. In judging this, excess demand as a proportion of the number of available lots is likely to be a useful metric.

A6.42 If the demand for unpaired 2.6GHz lots is less than or equal to nine, then no bid increment will apply to this category, so the price ratio of paired to unpaired lots may rise above 2:1. The exception referred to above applies if, in a later round of the auction, demand for unpaired 2.6GHz lots rises above nine, because then a sufficient price increase will be applied in the subsequent round to restore the 2:1 price ratio; in this case, the price increase could, if necessary, exceed 100% of the previous round price for unpaired 2.6GHz lots only.

### Activity rule and eligibility points

A6.43 Each category of lots in the auction has an associated number of eligibility points per lot. Any bid for a package of lots also has an associated 'activity' level that is determined by the sum of the eligibility points associated with all the lots in that package. As illustrated in Table 7: the 2010MHz lot has an associated eligibility of 2 points; each 2.6GHz paired lot has an associated eligibility of 2 points; and, in the primary bid rounds, a bid for two or more 2.6GHz unpaired lots has an associated eligibility of  $n - 1$  points, where  $n$  is the number of unpaired 2.6GHz lots in the bid.

A6.44 Ofcom will determine the initial eligibility for each bidder based on the size of their deposit at a fixed date and time prior to the first round of the auction. Each bidder

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<sup>38</sup> A split award describes an outcome where a bidder winning 2.6GHz unpaired lots is allocated its spectrum in two contiguous blocks, one in the lower unpaired area and one in the upper unpaired area.

receives 1 eligibility point per whole £50,000 of deposit. For example, a bidder with a deposit of £500,000 would have an initial eligibility of 10 points.

- A6.45 The minimum initial eligibility is 2 points, which would be sufficient to bid for either the 2010MHz lots, one paired 2.6GHz lot or up to three unpaired 2.6GHz lots (one of which would necessarily be a restricted unpaired lot). The minimum bid amount in the first primary bid round is £100,000, which corresponds to the reserve price of the 2010MHz lot, one paired lot or two unpaired 2.6GHz lots. Accordingly, the minimum deposit necessary to participate in the primary bid rounds is £100,000. Qualified applicants with less than £100,000 deposit at the specified time and date will be excluded from the auction.<sup>39</sup>
- A6.46 The maximum initial eligibility is 16 points, regardless of the level of a bidder's deposit. Thus, a bidder with a deposit of £800,000 or any amount larger than this would have an initial eligibility of 16 points. The maximum applies throughout the Principal Stage.
- A6.47 From the second primary bid round onwards, each bidder's eligibility is determined by their activity in the previous round. Specifically, each bidder's eligibility in any round from round 2 onwards is equal to the number of eligibility points associated with their bid in the previous round. For example, assume that Fred had an eligibility of twelve in round 8. He bids for a package consisting of two paired 2.6GHz lots, five unpaired 2.6GHz lots and the 2010-2025MHz lot. The number of eligibility points associated with his package bid is ten (four + four + two), so his eligibility in round 9 would fall to ten.
- A6.48 In any primary bid round of the auction, bidders can only bid for a package of lots with an associated number of eligibility points that is less than or equal to their eligibility in that round. Thus, over successive primary bid rounds, a bidder's eligibility can stay the same or fall, but can never increase.
- A6.49 As the primary bid rounds progress, bidders may switch eligibility between categories of lots. Therefore, it is possible that a bidder's activity in one or two categories may increase, provided that the bidder's activity in other categories is sufficiently reduced.
- A6.50 Any package bid specifying demand for unpaired 2.6GHz lots must contain at least two lots in this category. This means that the minimum number of eligibility points associated with any package bid is one point.

### Deposits and eligibility

- A6.51 During the primary bid rounds, Ofcom may, at any point and on any number of occasions, announce a deadline by which time bidders must have raised their deposit to a level that is at least X% of their highest bid up to that point in the auction, where X will be set at 50% at the beginning of the primary bid rounds and may be reduced during later primary bid rounds. If the announcement is made before 2pm on a business day, then the deposit deadline will be no earlier than midnight on the following business day (e.g. if the announcement was made at 1pm on Tuesday, the deadline for increasing deposits would be no earlier than midnight on Wednesday). If the announcement is made at any other time, the deadline will be no earlier than midnight on the next business day after the following business

<sup>39</sup> As the initial deposit is set at £100,000, it is only possible for a bidder to be excluded for having an inadequate deposit in the case that it has forfeit all or part of its initial deposit.



day (e.g. if the announcement was made at 3pm on Thursday, the deadline would be no earlier than midnight on Monday).

- A6.52 If a bidder does not meet a deadline for increasing its deposit, its eligibility will be reduced to zero in the next round after the deadline and it will in consequence not be able to submit any further primary round bids. Such a bidder will, however, still be able to participate in the supplementary bids round, subject to the constraints on bids implied by its eligibility dropping to zero in the relevant primary bid round (see below for further explanation on supplementary bids) and subject to meeting the rules on making bid deposits to support its supplementary bids. Specific deposit requirements will apply in the supplementary bids round to a bidder that fails to increase its deposit to the required level during the primary bid rounds.
- A6.53 For example, consider a bidder that had eligibility of 12 points in round 8 but then did not raise its deposit as required by Ofcom. Its eligibility would drop to zero in round 9, that being the next round after the deadline for increasing deposits. In the supplementary bids round, the bidder would still be able to make bids for packages with eligibility between 1 and 12 points inclusive, but its maximum bids for such packages would be capped on the basis of the prices for each category of lots that applied in round 9. For the avoidance of doubt, the bidder's bids in round 8 would be valid for the purpose of determining bid totals, i.e. the bids are taken into account in determining whether there should be another primary bid round and, if there is another round, whether the round price should be raised in a particular category.

### Submitting primary round bids

- A6.54 Primary round bids are submitted using the electronic auction system (save in exceptional circumstances, as described below). There is a two-step process for submitting bids:
- in the first step, bidders input their bid for checking by the electronic auction system; and
  - in the second step, a valid bid is formally submitted.
- A6.55 To make a bid, bidders select the number of lots in each category that they wish to include in their package. Within the electronic bid form, bidders will be presented with drop-down boxes to select the number of lots to be included in their package; the choices available within these drop-down boxes will be subject to the following constraints:
- the number of paired 2.6GHz lots must be between zero and eight;
  - the number of unpaired 2.6GHz lots must be either zero or between two and 17; and
  - the number of unpaired 2010-2025MHz lots must be either zero or one.
- A6.56 Note that each bid will also be subject to an eligibility cap of 16 points across all categories. Where a bidder does not wish to include any lots from a particular category in its package, the bidder should set the number of lots for that category to zero. It is not possible to include a single unpaired 2.6GHz lot in a package; if any unpaired 2.6GHz lots are included, then at least two must be included.

- A6.57 The amount of a primary round bid is determined by (a) for each category, multiplying the number of lots selected in that category by the relevant current round price; and (b) adding these values together. Bidders first choose the package that will be subject to a primary round bid then place their bid for the corresponding amount determined by the round prices.
- A6.58 Once a bidder has selected the package to be subject to a primary round bid, it must input this for checking by the electronic auction system. The electronic auction system will not allow bidders to submit a primary bid for a package that has associated eligibility points in excess of a bidder's eligibility limit. It will also warn bidders if a proposed bid would meet this requirement but would result in that bidder having lower eligibility in the next round. In either case, bidders will be able to return to the bid entry form to revise their bid.
- A6.59 Once a bid has been checked and has been confirmed as meeting the eligibility requirements, the screen will display the 'bid submission form', which provides a statement of the bid. A bidder can then formally submit this bid. Alternatively, the bidder could return to the bid entry form to revise its bid (in which case the bidder would need to check its bid once more before it could be submitted).

### Extensions

- A6.60 An extension right allows a bidder additional time in which to submit a primary round bid. In the event that a bidder with non-zero eligibility and one or more remaining extension rights fails to submit a bid during a primary bid round, the round will automatically be extended for that particular bidder and one of its remaining extension rights deducted. The electronic auction system will give that bidder a revised deadline for submitting a primary round bid 30 minutes later than the original round deadline.
- A6.61 The extension period lasts at most 30 minutes, but may terminate earlier once all bidders using extensions have successfully submitted their bids. The extension period only applies to bidders that failed to submit their bid during the normal round time, have one or more available extension rights and non-zero eligibility. Bidders who have submitted a decision already during the round cannot take any further action during the extension period; they will be told that the round has been extended and should wait for the announcement that the extension period has ended. Bidders who have not submitted a bid during the primary bid round and have no remaining extension rights will not be able to enter a bid during the extension period; such bidders will lose all eligibility to bid in further primary bid rounds.
- A6.62 Each bidder starts the auction with two extension rights. Each time the bidder fails to submit a bid in a primary bid round before the deadline and an extension period is triggered for that bidder, the number of extension rights available for that bidder in subsequent primary bid rounds is reduced by one.
- A6.63 Additional extension rights may be granted either to all bidders or to individual bidders at Ofcom's absolute discretion. Additional extension rights can ONLY be granted in the periods between primary bid rounds. They cannot be granted during a primary bid round.
- A6.64 Extension rights are provided to bidders as an emergency tool in case, owing to unforeseen circumstances, they are unable to submit a bid during a primary bid round. The overall intention of extension rights is to provide a backup against

technical failures, rather than to provide bidders with extra time to consider their decisions. For example, if a bidder has problems with its Internet connection and cannot access the auction system, it can use an extension right. In the event of significant problems that prevented a number of bidders accessing the electronic auction system, we would envisage using our exceptional powers to reschedule or re-run a primary bid round, rather than relying on extension rights.

- A6.65 A bidder may notify Ofcom that it is unable to submit a bid during a primary bid round and is likely to require an extension period; notification is not mandatory but would assist administration of the process, especially where the bidder might be having problems accessing the electronic auction system and needs to make use of the procedures described in the following section.

### Submission of primary round bids in exceptional circumstances

- A6.66 Where a bidder is unable to submit a primary round bid using the electronic auction system, it should seek in advance Ofcom's permission to submit a bid using either fax or email. A bidder may seek such permission before the start of a round or during a round or during an extension period. Where Ofcom grants permission, the bidder must submit its bid using the agreed mechanism, i.e. either fax or email (in these circumstances bids submitted by the electronic auction system will not be accepted unless Ofcom has expressly agreed) and within the deadline specified by Ofcom. Ofcom may grant such permission for a single round or for all rounds during a day or for a specified period.
- A6.67 In the event that a bidder submits multiple bids by fax or email, only the first bid received will be accepted. A bid must specify the number of lots in each category that the bidder accepts to purchase at the primary bid round prices prevailing in that round. Any bid made by fax or email will be subject to password verification.
- A6.68 If a bid submitted by fax or email exceeds the bidder's eligibility, is illegible or unclear, the bid will be invalid and the bidder's eligibility in the following round will fall to zero and, as a consequence, it will not be able to submit any further primary round bids. However, the bidder will be able to participate in the supplementary bids round, subject to the constraints on bids implied by its eligibility dropping to zero in the relevant primary bid round and subject to meeting the rules on making bid deposits to support its supplementary bids.

### Information available during the primary bid rounds

- A6.69 Before the start of the first primary bid round, each bidder will be notified of their own initial eligibility. This information will not be provided to other bidders. Further, Ofcom proposes not to announce the aggregate level of initial eligibility across all bidders.
- A6.70 At the end of each primary bid round, Ofcom will reveal to each bidder:
- aggregate demand for lots in each category;
  - anonymised information about the packages bid on by each individual bidder (number of lots in each category in that round); and
  - information about a bidder's own bids, their eligibility in the next round, the amount of that bidder's highest bid in the auction to date, and how many extension rights the bidder has remaining.

A6.71 The electronic auction system includes a history function that will allow bidders to view and download information about aggregate and anonymised individual demand in previous rounds and about their own bids.

### End of the primary bid rounds

A6.72 The primary bid rounds end when there is a round in which:

- there is no excess demand for the 2010-2025MHz lot; AND
- no excess demand for lots in the 2.6GHz band as a whole subject to the conditions that:
  - all remaining demand for contiguous unpaired lots could be met without resorting to a split award; AND
  - there is no excess demand for paired lots.

At this point, Ofcom will announce that the primary bid rounds have finished and that the auction will progress to the supplementary bids round.

A6.73 In addition, following the close of a primary bid round, Ofcom may announce that it is terminating the primary rounds early (i.e. while demand is still above supply in one or more categories). In this case, the auction will proceed directly to the supplementary bids round, as described further below, and there will be no further primary bid rounds. Ofcom will only terminate the primary rounds early if it believes that proceeding directly to the supplementary bids round at this time is in the general interest of running an efficient award process.

### **The supplementary bids round**

A6.74 In the supplementary bids round, bidders may submit a number of bids for packages of lots, subject to respecting the eligibility restrictions resulting from their bids in the primary bid rounds. This round provides an opportunity for bidders to bid for packages of lots that they were eligible to bid on in the primary bid rounds but that they did not bid for, and also to express the maximum amount they are willing to pay for packages that they bid on in a primary bid round, subject to their eligibility constraints. It also provides an opportunity for bidders to make bids for the same packages of lots contingent on any unpaired 2.6GHz lots being subject to split awards in specific configurations.

A6.75 All bids received from bidders in both the primary bid rounds and the supplementary bids round are then considered together to determine the winners of the Principal Stage and whether split awards will be part of the winning combination of bids.

A6.76 Unlike the primary bid rounds, bidders must choose the amount of any supplementary bids they make. These amounts are subject to a minimum and in some cases a maximum as described below. All bid amounts must be in units of a thousand pounds.

### Scheduling the supplementary bid round

A6.77 The start time and duration of the supplementary bids round will be announced by Ofcom after the completion of the primary bid rounds. There will be at least one clear business day in between the last primary round and the supplementary bids

round. Ofcom has discretion over the time and duration of the round. However, Ofcom anticipates that the round will take place between 10am and 5pm on a single business day, and last for at least 2 hours and no more than 7 hours.

### Restrictions on supplementary bids

A6.78 All supplementary bids are bids for distinct packages or configurations of lots from one or more of the three categories of lots. There are two types of supplementary bids that a bidder can submit:

- **Standard supplementary bids** – These are bids that either contain no unpaired 2.6GHz lots or include unpaired 2.6GHz lots contingent on these being assigned in a single contiguous range (i.e. no split award). Each standard supplementary bid must be for a distinct package of lots. These may be packages for which the bidder has already submitted a primary bid.
- **Split supplementary bids** – For every package bid made in the primary and supplementary bid rounds that contains 3 or more unpaired 2.6GHz lots, a bidder will also be eligible to make ‘split supplementary bids’ for the same package of lots *plus one extra unpaired lot*, contingent on it receiving a particular pattern of split award (i.e. some lots in the lower unpaired area and some in the upper unpaired area). Put differently, a bidder that submits a primary or standard supplementary bid that includes  $n$  unpaired lots will be allowed to make a split supplementary bid that includes  $n+1$  unpaired lots.<sup>40</sup> Note that, in this case, the lowest 5MHz block in both the lower and upper unpaired area would be subject to restricted usage rights.

A6.79 There is no limit on the number of supplementary bids (standard or split) that a bidder can submit (although it can only make one bid for each unique combination of lots). The number of split supplementary bids that can be made corresponding to one particular primary or standard supplementary bid depends on the number of unpaired lots in the bid. For example, a bidder that bid for a package containing seven contiguous unpaired lots, could also bid for the following split award options:

- 4 lots in one area and 4 lots in the other area;
- 5 lots in one area and 3 lots in the other area; and/or
- 6 lots in one area and 2 lots in the other area.

A6.80 Similarly, a bidder that bid for a package containing ten contiguous unpaired lots, could also bid for the following split award options:

- 6 lots in one area and 5 lots in the other area;
- 7 lots in one area and 4 lots in the other area;
- 8 lots in one area and 3 lots in the other area; and/or
- 9 lots in one area and 2 lots in the other area.

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<sup>40</sup> In both cases, the eligibility associated with these packages will be capped at 16 points.

- A6.81 As with primary bids, the bidder is not allowed to specify which lots will be in the lower area and which lots will be in the upper area. It is also not allowed to make a bid that specifies just one lot or no lot in either area.
- A6.82 All supplementary bids must exceed the sum of the reserve prices for the component lots within the package.
- A6.83 Some standard supplementary bids are subject to an upper bound on the amount bid. For the purposes of determining whether upper bound restrictions apply to a bid made by a particular bidder, a distinction is made between:
- bids for packages that have associated eligibility points which are less than or equal to the bidder's activity in the final primary bid round; and
  - bids for packages that have associated eligibility points that exceed the bidder's activity in the final primary bid round.
- A6.84 For standard supplementary bids for packages with eligibility points equal to or below the bidder's activity in the final primary bid round, there is no restriction on the maximum amount bid.
- A6.85 For standard supplementary bids for packages with eligibility points above the bidder's activity in the final primary bid round, the bid amount cannot exceed the price that would have applied to that package in the round where the bidder was last eligible to bid on that package.
- A6.86 A simple example makes this clear.
- Suppose that in round 8, the price per unpaired 2.6GHz lot was £150,000, the price per paired 2.6GHz lot was £300,000, and the price for the 2010-2025MHz lot was £250,000. Suppose that a bidder submitted a bid for a package of six unpaired 2.6GHz lots and two paired 2.6GHz lots. Thus, its total activity in round 8 was nine points.
  - Now suppose that in round 9, the price per unpaired 2.6GHz lot is increased to £160,000, the price per paired 2.6GHz lot is increased to £320,000 but the price for the 2010-2025MHz lot remains unchanged at £250,000. Then consider two cases according to the bids made from round 9 onwards:
    - i) The bidder continues to bid on six unpaired 2.6GHz lots and two paired 2.6GHz lots until the end of the primary bid rounds;
    - ii) The bidder reduces its demand to four unpaired 2.6GHz lots and two paired 2.6GHz lots in round 9.
  - In the first case, activity was maintained at nine points throughout the primary bid rounds, so there is no limit on the amount of a standard supplementary bid that the bidder could make for packages of lots with associated eligibility points less than or equal to nine points.
  - In the second case, activity declined from nine points to seven points in round 9, so the bidder's eligibility from round 10 onwards was reduced to seven points. Any standard supplementary bids for packages of lots with an aggregate eligibility of nine or eight points would be capped according to the prices in round 9, as this is the last round when the bidder was eligible to bid on packages with these

eligibilities. For example, the bidder could submit supplementary bids for packages such as:

- i) Ten unpaired 2.6GHz lots at a price not exceeding £1,600,000 (10\*£160,000);
- ii) Four unpaired 2.6GHz lots, two paired 2.6GHz lots and the 2010-2025MHz lot at a price not exceeding £1,530,000 (4\*£160,000 + 2\*£320,000 + £250,000);
- iii) Nine unpaired 2.6GHz lots at a price not exceeding £1,440,000 (9\*£160,000); and
- iv) Eight unpaired 2.6GHz lots and the 2010-2025MHz lot at a price not exceeding £1,530,000 (8\*£160,000 + £250,000)

A6.87 For split supplementary bids for packages containing n+1 unpaired 2.6GHz lots, the bid amount must be less than or equal to the bidder's highest standard supplementary or primary round bid for a package containing n unpaired 2.6GHz lots and the same number of other lots (if any), with one exception. The exception is the case that this maximum amount is less than the reserve price for the number of lots in the package.<sup>41</sup> In this case the split supplementary bid amount must be exactly equal to the reserve price of the component lots.

A6.88 For example, suppose that the bidder in the previous example intends to make a standard supplementary bid for eight unpaired 2.6GHz lots and the 2010-2025MHz lot at a price of £1,530,000. In this case, the bidder could also submit the following split supplementary bids for this package:

- five unpaired 2.6GHz lots in one area and four in the other area, plus the 2010-2025MHz lot at a price greater than or equal to £550,000 and not exceeding £1,530,000;
- six unpaired 2.6GHz lots in one area and three in the other area, plus the 2010-2025MHz lot at a price greater than or equal to £550,000 and not exceeding £1,530,000; and/or
- seven unpaired 2.6GHz lots in one area and two in the other area, plus the 2010-2025MHz lot at a price greater than or equal to £550,000 and not exceeding £1,530,000.

### Preparing supplementary bids

A6.89 The electronic auction system includes a supplementary bids management tool that bidders can use to maintain and revise a list of provisional supplementary bids (including both standard supplementary bids and split supplementary bids) throughout the primary and supplementary bids rounds. This system also provides information about all primary round bids submitted by the bidder and the constraints on supplementary bids deriving from these bids.

A6.90 The management tool is provided purely for the convenience of bidders. No provisional bids entered into the system will be visible to Ofcom or any other bidder.

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<sup>41</sup> This is possible because the split supplementary bid will contain one more unpaired 2.6GHz lot than the equivalent standard supplementary bid or primary round bid.

### Submitting supplementary bids

- A6.91 Supplementary bids are submitted using the electronic auction system within the specified timing for the supplementary bids round. The submission procedure is a two-step process, which is similar to that for the primary bid rounds:
- in the first step, bidders may prepare a list of supplementary bids (including both standard supplementary bids and split supplementary bids) which they enter for checking by the electronic auction system; and
  - in the second step, bids are displayed on a 'bid submission form', which should be formally submitted.
- A6.92 Any provisional supplementary bids stored by a bidder using the management tool, together with the bids they made for packages in the primary bid rounds, will be available as a starting point for compiling a list of supplementary bids during the supplementary bid round. A bidder may add, revise or delete its bids as required; though it cannot delete any primary round bids, only increase the amount of such bids, if it wishes (subject to constraints created by its bids in subsequent primary rounds). Bidders are also provided with details of any constraints on their maximum bids for packages with particular eligibility levels. All bids must be in units of a thousand pounds sterling.
- A6.93 Once a bidder has finalised its first list of supplementary bids, it must input these for checking by the electronic auction system. Any errors (such as a bid below the minimum or a bid above the maximum) will result in this entire first set of supplementary bids being rejected by the checking system. In this case, bidders will receive appropriate warning messages, and will be able to revise their supplementary bids and re-enter them for checking.
- A6.94 Once this list of supplementary bids has been checked and has been confirmed as meeting the requisite criteria, a statement of these bids will be displayed on a bid submission form. A bidder can then formally submit these bids. Alternatively, it could revise its bids and re-enter them for checking. As in the Principal Stage, submitting bids is a two-step process; supplementary bids are not considered to have been made until they have been submitted; entering bids for checking is not sufficient.
- A6.95 An extension right will be available to bidders in the supplementary bids round. The process for submission of supplementary bids in exceptional circumstances will be similar to that described above for the submission of primary round bids in exceptional circumstances.

### Deposit rule for supplementary bids round

- A6.96 Before the end of the day on which the supplementary bids round closes, bidders must have on deposit with Ofcom an amount at least equal to X% of their highest bid made across both the primary bid rounds and the supplementary bids round. The level of X will be set by Ofcom but will not be greater than 50%. The level of X will be announced in advance of the supplementary bids round, such that bidders have sufficient time to top-up their deposits if required.
- A6.97 If a bidder does not meet this deposit obligation, all its bids from the primary and supplementary bids stages will be void and excluded from consideration in the



determination of Principal Stage winners and prices. Such a bidder will also forfeit any deposit that it has submitted.

- A6.98 A bidder who failed to meet a deposit requirement in the primary bid rounds will be required to increase its deposit so that it is at least equal to 100% of its highest bid in the Principal Stage, i.e. across primary and supplementary bids, regardless of whether that bidder makes supplementary bids. If that bidder fails to meet the deposit requirement, it will forfeit its deposit, will be excluded from the award process and all bids it has made will be deemed invalid.

### Winner determination

- A6.99 Following the close of the supplementary bids round and completion of the deposit checks, Ofcom will proceed to determine the winning bids. These are the combination of valid primary and supplementary bids of greatest total value amongst all valid bids submitted, subject to the conditions that:

- no more lots are awarded than are available;
- at most one bid is accepted from each bidder; and
- assignments are contiguous except for those corresponding to split supplementary bids (which would consist of two contiguous ranges, one in the upper unpaired area and one in the lower unpaired area). Specifically, bids for unpaired spectrum must pack into the upper and lower areas subject to not splitting primary bids and standard supplementary bids, and respecting the splitting of lots into two contiguous groups indicated in any split supplementary bids.

- A6.100 A software algorithm will be used to determine the combination of bids that meets these criteria. It is possible that there could be more than one set of bids having the equal highest value. In this case, the tie will be resolved in the following way:

- The combination of bids with the highest number of associated eligibility points will be selected.
- If there is still a tie, with a number of possible allocations having the same total value of winning bids and the same number of eligibility points, then a process of random selection will be used to select the winning set of bids.

### Base price determination

- A6.101 Each winning bid has an associated base price. A base price is an overall price for the entire package of lots subject to a winning bid. A separate base price is determined for each winning bidder. (Notice that we do not determine a price per lot for each category of lot.) There is no base price for a bidder who does not win any lots in the Principal Stage.

- A6.102 Base prices are calculated using a second price rule. This is a single calculation that jointly determines a set of base prices – one for each winning bidder. We describe the second price rule in terms of a set of conditions that the base prices must satisfy. There is a unique set of base prices that satisfy these conditions.

- A6.103 First, the base price of a winning bid must be greater than or equal to the total reserve prices of the lots within the package associated with that winning bid.

A6.104 Second, base prices are required to satisfy a condition that there is no alternative bidder or bidders prepared to pay more than any winner or group of winners. We describe this second condition as a process for checking that the condition is satisfied:

- calculate the total amount of the winning bids (call this the “winning bid total”,  $W$ );
- for each winning bid, find the difference between the amount of that winning bid and the corresponding base price (call this the “price difference” for that winning bidder);
- calculate the total of the price differences for all winning bidders (call this the “total price difference”,  $P$ );
- take all of the winning bidders’ Principal Stage bids, and subtract the corresponding price difference for each winner from *all* bids made by that winner (call these the “modified bids”);<sup>42</sup>
- re-run the determination of winning bids using the method described above (see Winner determination), but using (a) the non-winning bidders’ Principal Stage bids; and (b) the winning bidders’ modified bids as reduced by the price differences (call this the “modified winner determination”);
- calculate the total of the winning bids found in the modified winner determination (call this the “modified winning bid total”,  $MW$ );
- the condition is satisfied when the sum of the modified winning bid total ( $MW$ ) and the total price difference ( $P$ ) is equal to the winning bid total ( $W$ ).

A6.105 There are typically many sets of base prices that satisfy these two conditions. To select amongst all these various sets of base prices, we require a third condition that the sum of the base prices across winning bidders is minimised.

A6.106 All base prices satisfying the first, second and third conditions have the property that the base price of a winning bid is not more than the amount of that winning bid.

A6.107 Where there is only one set of base prices (one base price for each winner) satisfying these three conditions, this determines the base prices for the Principal Stage. In the case where there are many sets of base prices satisfying these three conditions, we impose a fourth condition that selects a unique set of base prices. We can describe this condition in terms of a process for checking that it is satisfied.

- Calculate the opportunity cost for a particular winning bidder which is defined to be:
  - i) the amount of the winning bid of that bidder; less
  - ii) the total of all winning bids in the winning combination; plus
  - iii) the greatest possible total of bids subject to: (a) accepting at most one bid from each bidder; (b) accepting no bids from that winning bidder; (c) allocating each lot at most once; and (d) assignments are contiguous except for those corresponding to split supplementary bids;

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<sup>42</sup> These modified bids can be below the reserve price and may even be negative.

- Calculate the sum across winning bidders of the squares of the differences between the base price and the corresponding opportunity cost;
- The fourth condition is satisfied if there is no other set of base prices satisfying the first, second and third conditions with a strictly smaller sum of squares of differences between the base price for each winner and the opportunity cost for that winner.

A6.108 These conditions characterise a unique base price for each winning bidder that is no more than their winning bid and is at least the reserve price for that package. Finally, if these base prices are not amounts in whole thousands of pounds, they are rounded up to the nearest whole thousand pounds.

### End of the Principal Stage

A6.109 Once Ofcom has determined the winning bids and the base prices, the outcome of the Principal Stage will be announced to bidders. The following information will be released to all bidders:

- the identity of the winning bidders;
- the number of lots won in each category by each winning bidder;
- the division of lots between unpaired and paired spectrum in the 2.6GHz band and whether split awards are part of the winning combination; and
- the number of guard blocks.

A6.110 In addition, each winning bidder will be told the base price that applies to their own winning bid. This information will not be released to other bidders at this stage. Winning bidders will be required to increase their deposit so that it covers 100% of their base price, within a given period of probably 5 business days. A winning bidder that fails to meet this deposit requirement will forfeit its deposit and will be excluded from the award process and the lots identified in its winning bid will not be sold in this award process.

A6.111 Losing bidders and applicants who did not qualify and applicants who withdrew before the last day for withdrawal will be refunded their deposits, unless these have been forfeit.

A6.112 After the deadline for the increase of deposits by winning bidders, Ofcom will publish:

- the identity of the winning bidders who have complied with the deposit requirement;
- the identity of the winning bidders have been excluded from the award process;
- the number of lots won in each category by each of those winning bidders;
- the base price for each winning bidder;
- the division of lots between unpaired and paired spectrum in the 2.6GHz band and whether split awards are part of the winning combination;

- the number of guard blocks; and
- the number of unsold blocks.

### **The Assignment Stage**

A6.113 The purpose of the Assignment Stage is to determine how the available frequencies in the 2.6GHz band are distributed amongst the winning bidders from the Principal Stage, and the final price to be paid by each winning bidder. The Principal Stage will have already determined how much spectrum bidders will receive, whether split awards will be part of the outcome and if so, who will receive a split award (having specifically bid for it), but not the frequency ranges to be assigned (except in the case of the 2010-2025MHz lot).

A6.114 There is a separate assignment procedure for the paired 2.6GHz lots and for the unpaired 2.6GHz lots, although bidding and frequency selection will take place simultaneously for both categories. The exact procedure for each category will vary depending on whether there is only one or more than one winner of lots in that category. For categories where there are two or more winning bidders, a further round of bidding – the assignment bids round – is always required (except in the case where there are exactly two winners of 2.6GHz lots that are not split awards whose bids can be exactly accommodated in the upper and lower unpaired areas in only one way). For categories where there is only one winning bidder, then no further bidding is required.

A6.115 It is possible that some or all lots in some categories may be unassigned at the end of the Principal Stage. If there are unassigned lots in the 2.6GHz band, this will have an impact on the frequency selection options for winning bidders in this band. Unsold spectrum in each category will be contiguous and unsold lots may not be blocks that fall between blocks within a category. Any unsold lots will form either one or two contiguous frequency ranges:

- assignments of paired lots will be made contiguously ascending from 2500MHz (and corresponding blocks immediately above 2620MHz); and
- assignments of unpaired lots will be made contiguously descending from 2615MHz and possibly immediately below 2690MHz if there are more than 11 unpaired lots in total but depending on how unpaired assignments can be arranged given winning bidders' split supplementary bids.

A6.116 In the case of the 2010-2025MHz lot, there can only be one winning bidder from the Principal Stage. Therefore, no bidding round will be required. The final price for this lot will equal the base price if it is awarded on its own. If it is allocated as part of a package with 2.6GHz spectrum, the final package price will be determined at the end of the Assignment Stage (see below).

### **Procedure for assigning lots in categories with only one winning bidder**

A6.117 If there is only one winning bidder in a category and there are no unallocated lots, then no further bidding is required. The bidder will be assigned all the available frequencies in the relevant parts of the 2.6GHz band, consistent with its winning bid. A single winner of unpaired 2.6GHz spectrum would also be awarded the guard block at block 24.

A6.118 It is possible that some lots may be unallocated. If this is the case, the following rules apply:

- *There is one winner of paired 2.6GHz lots and 10 or less unpaired lots are awarded.* In this case, the winner of the paired spectrum will be awarded the contiguous frequencies immediately above 2500MHz and 2620MHz corresponding to the number of lots that it won.
- *There is one winner of unpaired 2.6GHz spectrum and its bid was conditional on its lots being all contiguous.* In this case, the bidder will be awarded the contiguous frequencies immediately below 2615MHz corresponding to the number of lots that it won. For example, if the bidder won 14 lots, it would be awarded the frequencies 2545-2615MHz (and the guard block at block 24).
- *There is one winner of unpaired 2.6GHz spectrum and its winning bid was a split award.* In this case, the bidder will be awarded two ranges of contiguous frequencies, one immediately below 2615MHz and one immediately below 2690MHz (and the guard block at block 24). The larger range will always be the one containing frequencies immediately below 2615MHz.

A6.119 In all these cases, the relevant bidder is not required to participate in any further bidding process for the lot category where it is the only bidder and no additional fee will be due for the frequencies in this category that it is assigned.

### **Scheduling the assignment bid round**

A6.120 For all categories where there is more than one winning bidder, an assignment bid round is typically required unless there is a unique way of assigning the lots won in the Principal Stage (an assignment bid round is always required for paired lots when there are several paired winning bidders; this may not be the case for unpaired lots in the case that licences are awarded in both the lower and upper areas to two winners). A separate bidding process is required for each category, but these will be conducted simultaneously using the electronic auction system. Each bidder will be presented with a single bid form that contains the bid options for all the categories where they are eligible to bid for lots in the Assignment Stage.

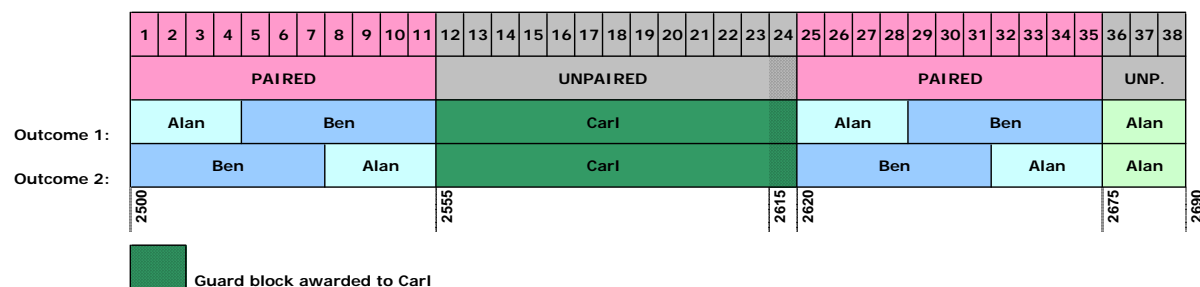
A6.121 The start time and duration of the assignment bid round will be announced by Ofcom after the completion of the Principal Stage. There will be at least one clear business day between the supplementary bids round and the assignment bid round (if required). Ofcom has discretion over the time and duration of the round. However, Ofcom anticipates that the round (if required) will take place between 10am and 5pm on a single business day, and last for at least 2 hours and no more than 7 hours.

### **Determining the bid options for the assignment bid round**

A6.122 Winning a certain number of lots within a category in the Principal Stage entails both a right and an obligation to purchase one of the corresponding frequency range options presented to that bidder in the assignment bid round. For example, if a bidder won three unpaired 2.6GHz lots contingent on a non-split award in the first stage, this entails a commitment in the second stage to accept any available contiguous package of three lots (15MHz) at specific frequencies in either the lower unpaired area or the upper unpaired area in the 2.6GHz band.

- A6.123 Bidders are not permitted to bid for smaller packages of lots than they won in the Principal Stage. They are also not permitted to bid for larger packages of lots, except in the case that their frequency bid options include an adjacent guard block, as follows:
- Any option for unpaired 2.6GHz spectrum that includes block 23 (2610-2615MHz) will additionally include the guard block at block 24 (2615-2620MHz);
  - In the case that block 38 (2685-2690MHz) is designated as a guard block (outcome 2 in Table 8), this lot will be included in any option for paired spectrum that includes the adjacent block 37 (2680-2685MHz).
- A6.124 For each category where there are two or more winning bidders, Ofcom will determine a set of frequency range options available to each bidder. For each bidder for paired spectrum, Ofcom will identify an exhaustive list of packages of contiguous frequencies which are consistent with the number of lots that they won in the Principal Stage and may also allow all other winners to receive contiguous assignments and any unsold lots to be allocated as contiguous blocks immediately above the highest assignment to a winner of paired 2.6GHz spectrum. There will be a relatively small number of such frequency range options given the requirement for contiguity. For each bidder for unpaired spectrum, the same rules apply, although if a split award is part of the winning combination, the corresponding bidder will be presented with bid option(s) for two ranges of contiguous unpaired spectrum, one each in the lower and upper unpaired areas, consistent with their winning bid from the Principal Stage.
- A6.125 In the case of the unpaired 2.6GHz lots, it is possible that there will be only one package of contiguous frequencies consistent with the conditions described above that is available for one or at most two bidders. In this case, such bidders will not participate in the assignment bid round and will be awarded the relevant frequencies.
- A6.126 Some simple examples illustrate. Suppose that in the Principal Stage, there were three winning bidders: Alan won 4 paired 2.6GHz lots and 3 unpaired non-split 2.6GHz lots; Ben won 7 paired 2.6GHz lots; and Carl won 12 unpaired non-split 2.6GHz lots. For the paired 2.6GHz lots, the bid options are as follows:
- Alan: blocks 1-4 paired with blocks 25-28; or blocks 8-11 paired with blocks 32-35.
  - Ben: blocks 1-7 paired with blocks 25-31; or blocks 5-11 paired with blocks 29-35.
- A6.127 For unpaired 2.6GHz lots, there is only one way of configuring the spectrum that ensures both Alan and Carl receive contiguous assignments: Alan must receive blocks 36-38 and Carl must receive blocks 12-23 (plus the guard block at block 24). The possible outcomes are illustrated in Figure 6.

Figure 6: Example of possible award outcomes I

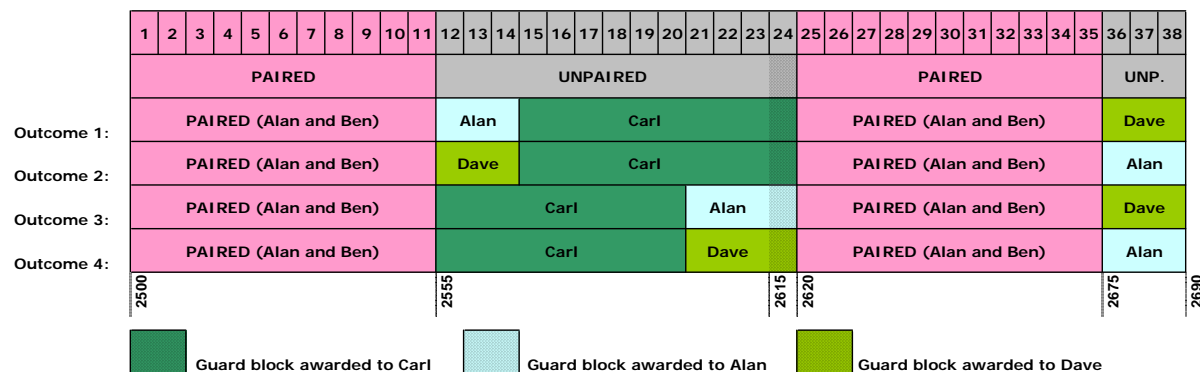


A6.128 Now consider the same example, but suppose that Carl won 9 unpaired non-split 2.6GHz lots instead of 12, and there was another winning bidder, Dave, who won 3 unpaired non-split 2.6GHz lots. The bid options for paired 2.6GHz lots are unchanged, but now there are a number of bid options for each winner of unpaired 2.6GHz lots:

- Alan: blocks 12-14; 21-23 (plus the guard block at block 24); or 36-38.
- Carl: blocks 12-20; or 15-23 (plus the guard block at block 24).
- Dave: the same bid options as Alan.

A6.129 The possible outcomes are illustrated in Figure 7.

Figure 7: Example of possible award outcomes II



A6.130 It is possible that there could be two or more winners of paired 2.6GHz lots and some lots suitable for paired spectrum that are unallocated. In this case, Ofcom will identify an exhaustive list of adjacent packages of contiguous frequencies, such that one of the packages always occupies the frequencies immediately above 2500MHz and 2620MHz. In all cases, the options presented to each bidder will be consistent with the number of paired 2.6GHz lots that they won in the Principal Stage.

A6.131 It is possible that there could be two or more winners of unpaired 2.6GHz lots and some lots suitable for unpaired spectrum that are unallocated. If this is the case, then the options available will depend on the aggregate number of unpaired 2.6GHz lots awarded:

- *If this is eleven or less:* Ofcom will identify an exhaustive list of adjacent packages of contiguous frequencies, such that one of the packages always occupies the frequencies immediately below 2615MHz.

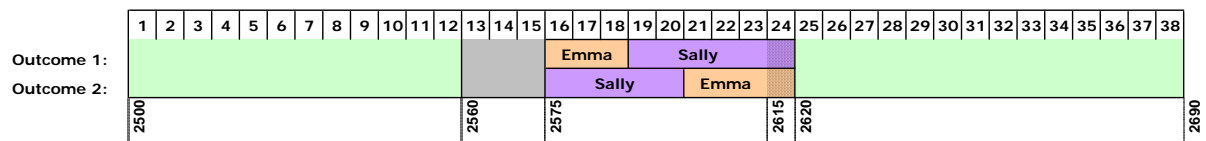
- *If this is twelve or more:* Ofcom will identify an exhaustive list of adjacent packages of contiguous frequencies in the lower and the upper unpaired areas, such that:
  - in the lower unpaired area, one of the packages always occupies the frequencies immediately below 2615MHz; and
  - in the upper unpaired area, one of the packages always occupies the frequencies immediately below 2690MHz.

A6.132 In all cases, the options presented to each bidder will be consistent with the number and structure of unpaired 2.6GHz lots that they won in the Principal Stage.

A6.133 A simple example illustrates. Suppose that in the Principal Stage, there were four winning bidders: Emma won 4 paired 2.6GHz lots and 3 unpaired non-split 2.6GHz lots; Kay won 6 paired 2.6GHz lots; Pam won two paired 2.6GHz lots; and Sally won 5 unpaired non-split 2.6GHz lots. Thus, there are only 12 paired lots and 8 unpaired non-split lots sold; lot 24 is designated as a guard block and 5 lots are unallocated.

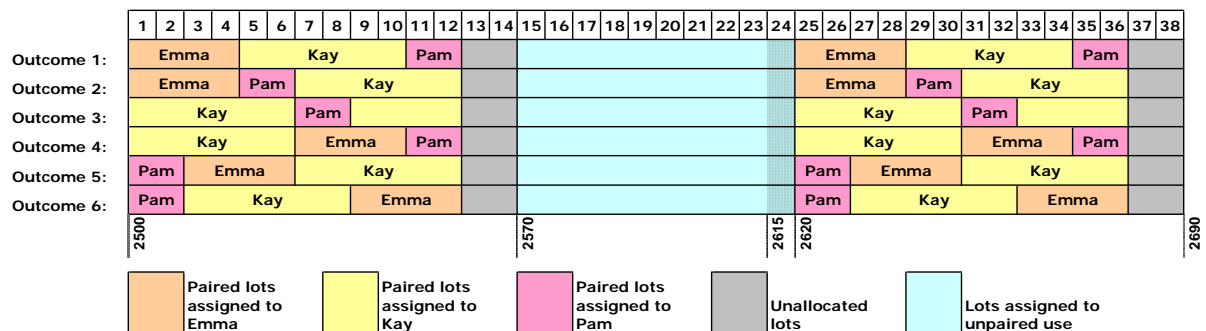
A6.134 For the unpaired 2.6GHz lots, Emma and Sally’s awards must be contiguous and adjacent to each other, and one of them must receive frequencies immediately below 2615MHz. There are two possible configurations of Emma and Sally’s lots, and both have two bid options each, as illustrated in Figure 8:

**Figure 8: An example of bid options for unpaired spectrum in the case of unallocated lots**



A6.135 For the paired 2.6GHz lots, Emma, Kay and Pam’s awards must be in two paired contiguous ranges and adjacent to each other, and one of them must receive frequencies immediately above 2500MHz and 2620MHz. There are six possible configurations of Emma, Kay and Pam’s lots, and each has four bid options, as illustrated in Figure 9:

**Figure 9: An example of bid options for paired spectrum in the case of unallocated lots**



**Split assignment of unpaired spectrum**

A6.136 A bidder for unpaired spectrum will only receive a split award if it has placed a corresponding split supplementary bid that is part of the winning combination.



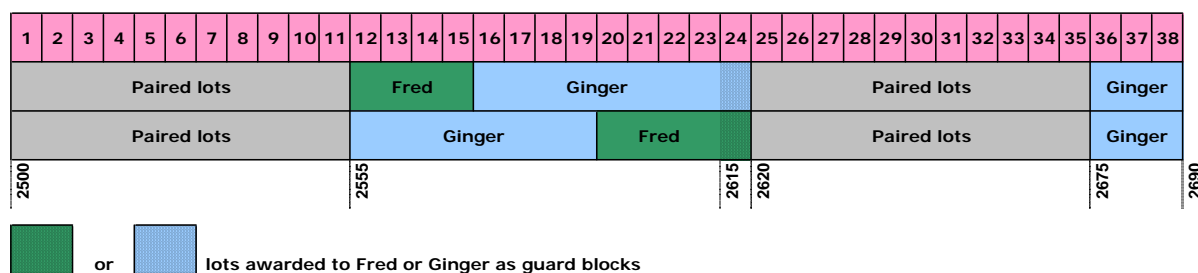
A6.137 A simple example illustrates the bid options for a winner of a split assignment. Suppose that in the Principal Stage, Ginger won eleven unpaired 2.6GHz lots, contingent on a split of eight lots in one area and three lots in the other area, and Fred won four unpaired 2.6GHz lots contingent on a non-split award. Further, assume that all other lots are allocated as paired spectrum or guard blocks. With 15 unpaired lots awarded, the unpaired spectrum must be split into two parts: 12 lots in the lower unpaired area and three in the upper area. On this basis, Ginger's range of eight contiguous lots must be located in the lower area and her range of three contiguous lots must be in the upper area. Similarly, Fred's range of four contiguous lots must be in the lower area. Figure 10 illustrates the possible outcomes, given these constraints. Ginger's bid options are as follows:

- blocks 12-19 & blocks 36-38; and
- blocks 16-23 & blocks 36-38, plus a guard block at block 24,

and Fred's bid options are:

- blocks 12-15; and
- blocks 20-23, plus a guard block at block 24.

**Figure 10: Illustration of bid options in the case of a split award of unpaired 2.6GHz lots**



### Submitting assignment round bids

A6.138 Assignment round bids are submitted using the electronic auction system during the specified round time. The submission procedure is a two-step process, which is similar to that in the Principal Stage:

- in the first step, bidders input their bids for every available frequency range option separately in every category where they are eligible to bid, and enter them for checking by the electronic auction system; and
- in the second step, a 'bid submission form' displaying their bids is formally submitted.

A6.139 Assignment round bids must be in whole pounds sterling. The minimum bid for each frequency range option is zero. There is no upper limit.

A6.140 If a bidder fails to submit a bid in the available time, then it will be deemed to have made a bid of zero for every frequency range option in every category where it was eligible to bid.

A6.141 Note that all bidders eligible to participate in the assignment round are guaranteed to win at least the same amount of spectrum in each category that they won in the

Principal Stage (in addition, they may be eligible to win one or two guard blocks). Only the relative bids made on different outcomes will affect the outcome selected and the additional prices to be paid. Therefore, it is recommended (but not obligatory) that bidders submit a bid of zero for their least favoured option in every category where they are eligible to bid. A bidder not submitting a bid will be deemed to have bid zero. If the bidder fails to submit a bid for one or more available packages, it will be deemed to have submitted a bid of zero for all such packages.

A6.142 An extension right will be available to bidders in the assignment bid round. The process for submission of assignment bids in exceptional circumstances will be similar to that described above for the submission of primary round bids in exceptional circumstances.

### **Deposit rule for the assignment bid round**

A6.143 Before the end of the day on which the assignment bid round closes, bidders must ensure that they have on deposit with Ofcom an amount no less than the aggregate sum of their base price and their highest assignment round bids for each of the categories where they have submitted such bids.

A6.144 If a bidder has on deposit an amount which is at least as great as their base price, but less than their base price and highest assignment round bid, all the bids it submitted in the assignment round will be void and it will be deemed to have submitted bids of zero for all frequency range options. These zero bids will be used for the purposes of determining what frequencies are awarded to the winning bidders in each category. No deposit will be forfeit for failing to meet this deposit rule.

### **Winner determination**

A6.145 Following the close of the assignment bid round and completion of the deposit checks, Ofcom will proceed to determine the winning bids for each category.

A6.146 For each category, the winning assignment bids are the combination of valid assignment round bids of greatest total value amongst all valid assignment bids submitted, subject to the conditions that:

- exactly one bid is accepted from each bidder;
- each bidder is assigned the same amount of spectrum in each band as they won in the Principal Stage, plus guard blocks if applicable;
- each bidder for paired 2.6GHz lots receives contiguous frequencies;
- each bidder for unpaired 2.6GHz lots is awarded a single block of contiguous frequencies, unless their winning bid was for a split award;
- if a bidder won a split award of unpaired 2.6GHz spectrum (having bid for it), then they will be awarded two blocks of contiguous frequencies, one each in the lower and upper unpaired areas, with the split of lots across the two areas being consistent with their winning Principal Stage bid; and
- the frequency ranges included in the winning assignment bids do not overlap.

A6.147 A software algorithm will be used to determine the combination of bids that meets these criteria. Each bidder will have exactly one winning assignment bid in each category where they won lots in the Principal Stage. Such an outcome is always possible because (i) bidders are only presented with assignment bid options that are consistent with all bidders receiving blocks of contiguous spectrum and (ii) all bidders make assignment bids (even if of amount zero) for all such options. It is possible that there could be more than one combination of bids having equal highest value. In this case, the tie will be resolved by the electronic auction system using a process of random selection.

### **Determining additional prices and the licence fee**

A6.148 In each category where there were two or more winning bidders, additional prices will be determined. The additional prices are determined using a second price rule in an analogous manner to the Principal Stage. As with the Principal Stage, we can describe the second price rule as a set of conditions that the additional prices must satisfy. There is a unique set of additional prices that satisfy these conditions.

A6.149 First, additional prices are required to be positive or zero.

A6.150 Second, additional prices must satisfy a condition that there is no alternative bidder or bidders prepared to pay more than any winner or group of winners. We describe this second condition as a process for checking that the condition is satisfied:

- calculate the total amount of the winning assignment bids (call this the “winning assignment bid total”, AW);
- for each winning assignment bid, find the difference between the amount of that winning assignment bid and the corresponding additional price (call this the “price difference” for that winning bidder);
- calculate the total of the price differences for all winning bidders (call this the “total price difference”, AP);
- take all of the winning bidders’ assignment bids, subtract the corresponding price difference for each winner from *all* Assignment Stage bids made by that winner and set any bid that would become negative after subtraction of the price difference to zero (call these the “modified assignment bids”);
- re-run the determination of winning assignment bids using the method described above (see Winner determination), but using the winning bidders’ modified assignment bids as reduced by the price differences (call this the “modified assignment winner determination”);
- calculate the total of the winning assignment bids found in the modified assignment winner determination (call this the “modified winning assignment bid total”, MAW);
- the condition is satisfied when the sum of the modified winning assignment bid total (MAW) and the total price difference (AP) is equal to the winning assignment bid total (AW).

A6.151 As with the Principal Stage, there are typically many sets of additional prices that satisfy these two conditions. To select amongst all these various sets of additional

prices, we require a third condition that the sum of the additional prices is minimised.

A6.152 Where there is only one set of additional prices satisfying these three conditions, this determines the additional prices for the Assignment Stage. In the case that there are many sets of additional prices satisfying these three conditions, we impose a fourth condition that selects a unique set of additional prices. We can describe this condition in terms of a process for checking that it is satisfied.

- Calculate the opportunity cost for a particular winning bidder which is defined to be:
  - the amount of the winning assignment bid of that bidder; less
  - the total of all winning assignment bids; plus
  - the sum of winning assignment bids in a modified winner determination as described earlier in which that winner's assignment bids are all set to zero;
- Calculate the sum across winning bidders of the squares of the differences between the additional price and the corresponding opportunity cost;
- The fourth condition is satisfied if there is no other set of additional prices satisfying the first, second and third conditions with a strictly smaller sum of squares of differences between the additional price for each winner and the opportunity cost for that winner.

A6.153 These conditions characterise a unique price for each winning bidder in each category that is no more than their winning Assignment Stage bid. Finally if these additional prices are not amounts in whole pounds, they are rounded up to the nearest whole pound.

A6.154 The licence fee for each bidder will be the sum of their base price (from the Principal Stage) and any additional prices for the specific frequency ranges assigned to them (from the Assignment Stage).

### **End of the Assignment Stage**

A6.155 Once Ofcom has determined the winning bids and the additional prices for the Assignment Stage, the results of the auction will be announced to all bidders. The following information will be released to all bidders:

- the identity of the winning bidders;
- the frequency ranges awarded to winning bidders in each category; and
- the licence fee to be paid by each winning bidder, including a breakdown of the base price and any additional prices applicable to that bidder.

### **The Grant Stage**

A6.156 In the Grant Stage, winning bidders are granted licences for the frequencies corresponding to the lots that they won in the Assignment Stage, including any guard blocks if applicable.

A6.157 Winning bidders will be refunded the amount of their deposit less the price for their winning bid, as determined according to the rules described above for determining additional prices and the licence fee, less any amount that has been forfeit.

## Other Auction Rules

### Exceptional circumstances

A6.158 In the case of exceptional circumstances (e.g. widespread technical failure) during the Principal Stage or the Assignment Stage, Ofcom has the discretion to:

- postpone the deadline for a round in progress;
- postpone the scheduling of further rounds;
- cancel a round that is either underway or for which round results have not yet been released, and re-schedule the round again; or
- void all bids received in the auction, and either cancel the auction or start the auction again.

A6.159 In the event that an individual bidder breaches the activity rules, as defined in the regulations, the bidder will either be fined but permitted to continue in the auction, or be expelled from the auction, depending on the severity of the breach. If a bidder is expelled from the auction, all its bids will become void, but for the avoidance of doubt there will be no retrospective change made to the process of the auction up to that point so far as it affects other bidders.

### Unassigned lots

A6.160 It is possible that at the end of the Principal Stage, the number of lots allocated to bidders in some categories may be less than supply, either due to deficient demand or because the winner determination produces a set of winning bids whose aggregate demand for lots is less than supply.

A6.161 If there are unallocated lots in the 2.6GHz band at the end of the Principal Stage (excluding lots set aside as guard blocks), there will be a corresponding number of unassigned lots at the end of the award. Ofcom will retain such unassigned lots for future award as appropriate. In the final assignment outcome, all unassigned lots will be positioned according to the rules set out earlier.

### Information policy

A6.162 Information policy determines the information released to bidders and the general public.

A6.163 All bidders will receive the same information (other than details of their own bids which are private up to the conclusion of the auction). Even if a bidder drops its eligibility to zero, it will continue to be able to monitor the progress of the auction (unless it is excluded from the award process, and locked out of the electronic auction system by Ofcom, for transgressing the rules). The information that will be released in each stage of the auction is described in the relevant section of the rules above.

A6.164 Before the auction, Ofcom will publish on its website the number and identity of the bidders. Upon completion of the Assignment Stage, Ofcom will publish on its website the identity of the winning bidders, the frequencies that they have won and their licence fees.

A6.165 After the award process is concluded, Ofcom intends to publish on its website details of all valid primary, supplementary and assignment bids.

### **Breach of activity rules**

A6.166 Any breach of the activity rules that would materially affect the outcome of the award process may result in a bidder or applicant forfeiting its deposit and may also result in that bidder or applicant being excluded from the award process. If a bidder has been issued a licence and is later found to have breached the activity rules, the licence may be revoked. The activity rules apply to all bidders and all applicants who have qualified to bid and they continue to apply until the licences have been awarded.

A6.167 Events that may lead to exclusion from the award process and/or to an initial deposit or bid deposit being forfeited include:

- an applicant or bidder has submitted false or misleading information to Ofcom;
- an applicant or bidder or any member of its bidder group is colluding or attempting to collude with any other person to distort the outcome of the award process, or is acting in a way which is likely to distort the outcome of the award process;
- the applicant or bidder or any member of its bidder group, or any person to whom confidential information has been disclosed, is disclosing, attempting to disclose or inciting another person to disclose confidential information to anyone other than to a member of its bidder group, Ofcom, a provider of finance (where the disclosure was for the purpose of raising finance for the bid) or to a person considering whether to join the bidder group of the applicant or bidder;
- the applicant or bidder or any member of its bidder group is obtaining or attempting to obtain confidential information in relation to any other applicant or bidder;
- the applicant or bidder or any member of its bidder group is receiving or attempting to receive services in relation to the award process from any person who has provided or is providing services to Ofcom in relation to the award process (for these purposes the advisers are Allen & Overy LLP, DotEcon Ltd, Professor Peter Cramton of the University of Maryland and Dr Ian Jewitt of Nuffield College);
- any member, director or employee of a member of the applicant's or bidder's bidder group, who is also a director or employee of a member of another bidder group, is taking part in the preparation of both bidder groups for participation in the award process or is receiving confidential information relating to both bidder groups;
- a member of an applicant's or bidder's bidder group is or becomes a member of another bidder group; and

- a change is occurring in the membership of an applicant's or bidder's bidder group subsequent to the application day except where a person ceases to be a member of the bidder group, a person has been added to the bidder group in accordance with the regulations, or where a person becomes an associate through merger and acquisition activity provided that such activity is not for a purpose related to the award process (and provided that the addition will not result in a member of one applicant or bidder's bidder group also being a member of another bidder group).

A6.168 Where any changes occur to the membership of an applicant's or bidder's bidder group, that applicant or bidder must notify Ofcom as soon as practicable.

## **Electronic Auction System**

A6.169 Both the Principal Stage and the Assignment stage will be conducted using an electronic auction system. Bidders will be able to access the system over the public Internet using a standard web-browser. The minimum requirements in terms of hardware and software will be described in a user manual that will be distributed to bidders prior to the auction. However, these requirements will not be onerous – a typical PC running Windows and using Internet Explorer or Firefox or an Apple Mac using Safari or Firefox should usually be sufficient. Java will need to be installed on the bidder's computer to access the electronic auction system (if not already available, this can be downloaded from [www.java.com](http://www.java.com) and easily installed).

A6.170 Bidders will need to have a reliable Internet connection (128Kbit/s download speed or better, so a typical ADSL or E1/T1 connection will suffice). Bidders need to maintain a continuous connection to the auction server when logged in; connectivity loss of more than 30 seconds will cause the bidder to be logged off automatically. We recommend that bidders consider having a backup computer and backup Internet connection.

A6.171 Internet addresses for primary and backup auction servers will be communicated to bidders prior to the auction. In order to access these servers, bidders will need to install digital certificates on the computers they intend to use to access the electronic auction system. This is a simple process and instructions will be provided in the user manual. Digital certificates will be distributed to bidders by Ofcom and are specific to each bidder. A password will be required to install the certificates, which will be distributed separately.

A6.172 Bidders will be able to log in to the auction system only from computers on which they have installed the necessary digital certificates. A further login username and password is required to access the electronic auction system, which Ofcom will communicate to bidders prior to the auction.

A6.173 Bidders will be identified by the electronic auction system through their digital certificates and their username and login password. Bidders will need to ensure that these are not disclosed to third parties. In the event of any breach of security, bidders should contact Ofcom at the soonest opportunity.

A6.174 The electronic auction system only allows a bidder to be logged in from one computer at any one time. However, should there be a failure of the bidder's computer or network connection, the electronic auction system will automatically log out the bidder, who can then log in from a different computer on which the necessary digital certificates are installed. The bidder will be able to continue using the electronic auction system from the point he or she left off.

- A6.175 The electronic auction system allows bidders to enter bids and to observe the progress of the auction. It provides a display of the key aspects of the auction state, such as the number of completed primary bid rounds, whether a round is currently running and a countdown timer for submitting decisions when deadlines are in force. It also displays a clock synchronised with the auction server to aid bidders in submitting bids. However, bidders should note that deadlines apply according to the time that bids are received at the server, not the time that they are sent from the bidder's computer. Therefore, it is prudent for bids to be submitted in good time prior to the end of rounds to allow for network delays. Bids are not processed by the electronic auction system and results are not released until after the end of the round, so there is no strategic advantage to bidders from delaying submission of their bids.
- A6.176 Submitting a bid into the electronic auction system involves a two-step checking and confirmation process (regardless of whether these are primary round bids, supplementary bids or Assignment Stage bids). Bidders will first need to enter their bid (or bids) and send these for checking by the electronic auction system. The system will check that the bid (or bids) is consistent with the auction rules. If not, the bidder will be given an explanation of the problem and be returned to the relevant screen to allow further editing of the bid (or bids). If the bid (or bids) is consistent with the auction rules, the electronic auction system will return a summary of the bid (or bids), which can then be submitted. Only bids that have been submitted will be considered to be valid bids. If a bidder checks a bid, but then fails to submit it, this will be treated as if no bid was made.
- A6.177 Throughout the primary bid rounds, bidders will be able to use the electronic auction system to store and update a list of supplementary bids on a provisional basis. This list of provisional supplementary bids can then be edited, checked and submitted during the supplementary bids round. The facility to check and submit supplementary bids will be disabled until the start of the supplementary bids rounds.
- A6.178 The electronic auction system will provide summaries of each bidder's own bids and also a history of round prices and excess demand. Downloadable files of own bids and the auction history will be provided for transferring data to other applications. These will be available in comma separated value (.CSV) and tab delimited (.TSV) formats. Either format can be easily read into programs such as Microsoft Excel.
- A6.179 Bidders will be able, if they so wish, to prepare supplementary bids off-line and then upload a file of supplementary bids into the electronic auction system for further editing, checking and submission.
- A6.180 The electronic auction system provides a one-way messaging system that allows Ofcom to send notices to bidders. Ofcom envisages this being the primary means of communicating with bidders about round schedules, deposit increase deadlines and other aspects of the auction process. If bidders need to contact Ofcom, they will need to use telephone and fax numbers supplied to them by Ofcom.

## **Miscellaneous**

- A6.181 Ofcom has a general power to exclude an applicant or bidder where it considers the grant of a licence to that applicant or bidder would be prejudicial to the interests of national security or where the applicant or bidder is not a fit and proper person to hold a licence.



Award of available spectrum: 2500-2690MHz & 2010-2025MHz

A6.182 Ofcom has a general power to alter the date, time, or place of delivery of any documents or the completion of any action in relation to the award process.

A6.183 Ofcom has a general discretion to refund any sums paid to it.

## Annex 7

# Draft Regulations

- A7.1 We have translated the updated auction rules and procedures set out in Annex 6 into a draft of the auction regulations for the 2.6GHz and 2010MHz award, which can be found in this Annex. We invite comments from stakeholders on whether the way in which these auction rules have been expressed in the form of draft regulations could affect their position in respect of the award.

**2008 No.**

**ELECTRONIC COMMUNICATIONS**

**The Wireless Telegraphy (Licence Award) Regulations 2008**

*Made* - - - - [\*\*\*]

*Coming into force* - - [\*\*\*]

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The Office of Communications (“OFCOM”) make the following Regulations in exercise of the powers conferred on OFCOM by section 14(1), (2), (3), (4), (6) and (7) and section 122(7) of the Wireless Telegraphy Act 2006(a) (“the 2006 Act”).

Before making these Regulations OFCOM have given notice of their proposal to do so in accordance with section 122(4)(a) of the 2006 Act, published notice of their proposal in accordance with section 122(4)(b) of the 2006 Act and have considered the representations made to them before the time specified in that notice in accordance with section 122(4)(c) of the 2006 Act.

## PART 1

### INTRODUCTORY

#### **Citation, commencement and extent**

**1.—**(1) These Regulations may be cited as the Wireless Telegraphy (Licence Award) Regulations 2008 and shall come into force on **[date of coming into force]**.

(2) These Regulations shall not extend to the Channel Islands or to the Isle of Man.

#### **Interpretation**

**2.—**(1) In these Regulations—

“additional price” has the meaning given in regulation 63;

“additional supplementary bid” shall be construed in accordance with regulation 17(3);

“applicant” means a body corporate making an application for a licence;

“assignment stage” has the meaning given in regulation 14(1);

“assignment stage bid” has the meaning given in regulation 51(3);

“assignment stage bid form” has the meaning given in regulation 51(7);

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(a) 2006 c.36.

“assignment stage round” has the meaning given in regulation 51(1);

“associate” means, in relation to an applicant or bidder, a person who has a material interest in that applicant or bidder;

“authorised person” means a person specified by an applicant in its application as authorised to bind that applicant for all purposes relating to the award process;

“available total” has the meaning given in regulation 14(4);

“basic supplementary bid” shall be construed in accordance with regulation 17(2);

“base price” has the meaning given in regulation 45;

“bidder” means an applicant which has qualified to bid in the award process and which has not withdrawn from the award process on or before the last day for withdrawal;

“bidder group” means, in relation to an applicant or bidder—

- (a) that applicant or bidder;
- (b) each associate of that applicant or bidder [Ofcom comment - we are considering the possibility of allowing associates to “opt out” of a bidder group subject to specific conditions and undertakings.]; and
- (c) each person in respect of whom the applicant or bidder has delivered to OFCOM a completed document in the form set out in Schedule 4;

“confidential information” means, in relation to any applicant or bidder, any information which is not in the public domain and which if it were made public, or disclosed to another applicant (or potential applicant) or bidder or a member of their respective bidder groups, would be likely to affect decisions that such other applicant (or potential applicant) or bidder may make in relation to the award process;

“contiguous range”, means, in respect of licence blocks and paired licence blocks, a number of adjacent licence blocks or paired licence blocks (as the case may be);

“deadline”, in relation to any requirement imposed on any person by or under these Regulations, means (as the case may require)—

- (a) the time,
- (b) the date, or
- (c) the date, and the time on that date,

by which that requirement must be fulfilled by that person;

“division” shall be construed in accordance with regulation 19(4)(d);

“electronic auction system” means the system established by OFCOM for bidders to participate in the award process;

“eligibility limit” shall be construed in accordance with regulation 23;

“end of round time” has the meaning given in regulation 30(2);

“excess demand”, in relation to a primary bid round, means—

- (a) in respect of the 2010-2025 megahertz band, where the 2010-2025 megahertz lot has been selected in more than one valid primary bid;
- (b) in respect of the 2500-2690 megahertz band—
  - (i) where there is at least one valid primary bid containing paired lots, the total number of licence blocks corresponding to the total number of lots selected in valid primary bids is more than thirty-seven;

- (ii) where there are no valid primary bids containing paired lots, the total number of licence blocks corresponding to the total number of lots selected in valid primary bids is more than thirty-eight;
- (iii) it would not be possible for OFCOM to assign—
  - (aa) to each bidder submitting a valid primary bid containing paired lots, a contiguous range of paired licence blocks equal to the number of paired lots selected in that valid primary bid; and
  - (bb) to each bidder submitting a valid primary bid containing unpaired lots, a contiguous range of licence blocks such that the number of licence blocks contained within that range is equal to the number of unpaired lots selected in that valid primary bid,

such that each licence block is assigned no more than once;

- (c) in respect of paired lots, where the total number of paired lots selected in valid primary bids is greater than fourteen;

“frequency range selection menu” shall be construed in accordance with regulation 11(1);

“grant stage” has the meaning given in regulation 14(1);

“initial deposit” shall be construed in accordance with regulation 4(3)(b);

“last day for withdrawal” has the meaning given in regulation 9(1);

“licence” means a wireless telegraphy licence to be granted pursuant to these Regulations to establish or use a wireless telegraphy station or install or use wireless telegraphy apparatus in the United Kingdom at frequencies to be determined in accordance with the procedure set out in Part 4 or Part 5 of these Regulations;

“lot” means—

- (a) the 2010-2025 megahertz lot;
- (b) any paired lot; or
- (c) any unpaired lot;

“lower unpaired area” means, in relation to the 2500-2690 megahertz band, the frequencies from 2500 megahertz to 2615 megahertz;

“material interest” means, whether held directly or indirectly—

- (a) any interest (construed in accordance with sections 820 to 825 of the Companies Act 2006(a)) in—
  - (i) any share which carries, or any shares which together carry, more than twenty five per cent. of the votes entitled to be cast at a general meeting of the applicant or bidder; or
  - (ii) any share or shares in the case of which the consent of the holder of that share or those shares is required for the conduct of any business of the applicant or bidder; or
- (b) the right to appoint or remove a majority of the applicant’s or bidder’s board of directors;

“OFCOM’s bank account” means the bank account nominated by OFCOM for the purposes of the award process, details of which are published on their internet website;

“pounds” means pounds sterling;

“primary bid” has the meaning given in regulation 15(1);

“primary bid form” has the meaning given in regulation 15(3);

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(a) 2006 c.46.



“primary bid rounds” has the meaning given in regulation 14(2);

“principal stage” has the meaning given in regulation 14(1);

“principal stage bid” means a primary bid, a basic supplementary bid, or an additional supplementary bid;

“round” means a period of time specified by OFCOM during which bidders may make bids in accordance with the procedure set out in Part 5 of these Regulations;

“round price” has the meaning given in regulation 15(2);

“selection of lots” means a specified number of lots;

“supplementary bid” has the meaning given in regulation 17(1);

“supplementary bids form” has the meaning given in regulation 18(1);

“supplementary bids round” has the meaning given in regulation 14(2);

“2010-2025 megahertz lot” means, in relation to the 2010-2025 megahertz band, the frequencies between 2010 megahertz and 2025 megahertz;

“2010-2025 megahertz band” means the frequencies between 2010 megahertz and 2025 megahertz;

“2500-2690 megahertz band” means the frequencies between 2500 megahertz and 2690 megahertz;

“upper unpaired area” means, in relation to the 2500-2690 megahertz band, the frequencies from 2620 megahertz to 2690 megahertz;

“valid additional supplementary bid” has the meaning given in regulation 29(1);

“valid assignment stage bid” has the meaning given in regulation 54(1);

“valid basic supplementary bid” has the meaning given in regulation 28(1);

“valid primary bid” has the meaning given in regulation 27(1);

“valid principal stage bid” means a valid primary bid, a valid basic supplementary bid or a valid additional supplementary bid;

“valid supplementary bid” means a valid basic supplementary bid or a valid additional supplementary bid;

“winning assignment stage bid” shall be construed in accordance with regulation 62;

“winning principal stage bid” shall be construed in accordance with regulation 44; and

“winning bidder” means a bidder that submitted a winning principal stage bid.

(2) A reference in these Regulations to an “unpaired lot”, a “paired lot”, a “licence block” or a “paired licence block” shall be construed in accordance with Schedule 1.

(3) A reference in these Regulations to “eligibility points” shall be construed in accordance with Schedule 7.

## PART 2

### APPLICATION STAGE

#### **Applications for the grant of a licence**

3. Applications for the grant of a licence shall only be made in accordance with the procedure set out in these Regulations.

#### **Application**

- 4.—(1) Only a body corporate may apply to OFCOM for a licence.
- (2) A body corporate may only make one application.
- (3) To apply for a licence, a body corporate must—
- (a) on the day specified by OFCOM for receipt of applications, deliver to OFCOM at Riverside House, 2a Southwark Bridge Road, London SE1 9HA within the times on that day specified by OFCOM a sealed envelope containing—
- (i) a document containing the application information required by Schedule [2], completed in respect of the applicant and signed on its behalf by two authorised persons;
- (ii) a document in the form set out in Schedule [3], completed in respect of the applicant and signed on its behalf by two authorised persons;
- (iii) for each person, not being an associate of the applicant, which the applicant wishes to join its bidder group, a document in the form set out in Schedule [4] which has been—
- (aa) completed by the applicant and signed on its behalf by two authorised persons; and
- (bb) completed by and signed by or on behalf of the person in respect of whom that document is completed; and
- (b) by a deadline specified by OFCOM on their internet website, pay into OFCOM's bank account by a same day electronic transfer, with accompanying information which identifies the applicant, an initial deposit of one hundred thousand pounds.
- (4) OFCOM shall publish the day, times and deadline on their internet website.

## PART 3

### QUALIFICATION STAGE

#### **Assessment of bidder groups**

- 5.—(1) OFCOM shall give notice to each applicant of—
- (a) the name of each other applicant and the names of their associates; and
- (b) the deadline by when each applicant must notify OFCOM under paragraph (3) or (4) (as the case may be).
- (2) On receipt of that notice, each applicant must examine the names of the other applicants and their associates and determine whether any member of its bidder group is also an associate of another applicant or is also an applicant.
- [Ofcom comment - we are considering the possibility of allowing associates to “opt out” of a bidder group subject to specific conditions and undertakings.]
- (3) Where an applicant determines that a member of its bidder group is also an associate of another applicant or is also an applicant, it must notify the other applicant and OFCOM of that

fact by the deadline specified by OFCOM, and OFCOM shall specify a further deadline by when each applicant concerned must—

- (a) notify OFCOM of any change in circumstances the effect of which is that no member of its bidder group is an associate of another applicant or is an applicant; and
- (b) where changes have occurred to its bidder group, provide OFCOM with versions of the documents provided under regulation 4(3)(a)(i) and (ii) which comply with those provisions in the changed circumstances.

(4) Where an applicant determines that no member of its bidder group is an associate of another applicant or is an applicant it must notify OFCOM of that fact by the deadline specified by OFCOM.

(5) If it appears to OFCOM from any application that a member of one bidder group is also a member of another bidder group, OFCOM shall give notice to each of the applicants concerned of that fact and specify the deadline by when each applicant concerned must—

- (a) notify OFCOM of any change in circumstances the effect of which is that no member of its bidder group is also a member of another bidder group; and
- (b) where changes have occurred to its bidder group provide OFCOM with versions of the documents provided under regulation 4(3)(a)(i) and (ii) which comply with those provisions in the changed circumstances.

(6) OFCOM shall record the members of each applicant's bidder group as soon as reasonably practicable after the last deadline specified by OFCOM under paragraphs (3) and (5).

#### **Subsequent changes to bidder groups**

**6.—**(1) An applicant or a bidder may change its bidder group after the recording by OFCOM of the members of each applicant's bidder group.

(2) Where the change involves the addition or removal of an associate, the applicant or bidder must notify OFCOM of the change and submit versions of the documents provided under regulation 4(3)(a)(i) and (ii) which comply with those provisions in the changed circumstances.

(3) To add a person who is not an associate of the applicant or bidder to its bidder group, the applicant or bidder must deliver to OFCOM a document in the form set out in Schedule [4] completed by the applicant or bidder and signed on its behalf by two authorised persons and completed by and signed by or on behalf of the person in respect of whom that document is completed.

#### **Determination of applicants which are qualified to bid**

**7.—**(1) OFCOM shall determine whether each applicant which has submitted an application in accordance with regulation 4 is qualified to bid in the award process.

(2) An applicant shall not be qualified to bid in the award process if a member of its bidder group is also a member of another applicant's bidder group.

[Ofcom comment - we are considering the possibility of allowing associates to "opt out" of a bidder group subject to specific conditions and undertakings.]

(3) In making their determination under paragraph (1) OFCOM shall take into account whether —

- (a) the grant of a licence to the applicant would be prejudicial to the interests of national security;
- (b) the applicant is a fit and proper person to hold a licence having regard to the probity of —
  - (i) the applicant;
  - (ii) each member of the applicant's bidder group; and
  - (iii) each director of each member of the applicant's bidder group;

- (c) any of the information submitted to OFCOM by the applicant in connection with the award process is false or misleading;
- (d) any member of the applicant's bidder group has colluded, or attempted to collude, or is colluding or attempting to collude, with another person to distort the outcome of the award process;
- (e) any member of the applicant's bidder group has acted or is acting in a way which is likely to distort the outcome of the award process;
- (f) any member of the applicant's bidder group, or any person to whom confidential information has been disclosed, has disclosed, or is disclosing or attempting to disclose or has incited or is inciting another person to disclose, any confidential information, whether directly or indirectly, to any person, except where the disclosure is—
  - (i) to OFCOM;
  - (ii) to a member of the applicant's bidder group;
  - (iii) to a provider of finance for the purpose of raising finance for the applicant's application; or
  - (iv) to a person for the purpose of enabling that person to decide whether to participate as a member of the applicant's bidder group;
- (g) any member of the applicant's bidder group has obtained or is obtaining or attempting to obtain confidential information relating to another applicant;
- (h) any member of the applicant's bidder group is receiving or is attempting to receive services in relation to the award process from any person who has provided or is providing services to OFCOM in relation to the award process; and
- (i) any person who is a member or a director or employee of a member of the applicant's bidder group and is also a director or employee of a member of another bidder group is—
  - (i) taking part in the preparation of both bidder groups for participation in the award process; or
  - (ii) receiving confidential information relating to both bidder groups.

(4) Applicants must, if requested to do so by OFCOM, provide by a deadline specified by OFCOM any information or documentation which OFCOM reasonably require to make their determination.

(5) If an applicant does not provide such information or documentation by the deadline specified by OFCOM, OFCOM shall also take that fact into account in making their determination.

(6) Where OFCOM determine that an applicant is not qualified to bid in the award process, that applicant's initial deposit shall not be forfeited for that reason.

**Publication of determination**

8.—(1) OFCOM shall notify each applicant of their determination under regulation 7(1).

(2) OFCOM shall also notify each applicant qualified to bid of the name of each other applicant who is so qualified and shall publish the names of all applicants who are qualified to bid on OFCOM's internet website.

**Withdrawal of an application**

9.—(1) OFCOM shall notify each applicant qualified to bid of the last day for withdrawal from the award process and shall publish the last day for withdrawal on OFCOM's internet website ("last day for withdrawal").

(2) If, on or before the last day for withdrawal, OFCOM receive notice of an applicant's intention to withdraw its application, signed by two authorised persons of that applicant, the application shall be withdrawn and the applicant shall be excluded from the award process and OFCOM shall notify all other applicants of the withdrawal.

(3) Where an applicant withdraws its application in accordance with paragraph (2), that applicant shall not be re-admitted to the award process.

(4) Where an applicant withdraws its application in accordance with paragraph (2), that applicant's initial deposit shall not be forfeited for that reason.

#### **Determination of number of bidders**

**10.**—(1) After the last day for withdrawal, OFCOM shall determine the number of bidders.

(2) Where there are no bidders, OFCOM shall complete the award process by refunding to applicants which were not qualified, or withdrew in accordance with regulation 9, the initial deposits (where such deposits have not been forfeited under regulation 69) but not any interest which has accrued on the deposits.

(3) Where there is only one bidder, OFCOM shall grant a licence in accordance with the procedure set out in Part 4 of these Regulations.

(4) Where the number of bidders is more than one, OFCOM shall grant a licence or licences (as the case may be) in accordance with the procedure set out in Part 5 of these Regulations.

(5) OFCOM shall publish the names of the bidders on OFCOM's internet website together with a statement as to whether OFCOM will proceed to grant licences in accordance with Part 4 or Part 5 (as the case may be) of these Regulations.

## **PART 4**

### **PROCEDURE WHERE THERE IS ONLY ONE BIDDER**

#### **Frequency range selection menu**

**11.**—(1) Where there is only one bidder, OFCOM shall notify that bidder of—

(a) a deadline by when the bidder must deliver to OFCOM at Riverside House, 2a Southwark Bridge Road, London SE1 9HA a frequency range selection menu in the form set out in Schedule [5] completed in accordance with paragraph (2) and signed on its behalf by two authorised persons; and

(b) a further deadline by when the bidder must pay into OFCOM's bank account by a same day electronic transfer, with accompanying information which identifies the bidder, a sum determined in accordance with paragraph (5);

(2) The bidder must, on the frequency range selection menu, select no more than one frequency range in respect of each of—

(a) the 2010-2025 megahertz band;

(b) frequency ranges for paired lots in the 2500-2690 megahertz band; and

(c) frequency ranges for unpaired lots in the 2500-2690 megahertz band,

such that the total number of eligibility points associated with that selection is no greater than sixteen.

(3) The number of eligibility points associated with each frequency range on the frequency range selection menu shall be construed in accordance with Schedule [5].

(4) The licence fee shall be the total amount of the prices indicated on the frequency range selection menu for the frequency ranges selected by the bidder.

(5) The sum which the bidder must pay to OFCOM shall be—

(a) where the initial deposit has not been forfeited in accordance with regulation 69, a sum equal to the licence fee less the initial deposit;

(b) where the initial deposit has been so forfeited, a sum equal to the licence fee.

(6) Where, due to the manner of completion, the completed frequency range selection menu is incomplete or defective but OFCOM believe that they can ascertain the bidder's intention in relation to the making of the selection, OFCOM shall ask the bidder to confirm in a notice to OFCOM by a specified deadline that OFCOM have correctly ascertained the bidder's intention in relation to the selection.

(7) Where the bidder confirms in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder that OFCOM have correctly ascertained the bidder's intention, the form in its entirety shall be accepted by OFCOM on that basis.

(8) Where the bidder does not give such confirmation in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder—

- (a) where the incompleteness or defect relates to one or more of the selections of frequency ranges made on the frequency range selection menu, that selection or those selections (as the case may be) shall be rejected by OFCOM and accordingly the bidder shall not be entitled to the grant of a licence for those selected frequency ranges;
- (b) where sub-paragraph (a) does not apply, the frequency range selection menu in its entirety shall be rejected by OFCOM and accordingly the bidder shall not be entitled to the grant of a licence and shall not receive a refund of its initial deposit, which shall (where it has not been forfeited under regulation 69) be forfeited.

(9) Where all the selections of frequency ranges made on the frequency range selection menu are rejected by OFCOM in accordance with paragraph (8)(a), the bidder shall not receive a refund of its initial deposit, which shall (where it has not been forfeited under regulation 69) be forfeited

(10) Where the bidder does not—

- (a) deliver a completed frequency range selection form to OFCOM in accordance with paragraph (1)(a); or
- (b) pay OFCOM the required sum in accordance with paragraph (1)(b),

the bidder shall not be entitled to the grant of a licence and shall not receive a refund of its initial deposit, which shall (where it has not already been forfeited under regulation 69) be forfeited.

### **Grant of licence**

**12.** Where OFCOM have received from the bidder a completed frequency range selection menu in accordance with regulation 11(1)(a) and the required sum in accordance with regulation 11(1)(b), OFCOM shall grant the bidder a licence for the frequency ranges selected on the frequency range selection menu that the bidder delivered to OFCOM.

### **Completion of the award process**

**13.—**(1) After the grant of the licence, OFCOM shall complete the award process by—

- (a) publishing on their internet website the name of the bidder to which a licence has been granted, the details of the frequency ranges in respect of which the licence was granted and the licence fee paid; and
- (b) refunding to applicants which were not qualified, or withdrew in accordance with regulation 9, the initial deposits (where such deposits have not been forfeited under regulation 69) but not any interest which has accrued on the deposits.

**PART 5**  
**PROCEDURE WHERE THERE IS MORE THAN ONE BIDDER**  
**CHAPTER 1**

Principal stage, assignment stage and grant stage

**Principal stage, assignment stage and grant stage**

**14.**—(1) Where there is more than one bidder, the process for the award of licences shall consist of the procedure set out in Chapters 2 to 5 of this Part (“principal stage”), the procedure set out in Chapters 6 and 7 of this Part (“assignment stage”) and the procedure set out in Chapter 8 of this Part (“grant stage”).

(2) During the principal stage there shall be one or more rounds for the submission of primary bids (“primary bid rounds”) and a further round for the submission of supplementary bids (“supplementary bids round”).

(3) A bid made during the principal stage shall be a bid for a selection of lots.

(4) The maximum number of lots available (“available total”) are—

- (a) one 2010-2025 megahertz lot in the 2010-2025 megahertz band;
- (b) fourteen paired lots in the 2500-2690 megahertz band;
- (c) thirty-eight unpaired lots in the 2500-2690 megahertz band.

(5) Following completion of the principal stage, the frequencies that are to be assigned to the winning bidders shall be determined in accordance with the assignment stage.

(6) Licences for the frequencies so determined shall be granted in accordance with the grant stage.

**CHAPTER 2**

Structure of principal stage

**Primary bids**

**15.**—(1) A bid made during a primary bid round (“primary bid”) for a selection of lots shall be at an amount in whole pounds being the total amount of the round prices in that primary bid round for each lot included in the selection of lots.

(2) The round price means the price per lot determined in accordance with regulation 21 or 22 (as the case may be) at which lots are offered to bidders during a primary bid round.

(3) In order to make a primary bid a bidder must, on a form provided to the bidder by OFCOM (“primary bid form”)—

- (a) specify in respect of the 2010-2025 megahertz band whether it wishes that lot to be included in a licence at the round price for that band;
- (b) specify in respect of the 2500-2690 megahertz band the total number of paired lots it wishes to be included in a licence at the round price for paired lots in that band;
- (c) specify in respect of the 2500-2690 megahertz band the total number of unpaired lots it wishes to be included in a licence at the round price for unpaired lots in that band; and
- (d) specify an amount in whole pounds that it is willing to pay for the licence, being the total amount of the round prices for the selected lots.

(4) The number of lots specified by a bidder under sub-paragraphs (3)(a)-(3)(c) must not be greater than the available total.

(5) Where the selection of lots comprised in a primary bid includes unpaired lots, that selection must include at least two such lots.

(6) A bidder must not submit more than one primary bid in any primary bid round.

(7) The selection of lots specified in a primary bid made by a bidder must be such that the total number of eligibility points associated with the primary bid in accordance with paragraph (8) does not exceed the bidder's eligibility limit for that primary bid round determined in accordance with regulation 25 or 26 (as the case may be) and notified to the bidder in accordance with regulation 30(1)(c).

(8) The number of eligibility points associated with a primary bid shall be a number equal to the total of the eligibility points attributed to each lot included in the selection of lots comprised in the primary bid in accordance with Schedule [7].

### **Requirement for a valid primary bid in the first primary bid round**

**16.** Any bidder which does not submit a valid primary bid in the first primary bid round shall be excluded from the award process and shall not receive a refund of its initial deposit or any sum that the bidder has paid as a deposit under regulation 24, which shall (where not forfeited under regulation 69) be forfeited.

### **Supplementary bids**

**17.—(1)** A bid made during the supplementary bids round ("supplementary bid") shall be either—

- (a) a basic supplementary bid; or
- (b) an additional supplementary bid.

(2) A basic supplementary bid shall be a bid at an amount in whole pounds for either—

- (a) a selection of lots containing no unpaired lots; or
- (b) a selection of lots containing unpaired lots where that bid is conditional on the bidder receiving one contiguous range of licence blocks in respect of those unpaired lots,

(3) An additional supplementary bid shall be a bid at an amount in whole pounds for a selection of lots containing unpaired lots where that bid is conditional on the bidder receiving two contiguous ranges of licence blocks in respect of those unpaired lots.

### **Basic supplementary bids**

**18.—(1)** In order to make each basic supplementary bid a bidder must, on a form provided to the bidder by OFCOM ("supplementary bids form")—

- (a) specify in respect of the 2010-2025 megahertz band whether it wishes that lot to be included in a licence;
- (b) specify in respect of the 2500-2690 megahertz band—
  - (i) the total number of paired lots; and
  - (ii) the total number of unpaired lots,

it wishes to be included in a licence; and

- (c) specify an amount in whole pounds that it is willing to pay for the licence.

(2) The number of lots specified by a bidder under paragraph (1)(a) to (1)(b) must not be greater than the available total.

(3) Where the selection of lots specified in a basic supplementary bid includes unpaired lots, that selection must include at least two such lots.

(4) The selection of lots specified in a basic supplementary bid made by a bidder may be the same as or different from the selection of lots comprised in a primary bid made by that bidder.

(5) The amount of the basic supplementary bid shall be determined by the bidder, subject to the restrictions set out in paragraph (6).

- (6) The restrictions are—



- (a) the amount of the basic supplementary bid must not be less than the total amount of the round prices in the first primary bid round for the lots included in the selection of lots specified in that bid;
- (b) where the basic supplementary bid is for a selection of lots in respect of which the bidder has also made a primary round bid, the amount of the basic supplementary bid must be greater than the amount of the highest primary round bid made by the bidder for that selection of lots;
- (c) where—
  - (i) the bidder did not make a valid primary bid in the final primary bid round; or
  - (ii) the total number of eligibility points associated with the basic supplementary bid in accordance with paragraph (12) is greater than the total number of eligibility points associated with the valid primary bid made by the bidder in the final primary bid round in accordance with paragraph (12),

the amount of the basic supplementary bid must not be greater than the amount determined in accordance with paragraphs (7) and (8).

(7) OFCOM shall identify, having regard to—

- (a) the total number of eligibility points associated with the basic supplementary bid, and
- (b) the bidder's eligibility limit for each primary bid round,

the latest primary bid round in which a primary bid made by the bidder for that selection of lots could have satisfied the restriction set out in regulation 15(7).

(8) The amount referred to in paragraph (6)(c) shall be the total amount of the round prices in that primary bid round for the lots included in the selection of lots specified in the basic supplementary bid.

(9) A bidder may submit any number of basic supplementary bids in the supplementary bids round, subject to the restriction set out in paragraph (10).

(10) A bidder may not submit more than one basic supplementary bid for each particular selection of lots.

(11) A bidder is not required to submit a basic supplementary bid.

(12) The number of eligibility points associated with a primary bid or a basic supplementary bid shall be a number equal to the total of the eligibility points associated with each lot included in the selection of lots specified in that bid in accordance with Schedule [7].

### **Additional supplementary bids**

**19.—**(1) A bidder may only make an additional supplementary bid where—

- (a) the bidder has made a valid primary bid for a selection of lots including three or more unpaired lots; or
- (b) the bidder has made a valid basic supplementary bid for a selection of lots including three or more unpaired lots,

(2) In order to make each additional supplementary bid a bidder must, on the supplementary bids form—

- (a) specify in respect of the 2010-2025 megahertz band whether it wishes that lot to be included in a licence;
- (b) specify in respect of the 2500-2690 megahertz band—
  - (i) the total number of paired lots; and
  - (ii) the total number of unpaired lots in each division,

it wishes to be included in a licence; and

- (c) specify an amount in whole pounds that it is willing to pay for the licence.

(3) Each additional supplementary bid must meet the conditions set out in paragraph (4).

- (4) The conditions are that—
- (a) the additional supplementary bid is for a selection of lots containing the same number of 2010-2025 megahertz lots as the bid meeting the conditions set out in paragraph (1);
  - (b) the additional supplementary bid is for a selection of lots containing the same number of paired lots as the bid meeting the conditions of paragraph (1);
  - (c) the additional supplementary bid is for a selection of lots containing  $n+1$  unpaired lots, where  $n$  is the number of unpaired lots in the bid meeting the conditions set out in paragraph (1); and
  - (d) the additional supplementary bid is for a selection of lots containing unpaired lots, where—
    - (i) those unpaired lots are divided into two divisions; and
    - (ii) each such division contains at least two unpaired lots.
- (5) The amount of the additional supplementary bid shall be determined by the bidder, subject to the restrictions set out in paragraph (6).
- (6) The restrictions are—
- (a) the amount of the additional supplementary bid must not be less than the total amount of the round prices in the first primary bid round for the lots included in the selection of lots specified in that bid;
  - (b) where the bidder has made a valid primary bid in accordance with paragraph (1)(a) and has not made a valid basic supplementary bid in accordance with paragraph (1)(b) for the same selection of lots, the amount of the additional supplementary bid shall be no greater than the amount of the highest valid primary bid for that selection of lots;
  - (c) where the bidder has made a valid basic supplementary bid in accordance with paragraph (1)(b), the amount of the additional supplementary bid shall be no greater than the amount of that valid basic supplementary bid.
- (7) A bidder may submit any number of additional supplementary bids, subject to the restriction set out in paragraph (8).
- (8) A bidder may not submit more than one additional supplementary bid for each particular selection and division of lots meeting the requirements of paragraph (4)(a) to (4)(d).
- (9) A bidder is not required to submit an additional supplementary bid.

### **Number of primary bid rounds**

**20.**—(1) After each primary bid round, OFCOM shall determine whether any of the conditions set out in paragraph (2) are met.

- (2) The conditions are—
- (a) there is excess demand for the 2010-2025 megahertz band;
  - (b) there is excess demand for paired lots;
  - (c) there is excess demand for the 2500-2690 megahertz band;
  - (d) the total number of unpaired lots selected in valid primary bids is more than nine.
- (3) Where at least one of the conditions set out in paragraph (2)(a) to (2)(c) are met, there shall be another primary bid round unless OFCOM determine, in accordance with paragraph (4), that there shall be no further primary bid rounds.
- (4) OFCOM shall only make such a determination where they are satisfied that it is unlikely that the information that would be made available to bidders under regulation 35 following any such further primary bid rounds would affect—
- (a) the determination of the winning combination of principal stage bids in accordance with regulation 44;
  - (b) the determination of the base price payable by a winning bidder in accordance with regulation 45.

- (5) Where—
- (a) OFCOM have determined under paragraph (3) that there shall be no further primary bid rounds; or
  - (b) none of the conditions set out in paragraph (2)(a) to (2)(c) are met.

there shall be a supplementary bids round.

### **Determination of round prices for the first primary bid round**

**21.** In the first primary bid round, the round price for each lot shall be the amount set out in Schedule 6.

### **Determination of round prices for subsequent primary bid rounds**

**22.—**(1) Subject to paragraph (2), the round price for the 2010-2025 megahertz lot shall be the same amount as it was in the previous primary bid round.

(2) Where after the previous primary bid round OFCOM have determined under regulation 20(1) that there is excess demand for the 2010-2025 megahertz band, the round price for the 2010-2025 megahertz lot shall be an amount that is higher than the amount that was the round price for that band in the previous primary bid round, subject to the limit set out in paragraph (7).

(3) Subject to paragraph (4), the round price for paired lots shall be the same amount as it was in the previous primary bid round.

(4) Where after the previous primary bid round OFCOM have determined under regulation 20(1) that—

- (a) there is excess demand for the 2500-2690 megahertz band; or
- (b) there is excess demand for paired lots,

the round price for paired lots shall be an amount that is higher than the amount that was the round price for paired lots in the previous primary bid round, subject to the limit in paragraph (7).

(5) Subject to paragraph (6), the round price for unpaired lots shall be the same amount as it was in the previous primary bid round.

(6) Where after the previous primary bid round OFCOM have determined under regulation 20(1) that—

- (a) there is excess demand for the 2500-2690 megahertz band; and
- (b) the total number of unpaired lots selected in valid primary bids is more than nine,

the round price for unpaired lots shall be equal to an amount that is half the amount of the round price for paired lots determined in accordance with paragraph (3) or (4) (as the case may be).

(7) The round price for the 2010-2025 megahertz lot and the round price for paired lots shall not be more than twice the amount of the round prices for those lots in the previous primary bid round.

### **Bidder's eligibility limit for primary bid rounds**

**23.** Before each primary bid round OFCOM shall determine an eligibility limit for each bidder for that primary bid round in accordance with regulation 25 or 26 (as the case may be).

### **Additional deposit before first primary bid round**

**24.—**(1) In addition to the initial deposit paid in accordance with regulation 4(3)(b), a bidder may pay an additional sum in pounds as a deposit which shall be taken into account by OFCOM in accordance with regulation 25 for the purpose of calculating the bidder's eligibility limit for the first primary bid round.

(2) A bidder wishing to pay such an additional sum must, by such a deadline as may be specified by OFCOM, pay the additional sum into OFCOM's bank account by a same day electronic transfer with accompanying information which identifies the bidder.

#### **Determination of bidder's eligibility limit for the first primary bid round**

**25.**—(1) After the deadline specified in regulation 24(2) and before the start of the first primary bid round, OFCOM shall determine each bidder's eligibility limit for the first primary bid round in accordance with the requirements of this regulation.

(2) OFCOM shall divide by fifty thousand the total amount of pounds that the bidder has on deposit (including the initial deposit and any additional sum paid under regulation 24, but not including any sum forfeited under regulation 69).

(3) Where the number that results from the calculation in paragraph (2) is greater than sixteen, the eligibility limit shall be sixteen.

(4) Where the number that results from the calculation in paragraph (2) is not greater than sixteen, the eligibility limit shall be—

- (a) that number, or
- (b) where the number is not a whole number, that number rounded down to the nearest whole number.

(5) Where a bidder's eligibility limit calculated in accordance with this regulation is less than two, that bidder shall be excluded from the award process and shall not receive a refund of its initial deposit or any sum that the bidder has paid as a deposit under regulation 24, which shall (where not forfeited under regulation 69) be forfeited.

#### **Determination of bidder's eligibility limit for subsequent primary bid rounds**

**26.**—(1) For subsequent primary bid rounds, OFCOM shall determine each bidder's eligibility limit under paragraph (2) or (5) (as the case may be).

(2) Where a bidder makes a valid primary bid in a primary bid round, OFCOM shall determine the bidder's eligibility limit for the next primary bid round by calculating the number of eligibility points associated with that valid primary bid.

(3) The number of eligibility points associated with a valid primary bid shall be a number equal to the total of the eligibility points associated with each lot included in the selection of lots specified in that valid primary bid in accordance with Schedule [7].

(4) The bidder's eligibility limit shall be a number equal to the number of eligibility points associated with that valid primary bid.

(5) Where a bidder does not make a valid primary bid in a primary bid round, the bidder's eligibility limit for the next primary bid round shall be zero.

#### **Valid primary bids**

**27.**—(1) A primary bid shall only be taken into consideration for the purposes of determining—

- (a) whether the conditions set out in regulation 20(2) are met;
- (b) the winning combination of principal stage bids in accordance with regulation 44;
- (c) the base price payable by a winning bidder in accordance with regulation 45;

if it is a primary bid which satisfies the conditions set out in paragraph (2) ("valid primary bid").

(2) The conditions are that—

- (a) the primary bid is made on a primary bid form that has been completed in accordance with regulation 15(3);
- (b) the primary bid is submitted in accordance with the restriction set out in regulation 15(6);

- (c) the primary bid complies with the restrictions set out in regulation 15(4) and 15(7) and with the requirement set out in regulation 15(5); and
- (d) the completed primary bid form is submitted to OFCOM in accordance with regulation 31(1) and is received by OFCOM in accordance with regulation 31(2).

**Valid basic supplementary bids**

**28.**—(1) A basic supplementary bid shall only be taken into consideration for the purposes of determining—

- (a) the winning combination of principal stage bids under regulation 44;
- (b) the base price payable by a winning bidder under regulation 45;

if it satisfies the conditions set out in paragraph (2) (“valid basic supplementary bid”).

(2) The conditions in respect of a basic supplementary bid are that—

- (a) the basic supplementary bid is made on a supplementary bid form that has been completed in accordance with regulation 18;
- (b) the amount of the basic supplementary bid specified by the bidder under regulation 18(1)(c) complies with the restrictions set out in regulation 18(6);
- (c) the basic supplementary bid complies with the restrictions set out in regulation 18(2) and 18(10) and with the requirement set out in regulation 18(3); and
- (d) the completed supplementary bids form is submitted to OFCOM in accordance with regulation 38(1) and is received by OFCOM in accordance with regulation 38(2);

**Valid additional supplementary bids**

**29.**—(1) An additional supplementary bid shall only be taken into consideration for the purposes of determining—

- (a) the winning combination of principal stage bids under regulation 44;
- (b) the base price payable by a winning bidder under regulation 45;

if it satisfies the conditions set out in paragraph (2) (“valid additional supplementary bid”).

(2) The conditions in respect of an additional supplementary bid are that—

- (a) the additional supplementary bid is made on a supplementary bid form that has been completed in accordance with regulation 19(2);
- (b) the amount of the additional supplementary bid specified by the bidder under regulation 19(2)(c) complies with the restrictions set out in regulation 19(6);
- (c) the additional supplementary bid complies with the restriction set out in regulation 19(8) and with the requirements set out in regulation 19(4); and
- (d) the completed supplementary bids form is submitted to OFCOM in accordance with regulation 38(1) and is received by OFCOM in accordance with regulation 38(2).

**CHAPTER 3**

**Procedure for primary bid rounds**

**Notice to be given to bidders before primary bid rounds and extensions to rounds**

**30.**—(1) Before the start of each primary bid round, OFCOM shall notify each bidder of—

- (a) the date on which, and the times on that date within which, the primary bid round will take place;
- (b) in respect of each lot, the round price for the lot in that primary bid round (determined in accordance with regulation 21 or 22, as the case may be);
- (c) the bidder’s eligibility limit for that primary bid round (determined in accordance with regulation 25 or 26, as the case may be).

(2) The time notified by OFCOM under paragraph (1)(a) as the end of the primary bid round (“end of round time”) may be treated by a bidder in respect of—

- (a) no more than two primary bid rounds, and
- (b) where paragraph (3) applies to the bidder, a further primary bid round,

as that time extended by thirty minutes and OFCOM shall treat that extended time as the end of round time for the purposes of paragraph (1)(a).

(3) This paragraph applies to a bidder where—

- (a) in respect of a previous primary bid round, the bidder treated the end of round time for that round as extended by thirty minutes in accordance with paragraph (2);
- (b) the bidder submitted its completed primary bid form for that primary bid round so that it was received by OFCOM by the end of round time so extended; and
- (c) OFCOM have notified the bidder that they are satisfied that, in respect of that primary bid round, circumstances existed which were beyond the bidder’s control which had the effect that the bidder could not have submitted its primary bid form so that it was received by OFCOM by the end of round time without such an extension.

### **Submission of primary bid form to OFCOM**

**31.**—(1) Except as provided for in regulation 32, a bidder must submit the completed primary bid form to OFCOM by using the electronic auction system.

(2) The completed primary bid form must be received by OFCOM by the end of round time.

### **Alternative method for submission of primary bid form**

**32.**—(1) Where OFCOM are satisfied that a bidder is unable to submit a primary bid form by using the electronic auction system because of technical failure (or an event or circumstance with similar effect on the bidder’s ability to use the electronic auction system), OFCOM shall notify the bidder of an alternative method of submitting the primary bid form and any requirements relating to the authentication of communications made by means of the alternative method.

(2) The bidder must submit the primary bid form by means of the alternative method and must comply with any requirements which have been notified to it under paragraph (1) relating to the authentication of communications.

### **Incomplete or defective primary bid form**

**33.**—(1) Where, due to the manner of completion, a primary bid form is incomplete or defective but OFCOM believe that they can ascertain the bidder’s intention in relation to the making of the primary bid, OFCOM shall ask the bidder to confirm in a notice to OFCOM by a specified deadline that OFCOM have correctly ascertained the bidder’s intention in relation to the making of the primary bid.

(2) Where the bidder confirms in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder that OFCOM have correctly ascertained the bidder’s intention, the primary bid form in its entirety shall be accepted by OFCOM on that basis.

(3) Where the bidder does not give such confirmation in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder, the primary bid form in its entirety shall be rejected by OFCOM and the primary bid submitted on the primary bid form shall not be a valid primary bid and accordingly shall not be taken into consideration for the purposes of determining—

- (a) whether the conditions set out in regulation 20(2) are met;
- (b) the winning combination of principal stage bids in accordance with regulation 44;
- (c) the base price payable by a winning bidder in accordance with regulation 45.

### **Notification that primary bid not valid**

**34.** Where a bidder submits a primary bid that is not a valid primary bid during a primary bid round, OFCOM shall, after the end of that primary bid round, notify the bidder of that fact and shall give the reasons why the bid is not a valid primary bid.

### **Release of information on primary bids in principal stage**

**35.—**(1) After the end of a primary bid round and before the start of the subsequent primary bid round (or before the start of the supplementary bids round if there is no subsequent primary bid round), OFCOM shall notify bidders of—

- (a) the total number of—
    - (i) lots in the 2010-2025 megahertz band;
    - (ii) paired lots; and
    - (iii) unpaired lots,included in valid primary bids, and
  - (b) the number of lots in the 2010-2025 megahertz band and the number of paired lots and the number of unpaired lots included in each valid primary bid without notifying bidders of which bidder made each bid.
- (2) OFCOM may, from time to time, publish on their website the total number of—
- (i) lots in the 2010-2025 megahertz band;
  - (ii) paired lots; and
  - (iii) unpaired lots,

included in valid primary bids submitted in the last primary bid round completed up to that time.

### **Further deposit for primary bid rounds**

**36.—**(1) Where in respect of a primary bid the amount specified by a bidder under regulation 15(3)(d) is greater than twice the total amount that the bidder has on deposit (including the initial deposit, any sum paid as a deposit under regulation 24 and any sum or sums paid as a deposit under this regulation, but not including any sum forfeited under regulation 69) OFCOM may, having regard to the desirability of securing an efficient outcome to the principal stage, subsequently notify the bidder that the bidder is required to pay a further sum in pounds as a deposit.

(2) The further sum shall be an amount such that the total amount that the bidder has on deposit (including the initial deposit, any sum paid as a deposit under regulation 24 and any sum or sums paid as a deposit under this regulation, but not including any sum forfeited under regulation 69) is no less than a proportion of the amount of the highest valid primary bid that the bidder made before OFCOM gave notice to the bidder under paragraph (1), where that proportion shall be specified by OFCOM in that notice.

(3) Any such sum shall be paid into OFCOM's bank account by a same day electronic transfer, with accompanying information which identifies the bidder, by a deadline specified by OFCOM.

(4) Where a bidder does not satisfy the requirements set out in paragraph (3), OFCOM shall notify the bidder of that fact, and for any primary bid rounds following notice being given under this paragraph the bidder's eligibility limit shall be zero.

## **CHAPTER 4**

Procedure for supplementary bids round and further deposit for supplementary bids round

### **Notice to be given to bidders before supplementary bids round**

**37.** Before the start of the supplementary bids round, OFCOM shall notify each bidder of—

- (a) the date on which, and the times on that date within which, the supplementary bids round will take place;
- (b) the deadline by when bidders must pay a further sum in pounds as a deposit in accordance with regulation 43.

#### **Submission of supplementary bids form to OFCOM**

**38.**—(1) Except as provided for in regulation 39, a bidder must submit the completed supplementary bids form to OFCOM by using the electronic auction system.

(2) Except as provided for in regulation 40, the completed supplementary bids form must be received by OFCOM by the time notified to bidders under regulation 37(a) as the end of the supplementary bids round.

#### **Alternative method for submission of supplementary bids form**

**39.**—(1) Where OFCOM are satisfied that a bidder is unable to submit a supplementary bids form by using the electronic auction system because of technical failure (or an event or circumstance with similar effect on the bidder's ability to use the electronic auction system), OFCOM shall notify the bidder of an alternative method of submitting the supplementary bids form and any requirements relating to the authentication of communications made by means of the alternative method.

(2) The bidder must submit the supplementary bids form by means of the alternative method and must comply with any requirements which have been notified to it under paragraph (1) relating to the authentication of communications.

#### **Extension to supplementary bids round**

**40.**—(1) Where—

- (a) OFCOM have not received a completed supplementary bids form from a bidder by the time notified to bidders under regulation 37(a) as the end of the supplementary bids round, and
- (b) paragraph (2) applies,

the time by which the bidder's completed supplementary bids form must be received by OFCOM shall be the time sixty minutes after the time notified to bidders under regulation 37(a) as the end of the supplementary bids round.

(2) This paragraph applies where OFCOM are satisfied that circumstances existed which were beyond the bidder's control which had the effect that the bidder could not submit its supplementary bids form so that it was received by OFCOM by the time notified to bidders under regulation 37(a) as the end of the supplementary bids round.

#### **Incomplete or defective supplementary bids form**

**41.**—(1) Where, due to the manner of completion, a supplementary bids form is incomplete or defective but OFCOM believe that they can ascertain the bidder's intention in relation to the making of the supplementary bid or bids, OFCOM shall ask the bidder to confirm in a notice to OFCOM by a specified deadline that OFCOM have correctly ascertained the bidder's intention in relation to the making of the supplementary bid or bids.

(2) Where the bidder confirms in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder that OFCOM have correctly ascertained the bidder's intention, the supplementary bids form in its entirety shall be accepted by OFCOM on that basis.

(3) Where the bidder does not give such confirmation in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder—

- (a) where the incompleteness or defect relates to one or more of the supplementary bids made on the supplementary bids form, that supplementary bid or those supplementary



bids (as the case may be) shall be rejected by OFCOM and shall not be taken into consideration for the purposes of determining—

- (i) the winning combination of principal stage bids in accordance with regulation 44;
  - (ii) the base price payable by a winning bidder in accordance with regulation 45;
- (b) where sub-paragraph (a) does not apply, the supplementary bids form in its entirety shall be rejected by OFCOM and none of the supplementary bids made on that supplementary bids form shall be taken into consideration for the purposes of determining—
- (i) the winning combination of principal stage bids in accordance with regulation 44;
  - (ii) the base price payable by a winning bidder in accordance with regulation 45.

#### **Notification that supplementary bid not valid**

42. Where a bidder submits a supplementary bid that is not a valid supplementary bid, OFCOM shall, after the end of the supplementary bids round, notify the bidder of that fact and shall give the reasons why the bid is not a valid supplementary bid.

#### **Further deposit for supplementary bids round**

43.—(1) By the deadline notified to bidders under regulation 37(b), each bidder must pay into OFCOM's bank account by a same day electronic transfer, with accompanying information which identifies the bidder, a further sum in pounds as a deposit so that the total amount the bidder has on deposit (including the initial deposit, any sum paid as a deposit under regulation 24 or 36 and any sum paid as a deposit under this paragraph, but not including any sum forfeited under regulation 69) is not less than—

- (a) where a bidder has on all occasions satisfied the requirements set out in regulation 36(3) the greater of—
  - (i) a proportion of the amount of the bidder's highest valid primary bid as specified by the bidder under regulation 15(3)(d); and
  - (ii) the same proportion of the amount of the bidder's highest valid supplementary bid as specified by the bidder under regulation 18(1)(c) or regulation 19(2)(c) as the case may be;

where that proportion shall be specified by OFCOM in the notice to bidders under regulation 37(b).

- (b) where a bidder has on at least one occasion not satisfied the requirements set out in regulation 36(3), the greater of—
  - (i) the amount of the bidder's highest valid primary bid as specified by the bidder under regulation 15(3)(d);
  - (ii) the amount of the bidder's highest valid supplementary bid as specified by the bidder under regulation 18(1)(c) or regulation 19(2)(c) as the case may be.

(2) Where a bidder does not satisfy the requirements set out in paragraph (1), OFCOM shall notify the bidder and the bidder shall be excluded from the award process and shall not receive a refund of its initial deposit or any sum paid as a deposit under regulation 24 or 36 or under paragraph (1), which shall (where not forfeited under regulation 69) be forfeited, and all of that bidder's primary bids and supplementary bids (if any) shall be deemed to be invalid and shall not be taken into consideration for the purposes of determining—

- (a) the winning combination of principal stage bids in accordance with regulation 44;
- (b) the base price payable by a winning bidder in accordance with regulation 45.

## CHAPTER 5

### Determination of winning principal stage bids and conclusion of principal stage

#### **Determination of the winning principal stage bids and the winning combination of principal stage bids**

44.—(1) The winning principal stage bids shall be those valid principal stage bids that comprise the winning combination of principal stage bids.

(2) Unless paragraph (4) applies, the winning combination of principal stage bids shall be the valid combination of principal stage bids having the highest total value of amounts bid.

(3) A valid combination of principal stage bids is any combination of valid principal stage bids within which—

- (a) there is at most one valid principal stage bid from any one bidder;
- (b) the 2010-2025 megahertz lot is included in at most one of the bids;
- (c) subject to sub-paragraph (d), in respect of the 2500-2690 megahertz band, it would be possible for OFCOM to assign—
  - (i) in respect of each bidder submitting a valid principal stage bid containing paired lots, a contiguous range of paired licence blocks where the number of paired licence blocks within that range is equal to the number of paired lots selected in that valid principal stage bid; and
  - (ii) in respect of each bidder submitting a valid principal stage bid containing unpaired lots, a contiguous range of licence blocks where the number of licence blocks contained within that range is equal to the number of unpaired lots selected in that valid principal stage bid,

such that each licence block is assigned no more than once.

(d) where a combination of valid principal stage bids includes at least one additional supplementary bid, it would be possible for OFCOM to assign—

- (i) in respect of each bidder submitting a valid principal stage bid containing paired lots, a contiguous range of paired licence blocks where the number of paired licence blocks within that range is equal to the number of paired lots selected in that valid principal stage bid;
- (ii) in respect of each bidder submitting a valid basic supplementary bid containing unpaired lots, a contiguous range of licence blocks where the number of licence blocks contained within that range is equal to the number of unpaired lots selected in that valid principal stage bid; and
- (iii) in respect of each bidder submitting a valid additional supplementary bid containing unpaired lots, two contiguous ranges of licence blocks where—
  - (aa) the total number of licence blocks contained within those ranges is equal to the total number of unpaired lots specified in that valid additional supplementary bid; and
  - (bb) the number of licence blocks within each range corresponds to the number of unpaired lots within each division specified in accordance with regulation 19(4)(d),

such that each licence block is assigned no more than once.

(4) Where there is more than one valid combination of principal stage bids for which the total value is equal highest, the winning combination of principal stage bids shall be determined in accordance with the order of precedence set out in paragraph (5) or, where paragraph (6) applies, in accordance with that paragraph.

(5) The order of precedence shall be determined by the total number of eligibility points associated with such valid combination of principal stage bids in accordance with paragraph (7) such that valid combinations of principal stage bids with which a greater total number of

eligibility points are associated prevail over valid combinations of principal stage bids with which a lesser total number of eligibility points are associated.

(6) Where the same total of eligibility points is associated, in accordance with paragraph (7), with any two or more valid combinations of principal stage bids for which the total value is equal highest, OFCOM shall employ a method of random selection from amongst those valid combinations of principal stage bids to determine the winning combination of principal stage bids.

(7) The number of eligibility points associated with a valid combination of principal stage bids shall be a number equal to the total of the eligibility points associated with each lot included in the selection of lots specified in the bids constituting that valid combination of principal stage bids in accordance with Schedule [7].

#### **Determination of base price of winning principal stage bids**

**45.** In respect of each winning principal stage bid OFCOM shall determine an amount in accordance with Schedule 8 (“base price”) which shall be payable by the relevant winning bidder.

#### **Notification of results of principal stage and refund of deposits**

**46.** Following the determination of the winning principal stage bids and the winning combination of principal stage bids under regulation 44 and the determination of the base price for each winning principal stage bid under regulation 45, OFCOM shall—

- (a) notify—
  - (i) each bidder which made a winning principal stage bid, as determined under regulation 44, that it has made a winning principal stage bid and the value of the base price for its winning principal stage bid, as determined under regulation 45 and the further sum in pounds as a deposit that it is required to pay in accordance with regulation 47; and
  - (ii) each bidder that did not make a winning principal stage bid, as determined under regulation 44, that it has not made a winning principal stage bid;]
- (b) refund to applicants which were not qualified or which withdrew in accordance with regulation 9 and to bidders which were not winning bidders the initial deposits and any sum paid as a deposit under regulation 24, 36 or 43 (where such deposits have not been forfeited under regulation 16, 43(1)(b) or 69), but not any interest which has accrued on the deposits.

#### **Final principal stage deposit**

**47.**—(1) OFCOM shall notify each bidder which made a winning principal stage bid, as determined by OFCOM under regulation 44 of a further sum in pounds as a deposit that it is required to pay.

(2) The further sum shall be an amount such that the total amount that the bidder has on deposit (including the initial deposit, any sum paid as a deposit under regulation 24, 36 or 43 and any sum paid as a deposit under this regulation, but not including any sum forfeited under regulation 69) is not less than the amount of the base price for that bidder determined under regulation 45.

(3) This further sum shall be paid into OFCOM’s bank account by a same day electronic transfer, with accompanying information which identifies the bidder, by a deadline specified by OFCOM.

(4) Where a bidder does not satisfy the requirements set out in paragraph (3), OFCOM shall notify the bidder and the bidder shall be excluded from the award process and shall not receive a refund of its initial deposit or any sum paid as a deposit under regulation 24, 36 or 43 or under paragraph (3), which shall be forfeited.

#### **Publication of results of principal stage**

**48.** After the deadline specified under regulation 47(3), OFCOM shall publish on their internet website—

- (a) the names of the winning bidders that have satisfied the requirements of regulation 47(3);
- (b) in respect of each winning bidder that has satisfied the requirements of regulation 47(3)—
  - (i) the number of lots in the 2010-25 megahertz band;
  - (ii) the number of paired lots; and
  - (iii) the number of unpaired lots,

comprised in its winning principal stage bid; and

- (c) in respect of each winning bidder that has satisfied the requirements of regulation 47(3) the base price for their winning principal stage bid.

## CHAPTER 6

Assignment of frequencies for the 2010-2025 megahertz band and for the 2500-2690 megahertz band where only one principal stage bid includes paired lots or unpaired lots

### **Procedure for the 2010-2025 megahertz band**

**49.** OFCOM shall assign to the bidder that submitted the winning principal stage bid for the 2010-2025 megahertz lot the frequencies between 2010 megahertz and 2025 megahertz.

### **Procedure for the 2500-2690 megahertz band**

**50.—(1)** Where paired lots were selected in only one winning principal stage bid, OFCOM shall assign to the bidder that submitted that winning principal stage bid a contiguous range of paired licence blocks such that—

- (a) the number of paired licence blocks contained within that range is equal to the number of paired lots selected in that winning principal stage bid; and
- (b) licence block one is contained within that range.

(2) Subject to paragraph (3), where unpaired lots were selected in only one winning principal stage bid, OFCOM shall assign to the bidder that submitted that winning principal stage bid a contiguous range of licence blocks in the lower unpaired area such that—

- (a) the number of licence blocks contained within that range is equal to the number of unpaired lots selected in that winning principal stage bid plus one block; and
- (b) licence blocks twenty-three and twenty-four are contained within that range.

(3) Where—

- (a) unpaired lots were selected in only one winning principal stage bid; and
- (b) that winning principal stage bid was an additional supplementary bid,

paragraph (4) shall apply.

(4) OFCOM shall assign to the bidder that submitted the winning principal stage bid meeting the requirement of paragraph (3)(b) two contiguous ranges of licence blocks such that—

- (a) the total number of licence blocks contained within those ranges is equal to the number of unpaired lots specified in that winning principal stage bid plus one block;
- (b) the number of licence blocks contained within each range corresponds to the number of unpaired lots within each division specified in that winning principal stage bid;
- (c) one contiguous range of licence blocks is assigned in the lower unpaired area where—
  - (i) the number of licence blocks within that range is equal to the number of unpaired lots in the division containing the larger number of lots specified in that winning principal stage bid; and
  - (ii) licence blocks twenty-three and twenty-four are contained within that range; and
- (d) one contiguous range of licence blocks is assigned in the upper unpaired area where—

- (i) the number of licence blocks within that range is equal to the number of unpaired lots in the division containing the smaller number of lots specified in that winning principal stage bid; and
- (ii) licence block thirty-eight is contained within that range.

## CHAPTER 7

Assignment of frequencies to winning bidders for the 2500-2690 megahertz band where more than one winning principal stage bid includes paired lots or unpaired lots

### **Assignment stage round and assignment stage bids**

**51.**—(1) Where more than one winning principal stage bid included—

- (a) paired lots; or,
- (b) unpaired lots,

there shall be one further round of bidding (“assignment stage round”) to determine which licence blocks or paired licence blocks shall be assigned to winning bidders in the 2500-2690 megahertz band.

(2) Only bidders that submitted a winning principal stage bid where the lots specified in that bid include a lot or lots to which the assignment stage round relates may take part in the assignment stage round.

(3) A bid made during the assignment stage round (“assignment stage bid”) shall be a bid for one or more contiguous ranges of licence blocks or one contiguous range of paired licence blocks (as the case may be) at an amount in whole pounds specified by the bidder.

(4) A bidder that is able to take part in the assignment stage round may only bid—

- (a) in respect of unpaired lots, for the contiguous range or ranges (as the case may be); and
- (b) in respect of paired lots, for the contiguous range of paired licence blocks,

that OFCOM determine are available to the bidder in accordance with regulation 52

(5) A bidder may submit no more than one assignment stage bid for each of the ranges so determined.

(6) A bidder is not required to submit an assignment stage bid.

(7) In order to make an assignment stage bid, a bidder must, on a form provided to the bidder by OFCOM (“assignment stage bid form”), specify an amount in whole pounds that it is willing to pay for a licence that includes that contiguous range or those contiguous ranges (as the case may be) of licence blocks or that contiguous range of paired licence blocks (as the case may be), in addition to the base price for that bidder’s winning principal stage bid determined under regulation 45.

### **Determination of frequencies**

**52.** For each lot to which the assignment stage round relates, the frequencies that are available to a bidder in the assignment stage round shall be determined by OFCOM such that the following conditions are satisfied—

- (a) in respect of paired lots—
  - (i) no more than one contiguous range of paired licence blocks is available to each winning bidder;
  - (ii) the number of paired licence blocks contained in that range is equal to the number of paired lots included in that bidder’s winning principal stage bid; and
  - (iii) no more than one contiguous range of paired licence blocks is assigned, where that range includes licence blocks one and twenty-five;
- (b) subject to sub-paragraph (c), in respect of unpaired lots—

- (i) no more than one contiguous range of licence blocks is available to each winning bidder;
- (ii) the number of licence blocks contained in that range is equal to the number of unpaired lots included in that bidder's winning principal stage bid;
- (iii) no more than two contiguous ranges of licence blocks are assigned, where—
  - (aa) the contiguous range of licence blocks assigned in the lower unpaired area includes licence block twenty-four; and
  - (bb) where frequencies are assigned in the upper unpaired area, licence block thirty-eight is assigned;
- (c) where a bidder's winning principal stage bid included an additional supplementary bid, in respect of unpaired lots—
  - (i) two contiguous ranges of licence blocks are available to each winning bidder;
  - (ii) the total number of licence blocks contained within those ranges is equal to the total number of unpaired lots specified in that bidder's winning principal stage bid;
  - (iii) the number of licence blocks contained within each range corresponds to the number of unpaired lots within each division specified in that bidder's winning principal stage bid;
  - (iv) one contiguous range of licence blocks is assigned in the lower unpaired area, where that range includes licence block twenty-four; and
  - (v) one contiguous range of licence blocks is assigned in the upper unpaired area, where that range includes licence block licence block thirty-eight;
- (d) each licence block is assigned no more than once.

**Assignment stage bid deposit**

**53.**—(1) Each bidder that makes an assignment stage bid must, by a deadline specified by OFCOM, pay into OFCOM's bank account by a same day electronic transfer, with accompanying information which identifies the bidder, a further sum in pounds as a deposit so that the total amount the bidder has on deposit (including the initial deposit, any sum paid as a deposit under regulation 24, 36 or 43 and any sum paid as a deposit under this paragraph, but not including any sum forfeited under regulation 69) is an amount that is not less than the amount (“*d*”) calculated in accordance with the formula set out in paragraph (2).

(2) The formula is—

$$d = b + a_p + a_u$$

where—

“*b*” is the amount of the base price of the bidder's winning principal stage bid (determined in accordance with regulation 45);

“*a<sub>p</sub>*” is the amount of the highest assignment stage bid made by the bidder for a contiguous range of paired licence blocks;

“*a<sub>u</sub>*” is the amount of the highest assignment stage bid made by the bidder for a contiguous range or ranges (as the case may be) of licence blocks.

(3) Where a bidder does not satisfy the provisions set out in paragraph (1)—

- (a) all of the assignment stage bids submitted by the bidder in the assignment stage round shall be deemed to be invalid and shall not be taken into consideration for the purpose of determining—
  - (i) the winning combination of assignment stage bids under regulation 62;
  - (ii) the additional price payable by a winning bidder under regulation 63;

- (b) the bidder will be deemed to have made a valid assignment stage bid of zero for each contiguous range of licence blocks or paired licence blocks (as the case may be) available to the bidder in accordance with regulation 52 for the purposes mentioned in subparagraph (a).

#### **Valid assignment stage bids**

**54.**—(1) An assignment stage bid shall only be taken into consideration for the purposes of determining—

- (a) the winning combination of assignment stage bids under regulation 62;
- (b) the additional price payable by a winning bidder under regulation 63;

if it satisfies the conditions set out in paragraph (2) (“valid assignment stage bid”).

(2) The conditions are—

- (a) the assignment stage bid is submitted in accordance with the restrictions set out in regulation 51(4) and 51(5);
- (b) the assignment stage bid is made on an assignment stage bid form that has been completed in accordance with regulation 51(7);
- (c) the completed assignment stage bid form is submitted to OFCOM in accordance with regulation 56(1) and is received by OFCOM in accordance with regulation 56(2).

#### **Notice to bidders before the assignment stage round**

**55.** Before the start of the assignment stage round, OFCOM shall notify each bidder that may make an assignment stage bid in the assignment stage bid round in accordance with regulation 51(2) of—

- (a) the contiguous ranges of licence blocks or paired licence blocks (as the case may be) that are available to that bidder as determined in accordance with regulation 52;
- (b) the date on which, and the times on that date within which, the assignment stage round will take place.

#### **Submission of assignment stage bid form to OFCOM**

**56.**—(1) Except as provided for in regulation 57, a bidder must submit the completed assignment stage bid form to OFCOM by using the electronic auction system.

(2) Except as provided for in regulation 58, the completed assignment stage bid form must be received by OFCOM by the time notified to the bidder under regulation 55(b) as the end of the assignment stage round.

#### **Alternative method for submission of assignment stage bid form**

**57.**—(1) Where OFCOM are satisfied that a bidder is unable to submit an assignment stage bid form by using the electronic auction system because of technical failure (or an event or circumstance with similar effect on the bidder’s ability to use the electronic auction system), OFCOM shall notify the bidder of an alternative method of submitting the assignment stage bid form and any requirements relating to the authentication of communications made by means of the alternative method.

(2) The bidder must submit the assignment stage bid form by means of the alternative method and must comply with any requirements which have been notified to it under paragraph (1) relating to the authentication of communications.

#### **Extension to assignment stage round**

**58.**—(1) Where—

- (a) OFCOM have not received a completed assignment stage bid form from a bidder by the time notified to bidders under regulation 55(b) as the end of the assignment stage round, and
- (b) paragraph (2) applies,

the time by which the bidder's completed assignment stage bid form must be received by OFCOM shall be the time thirty minutes after the time notified to bidders under regulation 55(b) as the end of the assignment stage round.

(2) This paragraph applies where OFCOM are satisfied that circumstances existed which were beyond the bidder's control which had the effect that the bidder could not submit its assignment stage bid form so that it was received by OFCOM by the time notified to bidders under regulation 55(b) as the end of the assignment stage round.

### **Incomplete or defective assignment stage bid form**

**59.**—(1) Where, due to the manner of completion, an assignment stage bid form is incomplete or defective but OFCOM believe that they can ascertain the bidder's intention in relation to the making of assignment stage bids, OFCOM shall ask the bidder to confirm in a notice to OFCOM by a specified deadline that OFCOM have correctly ascertained the bidder's intention in relation to the making of assignment stage bids.

(2) Where the bidder confirms in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder that OFCOM have correctly ascertained the bidder's intention, the assignment stage bid form in its entirety shall be accepted by OFCOM on that basis.

(3) Where the bidder does not give such confirmation in a notice given to OFCOM by the specified deadline which is signed by two authorised persons of that bidder—

- (a) where the incompleteness or defect relates to one or more of the assignment stage bids made on the assignment stage bid form, that assignment stage bid or those assignment stage bids (as the case may be) shall be deemed to be invalid, and regulation 61 shall apply accordingly;
- (b) in all other cases, the assignment stage bid form in its entirety shall be rejected by OFCOM and all of the assignment stage bids made on that assignment stage bids form shall be deemed to be invalid, and regulation 61 shall apply accordingly.

### **Notification that assignment stage bid is not valid**

**60.** Where a bidder submits an assignment stage bid that is not a valid assignment stage bid, OFCOM shall, after the end of the assignment stage round, notify the bidder of that fact and shall give the reasons why the bid is not a valid assignment stage bid.

### **Procedure where there is no valid assignment stage bid**

**61.** In respect of each contiguous range of licence blocks or paired licence blocks (as the case may be) available to a bidder in accordance with regulation 51, where the bidder does not make a valid assignment stage bid for a range, the bidder shall be deemed to have made a valid assignment stage bid of zero for that range for the purposes of determining—

- (a) the winning combination of assignment stage bids in accordance with regulation 62;
- (b) the additional price payable by a winning bidder in accordance with regulation 63.

### **Determination of the winning assignment stage bids and the winning combination of assignment stage bids**

**62.**—(1) OFCOM shall determine separately the winning assignment stage bids for—

- (a) contiguous ranges of licence blocks; and
- (b) contiguous ranges of paired licence blocks,



in accordance with paragraphs (2) to (6).

(2) In respect of paired lots, the winning assignment stage bids shall be those valid assignment stage bids for contiguous ranges of paired licence blocks that comprise the winning combination of assignment stage bids.

(3) In respect of unpaired lots, the winning assignment stage bids shall be those valid assignment stage bids for contiguous ranges of licence blocks that comprise the winning combination of assignment stage bids.

(4) Unless paragraph (6) applies, the winning combination of assignment stage bids shall be the valid combination of assignment stage bids having the highest total value of amounts bid.

(5) A valid combination of assignment stage bids is any combination of valid assignment stage bids for frequencies for that lot within which—

- (a) there is one valid assignment stage bid from each winning bidder that specified those lots in its winning principal stage bid;
- (b) there is no overlap between the frequencies comprised in the winning combination of assignment stage bids.

(6) Where there is more than one valid combination of assignment stage bids for which the total value is equal highest, OFCOM shall employ a method of random selection from amongst those valid combinations of assignment stage bids to determine the winning combination of assignment stage bids.

#### **Determination of additional price of winning assignment stage bids**

**63.** In respect of each winning assignment stage bid OFCOM shall determine an amount in whole pounds in accordance with Schedule 8 (“additional price”) which shall be payable by the relevant winning bidder.

#### **Notification of results of assignment stage**

**64.** Following determination of the winning assignment stage bids and the winning combination of assignment stage bids under regulation 62, and the determination of the additional price for each winning assignment stage bid under regulation 63, OFCOM shall notify each winning bidder of—

- (a) the frequencies in respect of which the bidder made winning assignment stage bids;
- (b) the additional price for each winning assignment stage bid made by the bidder.

### **CHAPTER 8**

#### **Grant stage**

#### **Determination of the licence fee**

**65.** The licence fee payable by a winning bidder shall be an amount equal to the total of—

- (a) the base price determined by OFCOM in accordance with regulation 45; and
- (b) the additional price for each winning assignment stage bid made by the bidder determined by OFCOM in accordance with regulation 63.

#### **Procedure where the amount of a winning bidder’s deposit is less than the licence fee**

**66.—(1)**Where, after completion of the assignment stage, the amount of a winning bidder’s deposit (including the initial deposit and any sum paid as a deposit under regulation 24, 36, 43 or 53, but not including any sum forfeited under regulation 69) is an amount that is less than the amount of the winning bidder’s licence fee calculated in accordance with regulation 65—

- (a) OFCOM shall notify the bidder of a deadline by when the bidder must comply with sub-paragraph (b);

(b) the bidder must by the deadline specified pay into OFCOM's bank account by a same day electronic transfer, with accompanying information which identifies the bidder, a sum in pounds calculated in accordance with paragraph (2).

(2) The sum which the bidder must pay to OFCOM shall be the difference between the amount of the winning bidder's licence fee calculated in accordance with regulation 65 and the amount of the bidder's deposit (including the initial deposit and any sum paid as a deposit under regulation 24, 36, 43 or 53, but not including any sum forfeited under regulation 69).

(3) Where a bidder has satisfied the requirement set out in paragraph (1)(b), OFCOM shall grant the bidder a licence for—

(a) the frequencies that are to be assigned to the bidder in accordance with Chapter 6 of this Part; and

(b) the frequencies for which the bidder submitted a winning assignment stage bid or winning assignment stage bids in accordance with Chapter 7 of this Part.

(4) Where a bidder does not satisfy the requirement set out in paragraph (1)(b), the bidder shall not be entitled to the grant of a licence under these Regulations and shall not receive a refund of its initial deposit or any sum paid as a deposit under regulation 24, 36, 43 or 53, which shall (where not forfeited under regulation 69) be forfeited.

#### **Procedure where the amount of a winning bidder's deposit is greater than or equal to the licence fee**

**67.**—(1) Where, after completion of the assignment stage, the amount of a winning bidder's deposit (including the initial deposit and any sum paid as a deposit under regulation 24, 36, 43 or 53, but not including any sum forfeited under regulation 69) is greater than or equal to the amount of the winning bidder's licence fee calculated in accordance with regulation 65, OFCOM shall—

(a) grant the winning bidder a licence for—

(i) the frequencies that are to be assigned to the bidder in accordance with Chapter 6 of this Part;

(ii) the frequencies in respect of which the bidder submitted a winning assignment stage bid or winning assignment stage bids in accordance with Chapter 7 of this Part;

(b) refund to the winning bidder a sum in pounds calculated in accordance with paragraph (2).

(2) The sum which OFCOM shall refund to a winning bidder shall be the difference (if any) between the amount of the winning bidder's deposit (including the initial deposit and any sum paid as a deposit under regulation 24, 36, 43 or 53, but not including any sum forfeited under regulation 69) and the amount of the winning bidder's licence fee calculated in accordance with regulation 65, but not any interest which has accrued on the deposit.

#### **Completion of the award process**

**68.** After the grant of licences and the payment of refunds to winning bidders in accordance with regulation 67(1)(b), OFCOM shall complete the award process by publishing on their internet website details of all valid principal stage bids and all valid assignment stage bids made by each bidder, the names of the persons to whom licences were granted, the details of the frequencies in respect of which those licences were granted and the details of the licence fees paid.

## PART 6

### ACTIVITY RULES

#### **Forfeit of deposit and exclusion from award process**

**69.** If, in relation to an applicant which is qualified to bid or a bidder, OFCOM are satisfied that any of the events set out in regulation 71 are occurring (or have occurred) and that the occurrence would materially affect the outcome of the award process—

- (a) the initial deposit and any sum or sums paid as a deposit under regulation 24, 36, 43 or 53 shall be forfeited by, and not refunded to, the applicant or bidder concerned; and
- (b) that applicant or bidder may also be excluded by OFCOM from the award process by OFCOM giving that applicant or bidder notice in writing.

#### **Bids made by an excluded bidder**

**70.**—(1) Where a bidder is excluded from the award process under regulation 69(b) during the principal stage, all of the principal stage bids submitted by the bidder shall be deemed to be invalid and shall not be taken into consideration for the purposes of determining—

- (a) the winning combination of principal stage bids in accordance with regulation 44;
- (b) the base price payable by a winning bidder in accordance with regulation 45.

(2) Where a bidder is excluded from the award process under regulation 69(b) during the assignment stage, all of the assignment stage bids submitted by the bidder (including any bids which the bidder is deemed to have submitted under regulation 61) shall be deemed to be invalid and shall not be taken into consideration for the purposes of determining—

- (a) the winning combination of assignment stage bids in accordance with regulation 62;
- (b) the additional price payable by a winning bidder in accordance with regulation 63.

#### **Events**

**71.** The events referred to in regulation 69, in relation to an applicant or bidder, are—

- (a) the submission to OFCOM of any information in connection with the award process which is false or misleading;
- (b) any member of that applicant's or bidder's bidder group colluding or attempting to collude with another person to distort the outcome of the award process;
- (c) any member of that applicant's or bidder's bidder group acting in a way which is likely to distort the outcome of the award process;
- (d) any member of that applicant's or bidder's bidder group, or any person to whom confidential information has been disclosed, disclosing, or attempting to disclose, or inciting another person to disclose, any confidential information, whether directly or indirectly, to any person, except where the disclosure is—
  - (i) to OFCOM;
  - (ii) to a member of that applicant's or bidder's bidder group;
  - (iii) to a provider of finance for the purpose of raising finance for a bid; or
  - (iv) to a person for the purpose of enabling that person to decide whether to participate as a member of the applicant's or bidder's bidder group;
- (e) any member of that applicant's or bidder's bidder group obtaining or attempting to obtain confidential information relating to another applicant or bidder;
- (f) any member of that applicant's or bidder's bidder group receiving or attempting to receive services in relation to the award process from any person who has provided or is providing services to OFCOM in relation to the award process;

- (g) any person who is a member or a director or employee of a member of that applicant's or bidder's bidder group and also a director or employee of a member of another bidder group is —
  - (i) taking part in the preparation of both bidder groups for participation in the award process; or
  - (ii) receiving confidential information relating to both bidder groups;
- (h) a member of that applicant's or bidder's bidder group is or becomes a member of another applicant's or bidder's bidder group;
- (i) a change occurring in the membership of that applicant's or bidder's bidder group from that notified to OFCOM in its application except as a result of —
  - (i) a person ceasing to be a member of that bidder group;
  - (ii) a person joining that bidder group under the procedure in regulation 6(3);
  - (iii) a person becoming an associate through merger or acquisition activity provided that such activity is not for a purpose related to the award process.

## PART 7

### MISCELLANEOUS

#### **General power of exclusion**

**72.** OFCOM may, at any time, notify any applicant or bidder of its exclusion from the award process if, in their opinion, the grant of a licence to that applicant or bidder would be prejudicial to the interests of national security or the applicant or bidder is not a fit and proper person to hold a licence.

#### **Notification to OFCOM**

**73.** If, in accordance with any provision of these Regulations, an applicant or bidder is required, or wishes, to notify OFCOM of any fact or circumstance, it must do so by notice in writing which is marked for the attention of the OFCOM personnel who are specified by OFCOM for that purpose on OFCOM's internet website and must deliver that notice to OFCOM —

- (a) by electronic mail to an electronic mail address dedicated to the award process which is published by OFCOM on their internet website;
- (b) by personal delivery to Riverside House, 2a Southwark Bridge Road, London, SE1A 9HA; or
- (c) by fax to a number dedicated to the award process which is published by OFCOM on their internet website.

#### **Changes to timing or location**

**74.—(1)** Subject to regulations 75 and 76, paragraph (2) applies where OFCOM determine that it is impracticable for any reason—

- (a) for any document which is to be delivered to OFCOM under these Regulations to be delivered at the place specified or by the deadline specified under these Regulations; or
- (b) for any action which is required to be undertaken in accordance with these Regulations to be completed by the deadline specified.

(2) Where this paragraph applies, OFCOM shall take all reasonable steps to notify the applicants or bidders (as the case may be) that—

- (a) delivery must be made on a different day or within different times on that day or at a different place;

- (b) the action must be completed on a different day or by a different deadline.

### **Changes to round times and use of electronic auction system**

**75.**—(1) Where a time for the start of a round has been notified to bidders and OFCOM determine that it is impracticable for any reason to start the round at that time, OFCOM shall take all reasonable steps to notify bidders of a revised time for the start of the round.

(2) Where a time for the end of a round has been notified to bidders and OFCOM determine that it is impracticable for any reason for the round to end at that time, OFCOM shall take all reasonable steps to notify bidders of a revised time for the end of the round.

(3) Where OFCOM determine that it is impracticable for any reason to use the electronic auction system for any of the purposes specified in Part 5 of these Regulations, OFCOM shall take all reasonable steps to notify bidders of an alternative method of participating in the award process and any requirements relating to the authentication of communications made by means of the alternative method.

(4) Bidders must use the alternative method of participating in the award process in accordance with a notification under paragraph (3).

### **Rerunning rounds**

**76.**—(1) Paragraph (2) applies where a round is in progress and OFCOM determine that it is not possible to continue the round because of technical failure (or an event or circumstance with similar effect on the continuation of the round).

(2) Where this paragraph applies, OFCOM shall—

- (a) take all reasonable steps to notify bidders of its determination under paragraph (1);
- (b) disregard the bids made in that round;
- (c) resume the award procedure from the end of the previous round (or, if there was no previous round, from the start of the first primary bid round).

(3) Paragraph (4) applies where OFCOM determine that it is not possible to continue the award process in accordance with the provisions of Part 5 of these Regulations because of technical failure (or an event or circumstance with similar effect on the continuation of the award process).

(4) Where this paragraph applies, OFCOM shall—

- (a) determine the rounds for which bids made in those rounds should be disregarded in order to have a fair and efficient outcome to the award process;
- (b) take all reasonable steps to notify bidders of its determinations under paragraph **Error! Reference source not found.** and sub-paragraph (a); and
- (c) resume the award process from the end of the latest round for which bids are not disregarded under sub-paragraph (a), or, where all bids are to be disregarded under that sub-paragraph, to rerun the award process from the start of the first primary bid round.

### **Refunds**

**77.** OFCOM may, in such cases as they think fit, refund, in whole or in part, sums which have been paid to them in accordance with any provision of these Regulations.

[Date]

[Signature]

## SCHEDULE 1

Regulation 2(2)

### MEANING OF UNPAIRED LOT, PAIRED LOT, LICENCE BLOCK AND UNPAIRED LICENCE BLOCK

In these Regulations—

- (a) “unpaired lot” means, in relation to the 2500-2690 megahertz band, any one licence block;
- (b) “paired lot” means, in relation to the 2500-2690 megahertz band, any two paired licence blocks;
- (c) “licence block” means, for each licence block mentioned in an entry in column (1), the frequency range shown in the corresponding entry in column (2); and
- (d) “paired licence block” means two licence blocks where the separation between the lowest frequency of one such licence block and the lowest frequency of the other such licence block is 120 megahertz.

<i>Column (1)</i> <i>Number of Licence block</i>	<i>Column (2)</i> <i>Frequency range</i>
1	2500-2505 MHz
2	2505-2510 MHz
3	2510-2515 MHz
4	2515-2520 MHz
5	2520-2525 MHz
6	2525-2530 MHz
7	2530-2535 MHz
8	2535-2540 MHz
9	2540-2545 MHz
10	2545-2550 MHz
11	2550-2555 MHz
12	2555-2560 MHz
13	2560-2565 MHz
14	2565-2570 MHz
15	2570-2575 MHz
16	2575-2580 MHz
17	2580-2585 MHz
18	2585-2590 MHz
19	2590-2595 MHz
20	2595-2600 MHz
21	2600-2605 MHz
22	2605-2610 MHz
23	2610-2615 MHz
24	2615-2620 MHz
25	2620-2625 MHz
26	2625-2630 MHz
27	2630-2635 MHz
28	2635-2640 MHz
29	2640-2645 MHz
30	2645-2650 MHz
31	2650-2655 MHz

32	2655-2660 MHz
33	2660-2665 MHz
34	2665-2670 MHz
35	2670-2675 MHz
36	2675-2680 MHz
37	2680-2685 MHz
38	2685-2690 MHz

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## APPLICATION INFORMATION

**1. Details of the applicant**

Provide the following details for the applicant—

Applicant's full name

Registered number of company

Registered office of company

Applicant's contact address (if different from registered office)

Telephone number

Fax number

Electronic mail address

Bank sort code and account number

**2. Authorised persons**

Provide details of the name and position in the applicant of at least three and no more than five persons, each of whom has authority to bind the applicant for all purposes relating to the award process. Also provide a specimen signature of each of these persons.

**3. Directors or members of managing body**

Provide the name and job title of each of the directors of the applicant or each of the members of the managing body of the applicant.

**4. Bidder group**

Provide the names of the applicant's associates (as defined in the Wireless Telegraphy (Licence Award) Regulations 2008 ("the Regulations")) and for each provide details of their material interest (as defined in the Regulations) in the applicant.

[Ofcom comment - we are considering the possibility of allowing associates to "opt out" of a bidder group subject to specific conditions and undertakings]

Provide the names of all other members of the bidder group (as defined in the Regulations) in respect of which the applicant has completed a document in the form set out in Schedule 4 to the Regulations in accordance with regulation 4(3)(a)(iii) of the Regulations.

**5. Qualification to bid**

In relation to the determination by the Office of Communications ("OFCOM") under regulation 7 of the Regulations concerning whether or not to qualify the applicant to bid in the award process—

- (a) provide details of any reason why the grant of a licence to the applicant may be prejudicial to the interests of national security;
- (b) provide details of any reason why the applicant may not be a fit and proper person to hold a licence;
- (c) state whether any member of the applicant's bidder group has colluded, or attempted to collude, or is colluding or attempting to collude, with another person to distort the outcome of the award process and provide a description of any such collusion;



- (d) state whether any member of the applicant's bidder group has acted or is acting in a way which is likely to distort the outcome of the award process and provide a description of any such actions;
- (e) state whether any member of the applicant's bidder group, or any person to whom confidential information has been disclosed, has disclosed confidential information, whether directly or indirectly, to any person, and provide a description of the circumstances of any disclosure and the information disclosed, except where the disclosure—
  - (i) was to a member of the applicant's bidder group; or
  - (ii) was to OFCOM;
- (f) state whether any member of the applicant's bidder group has obtained or is obtaining or attempting to obtain confidential information relating to another applicant and provide a description of any such circumstances;
- (g) state whether any member of the applicant's bidder group is receiving or is attempting to receive services in relation to the award process from any person who has provided or is providing services to OFCOM in relation to the award process and provide a description of the services concerned; and
- (h) state whether (and provide a description of any circumstances in which) any person who is a member or a director or employee of a member of the applicant's bidder group and also a director or employee of a member of another bidder group is—
  - (i) taking part in the preparation of both bidder groups for participation in the award process; or
  - (ii) receiving confidential information relating to both bidder groups.

## **6. Other information**

Provide a brief description of the substance of—

- (i) agreements (if any) relating to the management of the applicant; and
- (j) any criminal investigations or proceedings in the United Kingdom or overseas of which the applicant is aware relating to the applicant or any member of its bidder group or its directors or officers.

## SCHEDULE 3

Regulation 4(3)(a)(ii)

### APPLICATION DOCUMENT

[Insert name of applicant] (the “applicant”) represents and warrants to the Office of Communications that—

- (a) the persons authorised in section 2 of the applicant’s application have read and understood the Wireless Telegraphy (Licence Award) Regulations 2008 (“the Regulations”), the terms of the licence to be granted under the Regulations and the Wireless Telegraphy Act 2006;
- (b) the applicant has the legal authority to participate in the award process under the Regulations and to have a licence granted to it, and has in place all necessary consents, permissions and internal approvals for this purpose;
- (c) the information provided in, or in support of, the application is, to the best of the knowledge and belief of the applicant true, accurate and complete in all material respects; and
- (d) the applicant is aware of the provisions in regulations 69 and 71 of the Regulations, including the provisions about disclosure of confidential information (as defined in the Regulations) and obtaining confidential information relating to another applicant or bidder and that any such activities may lead to forfeiture of sums on deposit and exclusion from the award process.

**DOCUMENT FOR MEMBER OF APPLICANT'S BIDDER GROUP  
WHO IS NOT AN ASSOCIATE**

[Insert name of applicant or bidder] (the "applicant/bidder") wishes to include [insert name and address of person to be included in bidder group who is not an associate] as a member of the applicant/bidder's bidder group as defined in the Wireless Telegraphy (Licence Award) Regulations 2008 ("the Regulations") for the purpose of the award process under the Regulations.

Under regulation 7(2) of the Regulations an applicant shall not be qualified to bid in the award process where a member of its bidder group is also a member of another applicant's bidder group. Regulations 69 and 71 contain provisions on disclosure of confidential information (as defined in the Regulations) and obtaining confidential information relating to another applicant or bidder. Under the Regulations such activities may lead to forfeiture of sums on deposit and exclusion from the award process.

**1. Applicant/bidder**

In relation to regulations 7(2), 69 and 71 of the Regulations, the applicant/bidder represents and warrants to the Office of Communications ("OFCOM") that so far as it is aware, having made all reasonable enquiries, [insert name of person to be included in bidder group who is not an associate] is not a member of any other applicant's or bidder's bidder group.

The applicant/bidder undertakes to inform OFCOM immediately if it becomes aware that [insert name of person to be included in bidder group who is not an associate]—

- (a) has ever been or becomes a member of any other applicant's or bidder's bidder group;
- (b) has ever been or becomes a subsidiary of a member of any other applicant's or bidder's bidder group during the award process; or
- (c) has ever obtained or ever obtains confidential information (as defined in the Regulations) relating to another applicant or bidder.

**2. [Insert name of person to be included in bidder group who is not an associate]**

[Insert name of person to be included in bidder group who is not an associate] represents and warrants to OFCOM that it—

- (a) consents to be a member of the applicant/bidder's bidder group;
- (b) is not a member of any other applicant's or bidder's bidder group; and
- (c) is aware of the provisions in regulations 69 and 71 of the Regulations about disclosure of confidential information (as defined in the Regulations) and obtaining confidential information relating to another applicant or bidder.

[Insert name of person to be included in bidder group who is not an associate] undertakes to OFCOM that it will immediately inform OFCOM and the applicant/bidder—

- (a) if it has ever been or becomes a member of any other applicant's or bidder's bidder group;
- (b) if it has ever been or becomes a subsidiary of a member of any other applicant's or bidder's bidder group during the award process; or
- (c) if it has ever obtained or if it ever obtains confidential information (as defined in the Regulations) relating to another applicant or bidder.

## SCHEDULE 5

Regulation 11(1)(a)

### FREQUENCY RANGE SELECTION MENU WHERE THERE IS ONLY ONE BIDDER

Bidder's full name:

Bidder address:

Telephone number:

Fax number:

E-mail address:

<i>Frequency range</i>	<i>Eligibility Points</i>	<i>Price of frequency range</i>	<i>Selection of frequency ranges (indicate selected frequency ranges with a cross ("X"), selecting no more than one frequency range in respect of each of the 2010-2025 megahertz band, frequency ranges for paired lots and frequency ranges for unpaired lots and ensuring that the total number of eligibility points attributed to the frequency ranges so selected is no more than sixteen)</i>
<b>2010-2025 megahertz lot</b>			
1. 2010-2025 MHz	2	£100,000	
<b>Frequency ranges for paired lots</b>			
2. 2500-2505 MHz paired with 2620-2625 MHz	2	£100,000	
3. 2500-2510 MHz paired with 2620-2630 MHz	4	£200,000	
4. 2500-2515 MHz paired with 2620-2635 MHz	6	£300,000	
5. 2500-2520 MHz paired with 2620-2640 MHz	8	£400,000	
6. 2500-2525 MHz paired with 2620-2645 MHz	10	£500,000	
7. 2500-2530 MHz paired with 2620-2650 MHz	12	£600,000	
8. 2500-2535 MHz paired with 2620-2655 MHz	14	£700,000	
9. 2500-2540 MHz paired with 2620-2660 MHz	16	£800,000	
<b>Frequency ranges for unpaired lots</b>			
10. 2605-2620 MHz	1	£100,000	
11. 2600-2620 MHz	2	£150,000	
12. 2595-2620 MHz	3	£200,000	

13. 2590-2620 MHz	4	£250,000
14. 2585-2620 MHz	5	£300,000
15. 2580-2620 MHz	6	£350,000
16. 2575-2620 MHz	7	£400,000
17. 2570-2620 MHz	8	£450,000
18. 2565-2620 MHz	9	£500,000
19. 2560-2620 MHz	10	£550,000
20. 2565-2620 MHz and 2680-2690 MHz	10	£600,000
21. 2560-2620 MHz and 2680-2690 MHz	11	£650,000
22. 2555-2620 MHz and 2680-2690 MHz	12	£700,000
23. 2560-2620 MHz and 2675-2690 MHz	12	£700,000
24. 2555-2620 MHz and 2675-2690 MHz	13	£750,000
25. 2550-2620 MHz and 2675-2690 MHz	14	£800,000
26. 2555-2620 MHz and 2670-2690 MHz	14	£800,000
27. 2550-2620 MHz and 2670-2690 MHz	15	£850,000
28. 2545-2620 MHz and 2670-2690 MHz	16	£900,000
29. 2550-2620 MHz and 2665-2690 MHz	16	£900,000

## SCHEDULE 6

Regulation []

### ROUND PRICE IN THE FIRST PRIMARY BID ROUND

In the first primary bid round the round price for a lot of a description mentioned in an entry in Column (1) is the price shown in the corresponding entry in Column (2).

<i>Column (1)</i> <i>Description of lot</i>	<i>Column (2)</i> <i>Price in the first primary bid round</i>
The 2010-2025 megahertz lot	£100,000
Paired lot	£100,000
Unpaired lot	£50,000

## SCHEDULE 7

Regulation []

### ELIGIBILITY POINTS ASSOCIATED WITH LOTS

**1.**—Subject to paragraph 2, the number of eligibility points associated with a lot of a description mentioned in an entry in Column (1) is the number of points shown in the corresponding entry in Column (2).

**2.** Where a selection of lots contains unpaired lots, the number of eligibility points attributed to those unpaired lots will be—

- (a) where the selection of lots is not contained in an additional supplementary bid, ***n-1***;
- (b) where the selection of lots is contained in an additional supplementary bid, ***n-2***,

where ***n*** is the total number of unpaired lots selected.

<i>Column (1)</i>	<i>Column (2)</i>
<i>Description of lot</i>	<i>Number of eligibility points</i>
2010-2025 megahertz lot	2
Paired lot	2

## SCHEDULE 8

Regulation []

### DETERMINATION OF BASE PRICE

#### *Base price*

1.—(1) OFCOM shall determine a base price for each winning principal stage bid by imposition of the requirements that the base prices must satisfy that are set out in paragraphs 2 to 5.

(2) Where a base price so determined includes a fraction of a pound, the base price shall be that price rounded up to the nearest pound.

#### *First requirement*

2. The base price for each winning principal stage bid shall be—

- (a) no less than the total of the round prices in the first primary bid round for the lots included in the selection of lots specified in that winning principal stage bid; and
- (b) no greater than the amount of that winning principal stage bid.

#### *Second requirement*

3.—(1) Taking the base prices for the winning principal stage bids together, the base prices shall be such that if—

- (a) the amount bid by each winning bidder for the selection of lots specified in its winning principal stage bid had been the base price rather than the amount of its winning principal stage bid (“reduced winning principal stage bid”), and
- (b) the amount bid by each winning bidder in respect of each other valid principal stage bid made by that bidder had been reduced by an amount equal to the difference between the amount of its winning principal stage bid and the base price for that winning principal stage bid,

the combination of the reduced winning principal stage bids submitted by the winning bidders would have been the valid combination of principal stage bids or one of the valid combinations of principal stage bids (as the case may be) having the highest total value of amounts bid.

(2) The bids mentioned in sub-paragraphs (1)(a) and (1)(b) shall, after a reduction of the amount of those bids in accordance with those paragraphs, be treated as valid principal stage bids for the purposes of those paragraphs.

#### *Third requirement*

4. Taking the base prices for the winning principal stage bids together, the total of those base prices shall be no greater than the total of any other prices for the winning principal stage bids that satisfy the requirements set out in paragraphs 2 and 3.

#### *Fourth requirement*

5.—(1) Taking the base prices for the winning principal stage bids together, the opportunity cost variance of those base prices calculated in accordance with sub-paragraph (2) shall be less than the opportunity cost variance, calculated in accordance with sub-paragraph (2), of any other prices for the winning principal stage bids that satisfy the requirements set out in paragraphs 2 to 4.

(2) The opportunity cost variance (“ $OCV_B$ ”) of the prices mentioned in sub-paragraph (1) is the amount calculated in accordance with the formula—

$$OCV_B = \sum (p_B - c_B)^2$$

where—

“ $p_B$ ” is the price for a winning principal stage bid; and



“ $c_B$ ” is the amount calculated in accordance with the formula set out in sub-paragraph (3) in respect of that winning principal stage bid.

(3) The formula is—

$$c_B = u_B - t_B + b_B$$

where—

“ $u_B$ ” is the amount calculated in accordance with sub-paragraph (4);

“ $t_B$ ” is the total amount of the winning principal stage bids; and

“ $b_B$ ” is the amount of the winning principal stage bid for which  $p_B$  is the price.

(4) The amount calculated in accordance with this sub-paragraph is the total amount of the valid combination of principal stage bids or one of the valid combinations of principal stage bids (as the case may be) having the highest total value of amounts bid, where the valid combination or combinations of principal stage bids do not include any of the principal stage bids made by the winning bidder that submitted the winning principal stage bid for which  $p_B$  is the price.

#### *Interpretation*

**6.** In this Schedule “valid combination of principal stage bids” shall be construed in accordance with regulation 41.

## DETERMINATION OF ADDITIONAL PRICE

*Additional price*

1.—(1) OFCOM shall determine an additional price for each winning assignment stage bid by imposition of the requirements that the additional prices must satisfy that are set out in paragraphs 2 to 5.

(2) Where an additional price so determined includes a fraction of a pound, the additional price shall be that price rounded up to the nearest pound.

*First requirement*

2. The additional price for each winning assignment stage bid shall be no less than zero and no greater than the amount of that winning assignment stage bid.

*Second requirement*

3.—(1) Taking the additional prices for the winning assignment stage bids for frequencies for the same lot together, the additional prices for winning assignment stage bids for frequencies for each lot shall be such that if—

- (a) the amount bid by each winning bidder for the frequencies selected in its winning assignment stage bid for frequencies for that lot had been the additional price rather than the amount of its winning assignment stage bid (“reduced winning assignment stage bid”), and
- (b) Subject to paragraph (2), the amount bid by each winning bidder in respect of each other valid assignment stage bid made by that bidder for frequencies for that lot had been reduced by an amount equal to the difference between the amount of its winning assignment stage bid for frequencies for that lot and the additional price for that relevant winning assignment stage bid,

the combination of the reduced winning assignment stage bids submitted by the winning bidders would have been the valid combination of assignment stage bids or one of the valid combinations of assignment stage bids (as the case may be) for frequencies for that lot having the highest total value of amounts bid.

(2) Where the amount of a bid has been reduced in accordance with sub-paragraph (1)(b) and is less than zero, the amount of that bid shall be treated as if it were zero for the purposes of this paragraph.

(3) The bids mentioned in sub-paragraphs (1)(a) and (1)(b) shall, after reduction of the amount of those bids in accordance with those paragraphs, be treated as valid assignment stage bids for the purposes of this paragraph.

*Third requirement*

4. Taking the additional prices for the winning assignment stage bids for frequencies for the same lot together, the total of those additional prices for winning assignment stage bids for frequencies for each lot shall be no greater than the total of any other prices for the winning assignment stage bids for frequencies for that lot that satisfy the requirements set out in paragraphs 2 and 3.

*Fourth requirement*

5.—(1) Taking the additional prices for the winning assignment stage bids for frequencies for the same lot together, the opportunity cost variance of those additional prices for winning assignment stage bids for frequencies for each lot calculated in accordance with sub-paragraph (2) shall be less than the opportunity cost variance, calculated in accordance with sub-paragraph (2),

of any other prices for the winning assignment stage bids for frequencies for that lot that satisfy the requirements set out in paragraphs 2 to 4.

(2) The opportunity cost variance (“ $OCV_A$ ”) of the prices mentioned in sub-paragraph (1) is the amount calculated in accordance with the formula—

$$OCV_A = \sum (p_A - c_A)^2$$

where—

“ $p_A$ ” is the price for a winning assignment stage bid; and

“ $c_A$ ” is the amount calculated in accordance with the formula set out in sub-paragraph (3) in respect of that winning assignment stage bid.

(3) The formula is—

$$c_A = u_A - t_A + b_A$$

where—

“ $u_A$ ” is the amount calculated in accordance with sub-paragraph (4);

“ $t_A$ ” is the total amount of the winning assignment stage bids; and

“ $b_A$ ” is the amount of the winning assignment stage bid for which  $p_A$  is the price.

(4) The amount calculated in accordance with this sub-paragraph is the total amount of the valid combination of assignment stage bids or one of the valid combinations of assignment stage bids (as the case may be) for frequencies for the same lot having the highest total value of amounts bid, where, for each assignment stage bid for frequencies made by the winning bidder that submitted the winning assignment stage bid for which  $p_A$  is the price, the amount of that assignment stage bid is treated as if it were zero for the purposes of this sub-paragraph.

(5) Where the amount of an assignment stage bid is treated as if it were zero in accordance with sub-paragraph(4), that assignment stage bid shall be treated as a valid assignment stage bid for the purposes of that sub-paragraph.

#### *Interpretation*

**6.** In this Schedule “valid combination of assignment stage bids” shall be construed in accordance with regulation 62.

## Annex 8

# Description of a relaxed revealed preference activity rule

## Introduction

- A8.1 As discussed in Section 3 of this consultation, we are proposing to use a quantity-based activity rule for the award of the 2.6GHz and 2010MHz bands. However, we have received comments from stakeholders, both in the context of this spectrum award and others, that the proposed eligibility points activity rule might lead to an inefficient outcome of the auction. In light of these comments and further work undertaken by us, we have considered whether a value-based activity rule (in the form of a “relaxed revealed preference” rule) would better help us meet our duty of securing optimal use of the available spectrum.
- A8.2 This Annex discusses revealed preference activity rules in general terms, then sets out what a relaxed revealed preference activity rule might look like in the context of this award.

## Revealed preference activity rules

- A8.3 Revealed preference is a process by which a bidder would, as the auction proceeds, reveal which combination of lots it prefers, at the given relative prevailing prices, in preference to all of the other available combination of lots. In the context of an auction activity rule, what this would do is limit the ability of a bidder to change its relative valuations of different combinations of lots as the auction progresses.
- A8.4 In a strict form, a revealed preference activity rule would prevent a bidder from bidding on a combination of lots at a price which was inconsistent with its bidding behaviour in a previous round of the auction. A bidder would, in each and every round, have to bid in a manner consistent with its bidding behaviour in earlier rounds. If a bidder revealed in one round that it preferred combination of lots A to combination of lots B when combinations of lots A was £10,000 more expensive than combination of lots B that bidder could not, in a later round, bid on combination of lots B unless it was less than £10,000 less expensive than combination of lots A.
- A8.5 In the context of an auction where it might be expected that a bidder’s relative valuation of different combinations of lots may change (for example there exists significant common value uncertainty) such a strict form of a revealed preference activity rule is probably not desirable. This is because such a strict form of the activity rule would prevent a bidder from updating its relative valuations of different combinations of lots in light of information revealed as the auction progresses. Therefore, in such circumstances it is desirable to consider a revealed preference activity rule which has a more relaxed constraint on a bidder’s behaviour through the auction.

## A relaxed revealed preference activity rule

- A8.6 A relaxed revealed preference activity rule would allow a bidder to revise its relative valuation of combinations of lots as the auction progresses. However, in doing this, the activity rule cannot be “too relaxed” as this would risk allowing a bidder to hide

its true relative valuation of combinations of lots which could potentially undermine the efficiency of the auction process. Therefore, a relaxed revealed preference activity rule would need to strike an appropriate balance between giving a bidder flexibility to reflect its change in relative valuations between combinations of lots in light of information from the auction and not providing so much flexibility that a bidder could manipulate the auction design such that the efficiency of the auction is undermined.

- A8.7 In broad terms there are two main (potentially interacting) ways in which the activity rule can be relaxed. One is the amount by which a bidder can revise its relative valuation of combinations of lots as the auction progresses and the other is for how many rounds of the auction previous bidding behaviour is taken into account. Under the strict form of a revealed preference activity rule a bidder can only revise its relative valuations of a combination of lots in a way which is strictly consistent with all previous bids made in all proceeding rounds of the auction.

### **A possible relaxed revealed preference activity rule for the award of the 2.6GHz and 2010MHz bands**

#### **Constraint on bids in the first primary bid round**

- A8.8 A bidder's eligibility to bid in the first primary bid round would be the same as that proposed for the eligibility points rule. Eligibility would be determined by reference to the amount that each bidder has on deposit with us at the specified time prior to the start of the first primary bid round, with each whole £50,000 on deposit equating to one eligibility point.

#### **Constraint on bids in subsequent primary bid rounds**

- A8.9 Our proposal for a revealed preference activity rule in the award would be for a relaxed form of the activity rule. The rule would be relaxed such that:
- i. only a bidder's bid in the immediately proceeding primary bid round would be taken into account when considering whether the rule had been met; and
  - ii. the amount which the bidder was seeking to bid on the alternative combination of lots would have to have not increased by "too much more" than the amount by which the price of the combination of lots on which it bid in the previous round had increased by.
- A8.10 The "too much more" relaxation parameter in bullet ii) above would be announced by the auctioneer proceeding each primary bid round.
- A8.11 This form of relaxed revealed preference activity rule has two attractive characteristics which are not present in the more constrained form of the activity rule:
- i. because a bidder is only constrained by its bid in the immediately proceeding primary bid round the bidder is always able to bid on the same combination of lots in the next round (although noting that this may not necessarily be the optimal bidding strategy); and
  - ii. if the bidder bids consistently in each primary bid round for its most preferred combination of lots (and its relative valuations of different combinations of lots do not change more quickly than is permitted by the relaxation factor in each round)

it will always be able to bid for its most preferred combination of lots in every primary bid round.

### Constraints on bids in the supplementary bids round

A8.12 All supplementary bids must exceed the sum of the reserve prices for the component lots within the package.

A8.13 In addition, all supplementary bids must satisfy the following condition for all values of t:

$$b(x) \leq B(x_t) + (x - x_t) \cdot p_t + \max [ e_t \cdot |(x - x_t) \cdot p_t|, q_t \cdot B(x_t) ]$$

Where:

- $b(x)$  is the amount of the supplementary bid for the package,  $x$ ;
- $x_t$  is the package that the bidder bid on in primary bid round  $t$ ;
- $B(x_t)$  is the highest Principal Stage bid made by the bidder for package  $x_t$ , including all primary round bids and any supplementary bid for this package;
- $(x - x_t) \cdot p_t$  is the difference in price between package  $x$  and package  $x_t$  in round  $t$ .
- $e_t (\geq 0)$  is the first supplementary bids round relaxation factor for primary bid round  $t$  (announced before the start of the supplementary bids round);
- $q_t (\geq 0)$  is the second supplementary bids round relaxation for primary bid round  $t$  (announced before the start of the supplementary bids round); and
- $| \cdot |$  is the modulus (or absolute value).

A8.14 The two supplementary round relaxation parameters,  $e_t$  and  $q_t$ , will be set by the auctioneer.

## Annex 9

# SE42 block edge masks for the 2.6GHz band

## Introduction

- A9.1 This Annex describes the block edge masks (BEMs) for the 2.6GHz band developed by the SE42 project team in response to the EC mandate to CEPT on WAPECS. It is based on the draft CEPT report submitted by the ECC chairman to the European Commission in December 2007 and summarises the technical proposals set out in that document. We are proposing to adopt these technical conditions for the award of the 2.6GHz band in the UK.
- A9.2 In developing the BEMs, SE42 established a number of basic principles.
- Radiated limits (EIRP, not conducted limits) should be used as these provide greater certainty over interference that might be received.
  - The BEMs should not rely on detailed coordination and cooperation arrangements between operators in adjacent frequency blocks, when their base station are separated by 100m or more.
  - The BEMs should be derived on the basis of a 5MHz block arrangement but wider bandwidth systems should be treated equitably.
  - For both base stations and mobile/terminal stations, in-block radiated power limits are necessary, regardless of how these are regulated (e.g. under national licensing conditions or the requirements of the RTTE Directive<sup>43</sup>).
  - For the in-block radiated power limits, an integration bandwidth of 5MHz should be used.

## Base station BEMs proposed by the SE42 working group

- A9.3 The following parameters were used in deriving the base station BEMs as proposed by SE42:
- Separation distance (between victim and interfering antenna): 100m;
  - Maximum level for interference at victim receiver:  $I_{RX} = -115\text{dBm/MHz}$ <sup>44</sup>;
  - Base station effective antenna gain:  $G_{RX} = 17\text{dBi}$ ;
  - Increase in coupling loss due to base station antenna downtilt: 3dB per antenna<sup>45</sup>; and

<sup>43</sup> Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

<sup>44</sup> Assuming I/N of -6 dB and receiver noise figure of 5dB

<sup>45</sup> Based on the assumption that 3 degrees of downtilt provides 3dB of loss (for high gain antennae)

- Path loss model: Free space, reflecting the base station to base station paths for relatively short distances (100m) assumed and relatively high antenna placement.
- A9.4 For base stations operating at full power a 5MHz frequency separation is needed between full power base transmit (unrestricted) blocks and base receive blocks (i.e. between TDD and FDD uplink blocks or between two TDD blocks). This 5MHz may be left as a guard block or alternatively it may be used as a low power (restricted) block.<sup>46</sup> However, such restricted blocks may receive a higher level of interference from the adjacent user than unrestricted blocks.
- A9.5 It should also be noted that any 5MHz TDD block that is immediately adjacent to an FDD downlink block may suffer an increased risk of interference. It is not necessary to treat these blocks as a guard or restricted blocks in terms of low in-band power for their transmission rights (as their operation at full power is not likely to cause interference to the adjacent FDD blocks). However, such blocks may receive a higher level of interference from the adjacent user than other unrestricted blocks. Administrations should be aware of the above and treat these blocks appropriately when awarding spectrum.<sup>47</sup>
- A9.6 The base station BEMs for the 2.6GHz band include one BEM for use in unrestricted blocks and another for restricted blocks use. These BEMs are built up from two components:
- A baseline requirement; and
  - A BEM specific to individual licensed blocks.
- A9.7 For any particular frequency within the 2.6GHz band the higher of the baseline and specific requirement will apply.

### **Base station BEMs: baseline requirement**

- A9.8 The baseline requirement provides two levels. The first is applicable to FDD downlink (base transmit) frequencies and the frequencies  $\pm 5\text{MHz}$  either side of these. The second is applicable to all other frequencies in the band. Table 9 below gives the baseline requirement.

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<sup>46</sup> In the UK, we propose to authorise these 5MHz blocks as a low power restricted blocks.

<sup>47</sup> Under our proposals, block 24 at the unpaired/paired (FDD downlink) adjacency is treated separately and the lowest block in the unpaired upper area is a restricted block.

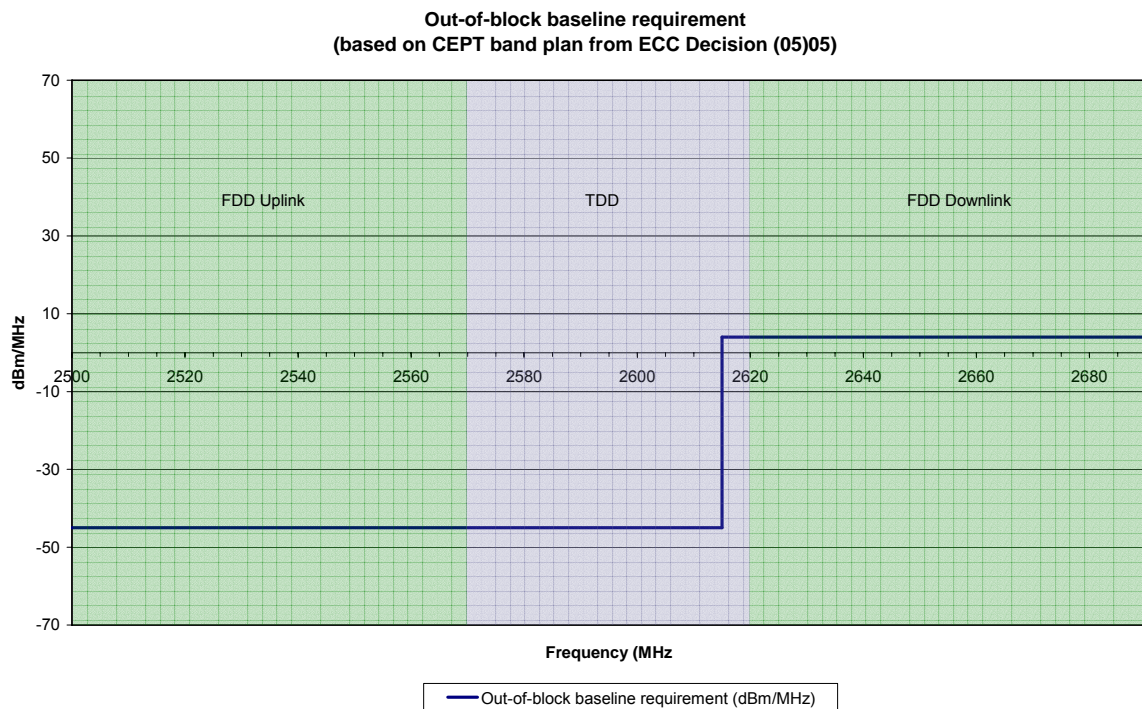


**Table 9: Base station: baseline requirement**

<b>Frequency range</b>	<b>Maximum mean EIRP (integrated over a 1 MHz bandwidth)</b>	<b>Description (purpose)</b>
Frequencies allocated to FDD downlink frequencies $\pm 5\text{MHz}$ either side	+4dBm/MHz	Protection of mobile terminals in the adjacent block (derived from 3GPP studies of adjacent channel leakage)
Frequencies in the 2500-2690MHz band not covered by the definition above	-45dBm/MHz	Protection for uncoordinated base station deployments for distances of 100m and above

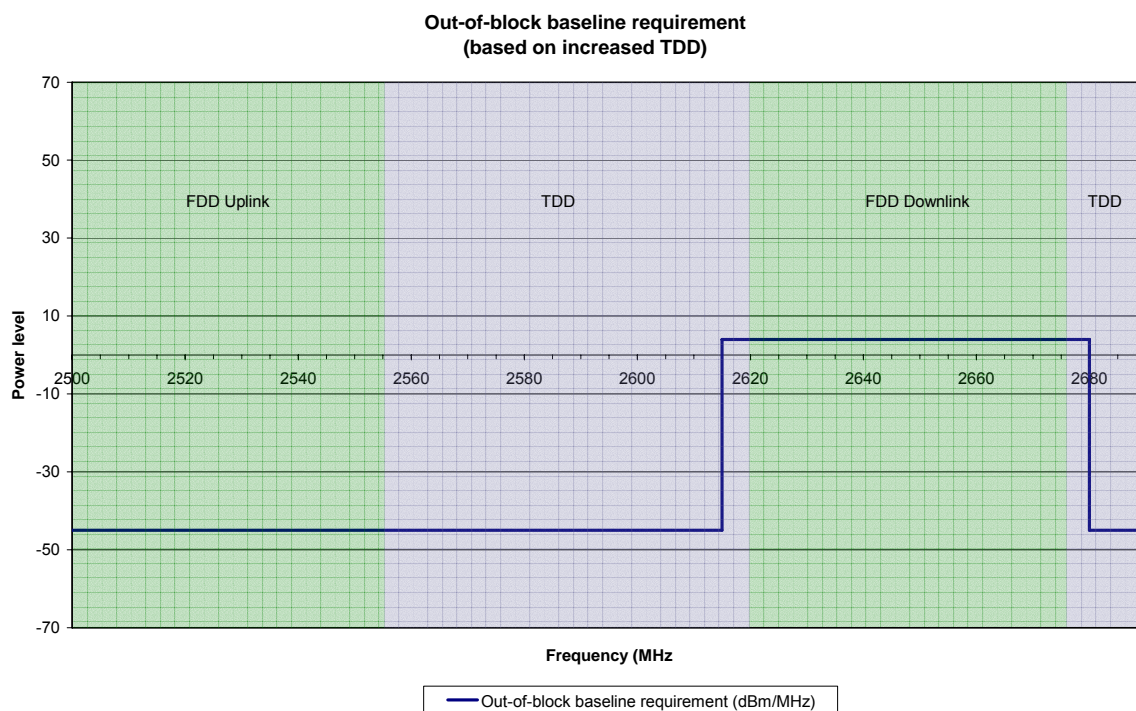
A9.9 Figure 11 below illustrates how the baseline requirement would apply where frequencies allocated to FDD and TDD within the band follow the CEPT band plan contained in ECC Decision(05)05.

**Figure 11: Base station baseline requirement (for ECC Decision(05)05 case)**



A9.10 Figure 12 below illustrates how the baseline requirement would apply where frequencies allocated to FDD and TDD within the band are different from those in the CEPT band plan contained in ECC Decision(05)05. This example illustrates the case where an additional 30MHz of spectrum is allocated to TDD according to the approach we are proposing to allow unpaired (TDD) use to expand.

**Figure 12: Base station baseline requirement (for extra 30 MHz of TDD)**



**Base station BEMs: specific BEM for unrestricted frequency blocks**

A9.11 Table 10 below gives the specific in-block power (EIRP) requirement for unrestricted blocks.

**Table 10: Base station - in block power (unrestricted blocks)**

<p><b>Maximum mean in-block EIRP (integrated over a 5 MHz bandwidth)</b></p>	<p>+61dBm/5MHz</p>	<p>This limit can be relaxed up to 68dBm/5MHz by administrations for specific deployment scenarios (e.g. rural areas, high masts, site sharing) provided that it does not significantly increase the risk of terminal station blocking.<sup>48</sup></p>
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A9.12 Table 11 gives the specific out-of-block power (EIRP) requirement for unrestricted blocks.

<sup>48</sup> It should be noted that Ofcom does not plan to include this relaxation to the in-block power as part of its award proposals. Any relaxation to cover the circumstances described would need to be dealt with on a case by case basis under a licence variation request.

**Table 11: Base station - out-of-block power (unrestricted blocks)**

<b>Offset from relevant block edge</b>	<b>Maximum mean EIRP</b>
Start of band (2500MHz) to -5 MHz (lower edge)	Baseline requirement level
-5.0 to -1.0MHz (lower edge)	+4dBm/MHz
-1.0 to -0.2MHz (lower edge)	+3 + 15( $\Delta_F$ + 0.2) dBm/30kHz
-0.2 to 0.0MHz (lower edge)	+3dBm/30kHz
0.0 to +0.2MHz (upper edge)	+3dBm/30kHz
+0.2 to +1.0MHz (upper edge)	+3 – 15( $\Delta_F$ – 0.2) dBm/30kHz
+1.0 to +5.0MHz (upper edge)	+4dBm/MHz
+5.0MHz (upper edge) to end of band (2690MHz)	Baseline requirement level

*Where:  $\Delta_F$  is the frequency offset from the relevant block edge (in MHz)*

**Base station BEMs: specific BEM for restricted frequency blocks**

A9.13 Table 12 below gives the specific in-block power (EIRP) requirement for restricted blocks.

**Table 12: Base station - in block power (restricted blocks)**

<b>Maximum mean in-block EIRP (integrated over a 5 MHz bandwidth)</b>	+25dBm/5MHz
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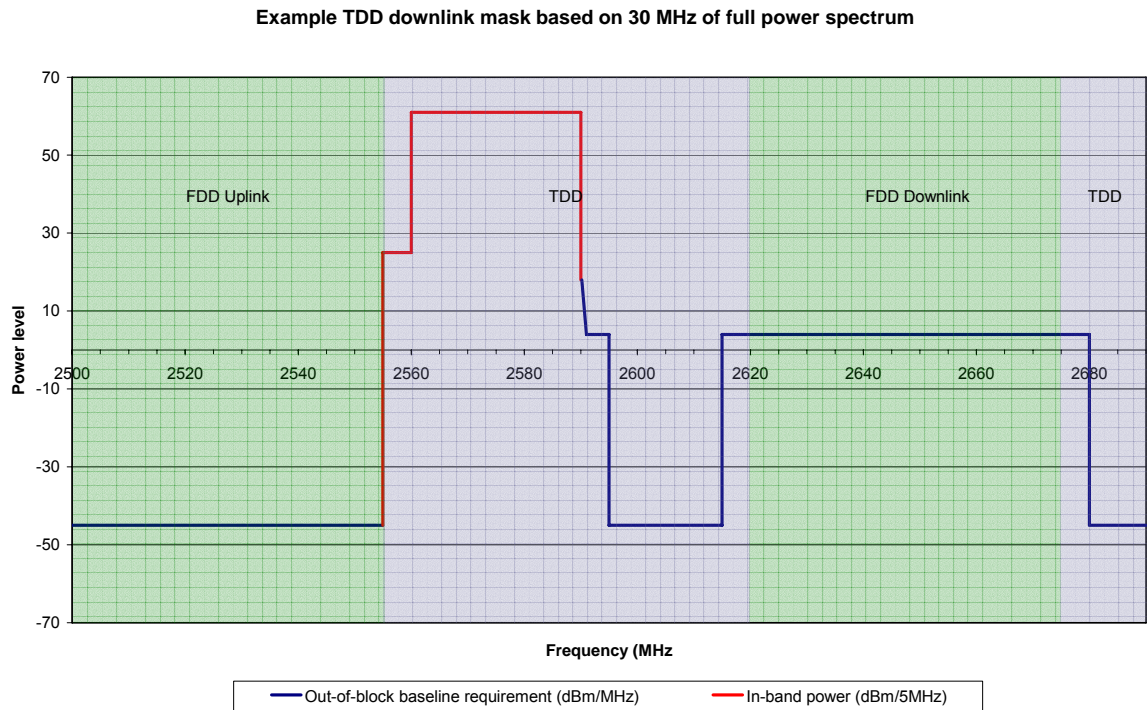
A9.14 In cases where licensees choose to coordinate, including the case of synchronised TDD, such coordination could include an agreement to enable restricted blocks to be operated as unrestricted blocks. In addition, if licensees choose to coordinate and agree they can relax the baseline requirement level within each others' respective blocks.<sup>49</sup>

**Base station BEMs: examples**

A9.15 Figure 13 below gives an illustration of the overall BEM for a block of TDD spectrum comprising of 30MHz of unrestricted spectrum and associated 5MHz restricted block.

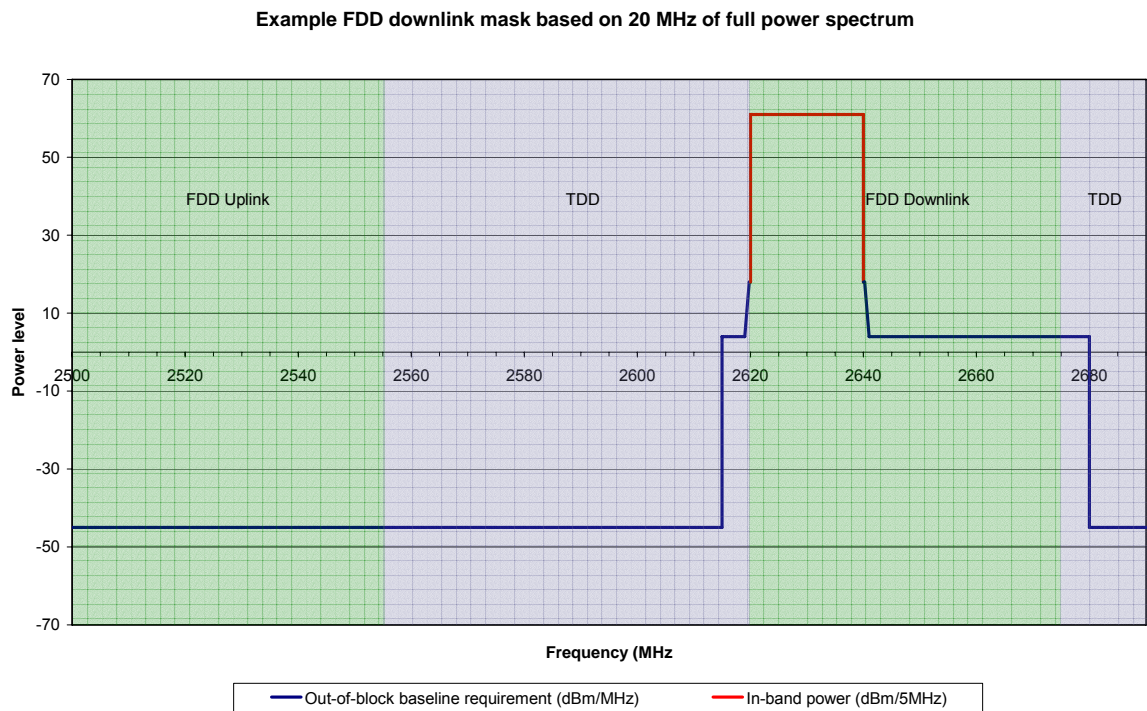
<sup>49</sup> In the UK this could be achieved by including a suitable clause in the licence which would allow a licensee to use an out-of-block limit of +4 dBm/MHz in their neighbouring licensee's spectrum if they had an explicit agreement to that effect.

**Figure 13: Example TDD base station BEM**



A9.16 Figure 14 below gives an illustration of the overall BEM for a 20MHz block of FDD spectrum.

**Figure 14: Example FDD base station BEM**



### Base station BEMs: special case where the administration has placed additional restrictions on antenna placement

A9.17 An administration may choose to apply requirements for out-of-block emissions that are different from the baseline defined above, using relaxed requirements as defined in Table 13 below, subject to certain conditions. The conditions are to include additional restrictions on the placement of antennas such as being indoors or under a certain height.<sup>50</sup> In this case, the in-block power limits would be the same as for restricted blocks. As a result, technical conditions can include two options for base stations, which licensees can choose from for each of their transmitter, for any block in which they operate:

- a) In-block power corresponding to unrestricted blocks and out-of-blocks limits as per the baseline requirement; or
- b) In-block powers corresponding to restricted blocks, relaxed out-of-blocks limits and conditions on location (indoors) or height (if outdoors).

**Table 13: Base station - out-of-block power (unrestricted blocks)**

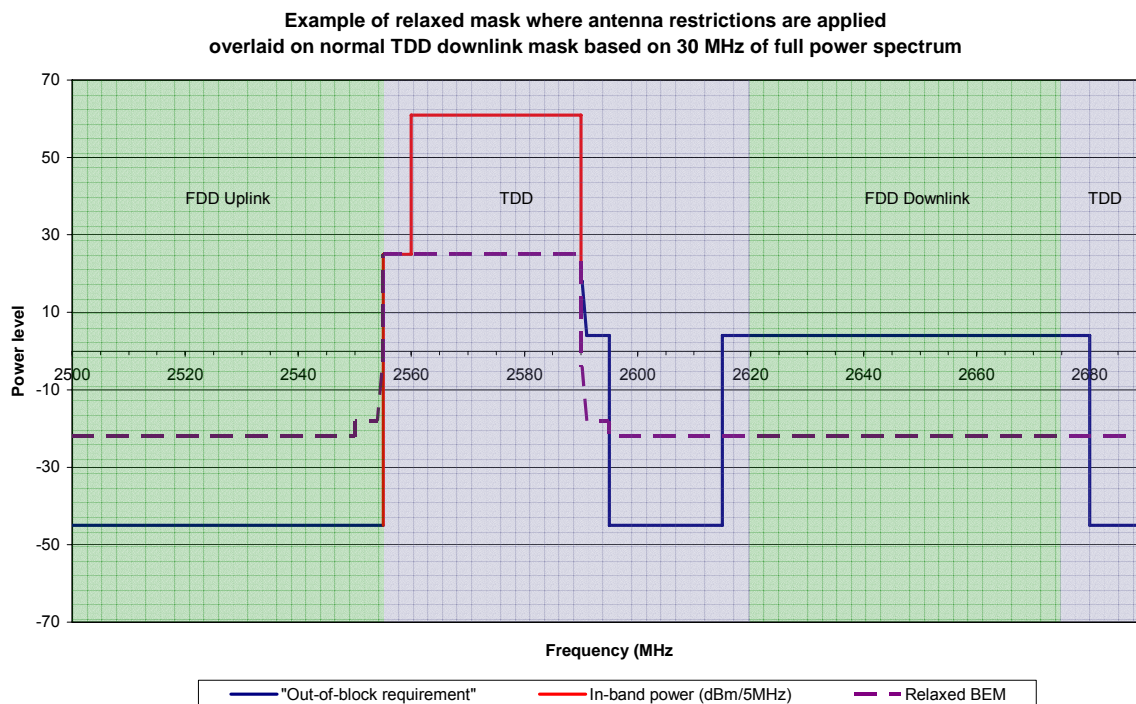
<b>Offset from relevant block edge</b>	<b>Maximum mean EIRP</b>
Start of band (2500MHz) to -5MHz (lower edge)	-22dBm/MHz
-5.0 to -1.0MHz (lower edge)	-18dBm/MHz
-1.0 to -0.2MHz (lower edge)	$-19 + 15(\Delta_F + 0.2)$ dBm/30kHz
-0.2 to 0.0MHz (lower edge)	-19dBm/30kHz
0.0 to +0.2MHz (upper edge)	-19dBm/30kHz
+0.2 to +1.0MHz (upper edge)	$-19 - 15(\Delta_F - 0.2)$ dBm/30kHz
+1.0 to +5.0MHz (upper edge)	-18dBm/MHz
+5.0MHz (upper edge) to end of band (2690MHz)	-22dBm/MHz

Where:  $\Delta_F$  is the frequency offset from the relevant block edge (in MHz)

A9.18 Figure 15 below gives an illustration of the relaxed BEM for situations where antenna restrictions are applied (overlaid on a normal TDD mask).

<sup>50</sup> In the case of the UK, Ofcom proposes that the relaxed out-of-block limits in Table 13 may be applied where antennas are either placed indoors or, if outdoors, where they are less than 5 metres above ground level.

**Figure 15: Illustration of the relaxed base station mask where antenna restrictions are applied (overlaid on normal TDD mask)**



**Mobile/Terminal station BEMs proposed by the SE42 working group**

A9.19 Table 14 below gives the specific in-block radiated power requirement for mobile/terminal stations.

**Table 14: Mobile/Terminal station - in block power**

<b>Maximum mean in-block Total Radiated Power (TRP<sup>51</sup>) (integrated over a 5MHz bandwidth)</b>	+31dBm/5MHz
<b>Maximum mean in-block EIRP (integrated over a 5MHz bandwidth)</b>	+35dBm/5MHz

A9.20 TRP should be used for mobile/nomadic stations and EIRP should be used for fixed/installed stations.

A9.21 Table 15 gives the specific out-of-block power (EIRP) requirement for mobile/terminal.

<sup>51</sup> TRP is a measure of how much power the antenna actually radiates. TRP is defined as the integral of the power transmitted in different directions over the entire radiation sphere.

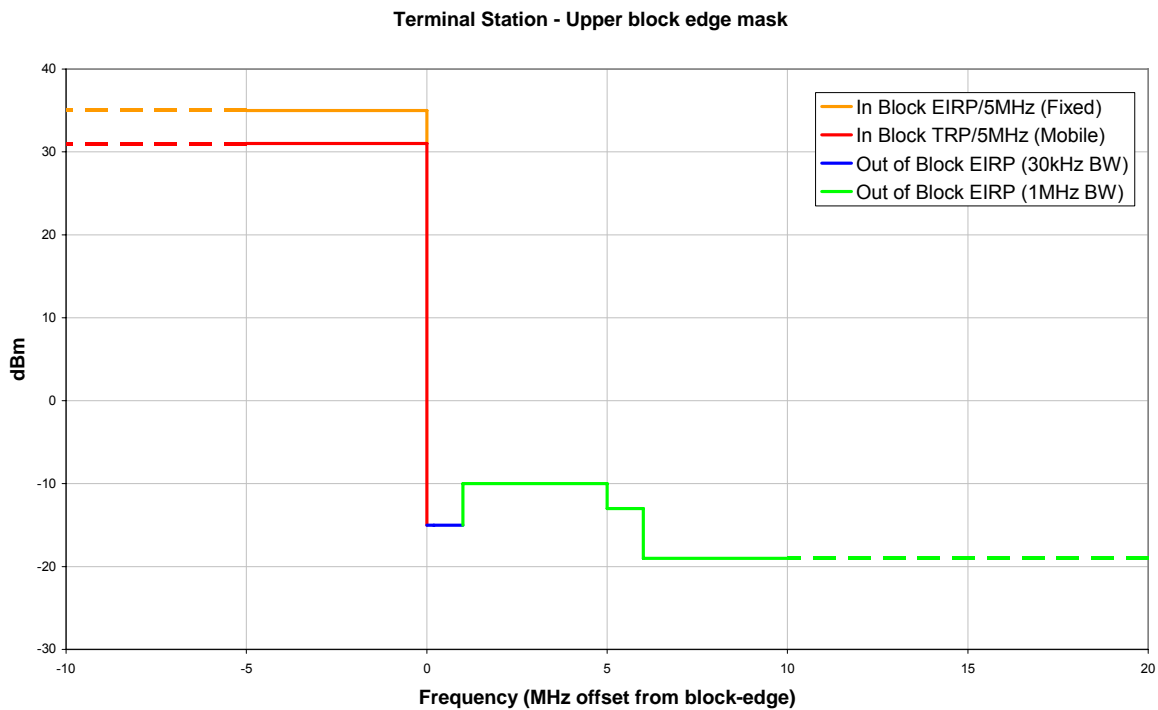
**Table 15: Mobile/Terminal station - out-of-block power**

<b>Offset from relevant block edge</b>	<b>Maximum mean EIRP</b>
Start of band (2500MHz) to -6MHz (lower edge)	-19dBm/MHz
-6.0 to -5.0MHz (lower edge)	-13dBm/MHz
-5.0 to -1.0MHz (lower edge)	-10dBm/MHz
-1.0 to 0.0MHz (lower edge)	-15dBm/30kHz
0.0 to +1.0MHz (upper edge)	-15dBm/30MHz
+1.0 to +5.0MHz (upper edge)	-10dBm/MHz
+5.0 to +6.0MHz (upper edge)	-13dBm/MHz
+6.0MHz (upper edge) to end of band (2690MHz)	-19dBm/MHz

Where:  $\Delta_F$  is the frequency offset from the relevant block edge (in MHz)

A9.22 Figure 16 shows the upper edge BEM for mobile/terminal (with different provisions for fixed and mobile/nomadic stations).

**Figure 16: Mobile/Terminal station - upper edge BEM**



A9.23 Figure 17 shows the lower edge BEM for mobile/terminal (with different provisions for fixed and mobile/nomadic stations).

**Figure 17: Mobile/Terminal station - lower edge BEM**

