Issues related to the Draft Information Memorandum

A report for ComReg

ComReg document 12/51

25 May 2012

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1 Introduction

1.1 Background

1. DotEcon's latest report for ComReg, published in March 2012 as ComReg document 12/24,[1] was part of the latest series of ComReg publications relating to the proposed multi-band award. The report reviewed various aspects of the proposed award process for the 800MHz, 900MHz and 1800MHz spectrum bands in light of the views raised by interested parties in relation to ComReg's response to consultation and Draft Decision (11/60) and our accompanying report (published as ComReg document 11/58).

2. While our March 2012 report focused on responses to ComReg's Draft Decision, it was noted that some of the issues raised by respondents in their subsequent responses to the draft Information Memorandum (ComReg Document 11/75) concerned matters other than just the detailed auction rules and were more appropriately addressed in that report.

3. Throughout our March 2012 report, we acknowledged respondents' comments provided in response to the draft Information Memorandum ("Draft IM") where appropriate, including (but not limited to) issues relating to:

   - inclusion of the 2.6GHz band;
   - reservation of spectrum for a specific class of bidder (either entrants or existing operators in a given band);
   - advanced commencement of liberalised licences assigned in the auction;
   - spectrum packaging – the two time slice approach;
   - implementation of the proposed early liberalisation option;
   - spectrum sharing; and
   - licence conditions

   and set out our analysis of and response to those submissions.

4. While our March 2012 report did not provide a full response to all the issues raised in response to the Draft IM, we noted that all points concerning the detailed auction rules would be addressed in a subsequent document. To that end, in this report we review the detailed auction rules in light of the views of interested parties, as expressed in responses to consultation on the Draft Decision, the Draft IM or correspondence over the period since the publishing of the Draft Decision.

5. DotEcon has had access to an advanced draft of a number of sections of ComReg's response to consultation on the Draft IM and of the final IM, which we understand will be published alongside this report. However, the views

[1] DotEcon, "Issues relating to the award of spectrum in multiple bands in Ireland – A report for ComReg"

expressed in this report are those of DotEcon only and do not necessarily represent the views of ComReg.

1.2 Structure of this document

6. In this report, subject to paragraph 7 below, we consider all issues raised and outstanding where they relate to the award process and auction rules as set out below**:**

 - Issues related to activity rules proposed for the award process. These relate to the proposed activity rules for the primary bid rounds including 'relaxed primary bids' and 'binding supplementary bids' (referred to herein as 'chain bids') and the restrictions on bids placed in the supplementary bids round. As part of this consideration, we provide a discussion of the reasoning for the inclusion of these rules in addition to examples of how they may be effectively used by bidders in the auction.
 - Issues related to the information policy proposed by ComReg in the Draft IM, including the restrictions on communication between parties and the information revealed to bidders at each stage of the award process.
 - Issues related to the practical implementation of the main stage of the auction such as round scheduling, round prices and deposit calls, and issues related to the indicative timeline and associated milestones.
 - Other issues raised by respondents as they relate to the Draft IM and the detailed auction rules proposed for the upcoming multi-band spectrum release.

7. Where issues raised in relation to the Draft IM are related to ComReg's policy, or are legal matters, we do not provide comment on these matters.

8. Annex A provides a commentary on any additional issues raised in response to ComReg's Decision on the multi-band spectrum release (D04/12) as submitted by respondents in letters to ComReg, following its publication on 16 March 2012.

9. Annex B provides information about new data that has become available since the publication of DotEcon's Fifth Benchmarking Report and provides our view on whether there is a need for a further update to the report.

10. Annex C considers the implications of the final price cap for bidding strategies in the supplementary bids round.

2 Activity Rules

2.1 Overview and background

11. In this subsection we discuss the activity rules as they have been presented in previous documents and provide an overview of the key refinements.

2.1.1 Initial proposals

12. In ComReg document 10/71, proposals for the use of a combinatorial clock auction (CCA) format included activity rules governing bidding behaviour during the main stage of the auction. Specifically, two important activity rules were:

- *An eligibility points-based activity rule for primary bid rounds*: This rule stipulated that a bidder's eligibility to bid in a round, as measured by the number of eligibility points linked to the package of lots bid on, would be set equal to the bidder's activity, also measured by eligibility points, in the previous round. Under this rule, a bidder's bidding activity (measured in eligibility points) can only be maintained or reduced as prices increase; bidding activity may not increase from one round to the next. This was intended to ensure that bidders were not able to conceal their demand for larger packages of lots in the early rounds of the auction only to reveal this demand when other bidders had dropped out or reduced their demand, which would have the effect of undermining price discovery in the primary bid rounds.
- *Relative caps on supplementary bids*: A bidder's bidding behaviour in the primary bid rounds would set caps on the level of its supplementary bids. This was also intended to ensure that bidders could not hide their true demand for spectrum in the primary bid rounds only to reveal it in the supplementary bids round (again undermining price discovery in the primary bid rounds). In particular, the preferences amongst packages of lots expressed by a bidder's supplementary bids must respect the implicit preferences amongst packages that the bidder had expressed in certain primary bid rounds (specifically, those in which the bidder had reduced eligibility).[2]

13. These elements of the auction proposal have had a high level of support from stakeholders thus far in the consultation process. Further, these features of the auction have been used in auctions previously:

- Eligibility points-based systems for regulating bidding behaviour have been used in most multi-round spectrum auctions to date, including those using a CCA format and those using an SMRA auction format.

[2] In ComReg document 11/60 and document 11/58, it was noted that the proposal for a relative cap activity rule had been welcomed by respondents and that the draft Information Memorandum would set out the detailed activity rules.

- The relative caps on supplementary bids in a CCA have been used in the Danish 2.6GHz auction, the Austrian 2.6GHz auction and the recent Swiss multi-band auction. Further, there are auction proposals in a number of other countries that include the use of these caps for regulating bidding behaviour in the supplementary bids round of a CCA. This includes the multi-band auction currently under consultation in the UK and Ofcom's previous proposals for a 2.6GHz auction (now superseded by the proposed multi-band auction and so never run) that originated the concept of relative caps.

2.1.2 Responses to initial proposals

14. Despite the support for the initial proposals, various respondents to previous consultations relating to the auction format raised concerns about the uncertainty that can occur within the CCA as to whether bidders will actually win the package they bid on in the last primary bid round (the 'final primary package'). The potential difference between the results in the last primary bid round and the overall auction outcome is due to the fact that the selection of winning bids at the end of the main stage of the auction takes into account *all* bids submitted during the primary bid rounds and the supplementary bids round when selecting the most valuable combination of winning bids. Although supplementary bids are subject to constraints that result from the activity rules, there is scope for the bids submitted in the last primary bid round to be ousted by an alternative combination of bids of greater total value.

15. It is important to recognise that we can never expect that the primary bid rounds alone will always be able to achieve the eventual outcome of a CCA. This is because in the primary bid rounds, all lots in a category have equal price (i.e. there is linear pricing of lot packages), which in some cases may not permit an efficient allocation of the available lots to be achieved. However, subject to this fundamental constraint, we wish to make the primary bid rounds as informative as possible. This aspect of the CCA can be improved somewhat by using more sophisticated activity rules, but clearly a trade-off must be struck between the complexity of such rules and the benefits of more informative primary bid rounds.

16. In this award process there are specific reasons (arising from offering spectrum that may be used by GSM licensees to continue their operations past the term of their existing licences) that mean we should be particularly concerned about the potential for the overall auction outcome to vary unexpectedly from the provisional position at the end of the final primary bid round. In particular, we wish to avoid an unexpected outcome where existing GSM operators fail to acquire the spectrum they would need to continue to offer GSM services, but do not have a further chance to revise their bids to avoid such an outcome. This could create a potential cost to consumers arising from a disruption of GSM services.

2.1.3 Revised activity rules presented in the Draft IM

17. For this reason, the activity rules were modified to reduce the uncertainty of the auction outcome relative to the result of the final primary bid round (specifically through the inclusion of a final price cap). The detailed

implementation of these revised activity rules was described in the Draft IM. We provide a fuller discussion of these rules in Section 2.2 directly below, including some further worked examples to clarify the operation of these rules.

18. The inclusion of a final price cap does not mean that existing GSM licensees are guaranteed to win lots continuing past the expiry of existing licences. However, provided that a bidder is willing to make bids at a sufficiently high level, this approach allows bidders to avoid facing an uncontrollable risk of failing to win the lots it bid on in the final primary bid round. This matter is discussed in detail in Section 2.4 below.

19. Relative to the initially proposed activity rules, the revised activity rules in the Draft IM incorporated tighter restrictions on supplementary bids to ensure that the provisional position in the final primary bid round cannot be too readily overturned. The final price cap means that a bidder's final primary bid is more committing. In turn, this requires a corresponding relaxation in the rules for making primary bids, which allows greater flexibility for bidders to bid on their most preferred packages in each round through the use of 'relaxed primary bids'. This relaxation is required so that the tighter constraints from the final price cap do not limit the ability of a bidder to bid according to its valuations. Whilst this increases the complexity of the rules, it provides bidders with significant additional flexibility.

20. The activity rules presented in the Draft IM intended to promote an efficient outcome from the auction by:

   a) preventing bidders from hiding their demand during the primary bid rounds and so promoting price discovery;

   b) minimising incentives for non-straightforward bidding behaviour, whether to secure spectrum at a better price or to disadvantage competitors;

   c) allowing reasonable flexibility for bidders to make use of the information revealed in the open rounds;

   d) minimising the number of constraints on bids made in later rounds arising from earlier rounds (subject to achieving the previous objectives); and

   e) providing the ability for bidders requiring continued access to spectrum for business continuity with a high degree of certainty that such spectrum can be secured provided that sufficiently high bids are made.

21. The need to implement these various principles unavoidably leads to a degree of complexity in the activity rules. However, this is a result of providing additional bidding flexibility, as we discuss below.

22. The detailed rules for CCAs have been subject to a process of continuous improvement over time, with spectrum authorities drawing on the experience of previous auctions. The first CCA for spectrum rights of use was Ofcom's 10-40GHz auction held in 2008. This used a relatively simple system of absolute caps on supplementary bids. However, subsequent auctions moved to a relative cap rule, as this provides better incentives for bidders to bid for their most preferred packages during the primary rounds. The relative caps rule was

first adopted in the Danish 2.5GHz auction (though was originally proposed for Ofcom's 2.6GHz, which was subsequently overtaken by the current proposals for a UK multi-band auction). The rules proposed by ComReg for its multi-band award (and indeed the similar activity rules proposed for the UK multi-band award) represent a further refinement in this regard, but are firmly based on the approach taken in previous CCAs.

23. While these revised activity rules may be regarded as novel, we note that, in the UK, Ofcom is currently proposing very similar activity rules for its multi-band auction.[3] These are again aimed at improving the predictability of the final outcome of the CCA relative to the provisional position at the end of the primary bid rounds. Industry Canada[4] and ACMA[5] (Australia) have recently published proposals for a broadly similar approach for their forthcoming spectrum auctions.

2.1.4 Refinement of the Draft IM rules

24. In the light of comments received from respondents and further analysis of the operation of these rules, we propose to make some modest refinements of the rules presented in the Draft IM. These changes are discussed in Section 2.3 below. The most substantial change concerns the treatment of eligibility in the two time slices when a bidder makes a relaxed primary bid. These changes do not affect the high-level discussion in Section 2.2, which applies equally to the rules presented in the Draft IM with or without the refinements discussed in Section 2.3. In particular, in our initial discussion in Section 2.2 we specifically avoid issues arising from the presence of two categories of eligibility (one for each time slice).

2.2 Revised activity rules

25. In this subsection, we discuss the revised activity rules detailed in the Draft IM. We then discuss some further modest refinements of these rules in Section 2.3 below. For the avoidance of doubt, the discussion in this subsection applies in equal measure to the activity rules as presented in the Draft IM either with or without these refinements.

2.2.1 Description of the revised activity rules

26. The revised activity rules detailed in the Draft IM (and noted in ComReg documents 11/60 and 11/58) have two main features that distinguish them from the previous activity rules (as discussed in ComReg 10/71a):

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[3] See http://stakeholders.ofcom.org.uk/consultations/award-800mhz-2.6ghz/

There are terminological differences between the activity rules for primary and supplementary bids proposed in the UK and those described in the Information Memorandum. However, the structure of these rules is closely similar.

[4] See http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10374.html

[5] See http://www.acma.gov.au/WEB/STANDARD/pc=PC_410319

a) A ***final price cap***, which limits the amount of a supplementary bid on a package other than a bidder's final primary package relative to the amount bid on that bidder's final primary package, and taking into account the round prices in the final primary round; and

b) ***Relaxed primary bids (RPBs)***, which provide the possibility for bidders to submit primary bids for packages that exceed the bidder's current eligibility provided that doing so is consistent with the preferences that the bidder has previously expressed through bids made in primary bid rounds where the bidder has dropped eligibility.

27. The **final price cap** applies to supplementary bids for *any* package other than a bidder's final primary package. The purpose of the final price cap is to require bidders to maintain their preferences across packages they express in making their final primary bid when submitting their supplementary bids.

28. An effect of the final price cap is to limit the incremental value (relative to its bid for the final primary package) that a bidder can express through supplementary bids for packages that differ from its final primary package. As a consequence, the final price cap limits the circumstances in which a bidder could win a package different from its final primary package in the overall auction outcome, as we discuss in Section 2.4 below.

29. As any primary bid round could potentially be the final primary bid round (with bidders only learning this after they have made their bids), the final price cap creates an incentive for bidders to bid on their most preferred packages at the prevailing round prices in every round. As the possibility of the primary bid rounds closing increases, this incentive becomes ever stronger. This improves the information released during the open stage of the auction.

30. The final price cap does not prevent a bidder from submitting supplementary bids in line with the bidder's valuations (and within the relative caps arising from their primary bids) provided that the bidder has adopted a straightforward bidding strategy in the primary bid rounds.[6] By 'straightforward' we mean that in each primary bid round the bidder bids on its most preferred package at prevailing round prices.[7] However, this might require the bidder to make use of the provisions for submitting a RPB.

31. Because the final price cap makes it more important for bidders to bid on their most preferred package in each primary bid round (otherwise a bidder may find that it cannot make supplementary bids in line with its valuations for different packages), bidders should not then be unnecessarily constrained by the activity rule governing the submission of primary bids. In this regard, an eligibility points-based activity rule alone (i.e. without the provisions for RPBs) could be too restrictive in situations where the relative prices of different lot categories change across primary bid rounds. Indeed, it is possible that a

[6] This only holds if the bidder is assumed to have a fixed set of relative valuations for different packages.

[7] I.e. the package that provides greatest surplus, defined as the difference between the bidder's valuation for the package and the price of the package at current round prices.

bidder could drop eligibility points in a given round and later find that, because of movements in the relative prices of different lot categories (and may not necessarily reflect the relative eligibility point weighting attributed to those categories), it would prefer to return to bidding on a package with more eligibility points than it currently holds. This limitation of a simple eligibility points-based activity rule is addressed by the RPB rules.

32. Notice that RPBs provide additional flexibility for bidders above and beyond a simple eligibility points-based activity rule. A bidder can *always* bid on any package (subject to the provisions of the spectrum caps and not exceeding the bidder's initial eligibility to bid) whose associated bid activity does not exceed the bidder's current eligibility (for each time slice). In some cases, depending on the current round prices, the bidder may *also* be able to bid on certain packages whose activity exceeds current eligibility.[8] This rule allows a bidder who has switched from bidding on a package *A* to a smaller package *B* (with fewer eligibility points) because package *A* has become relatively too costly to return to bidding on package *A* if it subsequently becomes cheaper relative to package *B*.

33. The final price cap and the RPB rules operate in concert. The final price cap limits the bid amount of supplementary bids for packages other than a bidder's final primary package (relative to the bid on the final primary package and given the round prices in the final primary round) and so creates an incentive for bidders to bid on their most preferred package in each primary bid round.

34. Submitting a RPB might require the bidder to submit additional bids for some of its constraining packages in order to ensure that the relative caps applicable to the bidder are not breached. The reason for this is that the relative caps depend on the bid amounts submitted for constraining packages bid on in primary bid rounds where the bidder reduced its eligibility. Therefore, as the auction progresses and round prices increase, it may be necessary to increase the bid on a constraining package in order to raise the relative cap that applies to the package subject to the RPB, so that the bidder is able to submit the relaxed primary bid at round prices without breaching the cap.

35. Such additional bids are referred to in the Draft IM as **binding supplementary bids**. However, this terminology is somewhat confusing (as some parties interpreted these as additional constraints applying to the supplementary bids round, which is not the case). In essence, these additional bids are supplementary bids that need to be submitted early (during the primary bid rounds) simply to ensure that RPBs submitted by a bidder are consistent with

[8] It is possible to create an activity rule for the primary bid rounds that is based entirely on revealed preference – that is imposing self-consistency requirements on the choices of packages made by bidders across primary bid rounds – which would obviate the need to choose eligibility point weights for the lot categories. However, this approach has not been adopted, as it would be complex and deviate significantly from the eligibility point based activity rule used in previous CCAs. Rather, modest adjustments have been made to the eligibility point based activity rule to make it fit for purpose once a final price cap is used in the supplementary bids round.

the relative caps created by previous decisions to drop eligibility. Therefore, we propose to change the terminology to ***chain bids***, emphasising the relation with the chain of constraining bids associated with any package subject to a RPB. For the avoidance of doubt, chain bids do not impose constraints on the supplementary bids round, but, like other bids, once submitted cannot be withdrawn and will be taken into consideration when selecting winning bids.

36. Chain bids will be required on constraining packages at the minimum bid amount necessary for the relative caps to be met; however, bidders may subsequently raise the bids on those constraining packages further during the supplementary bids round. In this sense, chain bids *do not constrain* the options available to bidders in the supplementary bids round, as these are the effective minimum bid levels that would need to apply in the supplementary bids round in any case to maintain consistency of relative preferences.

2.2.2 Simplified example of the revised activity rules at work

37. To illustrate the revised activity rules, consider the following example. For clarity, we greatly simplify the lot structure relative to the actual auction. Suppose that there are just two lots available (with each being a lot category in its own right):

a) Lot A with 10 eligibility points and a reserve price of €10m; and

b) Lot B with 5 eligibility points and a reserve price of €5m.

Suppose that bidders may only acquire one lot each, and therefore all start with an initial eligibility of 10.[9]

38. Consider a bidder who values Lot A at €25m and Lot B at €15m. The bidder's surplus for each lot in the first round is shown in Table 1 below.

Table 1: Round prices and bidder surplus in round 1

Lot	Eligibility associated with lot	Round price	Bidder valuation	Surplus
A	10	€10m	€25m	€15m
B	5	€5m	€15m	€10m

39. Suppose the bidder adopts the straightforward bidding strategy of bidding on its most preferred lot in each round, i.e. the lot that provides the highest surplus at prevailing round prices. Given the prices set in round 1, bidding on Lot A would yield a greater surplus than bidding on Lot B. Therefore, the

[9] We ignore the additional complications resulting from there being two different categories in the actual auctions to simplify the demonstration of the key features of the activity rules more clearly.

bidder would bid on Lot A, and would maintain its eligibility for the following round.

40. Suppose that, in subsequent rounds, the round price of Lot A increases faster than the price of Lot B, with the result that the bidder would at some point obtain a greater surplus from bidding on Lot B than on Lot A. For example, suppose that in some subsequent Round X, the prevailing round prices and associated surplus for this bidder are as shown in Table 2.

Table 2: Round prices and bidder surplus in round X (where X>1)

Lot	Eligibility associated with lot	Round price	Bidder valuation	Surplus
A	10	€18m	€25m	€7m
B	5	€6m	€15m	€9m

41. Given the prices prevailing in round X, bidding on Lot B would yield a greater surplus than bidding on Lot A. Therefore, the bidder would bid on Lot B in round X. As a result of switching to the Lot with fewer associated eligibility points, the bidder's eligibility for the following round would be reduced to 5.

42. It is possible that the price of Lot B then increases faster than Lot A, narrowing the price difference between them. Because of such price movements, at some point the bidder may again obtain a greater surplus from bidding on Lot A than on Lot B. For example, suppose that in some subsequent Round Y, the prevailing round prices and associated surplus for this bidder are as shown in Table 3, and that the bidder had been bidding on Lot B in all rounds since round X.

Table 3: Round prices and bidder surplus in round Y (where Y>X)

Lot	Eligibility associated with lot	Round price	Bidder valuation	Surplus
A	10	€19m	€25m	€6m
B	5	€10m	€15m	€5m

43. Given the prices prevailing in round Y, bidding on Lot A would yield a higher surplus. However, Lot A has an associated eligibility that exceeds the bidder's eligibility in the round.

44. Under a simple eligibility point based activity rule, the bidder would not be able to submit a bid on lot A in any round following round X, as bidders may not submit primary bids for packages with eligibility greater than the bidder's eligibility in that round. However, if this were to be the last primary bid round,

the bidder would be able to submit supplementary bids that reflect its valuations, as its supplementary bid for Lot B would be uncapped, while the relative cap on its supplementary bid for Lot A would be calculated as follows:

a) the bidder's bid for Lot B; plus

b) the price difference between Lot A and Lot B in round X (€12m) when the bidder dropped its eligibility.

Therefore, the bidder would be able make a supplementary bid at its valuation for each of the lots, of €15m for Lot B and €25m for Lot A (as this would be below the resulting relative cap of €15m + €12m = €27m).

45. These supplementary bids would be fully consistent with the bidding strategy followed by the bidder. However, these bids might destabilise the outcome of the last primary bid round, as these supplementary bids express a value difference between Lot A and Lot B that exceeds their price difference in the final primary round. By introducing the final price cap we avoid this problem.

46. However, if we only applied the final price cap without relaxing the activity rules in the primary bid rounds, then the bidder would not be able express its true valuations in its supplementary bids. For example, suppose that the bidder is not allowed to bid on Lot A in round Y (as the eligibility of Lot A exceeds the bidders' eligibility in round Y). If round Y were the last primary bid round, then the bidder would be subject to a final price cap (in addition to the relative cap calculated above) calculated as follows:

a) the bidder's bid on Lot B; plus

b) the price difference between Lot A and Lot B in the final primary bid round (€9m).

Therefore, the bidder would be able to bid €15m on Lot B, but then its bid on Lot A would be capped below its valuation of €25m (as the resulting final price cap would be €15m + €9m = €24m).

47. This situation is avoided in the revised activity rules by introducing RPBs. Under the revised activity rules, bidders are allowed to submit a primary bid on a package that exceeds its eligibility, provided that doing so is in accordance with the applicable relative caps. In this example, the price differential between Lot A and Lot B in round Y (€9m) is smaller than the price differential between these lots in round X (€12m) when the bidder first switched to Lot B. Therefore, the bidder would be allowed to submit a RPB for Lot A in round Y, as this would be consistent with the relative cap that results from the bidder's reduction in eligibility in round X.

48. Next we consider whether any chain bids (i.e. binding supplementary bids in the terminology of the Draft IM) would be required if the bidder makes a RPB for Lot A in round Y. Suppose that the bidder had last submitted a primary bid on Lot B when the round price of Lot B was €8m. The price for Lot A in round Y is €19m. Therefore, given the relative cap that applies to the bidder's bid on Lot A, the bidder would only be able to submit a bid of €19m for Lot A if its bid for Lot B is at least €7m. As the bidder has already submitted a primary bid of €8m for Lot B, then no additional bids are required.

49. However, suppose instead that a further primary bid round is run, with an increase in the price of both lots. For example, suppose that in Round Y+1, the prevailing round prices and associated surplus for this bidder are as shown in Table 4. Given the prices prevailing in round Y+1,bidding on Lot A (with an associated eligibility that exceeds the bidder's eligibility in the round) continues to yield a greater surplus.

Table 4: Round prices and bidder surplus in round Y+1

Lot	Eligibility associated with lot	Round price	Bidder valuation	Surplus
A	10	€21m	€25m	€4m
B	5	€12m	€15m	€3m

50. The price differential between Lot A and Lot B in this round (€9m) continues to be smaller than the price differential between these lots in round X (€12m) when the bidder dropped eligibility by bidding for Lot B for the first time. Therefore, the bidder would still be allowed to submit a RPB on Lot A.

51. However, the price for Lot A in round Y+1 is now €21m. Therefore, given the relative cap that applies to the bidder's bid on Lot A, the bidder would only be able to submit a RPB of €21m for Lot A if its bid on Lot B is at least €9m. As the highest bid submitted by the bidder for Lot B is €8m, submitting a RPB for Lot A without breaching the relative cap would require the bidder to also submit a chain bid (binding supplementary bid) of €9m for Lot B. Notice that the bid amount of the chain bid would not exceed the supplementary bid amount that the bidder would have wished to submit for this package under a simple eligibility points based activity rule.

2.2.3 Remarks about the revised activity rules

Packages subject to chain bids

52. Where the bidder has dropped eligibility more than once, it is possible that more than one chain bid could be required for the submission of a RPB. This would relate to cases where the package subject of the RPB is constrained by the bid on a package, which is in turn also subject to a relative cap. Notice that chain bids can only arise in respect of packages that:

a) the bidder bid for in rounds where its eligibility dropped ; and

b) have smaller eligibility than the package subject of the RPB.

Therefore, in practice, a RPB is likely to require at most a handful of associated chain bids (and often none at all).

53. The bid amounts of chain bids associated with a RPB will be calculated by the auction system as the minimum amount that would be required for the RPB to be consistent with the relative caps. However, the bidder may be able to increase these bids for constraining packages further above this level in the

supplementary bids round, provided that this is consistent with the final price cap.

A RPB as a final primary package

54. Where the bidder submits a RPB in the last primary bid round, then all supplementary bids will be subject to a cap (either the final price cap or the relative cap). However, the bidder may be able to raise a number of bids provided that this is consistent with the applicable caps. (This has implications for the packages that the bidder might eventually win, which are discussed in Section 2.4 below.)

55. In the example presented above, suppose that round Y+1 is the last primary bid round. Suppose that in round Y+1 the bidder submitted a RPB of €21m for Lot A, with the corresponding chain bid of €9m for Lot B. In this case:

   a) the bidder's supplementary bid for Lot A would be subject to a relative cap equal to the bid for Lot B plus €12m; and

   b) the bidder's supplementary bid for Lot B would be subject to the final price cap equal to the bid for Lot A minus €9m.

   The bidder would therefore be able to submit supplementary bids that reflect its true valuations (i.e. €25m for Lot A and €15m for Lot B), as this set of bids would satisfy both caps (the cap on the supplementary bid for Lot A would be €15m + €12m = €27m, while the cap on the supplementary bid for Lot B would be €25m - €9m = €16m).

56. Notice that the applicable caps simply require a bidder to bid in accordance with the preferences revealed during the primary rounds. Therefore, such caps do not adversely limit the options available to a bidder who bids according to its true valuations during the primary round.

2.3 Refinements relative to the Draft Information Memorandum

57. We now turn to a small number of refinements that we propose relative to the activity rules presented in the Draft IM. These fall into two main areas:

   a) the rule for eligibility carried forward to the next primary round when a RPB is made; and

   b) the ability of bidders with zero eligibility to submit RPBs.

58. In addition, as mentioned above, we also propose to change the terminology of "binding supplementary bids" used in the Draft IM for "chain bids" in the interests of clarity.

59. We also propose one further small enhancement to the tie-breaking rule for winner determination, discussed in Section 2.4 below, that has some interaction with the activity rules. The proposed change adds a secondary tie-breaking criterion of maximising the number of bidders who receive packages containing no fewer lots in any category than their final primary package.

2.3.1 Impact of RPBs on eligibility

60. The rules proposed in the Draft IM provided for eligibility to be maintained in both time slices in the event that a bidder makes a RPB. Therefore, in the event

that a bidder makes a RPB that exceeds its current eligibility in one time slice, but has activity that is strictly less than its current eligibility in the other time slice, these rules provided for eligibility to be maintained in both time slices.

61. Whilst this approach has the merit of simplicity, there is a risk that this rule could allow bidders to hide demand when making a RPB. In particular, a bidder would be able to bid for a package that exceeds its eligibility in one time slice (which is necessary for this to be a RPB) and at the same time omit its demand for lots in the other time slice without consequence for its subsequent eligibility in the following round. This point was raised in responses to the Draft IM (discussed below). This could affect the progress of the primary rounds, as excess demand could be a poor indicator of the true balance of supply and demand in rounds where RPBs are made by one or more bidders.

62. For this reason, we propose that the eligibility of a bidder who makes an RPB for the following round is set equal to the *smaller* of:

   a) its current eligibility for the time slice; and

   b) its bidding activity (measured in eligibility points) in that time slice in the current round.

63. This "minimum rule" for eligibility means that if a bidder exceeds its current eligibility in one time slice, then it still needs to bid on sufficient lots in the other time slice if it wishes to maintain its eligibility for that time slice. Therefore, it is not possible for a bidder to hide demand in one time slice without consequence.

Cycles of relative caps

64. One minor complication results from the minimum rule (as compared with the eligibility rule in the Draft IM). It is now possible for a bidder to drop eligibility in a round in which it makes a RPB. This means that packages subject of a RPB may become constraining packages (i.e. packages bid for in rounds where eligibility is dropped, which impose relative caps on other packages).

65. As a result, it is possible that two (or more) packages could become linked through a cycle of relative caps. For example, suppose that a bidder makes a RPB for some package *X* and that this results in a reduction of eligibility in one of the two time slices. Suppose that this results in the current round being the last round in which the bidder has eligibility to bid for some other package *Y*. Then:

   a) As this is the last round that the bidder has eligibility to bid for package *Y*, but instead bid for package *X*, this imposes a relative cap on package *Y* relative to package *X*. This arises because this is a round in which eligibility was dropped.

   b) It is possible that package *Y* was bid for in a previous round that was the last round in which the bidder was able to bid for package *X*. In this case, *Y* would be the constraining package for package *X*, and thus the bid for package *Y* would impose a relative cap on the bid for package *X*.

In this situation, the bids that the bidder may submit for packages *X* and *Y* become linked together as a result of these two relative caps. In effect, the bidder has bid for X when it could have bid for Y and also bid for Y when it could have bid for X, which reveals some bounds on its relative preference between these two packages (i.e. the value difference lies in an interval). Such cycles of relative caps are always self-consistent by virtue of the fact that a RPB was made for package *X*.

Example – cycle of relative caps

66. Taking a simple example consider two packages, A and B. Suppose package A has eligibility requirements of (6,4) whilst package B has eligibility requirements of (4,6). To demonstrate the treatment of eligibility points reduction and the associated caps, we begin in the last round where the bidder was eligible to bid for both packages (denoted as round n).

67. Consider the following valuations and round prices in round n:

Table 5: Round prices and bidder surplus in round n

Package	Eligibility associated with lot	Round Price (€m)	Bidder valuation (€m)	Surplus (€m)
A	(6,4)	11	15	4
B	(4,6)	17	20	3

68. In round n the bidder has eligibility of (6,6) and places a bid for the package that yields the greatest surplus. Thus, in round n the bidder will place a bid for package A. The activity associated with this bid is smaller than the bidder's eligibility in the second time slice. In accordance with the eligibility rules, the bidder's eligibility for the next round will be reduced. Therefore, the bidder's eligibility heading into round n+1 will be (6,4).

69. Suppose that in round n+1, the prices of package A and B have changed such that, given its valuations, the bidder would prefer to bid for package B:

Table 6: Round prices and bidder surplus in round n+1

Package	Eligibility associated with lot	Round Price (€m)	Bidder valuation (€m)	Surplus (€m)
A	(6,4)	13	15	2
B	(4,6)	17	20	3

70. At these round prices, package B becomes the bidder's most preferred package. However, the bidder has insufficient eligibility to place an ordinary primary bid on this package, as the eligibility associated with package B in the second time slice exceeds the bidder's eligibility in the round. The bidder may be able to place a RPB for this package, if doing so is in accordance with the

relative caps that result from its revealed preferences in rounds where it dropped eligibility.

71. Given round n was the last round in which the bidder had sufficient eligibility to bid for package B, any bids for package B are subject to a relative cap equal to the highest bid that the bidder submits for A (the package it bid for in round n) plus the difference between the round prices for package B and A in round n.

72. Let $\beta(x)$ denote the highest bid for package x and p_n the round prices prevailing in round n, the relative cap on package B can therefore be denoted as:

$$\beta(B) \leq \beta(A) + p_n(B - A)$$

73. Therefore, in order for a bid for package B of €17m to be consistent with the relative cap, the bidder may need to submit a chain bid for package A. The amount of the chain bid on package A is determined in the following way:

a) The bid amount at current round prices (round n+1) for package B is €17m;

b) The difference in prices between package 1 and 2 in the constraining round (round n) is €17m - €11m =€6m;

c) Therefore, the bid for package A must be at lest equal to the bid for package B minus €6m.

74. Therefore, in order for a bid for package B of €17m to be consistent with the relative cap, the bidder would need to submit a bid for package A of at least €11m. The bidder's highest bid so far on A is currently €11m (its primary bid in round n), and therefore no chain bid will be required. However, as the required bid for A does not exceed the current round prices, then the bidder may submit a RPB for package B.[10]

75. Although the bidder has placed a RPB for package B, the bidder will see a reduction of its eligibility for the first time slice, in accordance with the proposed 'minimum rule'. For the next round, the eligibility of a bidder who makes a RPB will be set equal to the *smaller* of:

a) its current eligibility for the time slice; and

b) its bidding activity (measured in eligibility points) in that time slice in the current round

thus the eligibility of the bidder will be reduced to (4,4).

76. However, due to this reduction in eligibility, round n+1 becomes the constraining round; that is, the last round in which the bidder's eligibility is greater than or equal to the eligibility of package A in all time slices (as after

[10] Note that in the simple case where the feasibility of a RPB depends on a single relative cap, a RPB for B is thus possible if $P_n(B-A) \geq P_{n+1}(B-A)$

the reduction in eligibility, the bidder's eligibility is smaller than the eligibility of package A in time slice 1). Therefore, the bid in round n+1 will impose a revealed preference relative cap on the bid that the bidder may submit for package A. The relative cap on A will be defined as:

$$\beta(A) \leq \beta(B) + p_{n+1}(A - B)$$
$$\beta(A) \leq \beta(B) + (€13m - €17m)$$
$$\beta(A) \leq \beta(B) - €4m$$

77. The primary bids in this example have resulted in packages A and B being capped relative to each other. Effectively, this bounds the difference between the bid amounts that the bidder may submit for these packages within the interval defined by these two relative caps.

78. However, note that these caps are fully consistent with the bidder's preferences and do not limit the bidder's ability to submit bids that reflect its true valuations:

- If the bidder submits a bid for A that is equal to its valuation of €15m, then the resulting cap on B is equal to €15m+€6m = €21m, thus allowing the bidder to bid its full valuation of €20m for package B.
- If the bidder submits a bid for B that is equal to its valuation of €20m, then the resulting cap on A is equal to €20m-€4m = €16m, thus allowing the bidder to bid its full valuation of €15m for package A.

2.3.2 Bidders with zero eligibility

79. The rules presented in the Draft IM provided for the possibility of RPBs being made even in situations where a bidder's eligibility had dropped to zero in both time slices (and, therefore, the bidder would be unable to make any further primary bids). This approach creates complications for the practical management of the primary bid rounds and also for bidders, while providing a very modest increase in the flexibility to submit RPBs. A simpler approach can be taken for bidders whose eligibility has dropped to zero (for both time slices), as we explain in this section.

80. The approach proposed for bidders with zero eligibility differs from the Draft IM in that when a bidder's eligibility drops to zero in both time slices, then that bidder can make no more bids – including RPBs – in any subsequent primary bid round. The bidder remains able to make supplementary bids.

81. Preventing further primary bids from bidders with zero eligibility has a significant advantage in terms of practical management of the auction. If a bidder with zero eligibility remains able to make RPBs, then it is necessary to provide for extensions to a round in cases where such a bidder was able to make a RPB, but failed to do so by the scheduled end of the round. However, this could result in unnecessary extensions of the primary bid rounds and potential practical problems in determining whether such a bidder did or did not want to (or was able to) exercise a right to make a RPB. This would create unnecessary delays, for example, in the event that a bidder had entirely exited the auction, not wanting to make any further bids and not logging in to the auction system.

82. This simplification does not limit the bids that a bidder may make, but rather acts as a requirement that a bidder makes those bids prior to reducing its eligibility to zero. Therefore, this change affects solely *when* bids need to be made, not *what* bids can be made (in terms of the package and bid amount).

2.4 Implications of the final price cap

83. The rationale for imposing the final price cap is that it mitigates the uncertainty about the package a bidder may be able to secure, provided they make sufficiently high bids. This section explores this issue in depth and demonstrates how the interaction of the final price cap with the activity rules affects the strategies available to bidders.

84. This issue was discussed in Section 3 of Annex 8 of the Draft Information Memorandum. In particular, this provided some analysis of the ability of bidders to secure their final primary package. However, as helpfully pointed out by one respondent, this analysis does not encompass the case in which the final primary bid made is a relaxed primary bid. We rectify this oversight and provide a complete analysis of the situation below.

85. Assume that we have a situation in which each bidder was bidding on some final primary package when the primary rounds closed. This could be a relaxed primary bid or a regular primary bid. Consider the following strategy adopted by some particular bidder in the supplementary bids round:

a) the bidder raises its bid for its final primary package by the value of any unallocated lots in the final primary round, plus an arbitrarily small amount;

b) the bidder may, or may not, increase its bid for other packages (including possibly making bids for new packages that have not been subject to primary bids).

Under these conditions, regardless of the bidding strategy adopted by other bidders (which must conform to the final price cap, but is otherwise entirely unrestricted for this argument to hold), the bidder in question must win **either**

c) its final primary package; **or**

d) some other package for which it has made a bid *strictly exceeding* the price of that package in the final primary round.

86. This result is proved formally in Annex C. It has the following immediate implication. If a bidder does not increase any of its primary bids *other than its final primary package*, but increases its bid for its final primary package in accordance with the strategy above, then it will win its final primary package.

87. In the case that a bidder's final primary bid is a relaxed primary bid, then it follows that the bidder might not be able to make a higher supplementary bid for this package without having to increase its bid for one or more constraining packages. Therefore, there is the potential that even if the bidder raises its bid for its final primary package in line with the strategy above, the bidder may win the constraining package. However:

a) Providing the bidder does not increase the price of any other packages, it is not possible to win any other package than the final primary package or the constraining package(s) whose prices were increased;

b) It is only possible to win a constraining package other than the final primary package if the price of this package *exceeds* its price in the final primary round.

88. Therefore, it is still the case that the final price cap provides a high degree of certainty for a bidder who is prepared to raise its bid sufficiently. In particular, if a bidder wished to win some package *X*, provided it maintains eligibility to bid for this package until the end of the auction, it will be able to make a regular (i.e. not relaxed) primary bid for this package in the final primary round. It can then increase its bid for just this package (and no other package) in the supplementary bids round.

89. In the case that a bidder has dropped eligibility to bid for package *X*, then it can only make a relaxed primary bid subsequently if relative price movements allow. Therefore, it is reasonable to assume that this package was not a key priority for that bidder. In any case, the bidder is able to make a relaxed primary bid as its final primary bid for this package and then adopt the strategy of increasing its bid for package *X* and the chain of constraining packages on *X* in the supplementary bid, guaranteeing that it receives either *X* or one of these constraining packages. This is reasonable as the bidder has already indicated it is willing to accept such packages as alternatives to *X* through its prior reductions in eligibility.

90. For clarity, we would point out that although the situation with regard to the number of unallocated lots will be transparent to bidders at the end of the primary rounds – permitting strategies of the type discussed above – ComReg maintains the right to make a deposit call after the supplementary bids round. In the event that a bidder failed to meet its deposit obligations, it is possible that its bids could be excluded from the auction, affecting the number of unallocated lots and the effectiveness of strategies such as those discussed above. This means that it is prudent for bidders to submit supplementary bids that reflect their valuations even in the case that there are no unallocated lots at the end of primary bid rounds.

2.5 Reponses to the Draft Information Memorandum

2.5.1 Respondents' views

91. In the previous section, we have described a number of small refinements to the activity rules relative to the Draft IM. In light of these refinements, we now turn to the specific issues raised by interested parties in their responses to the Draft IM and in subsequent letters to ComReg.

92. Three respondents (Vodafone, Telefonica and eircom Group) made specific comments on the proposed activity rules, while one respondent (H3GI) provided a late submission providing comment on the issues raised by other respondents to the Draft IM. Further, in its submission, eircom Group included a report prepared on its behalf by Power Auctions on the new activity rules. As this considers a number of detailed technical matters, we address this report separately in Section 2.7 below. Overall, respondents' views were mixed; some respondents supported certain aspects of the proposals, some were opposed

to the new changes, and some requested amendments or further clarification of the new activity rules.

93. In its response to the Draft IM, Vodafone expressed its concerns surrounding the "increasing complexity" of the auction with its "strange new activity rules". Vodafone noted that these were "in addition to already strange eligibility rules, in which a bidder has two separate eligibility levels for the different time-slices." Vodafone considered that previous CCAs have had much simpler activity rules, and given that these new rules have not been used in any "serious real-world auction" the impact or risk of unintended consequences is not known.[11] It considered that bidders may struggle to cope with the implications of RPBs, asserting that there is a serious risk that bidders will tie themselves in knots with unwanted constraints and become unable to express their preferences properly, leading to an outcome which is very inefficient. In addition, in a letter to ComReg dated 11 April 2012 Vodafone commented that removing the proposal to allow relaxed primary bids could reduce the complexity of the auction process. Vodafone noted that, "*the inclusion of the feature to allow relaxed primary bids has further increased complexity but has not been adequately justified by ComReg.*"

94. Vodafone stated that, in its opinion, part of the motivation of the new rules is to make the CCA more like an SMRA, and commented that if ComReg wants to produce the results of an SMRA, then they could do so by just running an SMRA.[12] In addition to these comments, Vodafone provided a list of questions seeking a confirmation of its understanding of specific elements of the proposed activity rules.

95. Telefonica also raised concerns regarding the additional complexity created by the new activity rules. In its response to the Draft IM, Telefonica commented that while it believes it understands the reason for introducing these new activity rules, they are not aware of such rules being tested or used elsewhere. They considered that ComReg's auction is already very complex and difficult to "digest". Given what it suggested was a relatively short period of consultation given to evaluate the impact of these changes, Telefonica stated its right to comment further on this matter in subsequent documents[13].

96. Further, Telefonica considered that the proposals put forward in the Draft IM put a "*huge burden*" on bidders to interpret implications of the rule changes. More generally, it considered that the complexity of the process could introduce asymmetries between bidders, an effect that would be inconsistent with ComReg's goal of promoting fair competition and efficient outcomes,[14] and that the complexity of the auction could lead to erroneous outcomes more generally. Telefonica noted that "[m]*ost of the increase in complexity*

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[11] See page 11 of Vodafone's response to the draft Information Memorandum

[12] See page 12 of Vodafone's response to the draft Information Memorandum

[13] See page 10 of Telefonica's Response to the draft Information Memorandum

[14] See page 20 of Telefonica's Response to the draft Information Memorandum

appears to stem directly from the multiple time slice and party specific lots approach"[15] and considered that if ComReg switched to a single time slice approach the proposed changes to the activity rules may still be considered and would be much easier to interpret. Telefonica also provided a list of questions seeking a confirmation of its understanding of specific elements of the proposed activity rules.

97. eircom Group agreed both with the proposal for a final price cap and with the proposal to allow eligibility-point exceptions on the basis that they are consistent with revealed preference constraints and considered such an approach to be appropriate in the primary bid rounds so as to allow bidders to bid on their most profitable package in each of the primary bid rounds.[16]

98. However, in recommending that ComReg implement similar rules to those proposed in the Draft IM, eircom considered that modifications were required to address the following points:

- The example provided in Annex 7 of the Draft IM ignores the bidder's activity points in the relaxed primary bid round and instead carries forward the bidder's eligibility points from the previous round. Eircom asserts that this treatment of activity and eligibility points is completely inconsistent with eligibility point-based activity rules implemented in previous spectrum auctions (both SMRAs and CCAs).
- The proposed introduction of binding supplementary bids described in the Draft IM and illustrated in the example provided in Annex 7 is arbitrary and incoherent as stated. Eircom considers that it should be substantially modified or withdrawn in the final Information Memorandum.
- In its submission, Eircom stated that Section 3 of Annex 8 of the Draft IM does not appear to account for situations where the bidder's final primary bid is a relaxed primary bid. It stated that it is concerned that a bidder who places a relaxed primary bid in the final primary bid round and is subject to a relative cap in the supplementary bids round may not be able to place bids that guarantee it will win its final primary package. It noted that it is important that this point be fully addressed in the final Information Memorandum

99. In support of their comments on the example provided in Annex 7 of the Draft IM, eircom Group submitted a report prepared on its behalf by Power Auctions LLP considering the proposals put forward in ComReg document 11/75.

100. Power Auctions were quite supportive of the basic changes proposed to the activity rules relative to the standard CCA, and in their submission made some points suggesting minor modifications or improvements. It supported the implementation of the final price cap. Its main criticism related to the treatment of binding supplementary bids. It asserted in its submission that

[15] See page 21 of Telefonica's response to the draft Information Memorandum

[16] See page 8 of eircom Group's response to the draft Information Memorandum

binding supplementary bids (now termed chain bids) impose a penalty on bidders making a relaxed primary bid even though the bid is derived from consistent bidding with a fixed set of valuations, stating that "*[u]nless ComReg can both communicate a valid rationale for Binding Supplementary Bids and devise a consistent and coherent way to implement the concept, ComReg would do better to substantially modify or withdraw this part of the proposal in the final Information Memorandum.*"

101. Power Auctions asserts that eligibility in round N+1 should be the lower of eligibility and activity in round N.

102. It presents alternative proposals implementing two of their recommendations:

- A bidder can make a relaxed primary bid if this satisfies revealed preference with every prior round's bid in which eligibility was reduced; and
- Supplementary bids larger than the final primary package (in terms of eligibility points) should be capped relative to all bids in eligibility point-reducing rounds

103. In a letter to ComReg dated 13 April 2012, and in response to the points raised by eircom and Power Auctions, H3GI provided comment. In some cases, H3GI was in agreement with Power Auctions and in other cases, H3GI supported ComReg's proposals, seeing fault in the alternatives proposed by Power Auctions.

104. In relation to the treatment of eligibility points following a relaxed primary bid, H3GI stated its agreement with Power Auctions. Further, H3GI noted that, *"[t]he proposed eligibility rule may allow for some strange or undesired bidding behaviour. For example, a bidder may completely abandon one time slice for a couple of rounds by submitting Relaxed Primary Bids for a larger package that only contains one time slice and then reappear in the other time slice at a later point. Such 'sniping behaviour' cannot be ruled out as unlikely given the value difference between time slice 1 and 2."*

105. However, in relation to Power Auctions' comments on 'binding supplementary bids' (now termed 'chain bids'), H3GI did not agree with Power Auctions' comments that such bids applied as a penalty for bidders. H3GI noted that, "*[s]imply removing the Binding Supplementary Bids rule implies that bids can be made for much larger packages without any requirement of consistency with 'revealed preferences' for all the other rounds in which the bidder dropped eligibility*"

106. H3GI also stated that in the interests of simplicity, it would support the use of a Final Price Cap instead of Power Auctions' proposed 'Simplified RP Cap'.

107. Finally, in expressing its understanding of the activity rules suggested by ComReg, and those proposed by Power Auctions they submitted, "*H3GI's perception is that ComReg's proposed rule requires that a bidder bidding for a larger package also submits bids for other larger packages if this is prescribed by her 'revealed preferences' while on the contrary, Power Auctions' alternative recommendation only allows a bidder to bid for a larger package if it is in accordance with her 'revealed preferences'. In other words, ComReg's rule allows a bidder to regret decreasing eligibility if it agrees to submit the Supplementary*

Binding Bids that ensure consistency with 'revealed preferences' while Power Auctions' rule prohibits a bid for a larger package if it is not consistent with 'revealed preference'."

108. Based on its understanding, as provided above H3GI stated its preference for the Power Auctions rule over that proposed by ComReg on the basis that the aim should be to incentivise bidders to bid consistently rather than forcing them to make bids on packages that are not their preferred packages at the current prices.

2.6 DotEcon commentary

109. Specific clarifying questions posed by Telefonica and Vodafone in their submissions in response to the Draft IM are reproduced in subsection 2.8 of this report with responses provided to each question.

110. In relation to the point raised by Vodafone and Telefonica relating to the auction having become overly complex as a result of the more detailed activity rules, we note the following:

- The main body of the activity rules proposed for this auction are unchanged relative to early auction proposals for a CCA.
- The development of the current set of auction activity rules has been driven by past responses to the consultation process, with modification to standard rules and addition of further rules in response to issues raised by existing GSM licensees, mainly, the uncertainty present in the award process owing to the possibility of one or more bidder's winning less than what they bid on in the last primary bid round despite making bids in the primary bid rounds and the supplementary bids round they believed to be sufficient to win them this amount of spectrum.
- This auction has been intentionally designed to reflect the specific characteristics of the market and the circumstances in which the auction will take place.
- The activity rules relating to RPBs relate only to the distinct circumstance where a bidder bids on a package of lots, switches to a smaller package and relative prices change such that a bid for a larger package that the bidder would wish to make in the supplementary bids round becomes possible to submit at round prices in the primary bid rounds. These circumstances may not arise at all and, if they do arise, will likely arise for a small number of bidders in a small number of rounds. Therefore, this additional decision-making requirement is not that onerous.
- In the case where a bidder has the option to make a relaxed primary bid, the EAS would assist bidders in managing any additional complexity related to identifying the associated chain bids. The EAS will provide the possibility for bidders to specify a list of packages, for which the EAS would then identify whether an RPB for any of these packages is possible. Upon 'checking' an RPB bid, the EAS will inform the bidder what, if any, chain bids the bidder would have to submit alongside the RPB. The bidder would then have the opportunity to approve this step or revert to the bid form to enter a different primary bid.

- There is still a clear and simple strategy available to bidders when bidding in the auction – work out valuations for each alternative package for which it has a surplus and bid in a straightforward manner based on these valuations and the relative prices of different packages. With this strategy a bidder will be content to stay within the constraints that have been created as a result of previous bids, even if it has to make an RPB and associated chain bids, as they will reflect the bidder's relative valuations. Therefore, bid decisions should not be complex if bidders bid straightforwardly.
- While the advanced rules proposed for the Irish auction are novel, similar rules have been proposed for the multi-band auction in the UK (albeit for different reasons). Separately, a similar set of activity rules has been developed independently of ComReg's auction advisors and have been proposed for use in upcoming spectrum auctions in Australia and Canada.

111. Given these factors, we still consider that the activity rules proposed for the Irish multi-band auction are reasonable from a complexity perspective, appropriate to ensure the achievement of ComReg's objectives for the award and necessary to meet the fitness-for-purpose criterion of a robust auction design.

112. Turning then to Telefonica's alternative proposals to reduce complexity by reducing the need for changes in activity rules, removing the two time-slice proposal and removing the early liberalisation option, we note that these proposals have been evaluated in ComReg documents 12/25 and 12/24.

113. In response to:

- Vodafone's assertion that bidders may struggle to cope with the implications of relaxed primary bids, and that there is a serious risk that bidders will tie themselves in knots with unwanted constraints and become unable to express their preferences properly; and
- Telefonica's statement that these rules put a "*huge burden*" on bidders to interpret implications of the rule changes, and the asymmetry that would be created between bidders as a result of these rules;

we note that:

- During a primary bid round, if a bidder were to be eligible to make a relaxed primary bid on a package of interest, it would be made aware of this by the electronic auction system. If the bidder then entered a relaxed primary bid on the bid form (where this step is non-committal), the electronic auction system would present to the bidder all of the chain bids (if any) it would be required to make at the same time as the relaxed primary bid, at the minimum level required in order to preserve its relative preferences as expressed in its previous bids.
- The electronic auction system would provide a dynamically updated supplementary bids editor. At any time during the primary bid rounds, a bidder would be able to view through this supplementary bids editor the existing constraints on further bids on packages bid on during the auction so far. It would be able to enter packages into the supplementary bids editor and the caps relevant to that package would be generated. The

supplementary bids editor would be updated to reflect bids submitted in the primary bid rounds once the result of rounds are released.

114. Given this information provision, and in combination with:

- the limited circumstances that are required for relaxed primary bids to be possible, and
- the existence of a facility for a bidder to adopt a straightforward bid strategy in order to express its relative preferences,

we consider that bidders should be able to avoid finding themselves constrained in a way that prevents them from expressing their relative demand for alternative packages of lots.

115. Vodafone and Telefonica both considered that the 'complexity' of the process could lead to an inefficient outcome. Vodafone's position remarking that by being unable to express its preferences properly could lead to an outcome which is 'very inefficient' would seem to be unfounded as the rules are intended to be consistent with a clear strategy for bidders in the auction. As noted above, there is a simple straightforward bidding strategy in which the bidder works out valuations for each package, and then make bids based on the package offering the largest surplus given the relative prices of different packages. With this strategy, the bidder can be sure to stay within the constraints that have been created as a result of previous bids, even if it has to make an RPB and associated chain bids, as they will reflect the bidder's relative valuations.

116. In relation to Telefonica's comments that the 'complexity' could introduce asymmetries between bidders that would be inconsistent with ComReg's goal of promoting an efficient outcome, we consider that this concern is addressed by our above comments regarding the help provided by the EAS, and the ease with which bidders can keep track of the required bids.

117. In addition, and as noted in subsection 2.1.3 above, these activity rules have been designed to promote an efficient auction outcome by promoting price discovery, minimising incentives for strategic bidding, allowing reasonable flexibility for bidders and providing for the ability of bidders requiring spectrum for business continuity a high degree of certainty that such spectrum can be secured provided that sufficiently high bids and made. As such, we do not consider that these new rules will result in an inefficient auction outcome.

118. In relation to eircom's points on the activity rules:

- We agree that these activity rules break from the conventional use of eligibility points-based activity rules in previous auctions. However, as noted above, relaxed primary bids are not arbitrary but represent an exception to the eligibility points constraint on bidding in specific circumstances but meet a more flexible criterion, that is, harmony with relative preferences as expressed in previous rounds.
- The calculation of chain bids is not arbitrary, and we consider that the example included in sub-section 2.2.2 above makes clear a number of features of the proposed activity rules, including how the value of chain bids, where necessary, are calculated and the effect of the final primary package being a relaxed primary bid.

119. Considering then the report by Power Auctions submitted by eircom:

- Regarding Power Auctions' claim that chain bids impose a penalty on bidders making a relaxed primary bid even though the bid is derived with a fixed set of valuations, we refer the reader to the example set out in sub-section 2.2.2 above. This example shows how a bidder with a fixed set of valuations can bid in line with these valuations when submitting a relaxed primary bid and the associated chain bids that the relaxed primary bid would necessitate. Therefore, no such "penalties" apply to bidders who bid straightforwardly according to valuations.
- Regarding Power Auctions' recommendation regarding the calculation of eligibility, we agree that this is a useful step. Whilst it does introduce some minor complications (which Power Auctions did not consider), this is manageable and outweighed by the benefit of discouraging misstatement of demand if a bidder makes an RPB.
- Power Auctions' alternative proposal implementing its recommendations relating to how caps on relaxed primary bids and supplementary bids would be implemented is discussed in Section 2.7. Whilst this approach is simpler to implement, it is more restrictive on bidders' decisions. We consider that the novel features of the auction (i.e. RPBs) should, as far as possible, be optional for bidders and provide additional flexibility, rather than there being a necessity to use them in order to implement a reasonable bid strategy. Accordingly, we do not recommend the introduction of the additional restrictions proposed by Power Auctions.

120. Regarding H3GI's comments in relation to the treatment of eligibility points following a relaxed primary bid, we note that this issue is discussed further in subsection 2.3.1. Further, we believe that the full discussion of the Power Auctions' proposed rules provided below may provide further clarity on H3GI's point in relation to the differences between the two sets of activity rules and why we believe the rules proposed by DotEcon are appropriate for the proposed award.

2.7 Response to the report prepared by Power Auctions

121. Power Auctions prepared a report where they raise their concerns about the activity rules proposed by ComReg in the IM, and put forward a proposal to use an alternative activity rule designed by Ausubel and Cramton.

122. First, we note that the motivation for the alternative suggestions by Power Auctions is similar to that underpinning the current rules proposed by ComReg. The similarities between both approaches are encouraging and provide further reassurance that the overall approach is reasonable.

123. Power Auctions make some valid observations in relation to the rules for adjusting bidder eligibility during the primary rounds, and in relation to the implications of the "knock-out" bid strategy for the supplementary bids round for a bidder whose final primary bid is a relaxed primary bid. These observations have been incorporated into the current proposals by ComReg.

124. However, we do not consider that the alternative approach proposed by Power Auctions is preferable overall because:

a) we believe that the approach put forward by Power Auctions imposes tighter constraints on bidders during the primary bid rounds with regard to updating their valuations during the open stage;

b) the more restrictive nature of the proposed rules also means that reductions in eligibility may tighten the caps on packages that exceed the bidder's eligibility, potentially limiting the ability of bidders to submit relaxed primary bids in subsequent rounds and adding complexity to bid submission decisions in the primary rounds;

c) at the same time, the activity rules proposed for the supplementary bid round would appear to either

- leave scope for bidders to avoid some of the constraints that result from reductions in eligibility during the primary rounds, which in turn could allow bidders to bid strategically to increase rivals costs and to omit bids for constraining packages that might otherwise be selected as winning bids in an efficient allocation; or
- simply defer the consequences of submitting relaxed bids to the supplementary round, which could lead to bidders failing to anticipate the consequences of their actions, and to applying relative caps in an inconsistent manner depending on which packages bidders submits supplementary bids for – this might distort the incentives for bidders to bid for a comprehensive range of options in the supplementary bids round to reflect their valuations.

125. Therefore, although we agree that the rules proposed by Power Auctions are somewhat simpler in terms of the calculations required for assessing whether relaxed primary bids can be submitted (which is purely a software implementation issue), they would appear to add complexity for bidders in terms of making decisions. Similarly, it is unclear that the approach suggested by Power Auctions is simpler to implement in relation to the supplementary bids round.

126. Below we address the issues raised by Power Auctions in their report. We then follow with a discussion of the features we consider problematic in their proposed approach and comment on their assessment of the advantages attributed to their proposal.

2.7.1 Issues raised by Power Auctions in relation to the activity rules proposed by ComReg

Adjustments to bidder eligibility following a relaxed primary bid

127. Power Auctions identify a possible improvement for the activity rules related to the multi-dimensional nature of eligibility in the auction and how the eligibility of a bidder is adjusted following the submission of a relaxed primary bid. In the previous version of the activity rules presented by ComReg in the Draft IM, the eligibility of a bidder who submits a relaxed primary bid would be unchanged for the following round. However, this could allow a bidder to submit a bid that is relaxed in relation to one dimension of eligibility (one time

slice) and contract demand in the other eligibility dimension without consequences.

128. This is undesirable, as it would provide bidders with an opportunity to hide demand in one eligibility dimension in certain circumstances. Power Auctions suggest using a minimum rule for adjusting bidder eligibility *even* when a bidder submits a relaxed primary bid. According to this minimum rule, the eligibility of a bidder in each dimension is always calculated as the minimum of (a) the bidder's eligibility in that dimension at the start of the round; and (b) the eligibility in that dimension associated with the primary bid submitted by the bidder in the round.

129. We agree that this is an improvement and we have incorporated this into the auction rules. This modification only affects situations where a bidder submits a relaxed primary bid for a package with eligibility that exceeds the eligibility of the bidder in one dimension (and is therefore relaxed in that dimension) but is lower in the other dimension (which triggers a reduction in eligibility in this second dimension). The loss of eligibility that results from such a bid will result in an additional revealed preference constraint, which will impose a relative cap on packages with eligibility that exceeds the new eligibility of the bidder. An example of this is provided below.

130. The modified activity rule avoids problems where a bidder could hide demand in relation to one eligibility dimension when submitting a relaxed bid in the other dimension, thus improving incentives for truthful bidding (see example below). The modified rule also implies that two packages may be mutually constraining – however, this is consistent with revealed preference and does not impose any unmanageable constraints on bidders.

131. Power Auctions also make a remark that the previous rules would only be reasonable if Time Slice 1 and Time Slice 2 were considered substitutes, but that this would in turn require having a single eligibility dimension. For the avoidance of doubt, Time Slice 1 and Time Slice 2 are ***not*** considered to be substitutes.

Example – hiding demand:

132. Return to our previous example in Section 2.3.1. At the beginning of round n, the bidder has eligibility (6,6) and is faced with the following prices and surpluses (given its valuations for the available packages):

Table 7: Round prices and bidder surplus in round n

Package	Eligibility associated with lot	Round Price (€m)	Bidder valuation (€m)	Surplus (€m)
A	(6,4)	11	15	4
B	(4,6)	17	20	3

133. At these round prices the bidder's most preferred package is package A. The bidder will place a bid for package A. By placing this bid, the bidders eligibility is reduced, and its eligibility heading into round n+1 will be (6,4).

134. However, in round n+1, the prices of package A and B have changed such that, given its valuations, the bidders most preferred package becomes package B.

Table 8: Round prices and bidder surplus in round n+1

Package	Eligibility associated with lot	Round Price (€m)	Bidder valuation (€m)	Surplus (€m)
A	(6,4)	13	15	2
B	(4,6)	17	20	3

135. Package B has associated eligibility in the second time slice that exceeds the bidder's eligibility in the round. However, the bidder may be able to place a RPB for package B, if doing so is in accordance with the revealed preference in round n.

136. As was shown in the first example above, for a relaxed primary bid of €17m for package B to be consistent with the relative cap, the bidder would need to submit a bid for A of at least €11m. Given that the bidder's highest bid so far on A is currently €11m (its bid in round n), no chain bid is required.

137. However, suppose now that the bidder's eligibility was not reduced in accordance with the 'minimum rule' for eligibility, but remained at (6,4).

138. The bidder might be able to submit RPBs in further primary bid rounds for an alternative package that includes the same lots as package B in time slice 2, but fewer lots in time slice 1 without this requiring that the bidder loses eligibility or giving rise to additional relative caps. This would allow the bidder to switch back to package A later on, by simply using its eligibility and without the need for satisfying any relative caps on package A.

139. This behaviour would not be consistent with revealed preference. Furthermore, because this bidder might be able to withhold its demand for time slice 1 for a number of rounds, this could undermine the value of price discovery information revealed during the primary bid rounds, as other bidders may account for this reduction in demand in time slice 1 in their decision making only to find that demand increases again in later rounds in a way that is inconsistent with the price and demand information observed in previous rounds.

Concerns in relation to chain bids

140. Power Auctions express their view that chain bids (referred to as "binding supplementary bids" in the previous version of the rules) are applied inconsistently and incoherently. They present two objections:

a) in the first place, they express concern that whether chain bids are required depends on the bids submitted in the previous rounds.

b) in addition, they express a view that chain bids impose a "penalty" even if a bidder were to bid consistently according to its valuations.

Concern that whether chain bids are required depends on the bids submitted in the previous rounds.

141. In relation to their first objection, they refer to the example provided in Annex 7 of the IM.

142. Their first remark is that the requirement for a chain bid depends on whether there are rounds in which the bidder reduces eligibility – a bidder might still be able to place a regular primary bid instead of a RPB if prices jumped forward and some rounds were skipped, in which case the chain bids that would have been associated with the RPB would not be required. This remark is obvious and misleading. It is obvious, and intentional, that relative caps that arise from revealed preferences in a particular round in which the bidder reduced eligibility would not apply in the event that the primary bid rounds in question were skipped. This is because revealed preference constraints may only arise when there is a situation where the bidder is asked to reveal their choice.[17]

143. Their second remark is that when a bid results in a reduction of eligibility, this should result in a revealed preference constraint regardless of whether the bid is a relaxed primary bid or not. This is a valid observation. However, this problem is resolved with the adoption of the new rule for eligibility adjustments during the primary bid rounds. Under the modified activity rules, a relaxed primary bid may also result in a reduction of eligibility and the corresponding constraints from revealed preference. This is demonstrated below by reworking the example provided in Annex 7 of the Draft IM.

Example – modified example from Annex 7 of the draft IM:

144. Returning to the example presented in Annex 7 of the draft IM, we update the example taking account of the modified rule for eligibility adjustments during primary rounds. This updated example presents how a relaxed primary bid may also result in a reduction in eligibility and how this will result in corresponding constraints from revealed preference.

145. Recall that the example presented at Annex 7 of the draft IM only considered bids for packages consisting of Lots in two categories, 800/1 and 800/2. The bidder had the following valuations for different packages of lots across these lot categories:

[17] In fact, in the extreme case where all primary rounds were skipped, then no relative caps would apply at all and bidders would be able to submit any set of supplementary bids (this would in essence be a sealed bid combinatorial auction). However, this is irrelevant. The revealed preference approach must ensure that when a bidder makes a choice that results in a revealed preference constraint, then later decisions are required to be consistent with this. The key is that in order to have a "revealed" preference, the bidder must have had an opportunity to make a choice.

Table 9: Packages of lots and corresponding valuations

Package name	Number of 800/1 Lots	Number of 800/2 Lots	Assumed valuation	Activity of package
1	2	1	€64m	(4,2)
2	1	3	€88m	(2,6)
3	2	3	€92m	(4,6)

146. The following (updated) table provides an overview of the bids that the bidder makes across the primary bid rounds given the round prices of the two categories of lots. We maintain the assumption that the bidder will in each round bid on its most preferred package being the package with the highest surplus amongst those it is able to bid on. In each round, the package bid for is highlighted in blue.

Table 10: Bids submitted in the primary bid rounds

Round	Round Price of 800/1 Lots (€m)	Round Price of 800/2 Lots (€m)	Package 1		Package 2		Package 3		Eligibility (First Time Slice, Second Time Slice)	Activity (First Time Slice, Second Time Slice)	Type of Bid
			Price (€m)	Payoff (€m)	Price (€m)	Payoff (€m)	Price (€m)	Payoff (€m)			
1	3.34	8.48	15.16	48.84	28.78	59.22	32.12	59.88	(4,6)	(4,6)	Standard
2	5	9	19	45	32	56	37	55	(4,6)	(2,6)	Standard
3	10	10	30	34	40	48	50	42	(2,6)	(2,6)	Standard
4	14	20	48	16	74	14	88	4	(2,6)	(4,2)	Relaxed
5	19	21	59	5	82	6	101	-9	(2,2)	(2,6)	Relaxed
6	20	23	63	1	89	-1	109	-17	(2,2)	(4,2)	Relaxed
7	25	25	75	-11	100	-12	125	-33	(2,2)	(0,0)	Zero Bid

147. As before, in round 1, the bidder bids for package 3, which has an activity of (4,6). Therefore, the bidder maintains its eligibility to bid in both time slices in round 2.

148. In round 2, the bidder bids for package 2, which has activity (2,6). Therefore the bidder drops eligibility in the first time slice, but not the second.

149. In round 3, the bidder bids again for package 2, so maintains its eligibility in both time slices.

150. In round 4 the bidder's preferred package (given the round prices) is package 1. As the bidder does not have sufficient eligibility to bid on this package, it

can only make a relaxed primary bid for the package. Given round prices, it is possible to make such a bid, as explained below.

151. The last time the bidder was eligible to bid for package 1 was in round 2. However, in round 2, the bidder bid on package 2. It may need to raise its bid for package 2.

152. The amount of a chain bid for package 2 is determined in the following way:

a) The bid amount at current round prices for package 1 in round 4 is €48m;

b) The difference in prices between packages 1 and 2 in the constraining round (round 2) is €19m - €32m = - €13m. Therefore, the bid for package 1 cannot exceed the bid for package 2 minus €13m.

c) Given the price of package 1 in this round, and the relative cap on package 1 resulting from the reduction in eligibility in round 2, the minimum bid for package 2 that would allow the bidder to submit the RPB for package 1 is €48m + €13m = €61m.

d) The required chain bid is higher than the bidder's highest bid for package 2 so far of €40m (made in round 3). Thus, the bidder will be required to submit a chain bid of €61m for package 2 alongside its RPB for package 1 of €48m.

153. The bidder is currently eligible to bid for package 2, so no further chain bids are needed.

154. Finally, for a bidder to be able to submit a relaxed primary bid, it is necessary that none of the associated chain bids exceed the price of the package at current round prices. At current round prices, package 2 would cost €74m. Therefore, the RPB for package 1 at €48m is permitted with an associated Chain Bid for package 2 at €61m.

155. However, based on the modified activity rules regarding the treatment of eligibility, the eligibility carried into round 5 is (2,2). This is because, for a bidder who makes a RPB, its eligibility for the following round is set equal to the *smaller* of: its current eligibility for the time slice and its bidding activity (measured in eligibility points) in that time slice in the current round. While the RPB for package 1 had an associated activity greater than the bidder's eligibility in the first time slice, the associated activity was lower than the bidder's eligibility in the second time slice. Thus the smaller of these is taken through to the next round. In this example, the eligibility carried forward is (2,2).

156. In round 5, the bidder's most preferred package is package 2. However, the bidder does not have sufficient eligibility to bid on this package. Therefore, a bid for package 2 would be a RPB at the current round price of €82m. Chain bids may be required for the bidder to submit this RPB.

157. The last round in which the bidder was eligible to bid for package 2 was in round 4. However, in round 4, the bidder bid on package 1. It may be necessary for the bidder to raise its bid on package 1.

158. The amount of a chain bid for package 1 is determined as follows:

a) The bid amount at current round prices for package 2 is €82m;

b) The difference in prices between these packages in the constraining round (round 4), i.e. €74m - €48m = €26m. Therefore, the bid for package 2 cannot exceed the bid for package 1 plus €26m.

c) Given the price of package 2 in this round, and the relative cap on package 2 resulting from the reduction in eligibility in round 4, the minimum bid for package 1 that would allow the bidder to submit the RPB for package 2 is €82m – €26m = €56m.

d) The required chain bid is higher than the bidder's highest bid for package 1 so far of €48m (made in round 4). Thus, the bidder will be required to submit a chain bid of €56m for package 1 alongside its RPB for package 2 of €82m.

159. The bidder is not currently eligible to bid for package 1, so a further chain bid may be required. As described above, in order to be able to make a chain bid for package 1 of €56m in this round, the bidder's bid on package 2 must be at least €56m + €13m = €69m. However, the RPB that the bidder submits for package 2 in round 5 exceeds this level and thus the relative cap is satisfied therefore no further chain bids are required this round.

160. In round 6, the bidder's most preferred package is package 1. However, the bidder does not have sufficient eligibility to bid on this package, so a bid for package 1 would be a RPB at the current round price of €63m. Chain bids may be required for the bidder to submit this RPB.

161. The last round in which the bidder was eligible to bid for package 1 was in round 2. However, in round 2, the bidder bid on package 2. It may be necessary for the bidder to raise its bid on package 2.

162. As described above, in order to make a RPB for package 1 in round 6, the bidder may also have to submit a chain bid for package 2 at a bid amount of €63m + €13m = €76m. Given that the bidder's current highest bid on package 2 is €82m (placed in round 5) no further chain bids are required this round.

163. In round 7, prices have increased to a level at which it is not profitable to Bid for any package given the bidder's valuations. The bidder submits a zero bid. If further rounds were run, then the bidder's eligibility would be zero and it would not be allowed to submit any further primary round bids.

Whether chain bids impose a "penalty"

164. In relation to their second objection, we disagree with Power Auctions in their view that chain bids are a "penalty". Any bidder should be content with (rather than antagonised by) the required chain bids provided that the bidder had bid according to its valuation in previous rounds. This is because the relative caps that are applied only reflect revealed preferences and therefore reflect the bidder's preferences if the bidder has bid truthfully.

165. In addition, there are also benefits from requiring chain bids as soon as the bidder submits a relaxed primary bid:

a) First, it ensures consistency with the revealed preference approach and thus provides incentives to bid according to valuations rather than strategically. This would preclude a bidder from bidding on smaller packages simply to increase their cost and without risk of winning them. Without the requirement to submit chain bids, a bidder could avoid raising the bids for some constraining packages by not submitting supplementary bids for packages that would require updating the bid amounts on such constraining packages.

b) Second, not requiring chain bids during the primary rounds could result in situations where bidders did not anticipate the consequences of submitting a relaxed primary bid, and where the number of constraints for the supplementary bids round could be difficult to manage. Essentially, a bidder who ended the primary rounds with a relaxed primary bid and wished to increase its bid on its final primary package to maximise its chances of winning spectrum in the auction would then be required to submit all chain bids in the supplementary round. Therefore, not requiring chain bids at the moment when a relaxed primary bid is submitted would only defer the chain bids to the supplementary bids round. Our proposed approach provides more clarity and is less likely to result in bidders failing to anticipate the consequences of their actions.

Example: Allowing for relaxed primary bids without requiring chain bids

166. Suppose a bidder has valuations for two packages, A and B with valuations of 20 and 30 respectively. In round n, the bidder has an eligibility of (4,6) and knows the following information:

Table 11: Round prices and bidder surplus in round n

Package	Eligibility associated with package	Round Price (€m)	Bidder Valuation (€m)	Surplus (€m)
A	(2,6)	10	20	10
B	(4,6)	22	30	8

167. Following a straightforward bidding strategy, that is bidding for the package that yields the greatest surplus, in round n, this bidder will place a bid for package A at round prices. By placing this bid, the bidder's eligibility heading into the following round will be reduced to (2,6).

168. Now, suppose that prices evolve in future rounds such that in some round n' (n'>n), prices are as follows:

Table 12: Round prices and bidder surplus in round n' (n'>n)

Package	Eligibility associated with package	Round price (€m)	Bidder Valuation (€m)	Surplus (€m)
A	(2,6)	15	20	5
B	(4,6)	24	30	6

169. At these round prices, given its valuations, the bidder's most preferred package is package B. However, package B has an associated eligibility that exceeds the bidder's current eligibility, so a bid for package B would be a RPB. The bidder can place an RPB for package B provided that doing so is in accordance with the applicable relative caps.

170. Given that the bidder was last eligible to bid for package B in round n, any bids for package B are subject to a relative cap equal to the highest bid placed for A plus the difference between the round prices for package B and A is round n (the last round the bidder was eligible to bid for package B). That is:

$$\beta(B) \le \beta(A) + p_n(B - A)$$
$$\beta(B) \le \beta(A) + (€22m - €10m)$$
$$\beta(B) \le \beta(A) + €12m$$

171. Therefore in order for a bid for B of €24m to be consistent with revealed preference and the relative cap, the bidder would need to submit a chain bid for A of at least €24m –€12m = €12m.

172. If the bidder was not required to update its previous bid for A via a chain bid, but allowed to submit a RPB at current round prices, then clearly this would be inconsistent with the bids placed so far. Without the requirement to submit chain bids, a bidder could avoid raising the bids for some constraining packages simply by not submitting any bids in the supplementary bids round for packages that would require updating the bid amounts on such constraining packages. For example, if round n' was the final primary bid round, the bidder could choose not to submit any supplementary bids and the final set of bids received from the bidder would not be consistent with the preferences it revealed in the primary bid rounds. However, this would also mean that the final set of bids used for calculating the winning outcome might not be consistent with the information about relative prices and demand revealed during the primary bids rounds.

173. The rules proposed by ComReg ensure that bidders will be required to submit any associated chain bids at the time of placing a RPB, such that all bids placed in the primary bid rounds are consistent with the relative caps that arise from revealed preference in the rounds where the bidder drops eligibility.

Power Auctions' comments about the final price cap

174. Power Auctions express their view that the final price cap applied on supplementary bids is very similar to the rule proposed by Ausubel and Cramton, and that they do not have a strong preference for the rule proposed by Ausubel and Cramton. However, they suggest that the Ausubel and

Cramton rule has greater consistency with the activity rule of the clock rounds because it includes further constraints, derived from *each* eligibility-reducing round following that in which the eligibility of the bidder fell below the eligibility of the constrained package in any of the two dimensions.

175. However, ComReg's proposals are less restrictive to bidders in two key aspects:

a) under the rules proposed by ComReg, a drop in eligibility may result in fewer constraints, and therefore is somewhat more flexible and consistent with updating valuations using information revealed during the primary rounds (we expand our discussion of this issue in paragraphs 182 to 195);

b) in addition, imposing the caps using a weak inequality allows bidders to express indifference between two packages under some circumstances where this would be consistent with reasonable valuation structures, but this would not be possible if a strict inequality were used.

176. In relation to the second point, the motivation for using strict inequality would appear to be to ensure that the bids for packages other than the final primary packages are strictly smaller than the cap. This avoids ties between the outcome in which all bidders win the lots included in their final primary package and alternative allocations. However, this conflict can be resolved without the need for tightening bidding restrictions by using tie-breaking rules that select outcomes compatible with every bidder winning all the lots they included in their final primary bid. Therefore, while any efficiency loss from the tighter restriction might be small, this would appear to be an unnecessary restriction.

177. Overall, we believe that the additional flexibility provided by the rules proposed by ComReg is beneficial to bidders and should be maintained.

Implications of chain bids on knock-out bid strategy

178. Power Auctions observe that the "knock-out" bid strategy presented in the IM does not literally apply to bidders who submit a relaxed primary bid in the final primary round. Such bidders may be required to also raise bids for relevant constraining packages when submitting a knock-out bid for their final primary package, and thus a recipe that requires that bidders do not raise any bids for package smaller than the final primary package may not always be possible.

179. The knock-out bid strategy is aimed at providing greater certainty to bidders about the bids they require in order to ensure they will win spectrum. We have included further details on the knock-out bid strategy and its implications for bidders who submit a relaxed primary bid in the final primary round in Section 2.4 above. In essence, submitting such a knock-out bid guarantees that the bidder will win either:

- its final primary package; or
- one of its constraining packages, *only* if the supplementary bid required for such package (in order for the bidder to be able to submit the knock-out bid for the final primary package) is above the price of this package in the final primary bid round.

2.7.2 Assessment of Power Auction's alternative recommendations

Activity rules proposed by Power Auctions

180. Power Auctions propose what they call a simplified version of the activity rules. The main features of their proposed rules would appear to be:

a) A reduction of eligibility imposes a revealed preference cap on all packages with eligibility exceeding the new eligibility level of the bidder. This means that additional constraints arise when a bidder drops eligibility relative to those that would arise under the rules proposed by ComReg. It also means that failure to submit a relaxed primary bid for a given package in a round in which a bidder loses eligibility could result in a tighter cap on that package, which could prevent the bidder from submitting a RPB for that package in subsequent rounds.

b) Constraints are applied with strict inequality, rather than weak inequality as under the rules proposed by ComReg.

c) The assessment of whether a bidder may submit a relaxed primary bid is done on the basis of the prices prevailing in the round, and the prices (and revealed preferences) in all previous rounds in which the bidder's eligibility were reduced. Bidders are not required to update the bid amounts for constraining packages, as the possibility of submitting a relaxed primary bid does not depend on such bid amounts, but only on round prices. Therefore, chain bids are not required during the primary bid rounds.

d) The activity rules that would apply to the supplementary bids round are somewhat unclear. However, the proposals seem to allow bidders to avoid some constraints that arise from their revealed preference caps. This would appear to allow bidders to submit relaxed primary bids while omitting the bids for constraining packages that would have been required had the bidder submitted such a bid in the supplementary bids round. Our concern is that this is likely to distort incentives to bid truthfully in at least some situations.

181. We assess these features of the proposed activity rules in turn below, including some alternative interpretations relating to the activity rules that would apply to the supplementary bids.

Impact of additional constraints from eligibility reductions

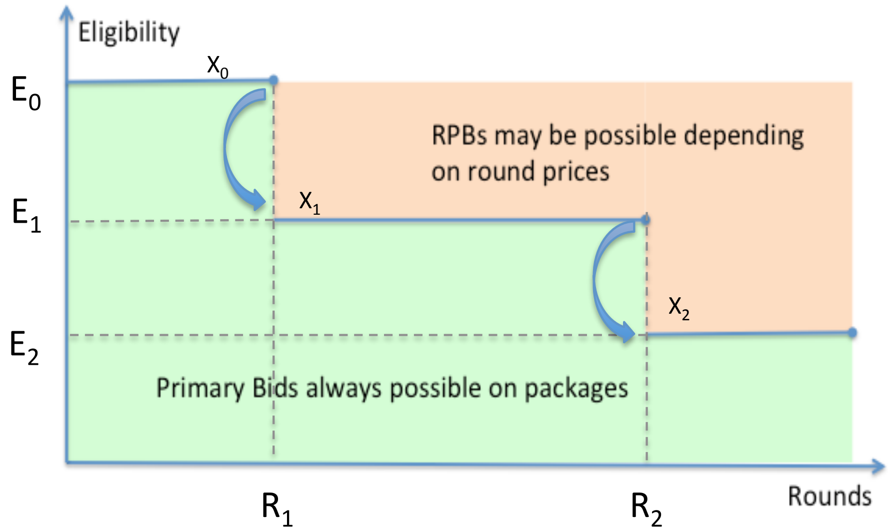
182. Note that both under the rules proposed by ComReg and those proposed by Power Auctions, subsequent eligibility reductions yield a chain of constraints that apply to packages with eligibility greater than the eligibility level to which the bidder drops to. However, the rules proposed by Power Auctions feature *additional* constraints:

a) a loss in eligibility will result in a constraint on all packages with eligibility greater than the new eligibility (in either of the two dimensions);

b) conversely, a loss in eligibility under the rules proposed by ComReg will only impose a constraint on those packages with eligibility greater than the new eligibility level but no greater than the bidder's eligibility before the most recent loss in eligibility.

183. The diagram below tracks the eligibility of a bidder across a number of rounds. Under the rules proposed by ComReg, any package Y with eligibility between E_0 and E_1 would be subject to a relative cap defined in relation to package X_1, which would be in turn subject to a relative cap defined in relation to package X_2. These relative caps would also apply under the rules proposed by Power Auctions. However, the rules proposed by Power Auctions would impose an additional relative cap on Y defined directly in relation to package X_2.

Figure 1: Eligibility dynamics and RPBs



184. As the chain of constraints that results from a series of eligibility losses under the ComReg rules is also applicable under the rules proposed by Power Auctions, the approach suggested by Power Auctions may only be as restrictive or more restrictive than the approach suggested by ComReg.

185. Because of the more restrictive nature of the rules proposed by Power Auctions, failure to submit a relaxed primary bid when the bidder drops eligibility may limit the ability of the bidder to do so in subsequent rounds. A mitigating factor is that whenever the additional constraints might prevent a bidder from submitting a relaxed primary bid in subsequent rounds, then submitting the relaxed primary bid in question *must* have been possible in the round when the bidder dropped eligibility. Nevertheless, a bidder must ensure that any desired relaxed primary bids are submitted instead of dropping eligibility in any round in which the bidder considers bidding for a package with smaller eligibility.

186. For simplicity consider a case in a single dimension. There are three possible packages: X_1, X_2, X_3 with associated eligibility of 6, 4 and 2 respectively. The bidder holds the following valuations for these packages:

Table 13: Eligibility and bidder valuations

Package	X_1	X_2	X_3
Eligibility	6	4	2
Valuation	€30m	€25m	€19m

187. The bidder begins round 1 with an eligibility level of 6.

188. Consider the following order of events, with round prices rising and the bidder choosing to bid on the highlighted package in each round:

Table 14: Bids submitted in the primary bid rounds

	Package 1		Package 2		Package 3				
Round	Price (€m)	Payoff (€m)	Price (€m)	Payoff (€m)	Price (€m)	Payoff (€m)	Eligibility	Activity	Type of Bid
1	23	7	17	8	12	7	6	4	Standard
2	25	5	22	3	15	4	4	2	Standard
3	29	1	25	0	20	-1	2	6	Relaxed

189. In Round 1, the bidder's most preferred package is package 2. The bidder places a bid for this package and sees a reduction in eligibility to 4.

190. In Round 2, the bidder preferred package should be package 1, and therefore a bidder who bids straightforward to valuations should make a RPB for package 1. However, suppose that the bidder chooses to bid for package 3 instead by error, and sees a reduction in eligibility to 2.

191. In Round 3, the bidder realises that he would prefer package 1. Under the rules proposed by ComReg, the bidder would still be able to submit a RPB for package 1 in round 3, as this can be consistent with the applicable relative caps:

   a) We first consider the relative cap on package 1.

      i) The bidder was last eligible to bid for package 1 in round 1, when it bid for package 2 instead.

      ii) Therefore, the highest bid that the bidder may submit for package 1 cannot exceed the highest bid that the bidder submits for package 2 plus the difference between the prices of these packages in round 1 (€23m - €17m = €6m).

      iii) For the bidder to be able to submit a RPB of €29m for package 1, the highest bid from this bidder for package 2 must be at least €29m - €6m = €23m. This would be the chain bid that the bidder would be required to submit for package 2 in order to be able to place a RPB for package 1 this round.

      iv) As the required chain bid for package 2 is below current round prices, the bidder would be allowed to submit such a chain bid.

b) As the bidder is not eligible to bid for package 2 in round 3, we need to check whether any further chain bids are required.

i) The bidder was last eligible to bid for package 2 in round 2, when it bid for package 3 instead.

ii) Therefore, the highest bid that the bidder may submit for package 2 cannot exceed the highest bid that the bidder submits for package 3 plus the difference between the prices of these packages in round 2 (€22m - €15m = €7m).

iii) For the bidder to be able to submit the required chain bid of €23m for package 2, the highest bid from this bidder for package 3 must be at least €23m - €7m = €16m. This would be the additional chain bid that the bidder would be required to submit (for package 3 in this instance) in order to be able to place a RPB for package 1 this round.

iv) As the required chain bid for package 3 is below current round prices, the bidder would be allowed to submit such a chain bid.

192. Therefore, the bidder may make a RPB for package 1 in round 3, provided that it also submits a chain bid of €23m for package 2 and a chain bid of €16 for package 3, which is consistent with the bidder's valuations.

193. However, under the rules proposed by Power Auctions, the relative cap that applies to bids for package 1 is tighter due to the bidder's loss of eligibility in round 2. Under the rules proposed by Power Auctions, a RPB for package 1 is only possible if:

a) the price difference between packages 1 and 2 in the current round (€29m - €25m = €4m) is smaller than the price difference between these two packages in round 1 (€23m - €17m = €6m); *and*

b) the price difference between packages 1 and 3 in the current round (€29m - €20m = €9m) is smaller than the price difference between these two packages in round 2 (€25m - €15m = €10m).

194. However, the second requirement (relating to round 2) is not satisfied. Therefore, the bidder would not be able to make this RPB under the rules proposed by Power Auctions.

195. The additional restrictions provide greater incentives for bidders to submit relaxed primary bids at any stage where they would contemplate dropping eligibility. However, the additional restrictions also mean that the submission of primary bids is more complex; that mistakes in earlier rounds have greater implications; and that there is less flexibility to update relative preferences during the primary rounds. Therefore, these additional restrictions do not seem to provide an advantage.

Impact of using strict rather than weak inequalities when setting relative caps

196. Power Auctions propose to impose revealed preference constraints with *strict* inequality, while the rules proposed by ComReg would allow bidders to submit bids with amounts equal to the applicable caps. Although this would appear to be a minor difference, it may cause problems in situations where some alternative packages are perfect substitutes for a bidder at give prices – the

bidder may need to make a choice between the two options, and then be unable to make a bid for the same amount on both packages.

197. For example, consider that a bidder places an equal value on two different packages (A and B). Suppose that the bidder is bidding for package A in the final primary round, at which point both packages have the same price. If the final price cap is imposed with strict inequality, the bidder will not be able to make a bid for package B for the same bid amount as for package A.

198. Such an additional constraint does not appear to be necessary or desirable.

Omission of chain bids

199. By not requiring chain bids, the rules proposed by Power Auctions would allow a bidder to strategically reduce demand or switch to an alternative package with smaller eligibility without being held by revealed preference constraints. This could allow bidders to strategically bid on lots they do not wish to acquire simply to raise the prices faced by competitors and potentially drive them to a situation where competitors need to reduce demand due to budget constraints.

200. Although these constraints might apply in the Supplementary Round (as discussed below), we are unsure as to whether Power Auctions propose to do this or not. Either way, it would appear that a bidder would always be able to avoid updating the bid amounts of constraining packages in the supplementary bids round by simply not submitting any (or by submitting only selected) supplementary bids. Therefore, the omission of chain bids may distort bidding incentives, and could result in strategic bidding even if it led to eligibility reductions in the primary rounds or in the suppression of supplementary bids that might be relevant for determining an efficient allocation.

Proposed activity rule for the supplementary round

201. As presented in its report, the proposal by Power Auctions would appear to be that bidders are only subject to relative caps that result from losses in eligibility during the primary rounds that are *larger* than the final primary package. We assume that a package is considered *larger* than the final primary package if its eligibility is greater than the eligibility of the final primary package in *any* of the two dimensions of eligibility.

202. However, whether the *informal description* of the activity rules that would apply to the supplementary bids round reflects the *technical description* of such rules provided by Ausubel and Cramton in their academic paper (referenced in the report provided by Power Auctions) is somewhat unclear. In particular, it is not clear whether the relative caps that arise from revealed preference in rounds where the bidder drops eligibility would apply to the final primary package in the event that the bidder submits a relaxed final primary bid (i.e. the eligibility of the final primary package exceeds the bidder's eligibility in the final primary round):

a) the technical description would seem to imply that all packages would be subject to the relative caps that results from eligibility-reducing rounds (thus the final primary package would be subject to such caps when the bidder submits a relaxed final primary bid);

b) however, the informal description suggests that the relative caps that result from eligibility-reducing rounds would only apply to packages that are larger than the final primary package (thus the final primary package would not be subject to any such caps in any case).

203. These two alternatives result in identical constraints when the bidder submits a final primary bid for a package that does not exceed the bidder's eligibility in the final primary round. However, the two alternatives have materially different implications in the event that the bidder submits a relaxed final primary bid. Therefore we assess both options.

204. We also note that the rules proposed by Power Auctions for the upcoming Australian 700 MHz and 2.5 GHz spectrum auction do not provide further clarification on this point, as they seem to use a rather different approach for defining the caps that apply to supplementary bids. In the rules for the Australian auction, the assessment of relative caps that apply to supplementary bids is done in relation to whether a given package would include the final package and only additional lots for which there was excess supply in the final primary round. Our understanding of this version is that relative caps that result from reductions in eligibility on packages that are different to the final primary package would still apply (even in the case of packages that are strictly smaller than the final primary package and the final primary bid was a relaxed primary bid). However, it seems clear that in the rules proposed for the Australian auction a supplementary bid for the final primary package would not be capped even if the final primary bid was a relaxed primary bid.

Option A – all relative caps apply in the supplementary bids round

205. If all relative caps from reductions in eligibility are applied to all relevant packages in the supplementary bids round, the submission of chain bids would simply be deferred to the supplementary bids round: A bidder who submits a relaxed primary bid in the final primary round and wished to submit a supplementary bid for its final primary package would be required to update the bid amount of the relevant constraining packages, which would in turn be constrained by the final price cap. Therefore the approach proposed by Power Auctions would not provide a simplification of the process – rather the opposite, the bidder would be presented with all the requirements for updating bid amounts at once in the supplementary bids round. As discussed above, this option might make it difficult for bidders to fully understand the implications of their primary bids.

206. On the other hand, this alternative would not provide any further guarantees for a bidder whose final primary bid was relaxed and who wishes to follow a knock-out bid strategy to secure the final primary package. Such a bidder would still be at risk of winning a constraining package.

207. Last, this alternative would yield an inconsistent approach in the application of the caps, and could allow a bidder to omit some of the bids required for consistency between relaxed primary bids and the applicable revealed preference constraints.

Option B – some relative caps are omitted in the supplementary bids round

208. Under this option we consider the case in which the relative caps from reductions in eligibility would only apply to packages that are greater than the final primary package.

209. The obvious consequence of this approach would be that the final primary package would not be capped. Therefore, a bidder could increase its bid for the final primary package free of the constraints that resulted from reductions of eligibility *even* in the case where the bidder's final primary bid is a relaxed primary bid.

210. This alternative approach would allow a bidder to submit bids that are ***not consistent*** with their revealed preferences during the primary rounds. This has a number of implications when a bidder's final primary bid is a relaxed primary bid:

a) Unless bidders are required to submit all chain bids in the supplementary bids round, the rules proposed by Power Auctions would allow bidders to omit some or all of such chain bids. However, such chain bids could in fact be those that would be selected as winning bids in an efficient allocation. This could lead to some lots going unsold inefficiently or not being allocated in a way that maximises total value.[18]

b) As discussed above, this approach would also allow bidders to engage in strategic bidding during the primary rounds simply to raise prices for rivals with limited consequences even when such bids result in a reduction of eligibility. If a bidder is able to submit a relaxed primary bid for a larger package in the final primary round, the bidder could mitigate the risk of winning any of the smaller constraining packages it had bid for by submitting a sufficiently high bid for the final primary package.

c) Lastly, the omission of chain bids could also result in an under-representation of opportunity costs and artificially low prices.

211. Despite the fact that this proposal would simplify the application of caps in the supplementary bids round, we believe that the risks it creates in terms of inefficient allocations and strategic behaviour do not justify such simplification.

2.7.3 Power Auctions' assessment of the advantages of their proposed activity rules

212. Power Auctions provide a number of advantages that they attribute to their alternative proposal. However, most of the advantages provided are a direct

[18] Note that the price of constraining packages needs to relatively increase in order for a RPB to be possible. As chain bids cannot exceed round prices, this suggests that there is demand for the lots included in the package subject of a chain bid at prices that result in a value for such lots that exceed the value of the chain bid. However, this does not provide a guarantee that the demand for these lots can be accommodated in the final primary round or at the end of the auction, as this demand may be part of bids for larger packages that cannot be accommodated with the other winning bids in the final outcome.

consequence of the final price cap, and therefore are also applicable for the rules proposed by ComReg. We discuss these in turn:

a) *The rule enables the bidder to bid on her most preferred package throughout the clock stage, thereby improving price discovery (more revelation of relevant marginal value information) and making the final clock allocation a better predictor of the auction outcome.*

   This is equally valid under the rules proposed by ComReg.

b) *The rule guarantees that the final clock allocation will not change if there are no unallocated items – each winner is guaranteed to win her final clock package without making any supplementary bids.*

   This is simply a consequence of the final price cap and hence is equally valid under the rules proposed by ComReg (except in the case of a bidder defaulting payment prior to the calculation of the winning allocation, which would equally apply under the rules proposed by Power Auctions).

c) *The rule prevents a competitor from placing supplementary bids that have no chance of winning that would increase the payments of rivals.*

   Power Auctions do not seem to provide any further details to substantiate this claim, and might not hold under the approach suggested in the *informal description* of the activity rules proposed by Power Auctions. Conversely, the rules proposed by ComReg introduce some degree of risk that bidders might win the alternative package to which such bids relate, thus ensuring that such strategies would not be risk-free.

d) *The emphasis on revealed preference with respect to the final clock packages motivates the bidder to bid on her most preferred package in the final clock round to improve her chances of winning her most preferred package. Since the bidder does not know which round will be the final clock round, there is a persistent motivation to bid on the most preferred package throughout the clock stage. This behaviour is exactly what reveals the bidders' tradeoffs among relevant packages and promotes efficient outcomes.*

   This is simply a consequence of the final price cap, and thus also equally valid under the rules proposed by ComReg.

e) *Revealed preference constraints that are not needed to prevent undesirable behaviour are not included. This simplifies the activity rule and gives the bidders greater flexibility throughout the auction. Supplementary bids are only constrained by revealed preference with respect to the final round and relevant rounds in which the bidder reduced eligibility.*

   As discussed above, the approach suggested by Power Auctions is less flexible than that proposed by ComReg, and it results in additional constraints being imposed as a result of a loss of eligibility. In our view, such additional constraints are not necessary and may excessively limit the ability of a bidder to update their valuations. The additional constraints would therefore add complexity to the decisions in the primary rounds. In addition, under the approach suggested by the *informal description* provided by Power Auctions, it would be possible for bidders to avoid some of the constraints that result from reductions in eligibility when they end the final primary rounds with a relaxed primary bid. Conversely, if none of the revealed preference constraints were dropped, then the activity rules would not be simpler, but only defer the consequences from primary bids to the supplementary bids round, making it more difficult for bidders to assess the implications of their bidding behaviour in the primary rounds.

f) *In the supplementary round, revealed preference puts a cap on the amount a bidder can bid for a particular package. For example, revealed preference with respect to the final primary package says that the bid for the package must be less than the bid for the final primary package plus the difference between the package and the final primary package evaluated at the final clock prices. That is, the supplementary bid amount for the specified package and the final primary package needs to be consistent with the fact that the bidder preferred the final primary package to the specified package at the final clock prices.*

   This is simply a consequence of the final price cap, and thus also equally valid under the rules proposed by ComReg.

g) *The proposed rule does this without introducing Binding Supplementary Bids which, without question, are the hardest part of ComReg's modifications to understand or to implement.*

   It is certainly the case that the proposal by Power Auctions would do away with chain bids (previously called binding supplementary bids). However, this comes at the expense of either (a) allowing bidders to avoid their revealed preference constraints and thus potentially take advantage of the rules to engage in strategic bidding; or (b) deferring such bids to the supplementary bids round, in which case the consequences of submitting a relaxed primary bids could be more difficult to assess during the primary rounds. In addition, dealing with chain bids should not be a challenge for bidders, especially given that ComReg proposes that the auction software would assist bidders in identifying required chain bids and bid amounts. Conversely, the rules proposed by Power Auctions impose additional restrictions that mean that failure to submit a relaxed bid could lock a bidder out of this possibility in subsequent rounds – a constraint that does not apply under the ComReg rules with the exception of the final primary bid round.

2.8 Responses to questions on activity rules

2.8.1 Questions from Telefonica

Question	Answer
Paragraphs 4.142 and 4.150 - These paragraphs appear to contradict each other. Should clause 4.142 be amended to distinguish that a final round primary bid is not uncapped if it is a relaxed primary bid?[19]	Paragraph 4.142[20] and paragraph 4.150[21] do not contradict each other. Nevertheless, some clarification could be usefully provided. Paragraph 4.142 is correct in stating that there is no limit on the Supplementary Bid that may be made for the Package Bid in the final Primary Bid Round (that is the Final Primary Package) in the sense that it is possible to make a bid at an arbitrarily high level. In the case that the final Primary Bid is not a Relaxed Primary Bid, this is always possible without increasing any other bid. However, in the case that the final Primary Bid is a Relaxed Primary Bid, the Final Primary Package will be subject to a Relative Cap from some other constraining package. This constraining package could in turn be subject to a Relative Cap and so on. It is still possible to make a bid for the Final Primary Package at an arbitrarily high level, but this will require sufficiently high bids to also be made for these constraining packages.

[19] See page 32 of Telefonica's response to the draft Information Memorandum

[20] Paragraph 4.142 of the draft Information Memorandum reads, "*There is no limit on the Supplementary Bid that may be made for the package Bid for in the final Primary Bid Round, provided this package contains at least one Lot in some category (i.e. is not a trivial package of zero Lots). This package will be referred to as the Final Primary Package.*"

[21] Paragraph 4.150 of the draft Information Memorandum reads, "*In the event that the Primary Bid made by a Bidder in the final Primary Bid Round was a Relaxed Primary Bid, any Supplementary Bid for the Final Primary Package is subject to Relative Cap. This is a consequence of the Relative Cap rule as already defined above, as in this case the Final Primary Package is a package that the Bidder had insufficient Eligibility to Bid for in the final Primary Round.*"

In a tie-break situation, paragraph 4.180 prioritises between notional release scenarios according to the greatest number of released lots. However, according to paragraph 4.182, within a winning release scenario, a purely random process is used to identify the winning combination from amongst those combinations with equal highest value. Please clarify that only winning combinations in which bidders win the requisite number of party-specific lots will be included in this random selection. Put differently, please clarify that combinations that include zero bids (by a releaser) within the winning scenario will be discarded, even if they have equal value to potential winning combinations in which there are no such zero bids (from a releaser).[22]	Paragraph 4.180[23] concerns the selection of a Winning Scenario. Within this Winning Scenario, paragraph 4.182[24]concerns the choice of a Winning Combination of Bids. In the event that there are multiple feasible notional release scenarios with equal greatest total value, the Winning Scenario must be chosen to maximize the number of MHz of spectrum subject to winning Party-specific bids from amongst the ties scenarios. There are still tied potential Winning Scenarios after applying this criterion, one is selected at random. Paragraph 4.182 of the Draft IM refers to the case where there is more than one potentially winning combination of Bids in the Winning Scenario. Only Winning Scenarios will be considered in which bidders win back the requisite number of lots presumed released in the Winning Scenario. In the event that there are tied Winning Combinations of Bids, in this document we propose adding a tie-breaking criterion of first maximizing the number of bidders winning at least as many lots in each category as bid for in the final primary round. If ties still remained, these would then be broken randomly from amongst the remaining winning combinations. Therefore, for the avoidance of doubt, Telefonica is thus correct in stating that

[22] See page 32 of Telefonica's response to the draft Information Memorandum

[23]Paragraph 4.180 of the draft Information Memorandum read, *"In the event that there are multiple feasible notional release scenarios with equal greatest total value, then the Winning Scenario will be selected from amongst these tied winning scenarios. First, the Winning Scenario must maximize the number of MHz of spectrum subject to winning Party-specific Bids from amongst the tied scenarios. Second, if ties still remain, this will be resolved by random selection of a Winning Scenario from amongst the remaining ties by the EAS."*

[24] Paragraph 4.182 of the draft Information Memorandum read, *"If there is more that one potentially winning combination of Bids in the Winning Scenario, then one of these will be chosen at random by the EAS. This will be the Winning Combination."*

	only winning combinations in which bidders win the requisite number of party-specific lots will be included in this random selection. This will be made explicit in the technical annex on winner determination in the Final IM.
Paragraph 4.82 Which round does "current round" and "previous round" refer to? Does current round refer to round M_1? What does "no Bid is required in this round" mean? Does it mean no further Binding Supplementary Bids (in addition to Z_1), or does it mean no Binding Supplementary Bid for Z_1?[25]	In the explanation provided from paragraph 4.76 of the Draft IM, the "current round" refers to the round in which the bidder is considering making a relaxed primary bid on package X – that is, the activity associated with a bid for package X exceeds the bidder's current Eligibility in one or both time slices. This is not the same as round M_1, as round M_1 refers to the most recent round in which the bidder was eligible to bid for package X. A "previous round" in paragraph 4.82 refers to any prior round that has already been run before the "current round". In the context of paragraph 4.82 "no Bid is required" means that no chain bid (previously referred to as a binding supplementary bid) is required for Z_1 as some previous bid (a primary bid, relaxed primary bid or chain bid) as already been made at the required level. The bidder can thus place a relaxed primary bid for package X, without the need for any chain bids.
Annex 8, section 1.3 The variable "s" is referred to as a "notional release scenario" and as a "supply scenario". Is this the same thing?	Yes, for the purposes of the description provided in section 1.3 of Annex 8 of the Draft IM, 'notional release scenario', 'supply scenario' and 'scenario' are all interchangeable. The Final IM will tighten up this language.

[25] See page 32 of Telefonica's response to the draft Information Memorandum

Annex 8, section 3.3, last paragraph: Should "final" be deleted in "at the end of each final primary bid round"?[26]	Yes – this is correct. This sentence should read, "Aggregate demand in the regular categories is revealed to all bidders at the end of each ~~final~~ primary bid round." This will be amended in the Final IM.

2.8.2 Questions from Vodafone

Primary bid rounds

Question	Answer
The very first round will be run on paper, as part of the application process. So the primary rounds actually start with the second round (sort of), and they might not be run at all if not needed. If they are run, then the prices have to be announced, as they won't just be reserve price. Presumably this is to avoid the situation where the bidders must bid electronically at the reserve price more than once?[27]	Correct – as noted in Section 3.5 of this report on Information Policy, following the application stage, and prior to the beginning of the main stage, bidders will be presented with the round prices and aggregate demand for each Lot category, based on the 'bids' provided on the Lot Application Form at reserve price. Given that the lots chosen on the Application Form are used to determine the deposit amount and the initial eligibility of each bidder, by operating in this way, the lots chosen on the Application form are necessarily binding, and will be treated as a firm bid for that package of lots. In effect, the demands stated in the Application Forms are the initial round (i.e. round 0).
There are new options for "Relaxed Primary Bids" which in some cases exceed the number of eligibility points that a bidder has in a given primary round. The purpose of this seems (roughly) to retain the sort of flexibility you have with a % activity rule in an SMRA, and allow you to bid for a slightly larger package again after having bid for a smaller one. Can ComReg confirm?[28]	In certain circumstances bidder will be able to make a Relaxed Primary Bid. RPBs allow a bidder to make a bid for a package whose associated activity exceeds its current eligibility in one or both time slices. This is possible only where current round prices would allow such a bid to be made consistently with the preferences expressed in previous round where the bidder has dropped

[26] See page 32 of Telefonica's response to the draft Information Memorandum

[27] See page 12 of Vodafone's response to the draft Information Memorandum

[28] See page 12 of Vodafone's response to the draft Information Memorandum

	eligibility. There is no necessity for bidders to make relaxed primary bids. However, they do provide additional flexibility that may allow a bidder to bid for its most preferred package in circumstances where an eligibility point based rule alone might not. Because of the Final Price Cap, a bidder who was not bidding for its most preferred package in the final primary round might find its ability to make bids at valuations for packages of interest limited. Therefore, the presence of the Final Price Cap makes it desirable to give some additional flexibility to bidders.
When making a "Relaxed Primary Bid" the bidder is sometimes deemed to have already made a Supplementary Bid, what ComReg call a "Binding Supplementary Bid". Can ComReg confirm?[29]	A Relaxed Primary Bid can be made provided that it is consistent with the previous Bids made by the Bidder. In some cases, to make a consistent bid for the larger package, it might be necessary to raise a bidder's previous bid for one or more packages that give rise to a relative cap. In the Draft IM, such a bid was referred to as a binding supplementary bid. However, as noted above, the terminology has now changed to reduce scope for confusion. As these bids are not actually supplementary bids, these bids will now be referred to as chain bids, emphasising the relation with the chain of constraining bids associated with relative caps on any package subject to a relaxed primary bid.
The bidder has two levels of eligibility anyway, corresponding to the two time-slices, and eligibility points are not transferable between the slices. So a bid may be relaxed with respect to one time-	Under the activity rule proposed in this document (i.e. eligibility in each time slice is the smaller of current eligibility and current bidding activity) it is possible for eligibility to be reduced in a round where

[29] See page 12 of Vodafone's response to the draft Information Memorandum

slice but not another. Can ComReg confirm?[30]	a bidder makes a Relaxed Primary Bid. This happens where a package exceeds current eligibility for one time slice but has activity strictly less than current eligibility in the other time slice. As this would be a round in which eligibility was reduced, this would give rise to relative caps.
In addition, the variable deposit rules have returned in this iteration. ComReg reserve the right to ask any bidder to increase its deposit up to the level of its highest bid (presumably including one of its "Binding Supplementary Bids") and with three days notice. They can suspend the primary rounds while a bidder is doing that. Can ComReg clarify please?	Correct - it is true that ComReg will reserve the right to ask any Bidder to increase its deposit up to the level of its highest Bid in the Primary Bid Round up to that point. This does indeed also include any Binding Supplementary Bids (now termed 'chain bids') submitted in conjunction with a relaxed primary bid (although these would typically be for smaller packages than that subject to the relaxed primary bid and so not give rise to the bidder's highest bid amount). Bidders will be given at least three Business Days from being given notice by ComReg to providing the cleared funds to it. ComReg reserves the right not to schedule any Primary Bid Rounds until it has receipt of the increased Deposit amount, or the deadline set by it, whichever is earliest.
Paragraph 4.146 of ComReg document 11/75 states: *"Supplementary Bids for all packages whose eligibility exceeds that of Final Primary Package are subject to a Relative Cap."* We believe that this wording does not capture the intended price cap if the final round bid was a Relaxed Primary Bid. For instance consider paragraph 4.167; there you expect that package Xk-1 will be subject to a Relative Cap. But the eligibility of Xk-1 may not exceed that of the Final Primary Package; it is smaller in at least one time slice (because the Final Primary Package was a Relaxed Primary	The original text has a mistake. The proposed correction by Vodafone is correct. Any package that the bidder is eligible to bid on in the final primary round is not subject to relative caps, though is still subject to the final price cap. However, any other package that the bidder is not eligible to bid for in the final primary round will be subject to a relative cap. The final IM will correct this.

[30] See page 12 of Vodafone's response to the draft Information Memorandum

Bid), and it may be smaller in both time slices. In that case, Xk-1 will not be subject to a Relative Price Cap according to the current wording of paragraph 4.146. Accordingly Vodafone believes that 4.146 should be worded differently to reflect what we believe is the intended meaning as follows: *"Supplementary Bids for all packages whose eligibility exceeds the bidder's eligibility at the end of the final primary round are subject to a Relative Cap."*[31]	

Supplementary bids round

Question	Answer
As well as the "Relative Cap" ComReg are proposing a new "Final Cap" in which the final primary round package binds all other packages (whereas in the relative cap, the final round package only binds packages that are the same size or smaller). Can ComReg confirm?[32]	All supplementary bids are subject to the Final Price Cap, which is set relative to the Bid made for the Final Primary Package.
It would appear that a bidder also has the option to increase some of their "Binding Supplementary Bids" that they probably didn't realise they were making in the first place. Can ComReg confirm that such a scenario is possible under the auction rules?[33]	For the avoidance of doubt, bidder will be aware of when they are required to submit a 'chain bid'. If the bidder enters a relaxed primary bid on the bid form (where this step is non-committal), the electronic auction system would present to the bidder all of the chain bids it would be required to make at the same time as the relaxed primary bid, at the minimum level required in order to preserve its relative preferences as expressed in its previous bids. Typically, only a small number of chain bids will be required (if any). At the supplementary bids stage, bidders

[31] See page 2 of Vodafone's supplementary response to the draft Information Memorandum (12 March 2012)

[32] Seepage 13 of Vodafone's response to the draft Information Memorandum

[33] See page 13 of Vodafone's response to the draft Information Memorandum

	will be able to increase the highest bid amounts on each of the packages submitted so far in the primary bid round. At this point, it makes no difference what the source of the highest bid so far is for a package (i.e. initial choice at application, primary bid, relaxed primary bid or chain bid).
There appears to be added complexities if the final primary round bid was itself a "Relaxed" bid in one or both time-slices. In that case, all packages will have some sort of cap in the supplementary round, and a bidder will be left struggling to work out which one to raise first (without triggering a validation error). Can ComReg clarify please?[34]	Where a bidder makes a relaxed primary bid in the final primary bid round, that package will be subject to a relative cap as it is not a package that the bidder is eligible to bid for in the final primary round. Therefore, there is a constraining package setting a relative cap on the final primary package. That constraining package could itself be subject to a relative cap and so on. Therefore, there could be a chain of constraining packages associated with the final primary package. These constraining packages are subject to final price cap, which limits bids for these packages relative to the final primary package. Therefore, supplementary bids for the final primary package and these constraining packages will need to be increased together, holding the bidder to the consequences of it having previously dropped eligibility. However, these various constraints are always self-consistent. The EAS will identify the group of packages that need to be increased together with the supplementary bid for the final primary package if this situation occurs.

[34] See page 13 of Vodafone's response to the draft Information Memorandum

3 Information Policy

3.1 Background

213. Throughout the consultation process, ComReg has considered ways in which the risk of collusive (including tacitly collusive) behaviour in the auction could be minimised. In support of this goal, a strict information policy has been proposed, which would set limits on communication throughout the award process with the aim of restricting the ability of bidders to communicate information relevant to valuations and bid strategy, and to limit the ability of bidders to act strategically during the auction itself conditioned on what they observe other bidders doing.

214. In the Draft IM, ComReg made clear the information policy it proposed to implement, stating its intention for restrictions on communication amongst bidders to come into force from the publication of the final Information Memorandum.

215. The information policy as set out in the Draft IM involves a number of features including:

- A restriction on communication between bidders from the publication of the Information Memorandum and until ComReg announces the outcome of the award process;
- Specified information only to be revealed following the qualification stage and assessment of applications;
- Specified information only to be made available to bidders prior to the start of the Auction;
- Specified information only available before the start of the first primary bid round;
- Specified information only to be made available at the end of each primary bid round;
- Specified information only to be made available upon scheduling of a further primary bid round;
- Specified information only to be provided at the end of the last primary bid round and prior to the start of the supplementary bids round;
- Specified information to be disclosed at the end of the main stage of the auction; and
- Specified information only to be released to bidders at the end of the auction, that is, once ComReg has determined the winning bids for lots in all lot categories and the additional prices for the assignment stage, the results of the auction will be notified to all bidders but bids will not be published.

216. In this section of our report we consider each of the features above in turn, discuss the reasoning behind each of ComReg's proposals, and address any concerns raised in respondents' comments on the Draft IM.

3.2 Rules governing the duration of the award process

3.2.1 Proposed rules as stated in the draft Information Memorandum

217. In subsection 3.3.5 of the Draft IM, ComReg set out proposed rules that would govern the behaviour of interested parties in relation to confidential information, collusion, restrictive agreements and disruption to the award process.

218. The rules proposed in this subsection of the Draft IM were intended to govern the behaviour of interested parties over the course of the auction process, including both prior to and after submission of applications and up until ComReg announces the outcome of the award process.

3.2.2 Respondents' views

219. In their responses to the Draft IM two respondents (eircom Group and Telefonica) raised concerns about the restrictions to be imposed on applicants following the start of the award process. Respondents commented that:

- The award process will start on the day of publication of the IM and would run for up to twelve weeks (4 months) even in the absence of delay. This would leave operators bound by "severe rules" for a considerable period (Telefonica & eircom);
- In a situation where the auction was subject to a significant and undefined delay, during that period it would be unclear whether operators could enter into discussions on subjects that are not directly related to the auction (Telefonica);
- Potential applicants do not know when ComReg will publish the final IM and therefore cannot plan effectively to participate in the award process. This is likely to be problematic. For example, suppose that two entities in advance of publication of the final IM are considering forming a bidding group to participate in the auction as permitted by the auction rules. Under the proposed rules, the publication of the Information Memorandum would put an abrupt end to their negotiations, as continuing discussions would exclude them as potential individual applicants (eircom);
- A rule that disallows communication with other potential bidders on the date that the regulator releases the Information Memorandum makes no sense and will be impossible to enforce since prospective bidders will not know with whom they are prohibited from communicating with. (eircom)

220. In the context of their respective criticisms, these respondents put forward a number of modifications to the information policy governing the award process including the following suggestions:

- Potential applicants should be provided with notice of a fixed start and end date for prohibited communication. In the United States, the Federal Communications Commission include a 'bright line rule' that prohibits communication among applicants from the time they submit their auction application until the payment deadline after the auction. (eircom)

- The rules on contacts should only apply for a defined period before applications are submitted (e.g. 4 weeks), rather than from the date the final rules are published. ComReg must also accept that normal day-to-day business contact must continue throughout the auction process, so long as it does not compromise the auction process. (Telefonica)

3.2.3 DotEcon commentary

221. It is necessary to specify restrictions on the level and nature of communication between interested parties, applicants or bidders and their connected persons and insiders to minimise the possibility of any restrictive practices, sharing of confidential information or collusion occurring that would distort the outcome of the award process. While some respondents may consider the duration under which applicants or bidders are bound to these restrictions are "considerable", we believe it is necessary that the restrictions are applied from, or in advance of the submission of applications through to at least the announcement of the final auction results in order to ensure the smooth running of the auction process and an efficient outcome without the threat of possible collusive behaviour or restrictive agreements. Such rules are commonly applied in spectrum auctions.

222. While Telefonica notes that complications may arise in a situation where the auction is subject to a "*significant and undefined delay*", DotEcon considers that there is no reason to build in to the information policy of the award process the possibility that there will be any significant delay to the award process. In the unlikely event that there are extraordinary circumstances outside of ComReg's control under which there is a significant delay to the auction, we consider that the specifics of the situation prevailing at that time (including the cause of such a delay and its expected magnitude) would dictate the steps that should be taken with regard to the information policy. In some cases it might be appropriate to relax or suspend restrictions on communication in force on bidders, or to delay their imposition. However, by its very nature such a circumstance would be unexpected and a fully contingent response to such eventualities cannot be fully provided for in the IM.

223. Some of the comments received from respondents failed to distinguish clearly between normal business communications unrelated to the auction process and communication of confidential information that may affect behaviour within the auction, such as plans for future use of spectrum, bidding strategies and valuations. The former should not normally be affected by restrictions on the latter. Therefore, the requirements in the Information Memorandum cannot be considered to be especially disruptive to day-to-day business for bidders. However, it is not feasible to provide an exhaustive list of cases which are directly or indirectly related to the auction process and that may be considered to involve sharing of confidential information, collusion, restrictive agreements or disruption to the award process. Indeed, how bidders configure their business operations will affect the steps they may need to take to ensure compliance with these requirements. Therefore, bidders will need to make their own assessment of the detailed compliance steps they will need to take.

224. The broad principles governing communication during the auction process have already been clearly laid out in the Draft IM. It is not realistic to expect

ComReg to be able to respond to specific queries from bidders on an *ex ante* basis to provide safe harbour for particular business activities. This responsibility resides with the bidders. ComReg must always remain free to impose *ex post* sanctions on bidders if they are subsequently found to have breached auction rules.

225. While the draft Information Memorandum noted that restrictions would come into force from the issue of the Information Memorandum, eircom complained that potential applicants will not know when the final IM will be published and as such may have to put an abrupt end to any communication they may have with other operators. eircom also commented that even following the publication of the final IM, with no way of knowing the other potential applicants and bidders it will not know which parties it can continue to communicate with and with whom they must cease communications.

226. We agree that it is impractical for interested parties to cease all communication with all other likely potential bidders without adequate notice. In addition to problems for any parties involved in joint bidding discussions, there are a number of everyday operational interactions related to spectrum use that would benefit from some notice to cease communications.

227. These problems can only be adequately addressed by giving parties a notice period before restrictions on communications come into place on a pre-announced date. That could be done either by giving a firm commitment to publish the final IM on a particular date, or by including within the final IM a notice period and subsequent date on which restrictions on communications come into force. The latter approach has the advantage that the terms of the restrictions on communication would have been clearly stated to interested parties in the final IM, giving them time to comply with the requirements by the time they come into force.

228. Therefore, we consider that the most practical approach is for restrictions on communication to come into force after the publication of the Information Memorandum and either on, or prior to, the deadline for submission of application forms.

229. On this basis we have considered the proposals put forward by eircom Group and Telefonica with regard to specifying a date from which the restrictions would come into force.[35] We consider that specifying that the rules regarding confidential information and bidder behaviour would apply from 4 weeks prior to the date specified for submission of applications may provide a reasonable balance between allowing potential applicants time to bring any open ended discussions to a close, while ensuring that these strict and necessary communication restrictions are applied in advance of the deadline for submission of application forms. However, given the indicative timetable proposed in Section 6.2 of this report, we note that this period would lie between the publication of the final Information Memorandum and the

[35] We note that these restrictions augment and are not a substitute for the constraints imposed by competition law, which are binding at all times on participants and potential participants in the auction.

deadline for submission of application forms and deposits. Further, if restrictions on communication were to come into force 4 weeks prior to the deadline for submission of applications as suggested by Telefonica, we note that this would also mean that, given the proposed timetable, the restrictions would come into force prior to the deadline specified for ComReg to publish answers to any further questions raised by respondents. While we consider that these questions will mainly relate to the detailed auction rules and the process, we cannot rule out that some bidders could be relying on the answers to these questions to decide whether to enter the process as a bidding group or as an individual bidder (or indeed at all). As such, we believe that not imposing the proposed communication restrictions before the date of publishing of answers to questions posed by interested parties would best accommodate parties in this position.

230. Further, if restrictions on communication are applied far in advance of the deadline for submission of applications, this may cause problems for those wishing to enter a joint bidding group. In effect, this would require a committing decision to be made whether or not to bid as a single group by the point that communication restrictions come into place.

231. We therefore recommend that in relation to restrictions to be applied on communication between interested parties / bidders in the auction, ComReg may consider that such restrictions come into force for each applicant alongside the submission of their first application, and for all other interested parties alongside the final deadline for submission of applications. From this point on, bidders would be bound by the communication restrictions as outlined in the Draft IM, and subsequently provided in the final Information Memorandum. This has the benefit of a clearly defined start date for the restrictions on communication and would avoid imposing any disadvantage on parties considering the possibility of entering the award process as a joint bidding group.

232. For the avoidance of doubt, where parties are in a joint bidding partnership and become a qualified bidder, they will be treated as a single entity for the purposes of the auction rules. Therefore, parties within such an entity will be able to communicate freely amongst themselves throughout the auction. However, information passing outside the entity will be subject to restrictions.

233. In relation to the end date for such restrictions, as noted above, we consider that it is necessary for the restrictions to apply until at least the announcement of the final auction results. There is a good argument that this should continue until payment is made for licences (though there is no need to wait for award of those licences). Indeed, eircom noted that in the Unites States the FCC's bright line rule prohibits communication until the payment deadline after the auction. It is only at this point that the auction process is truly complete and we can be sure that bidders can no longer be influenced by other participants in relation to the acceptance of (and payment for) the licences awarded in the auction.

3.3 Information made available to bidders following the qualification stage and assessment of bidders

3.3.1 Proposed rules as stated in the draft Information Memorandum

234. As noted in the Draft IM, following the publication of the final IM, interested parties will be able to submit an application for the award process. Once the deadline for applications has passed, ComReg stated that it would evaluate the applications and inform each applicant whether it has become a qualified bidder and will thus be eligible to bid for spectrum in the award process.

235. However, ComReg's proposals made it clear that it did not intend to inform qualified bidders about the identity or number of other qualified bidders, or the initial eligibility to bid of the other qualified bidders. Furthermore, ComReg proposed that it would not reveal any information about unsuccessful applicants who fail to become qualified bidders.

236. Where applicants are unsuccessful in becoming qualified bidders, ComReg proposed that they would remain bound by the rules on confidential information for the duration of the award process.

3.3.2 Respondents' views

237. In response to ComReg's proposals to withhold the identity of qualified bidders, two respondents to the Draft IM, Telefonica and eircom Group, took issue with this policy. In summary, these respondents considered that this was overly restrictive, would create an additional administrative burden for ComReg and could distort the ability of bidders to gather the necessary information for an efficient outcome.

238. Specifically, eircom Group acknowledged that strict collusion rules, including prohibition of communication among applicants, have been implemented in previous auctions. However, providing the example of the United States, they noted that despite strict rules on communication, the Federal Communication Commission makes the details of the applicants public (including ownership information) so that all applicants know with whom they may not communicate during the prohibited communication period. They considered that the rule proposed by ComReg, "*makes no sense and will be impossible to enforce since prospective bidders will not know with whom they are prohibited from communicating with.*"[36]

239. Separately, Telefonica commented that the proposal to restrict bidder identities offers no "*obvious benefits*" that cannot be achieved through restrictions on bid data revelation. However, Telefonica submitted that it does introduce real costs, providing a number of reasons to support its view including:

- *Reduced scope for price discovery* - Without knowing the number and identity of bidders, it becomes much harder to interpret information

[36] See page 7 of eircom Group's response to the draft Information Memorandum

about prices and aggregate demand revealed in the auction. As a result, bidders may be deprived of information they would otherwise have used to confirm or revise their valuations and bid strategy. In a common value setting, such as a spectrum auction, this makes it more likely that bidders submit misguided bids resulting in outcomes that are inefficient, both for bidders and ultimately for Irish society.

- *Information asymmetries between bidders* - Participation in the award by some bidders is more predictable than others. This is uniquely the case for the proposed auction where existing operators must participate in order to maintain spectrum for existing networks – everybody knows that the three existing GSM operators must participate. Bidders whose participation is uncertain may gain an advantage over those who will be predictably present, because they can more easily interpret demand data. The impact and extent of such asymmetries are difficult to predict, but their existence reduces the likelihood of a level playing field across bidders.
- *Undue burden on ComReg* - Without the list of qualified bidders, it is impossible for participants to play any role in self-policing the risk of association with other bidders. Instead, the obligation to identify associations and connections will rest with ComReg, even though it may lack access to the information needed to complete this task. Further, in the event that ComReg identified an association and contacted a subset of bidders to resolve this, those bidders would in the process gain access to information about participation not available to other bidders. This would offer them an unfair advantage with respect to interpreting price information during the auction.
- *Unreasonable restrictions on bidders* - As part of the information restrictions, ComReg has proposed that bidders be forbidden from disclosing publicly their participation in the auction. However, for an award of this importance to the industry and national economy, it is simply untenable to expect bidders to hide their involvement in an event of public interest. While we support measures to prevent bidders disclosing information germane to their bid strategy, this restriction is a step too far. For some bidders, this restriction may even be inconsistent with their stakeholder disclosure obligations. Telefonica, for example, might be required to reveal its participation in the auction under stock-exchange rules.[37]

240. In its submission, Telefonica proposed that ComReg notify applicants of the identity of all other applicants, and the aggregate demand in each band before the main stage of the auction begins. Telefonica held the view that, at a minimum, ComReg should follow the established approach of revealing bidder

[37] See page 21 of Telefonica's response to the draft Information Memorandum

identities, as practiced in similar CCA auctions such as those in Denmark and the UK.[38]

3.3.3 DotEcon commentary

241. With regard to the administrative burden on ComReg that the proposed information policy creates (by virtue of the fact that ComReg has proposed that it assess applications itself, and has further set a timeframe for doing so that will be set upon publishing of the Information Memorandum), we do not consider that this is a reasonable objection. The so-called "burden" on ComReg of assessing applications is not an issue that interested parties should concern themselves with. It is for ComReg and its legal advisers to determine the reasonableness of the burden on ComReg.

242. Consider now the case highlighted by Telefonica where ComReg identifies an association between some bidders and contacts them to resolve this and how such a situation might be dealt with. Telefonica point out that as a result of such an association, these bidders would gain access to information about participation not available to other bidders. However, this is not necessarily correct and in certain cases bidders would not gain access to any additional information. For example, a bidder may be informed by ComReg that its advisor is also assisting another unnamed bidder and that ComReg requires a written undertaking from this advisor to prevent information leakage (or some other measure). ComReg's response in these circumstances would likely involve minimising the amount of information disclosed to bidders.

243. Notwithstanding such circumstances, if information is unavoidably provided by ComReg to one or more bidders about other applicants as a result of an association that is likely to have a significant effect on the auction then, in the interests of fairness and symmetry of information, we would recommend that this information would be made available to all applicants by ComReg. In making any disclosure of information relating to other bidders or any other aspects of the auction, ComReg can be guided by the principles of fairness and non-discrimination. However, in order to ensure that bidders have the right incentives to be vigilant in adhering to the information policy for this award process, bidders should not be 'rewarded' for breaches of this policy by being provided with information about the identity of any other bidders in the auction. In particular, if the need to disclose information about the identity of associated parties became necessary, then there may be no reason to treat all bidders symmetrically and disclose similar information about other bidders to the associated parties.

244. Regarding Telefonica's and eircom Group's complaints about bidder's lack of knowledge of who it may share information with during the award process, we note that the auction rules will prohibit communication with any other interested party from the deadline for submission of applications to the end of the award process. Separately, the auction rules prohibit making public

[38] See page 21 - 22 of Telefonica's response to the draft Information Memorandum

information relating to a party's participation or otherwise in the award process. Whilst eircom notes that in the United States the auctioneer makes the details of the applicants public (so that all applicants know with whom they may not communicate during the prohibited communication period) we do not believe this is necessarily required. Together, the communication rules proposed by ComReg mean that it would be a clear breach of the auction rules to share information with *any* party, other than insiders notified to ComReg, which relates - either directly or indirectly - to their participation or otherwise in the auction process, the bidder's bid strategy or its intended use of the licences to be awarded. Therefore, bidders should participate under the assumption that this information should be kept confidential for the relevant period. To be clear, we do not agree that the rules on communication are impractical as parties do not know who they are barred from communicating with, as they should prevent the disclosure of confidential information regarding the auction to *any* other party. Note that disclosure of valuation relevant information or comments about intended bid strategy to the public domain necessarily constitutes communication to other bidders.

245. In relation to bidders' ability to glean information from the bidding behaviour of others during the open rounds of the auction, and the effect that this ability would have on efficiency of the auction outcome, we note that under the current proposals:

- bidders will have the opportunity to work out their relative valuations for different packages of spectrum before the auction;
- bidders will be able to observe aggregate demand for spectrum in each band in each time slice lot and the development of prices in each of these lot categories (1-6) in each round, with an approximate market clearing price emerging over the course of the primary bid rounds; and
- bidders will be able to refine their valuations of spectrum based on this information and bid accordingly within the limitations of the activity rules.

246. As such, bidders will benefit from price discovery during the auction and will have the opportunity to respond to such information within the primary bid rounds of the auction. Aggregate market information will be available, but not detailed information on the specific bids of each and every bidder. This information is of significant benefit in reducing common value uncertainty, but prevents bidders conditioning their bids on the specific behaviour of one or more rivals (be this to sustain a tacitly collusive outcome or to follow 'predatory' bidding strategies).

247. Turning then to the benefit of knowing the identity or number of other bidders, we consider that the benefit of this information for reducing common value uncertainty, above and beyond releasing information on the aggregate demand at the band and time slice level for every round, is limited. The most relevant information for a bidder wishing to benchmark its own uncertain valuation is market aggregate data that averages out the idiosyncratic influences of any individual bidder's valuation. As such, we do not consider that withholding information regarding the identity or number of other bidders will "*jeopardise an efficient auction outcome*" as bidders will continue to have access to sufficient information to help form their bid strategy and

update valuations based on the level of demand prevailing at round prices in the auction.

248. With regard to Telefonica's comments regarding potential information asymmetries between bidders, we do not agree that the level of asymmetries amongst bidders is hard to predict; rather, we consider that the level of information asymmetries is low. It is likely that all parties will consider that existing mobile operators will participate in the award process with a high probability, and that the participation of bidders that are not existing mobile operators in the market for mobile services in Ireland is less certain. However, the actual participation in the auction is not known with absolute certainty by any party, nor is information on how much spectrum such bidders will bid for. Beyond this, the main source of information will be the market aggregate data released in the primary bid rounds, which will be available to all bidders on an equal footing.

249. While Telefonica notes that in the case of Denmark and the UK, bidder identities are proposed to be released, we do not consider this to be the 'established approach' as it suggests. There are examples of other CCAs where the identity of bidders was not revealed, for example the recent Swiss auction. Further, and as described above, this should not result in a significantly improved ability to gain any further valuation-relevant information coming from the aggregate demand data proposed for release. The decision regarding the transparency during an auction will depend on the specific aims and objectives of the award process, and the relevant market context, and are just one component of a package of features forming the auction rules and thus cannot be considered in isolation.

250. Finally, in relation to Telefonica's comments that the resulting restriction on the ability to publicise its participation in the auction is "*untenable*", we note that the recent Swiss multi-band auction was run effectively despite no announcement of the identity of bidders or indeed a public announcement of the date of commencement of the auction; the first information published in that case was the auction results. We note that Orange, a company operating in the mobile market in several countries, was able to participate in this auction given these rules on information disclosure.

251. In summary, we do not consider that there is a compelling case for modifying the Draft IM to provide information to all qualified bidders about the identity of other bidders in the award process. However, this discussion raises the possibility that ComReg include in the Information Memorandum the facility to provide additional information to qualified bidders, or make public information relating to the auction, at its absolute discretion, in order to ensure the efficient running of the auction and subject to its statutory objectives. This reserve power would permit ComReg to address concerns about potential information asymmetries if associations between bidders led to some, but not all, bidders knowing the identity of some participants. However, in many cases we would expect ComReg to be able to resolve such a situation without needing to use such a power.

3.4 Information made available prior to the main stage of the auction

3.4.1 Proposed rules as stated in the draft Information Memorandum

252. In subsection 4.1.2 of the draft Information Memorandum ComReg proposed that before the start of the main stage of the auction, it would announce the following information to all bidders:

- the round price for each lot category in the first primary bid round;
- the provisional round schedule for the first few days of the auction; and
- the number of extension rights to be granted to each bidder for the primary bid rounds.

253. Furthermore, as previously specified, following the qualification stage, bidders will have already been informed of their individual initial eligibility to bid in each time slice.

3.4.2 Respondents' views

254. Telefonica commented on the information that would be presented to bidders at this point in the auction. Accepting that the application stage will act as the first round in the main stage of the auction, Telefonica was concerned that in the Draft IM ComReg did not propose to notify bidders of the level of demand. Telefonica raised its concern that this would introduce an information gap regarding the first round that would inhibit bidders consideration of subsequent bids in the auction.[39]

3.4.3 DotEcon commentary

255. As the application forms will essentially act as the first round in the main stage of the auction (what we refer to as "Round 0" from this point on), we consider that it would be appropriate to provide an indication of the aggregate demand for lots in each of Lot Categories 1-6 in the auction prior to the start of the main stage of the auction (i.e. in advance of Round 1).

256. Notice that this is *in any case* done by making prices set for Round 1 available before the start of the auction. Because of the rule for increasing round prices based on excess demand, bidders will be able to infer which lot categories are subject to excess demand in Round 0. Therefore, even in the absence of explicitly providing aggregate demand data, bidders would in any case be able to identify which lot categories are facing excess demand based on which round prices are greater than reserve prices. As such, revealing aggregate demand data simply provides bidders with a little more transparency about the level of demand causing the increase in round prices.

257. Nevertheless, we consider that there is no great benefit to withholding aggregate demand data for Lot Categories 1-6 at this point and that ComReg

[39] See page 9 of Telefonica's response to the draft Information Memorandum

might usefully reveal this information via the EAS prior to the start of the main stage of the auction along with round prices for round 1 and all other information proposed in the Draft IM.

3.5 During the auction

258. Throughout the auction process, bidders will remain subject to the provisions of the auction rules and competition law with regard to coordination of bidding decisions with other bidders or sharing of information with other bidders.

259. Bidders will be provided with certain information via the EAS during the auction. In the Draft IM ComReg outlined the information that will be available to bidders during the primary bid rounds, before the supplementary bid round, and at the end of the auction.

3.5.1 Proposed rules as stated in the draft Information Memorandum

260. In the Draft IM, ComReg proposed that, throughout the primary bid rounds, bidders will never be provided with information about the eligibility or specific bidding behaviour of other individual bidders in the auction. Each bidder will only be made aware of its own eligibility, extension rights and its specific bids, and of the aggregate demand for lots in each of lot categories 1 to 6 in the most recently completed round. For the avoidance of doubt, in the Draft IM ComReg proposed that the following information will be available during the primary bid rounds:

- Before the start of the first primary bid round (i.e. Round 1), each bidder will be informed about its own initial eligibility in each time slice, the number of extension rights it holds and the price per lot in each lot category during the first primary bid round. Information about the initial eligibility of individual bidders will not be provided to other bidders.
- At the end of the first and subsequent primary bid rounds, ComReg will release to each bidder information about: the aggregate demand for lots in each of lot categories 1 to 6 in the most recently completed round; and the bidder's own bid in that round, its eligibility in the next round in each time slice and how many extension rights the bidder has remaining.
- Upon scheduling of a further primary bid round, ComReg will provide to each bidder information on: the eligibility of that bidder in the forthcoming scheduled round in each time slice; the number of extension rights the bidder has remaining; and the round price in each lot category for the forthcoming scheduled round.

261. In addition, at the end of the primary bid rounds (that is, the end of the last such round and prior to the start of the supplementary bids round), ComReg will provide information about the demand for party-specific lot categories 7 to 10 to all bidders. For the avoidance of doubt, this information will not be released at the end of any primary bid round other than at the end of the final primary bid round.

262. Whilst not stated in the Draft IM, in line with our comments in subsection 3.4.3 above, we note that, in addition to the information proposed in the Draft IM, before the start of the first primary bid round, the aggregate demand for lots in

each of lot categories 1 to 6 will also be provided to each bidder via the electronic auction system.

3.5.2 Respondents' views

263. In their responses to the Draft IM two respondents provided comment on the level of information available to bidders during the primary bid rounds.

264. Telefonica commented that:

- revealing more complete information about bids in each primary bid round could make it easier for bidders to refine their views on the value of lots during the auction;
- given ComReg's stated (but unsubstantiated) concern about tacit collusion, we view restrictions on transparency of bids as a much more effective and less distorting measure to tackle this issue than setting high reserve prices;
- placing restrictions on round-by-round bid revelation may be an acceptable compromise between bidder's needs for price discovery and regulator concerns about tacit collusion; however, ComReg's proposal is excessively restrictive and undermines this balance.[40]

265. H3GI requested clarification on one particular aspect of the proposal, the information available at the end of the primary bid rounds and prior to the start of the supplementary bids round. In paragraph 4.210 of the draft Information Memorandum, it was noted that at this point, ComReg would provide information about the demand for the party-specific lot categories 7 to 10 to all bidders. H3GI asked, *"Why does ComReg make this information available at this time? What role or function does such information disclosure serve?"*[41]

3.5.3 DotEcon commentary

266. While Telefonica seems to acknowledge that restrictions on round-by-round revelation of bid information are necessary, they consider that ComReg's proposals are "*excessively restrictive*". Revealing more complete information about bids could allow for signalling in the auction and support forms of tacit collusion. We note that ComReg's proposal on the information available during the primary bid rounds will provide bidders with sufficient information to allow them to evaluate their bid strategy throughout the primary bid rounds and is generally consistent with recent and upcoming spectrum auctions throughout Europe. For example, in the recent Swiss auction, and in the proposals for auctions in the Netherlands, Denmark, UK and Australia, there are no circumstances in which any information about the individual bids submitted by other bidders will be revealed during the auction.

[40] See page 21-22 of Telefonica's response to the draft Information Memorandum

[41] See page 27 of H3GI's response to the draft Information Memorandum

267. Similarly, before the primary bid rounds begin, while bidders will be given information on their own eligibility in each time slice, the number of extension rights available and the prices in each lot category, bidders will not be provided with information about the initial eligibility of individual bidders. Again, this is consistent with previous and proposed auctions.

268. We consider that the proposals made by ComReg regarding Information to be made available during the primary bid rounds are consistent with that proposed elsewhere and are necessary to mitigate the potential for tacit collusion in the auction. At the same time, they provide bidders with sufficient information (i.e. the aggregate demand across different lot categories) to reduce common value uncertainty.

269. With regard to H3GI's question on the revelation of information on demand for party-specific lots at the end of the primary bid rounds, we note that the reason for not making this information available during the primary bid rounds is because it could be used as a particularly effective signalling tool by those bidders capable of making a bid on party-specific lots. By displaying demand for party-specific lots, it immediately becomes clear whether the associated bidder intends to liberalise its existing spectrum or not and may thus provide other competing bidders strong information regarding the strategy of that bidder. Therefore, revealing this information is incompatible with the policy of only anonymous, aggregate information being revealed in the primary bid rounds.

270. However, ComReg's proposal to reveal this information following the end of the primary bid rounds is necessary to allow bidders to determine if there are any currently unallocated lots. Such information may be necessary for bidders when calculating the bid amounts for their supplementary bids, according to the strategy they intend to employ. This issue is discussed in Annex 9 of the final Information Memorandum.

3.6 End of the main stage

3.6.1 Proposed rules as stated in the draft Information Memorandum

271. Following the completion of the primary bid rounds and the supplementary bids round ComReg will determine the winning bidders and the base prices to be paid by each winning bidder. In the Draft IM, ComReg proposed that at this point it would announce the outcome of the main stage to bidders.

272. ComReg proposed that at this point:

- the number of lots won by each bidder in each lot category will be released to all bidders;
- in addition, each winning bidder will be told the base price that applies to its own winning bid. This information will not be released to other bidders.

273. Given that there were no specific responses to the Draft IM concerning the information to be released at the end of the main stage, we consider that the proposals made in the Draft IM on this issue should remain unchanged.

3.7 End of the Assignment Round

274. In section 4.5.7 of ComReg document 12/25, ComReg's stated its final position on the assignment round. At the end of the assignment round, ComReg will allow successful bidders a period of two weeks to come to agree and notify ComReg of any re-organisation of the specific spectrum band. The two-week period for each of the 800MHz, 900MHz and 1800MHz bands will run concurrently with each other.

3.7.1 DotEcon Commentary

275. In order to provide a starting point for the Negotiation Phase, following the completion of the Assignment Round, we recommend that ComReg announce the following information to the winning bidder in each spectrum band:

- the identity of the winning bidders in that spectrum band;
- the specific frequency ranges each winning bidder has been assigned in that band in each of the time slices in which a bidder has won lots in the main stage and/or retained GSM spectrum rights; and
- any all additional prices to be paid by winning bidders for specific frequency assignments in that band.

3.8 End of the auction

3.8.1 Proposed rules as stated in the draft Information Memorandum

276. At the end of the auction (that is, once ComReg has determined winning bids for lots in all lot categories and the additional prices for the assignment stage) ComReg proposed that the results of the auction would be announced to all bidders. While ComReg did not intend to reveal all auction data, ComReg proposed that bidders would be provided with the following information:

- the identity of the winning bidders;
- the frequency ranges awarded to each winning bidder;
- the frequency ranges retained as GSM spectrum rights in the first time period, where applicable; and
- the upfront fee to be paid by each winning bidder, including a breakdown of the base price and any additional prices for specific frequency assignments.

3.8.2 Respondents' views

277. There was only one respondent to the draft Information Memorandum that commented specifically on ComReg's proposals for revelation of auction results.

278. H3GI requested that ComReg publish all bids made in the auction. Noting that such an approach is currently proposed in the UK for the auction of 800MHz

and 2600MHz spectrum, H3GI submitted that, as explained by Ofcom "*This is both for transparency purposes and to allow all interested parties to carry out their own verification of the results.*"[42]

3.8.3 DotEcon commentary

279. We consider that the revelation of all bids made in the auction is not necessary and the existing proposals regarding the announcement of results provided to bidders at the end of the auction are sufficient in providing bidders with all the information necessary to conclude the award process.

280. If H3GI's concern is simply with verification of the results we note that it is ComReg's intention is to have a third party verify the results of the auction to ensure that all the information provided to bidders at the end of the auction is correct, based on the bids placed by all bidders during the auction. On this basis, we consider that it is not necessary for full bid information to be published for audit reasons.

281. Furthermore, there may be additional considerations involved with publication of all bids from all bidders made during the auction. Given that one or more bidders may have operations in a number of different countries, and given that there are a number of awards proposed throughout Europe auctioning spectrum in the same or similar bands, revelation of bid strategy and spectrum valuations in one auction may reasonably be opposed by any of the bidders in the auction, to the extent that it could provide indication of bid strategy or spectrum valuations in other jurisdictions, as such bid data could be deemed to be commercially sensitive and/or confidential. On this basis, and given that there is no significant disadvantage of not revealing this information, we consider that ComReg should not reveal information regarding bids submitted during the auction. We note that this approach has been adopted in a number of other auctions, such as the Danish 2.6GHz auction and the recent Swiss multi-band auction.

[42] See page 27 of H3GI's response to the draft Information Memorandum.

4 Main Stage

4.1 Primary bid rounds

282. The primary bid rounds form one part of the main stage. If a main stage of the auction is necessary, there will be one or more primary bid rounds followed by one further round of bidding known as the supplementary bids round. For each primary bid round, round prices for each lot category will be announced by the auctioneer. These round prices will be adjusted from round to round to reflect excess demand in each lot category. In each primary bid round, bidders will be allowed to make a bid for a single package for the amount indicated by the round prices. The primary bid rounds will close when there is no excess demand in any of the lot categories 1 to 6 (subject to certain provisions for exceptional circumstances).

283. In this section, we consider the issues raised by respondents to the draft Information Memorandum ('the Draft IM') in relation to a number of primary bid round features including:

- the schedule for primary bid rounds;
- bid submission;
- round prices;
- extension rights; and
- deposit calls during the primary bid rounds.

4.1.1 Schedule for primary bid rounds

284. Subsection 4.4.1 of the Draft IM sets out full details of the proposed schedule for the primary bid rounds. While we do not repeat the proposals in detail we note that:

- there was no proposed minimum or maximum length for a primary bid round, however ComReg did not anticipate setting primary bid round schedules such that round duration would be less than 30 minutes or greater than two hours (assuming no extensions are triggered);
- all primary bid rounds would be scheduled to run between 9.00 and 18.00 hours on business days assuming that no extensions are triggered;
- there was no proposed upper bound on the number of primary bid rounds that may be run in a day, although ComReg did not anticipate running more than eight primary bid rounds in a single day;
- bidders would be notified of the start time of a primary bid round through the Electronic Auction System ('EAS') at least 15 minutes in advance; and
- even if all bidders had submitted bids prior to the scheduled end of a primary bid round to which no extension has applied, the round would not be closed early.

Respondents' views

285. In its response to the Draft IM, one respondent (Telefonica) provided further comment on the issue of round scheduling. This was in addition to some comments it had previously raised in its response to ComReg document 11/60 on the matter.[43]

286. Telefonica expressed the view that it is important for bidders to have as much certainty as possible over the scheduling of bidding rounds so as to allow management of internal governance processes. While in support of ComReg's proposal that round lengths should not normally be less than 30 minutes or more than 2 hours, it urged ComReg to set clear bounds within which it will make decisions on round scheduling, including:

- a hard cap on the maximum number of rounds per day (e.g. 10 rounds);
- a minimum duration between rounds – Telefonica propose 30 minutes; and
- an indicative timetable to be published at the end of each auction day providing a round schedule for the next day of bidding, with the understanding that scheduled times may slip and that the number of rounds may be reduced in case of use of extensions or other reasons.[44]

DotEcon commentary

287. With regard to Telefonica's request for a hard cap on the maximum number of rounds per day we note that ComReg has already outlined its expectation that it will run no more than 8 rounds per day – a number which is lower than the hard cap suggested by Telefonica. We are not convinced that a hard cap is necessary and note that such a cap has not been placed in recent auctions. For example, in the recent multi-band auction in Switzerland, whilst no hard cap was specified the auction manager stated its expectation that it would run no more than 8 rounds in any one day. [45]

288. However, we consider that it would not be unreasonable to specify a minimum duration between rounds as suggested by Telefonica. While we note that in the Draft IM ComReg proposed to notify bidders of start times for primary bid rounds at least 15 minutes prior to the start, we consider that a minimum period of 30 minutes between the end of one primary bid round and the start of the next primary bid round should be incorporated to allow bidders some certainty regarding the minimum time they will have to prepare between rounds.

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[43] See page 25 of Telefonica's Response to ComReg document 11/60

[44] See page 28-29 of Telefonica's response to the draft Information Memorandum

[45] Federal Communications Commission, ComCom and the Federal Office of Communications, "Auction rules for the combined award of spectrum in the 800MHz, 900MHz, 1.8GHz, 2.1GHz and 2.6GHz bands" 9 November 2011.

289. Further, while Telefonica has indicated its preference for an indicative timetable to be published specifying the round schedule for the next day of bidding, we note that in subsection 4.1.2 of the Draft IM, ComReg proposed that before the start of the main stage of the auction it would announce the provisional round schedule for the first few days of the auction. In addition, we consider that it would be reasonable to provide a provisional schedule for the following day of bidding at the end of each auction day throughout the primary bid rounds. However, given the scope for times to slip as a result of extensions being triggered or exceptional circumstances, the timetable provided will only be as guidance – ComReg should maintain sufficient flexibility to allow it to respond to developments in the auction process and should not be bound to the times specified in the timetable if circumstances change.

290. We consider that the above plans proposed by ComReg with regard to scheduling of the primary bid rounds are sufficient and are generally in line with recent spectrum auctions throughout Europe and those currently under consultation more widely. By adding in a minimum duration between rounds, and by committing to publish an indicative round schedule for each auction day in advance, we consider that bidders will have a high level of clarity surrounding round scheduling and indeed a sufficient level of certainty to assist with internal planning. We do not consider that further detail (save the minimum period between rounds and a commitment to publish an indicative round schedule for each auction day) need be provided in the Information Memorandum, as this is primarily an operational matter when running the auction.

4.1.2 Bid submission

291. Given that there were no specific responses to the Draft IM concerning the process of bid submission in the primary bid rounds, we consider that the proposals made in the Draft IM on this issue should remain unchanged.

4.1.3 Round prices

292. In the Draft IM ComReg outlined how round prices would be set, noting that for each of lot categories 1 to 6 the amount by which the round price would be increased in the case of excess demand is set at ComReg's discretion.

293. ComReg commented that price increments would normally be based on the level of excess demand, and increments may vary across lot categories and across primary bid rounds. In any case, ComReg noted that a cap would be placed on the amount by which the round price would increase from one primary bid round to the next, noting that the increase would be no more than 50%.

294. Further, round prices would be given in units of 1,000 euros and the round price of any lot category would never be reduced during the primary bid rounds.

Respondents' views

295. In their responses to the Draft IM both Telefonica and eircom Group commented on this issue. Respondents commented that:

- '*one of the most significant sources of uncertainty is the rate at which prices may increase, both by round and on each business day. For this reason, bidders typically value clear rules or guidelines for the approach that the auctioneer will adopt on round scheduling and bid increments*' (Telefonica);
- '*we are very disappointed with the proposal regarding bid increments, which we believe exposes bidders to excessive uncertainty over price movements*' (Telefonica);
- '*a cap of 50% of current prices is excessively lax, especially given ComReg's proposal to set reserve prices at levels which reflect the potential market value of the spectrum*' (Telefonica);
- '*we urge ComReg not to fall into the approach taken by some auctioneers of basing bid increments on simple percentages of current prices, without due consideration to the absolute price increases faced by bidders, which may escalate rapidly as current round prices increase*' (Telefonica);
- '*Bidders participating in the auction will need to develop and implement governance procedures and terms of reference to facilitate effective and time sensitive decision making processes during the auction. It may prove very difficult for bidders to develop and effectively implement governance procedures without ComReg identifying more specific guidelines on pricing increments that will be used during the auction*' (eircom);
- '*It is necessary for bidders to be able to estimate future round prices in advance for effective governance to estimate the likely timing of decision points in the auction'* (eircom); and
- '*We request that full details regarding how the bid increments will be calculated be included in the final Information Memorandum*' (eircom).

296. While calling for more details on how the price increments will be calculated, eircom did not provide a specific recommendation of its own, or pass comment on the proposed cap specified in the Draft IM. In contrast, Telefonica commented that ComReg should set clear bounds within which it will make decisions on bid increments, and suggested that ComReg set maximum price increases in absolute terms. The amounts proposed by Telefonica are:

- €250,000 per lot per round; and
- €2,000,000 per lot per day

297. Telefonica further commented that guidance on ComReg's intended approach to price increments would help firms plan how prices may evolve and that ComReg would be able to have flexibility on determining the level of increments "*subject to reasonable notice of any change in approach.*" [46]

[46] See page 30 of Telefonica's response to the draft Information Memorandum

DotEcon commentary

298. Specifying a cap on the maximum price increase per lot category per round ought to provide bidders with some clarity around the rate at which prices may increase during the auction. ComReg's proposed percentage based cap is consistent with other spectrum auctions and at 50%, the cap proposed by ComReg is in fact lower than those proposed for other upcoming (or recently completed) spectrum auctions in Europe. For example, Switzerland, Denmark and the Netherlands all proposed that the round price would increase by no more than 100% round by round. In practice, these hard limits were never reached (or indeed even approached) in the relevant auctions already completed, and much smaller increments were used.

299. However, with regard to the specific case of the Irish auction, DotEcon has considered the respondents' views and believes that a cap of 50% may usefully be lowered somewhat to provide bidders with further clarity on potential price movements during the auction given the strength of the concerns expressed. On this basis we would propose the revision of the policy on round price increases laid out in the Draft IM such that, under normal circumstances, prices per lot category per round will rise by no more than 20%. We do not consider that this would materially affect ComReg's options in conducting the auction.

300. While acknowledging respondents' views surrounding the use of limits on absolute price increases, we consider that a percentage-based cap itself is more flexible and will allow for a more consistent approach to increasing round prices for lot categories with excess demand. Specifying a single maximum absolute price increase per lot per round, as requested by Telefonica, ignores the fact that different lots face different reserve prices and will possibly see further divergence in round prices depending on the patterns of demand that emerge. An absolute cap might limit the ability to increase the price of lot categories most in excess demand and result in categories that are less over-subscribed receiving larger relative price increases than other categories that are more over-subscribed.

301. With regard to a cap on maximum round price increases per day, we again consider that such a cap is arbitrary. There is no certainty that the same number of rounds will be run on one day to the next and there is a possibility that the primary bid rounds will come to a close before the anticipated number of rounds for any one day are run (i.e. the closing conditions are satisfied). In addition, an absolute cap on lot price increases per day could result in a situation where the bidding day has to be 'cut short' if a situation arises where price increases have already reached that cap for that day. While the specific absolute price caps proposed by Telefonica ensure that the round price increases restrict this situation occurring in the case where there are 8 or less rounds per day,[47] if ComReg were required to run an extra round in the day

[47] With an absolute price cap of €2,000,000 per Lot per day, applied evenly across all Primary Bid Rounds in a single day, this means that round prices would be able to rise by €(2,000,000/no of rounds). However, in the case where there are fewer than 8 rounds in any one day, Round Price increases would be restricted by the tighter and pre-specified absolute cap of €250,000 per Lot per round.

then its ability to do so may be restricted by the limits placed by the cap on price increases for that day.

302. Further, we note that the proposed level of maximum increases per lot per round strikes a good balance between providing flexibility to ComReg to progress the auction at a reasonable pace and limiting maximum increases to a level that would mean that corporate governance issues regarding committed expenditure in the auction should not be unduly taxing in the absence of further rules limiting the level of price increases.

303. As such, we consider that a cap on round price increases per lot per day is unnecessary given that there will already be caps on the amount by which round prices per lot can increase per round. Further, we note that no recent (or proposed) auctions implement any cap on maximum round increases per day.

304. In response to eircom's call for further clarification on how exactly round price increases will be calculated, we note that this will be set at ComReg's discretion, and increments may vary across lot categories and across primary bid rounds. Price increments will normally be based on the level of excess demand in that category, but may take into account other factors, such as the extent of excess demand in closely substitutable categories. As specified above, any increases in round prices will be bound by a 20% maximum increase per lot per round.

4.1.4 Extension rights

305. Given that there were no specific responses to ComReg on the issue of extension rights in the primary bid rounds, we consider that the proposals made in the draft Information Memorandum on this issue should remain unchanged.

306. Note that we propose a small modification of the activity rule relating to primary bid rounds which is discussed in subsection 2.3.2 and relevant to the matter of extensions.

307. Here we propose that any bidder who drops to zero eligibility in both time slices during the primary bid rounds will not be able to make any more primary bids or relaxed primary bids. Therefore, once a bidder's eligibility drops to zero, there would be no need for that bidder to enter any further bids during subsequent primary bid rounds (though the bidder would be able to make supplementary bids during the supplementary bids round). This means that such a bidder would not trigger an extension if it did not submit any decision by the round deadline, as no decision would be required.

4.1.5 Deposit calls during the primary bid rounds

308. In the Draft IM it was proposed that during the primary bid rounds, ComReg may give notice to one or more bidders that they will need to increase their deposits to an amount specified by ComReg. This amount would not exceed the highest bid made so far by the bidder in the primary bid rounds and would have to be received by ComReg by the deadline specified (which would be not less than three business days).

Respondents' views

309. Four respondents to the draft Information Memorandum (eircom Group, Telefonica, Vodafone, H3GI) provided comment on ComReg's proposal to call for deposit increases during the primary bid rounds.

310. One respondent (Vodafone) requested further clarification, asking: *"ComReg reserve the right to ask any bidder to increase its deposit up to the level of its highest bid (presumably including one of its 'Binding Supplementary Bids"' and with three days notice. They can suspend the primary rounds while a bidder is doing that. Can ComReg clarify please?"*[48]

311. One respondent (Telefonica) was in support of the proposal on the basis that it would reduce the likelihood of "bidder walk away". However, Telefonica considered that ComReg should provide further clarity regarding thresholds at which the deposit call will be made.[49]

312. Two respondents (eircom Group and H3GI's) were opposed to certain aspects of the proposal. Eircom considered the requirement to be unnecessary and believed that it could prove "*highly disruptive"* to the auction process. Eircom considered that

> *"Deposit calls during an auction are administratively difficult for spectrum regulators and operationally difficult for bidders. They create a completely unnecessary distraction during the auction. They also create potential scenarios where the spectrum regulator is obliged to expel a bidder from the auction for failing to make a deposit call, even though both economic efficiency and revenue maximization would be better served by keeping the bidder in the auction"*[50];

313. H3GI's concern was based on the period of time allowed between being provided with a notification that the deposit would need to be increased, and the deadline by which the cleared funds must be received by ComReg. H3GI stated:

> *"With respect, three Business Days is not sufficient to organise an increase in a bidder's deposit. An increase will require formal shareholder approval by the relevant funder and transfer to ComReg's bank account. Fourteen Business Days is required to organise an increase in a bidders deposit."*[51]

314. Furthermore, eircom Group and Telefonica provided some alternatives or modifications which they believed ought to be considered by ComReg with regard to deposits.

315. Eircom stated a preference for a single upfront deposit that would be set equal to 20% of the estimated final prices of the spectrum for which the bidder is

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[48] See page 12 of Vodafone's response to the draft Information Memorandum

[49] See page 23-24 of Telefonica's response to the draft Information Memorandum

[50] See page 9 of eircom Group's response to the draft Information Memorandum

[51] See page 26 of H3GI's response to the draft Information Memorandum

obtaining eligibility. They considered such an amount would provide sufficient financial security for the duration of the auction and would thus remove the need for deposit calls.[52]

316. In contrast, Telefonica provided specific recommendation on the levels at which deposit calls should be 'triggered' suggesting that this should occur "*in the event that any bidder's highest bid exceeds 200% of their deposit*".[53] Telefonica further considered that bidders should be prevented from placing any bid in the supplementary round which in aggregate exceeds 200% of their standing deposit. Providing justification for its proposals Telefonica noted, "*If the trigger points are defined in advance, then bidders will know their selves as the auction progresses whether they are approaching a trigger and can be prepared.*"[54]

317. Telefonica considered that *"as a minimum"* ComReg ought to include a deposit review point before the commencement of the supplementary round.[55]

DotEcon commentary

318. In response to Vodafone's question, we understand that ComReg will reserve the right to ask any bidder to increase its deposit up to the level of its highest bid up to that point in the primary bid rounds. This does indeed also include any binding supplementary bids (now termed 'chain bids') submitted in conjunction with a relaxed primary bid (though these would typically be for smaller packages than that subject to the relaxed primary bid and so not give rise to the bidder's highest bid amount). Bidders will be given at least three business days from being given notice by ComReg to provide the cleared funds. ComReg should reserve the right not to schedule any primary bid rounds until it has receipt of the increased deposit amount, or the deadline set by it, whichever is earliest. We consider that such an approach is appropriate, providing a balance between allowing ComReg to ensure that deposits remain sufficiently high relative to bids committed throughout the auction and also allowing bidders a reasonable minimum time period to respond. We recommend that ComReg do not schedule any further primary bid rounds until it has successfully received the bidder's increased deposit amount, or until the passing of the deadline for receipt of an updated deposit, whichever comes first.

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[52] See page 9 of eircom Group's response to the draft Information Memorandum. In support of its proposal eircom considered, *"The proposed upfront auction deposits are already extremely high as a percentage of benchmarked auction proceeds for similar spectrum and, without deposit calls, will more than adequately protect the Government from the risk of defaults. Many countries with successful spectrum auctions programmes have never relied on deposit calls. The Deposit Calls provision should be removed from the rules in the final Information Memorandum."*

[53] See page 23-24 of Telefonica's response to the draft Information Memorandum

[54] See page 23-24 of Telefonica's response to the draft Information Memorandum

[55] See page 23-24 of Telefonica's response to the draft Information Memorandum

319. While eircom considers that deposit calls are unnecessary and considers that a single upfront deposit equal to 20% of the estimated final price is sufficient, we submit that it is difficult to predict final lot prices with any certainty prior to seeing how bidding in the auction process evolves; therefore this suggestion is not practical. Second, bidders would be required to submit an upfront deposit along with their application, and as ComReg would not know in advance of this point the packages that bidders wish to bid for, ComReg would not be able to pre-specify a deposit amount based on the estimated final price of the bidder's preferred package, even in the unlikely event that it were able to estimate the final prices of specific lots with any certainty. Third, even if ComReg were able to accurately predict the final prices to be paid, 20% may not be sufficiently high to provide adequate incentives against default; given that the existing proposal is for a bidder's initial deposit to correspond to the sum of the reserve prices of lots requested in its lot application form it cannot be ruled out that eircom's proposal might in fact lead to a lower deposit than is currently proposed. As stated previously, a lower deposit value may result in increased risk of a bidder not meeting the financial commitment relating to a winning bid causing disruption to the auction process.

320. Further, with regard to eircom's comments that allowing for deposit calls during the primary bid rounds *"could prove to be highly disruptive to the ongoing auction process"* and that this requirements is "*unnecessary*", on the contrary, we consider that such a provision is required to ensure that deposits are always adequately high to provide sufficient incentives against bidder walkaway and to provide a suitable remedy in the event of default by the bidder. As the auction progresses and round prices increase, the initial deposit may prove insufficient given the value of the packages that bidders continue to bid for and thus ComReg should retain the power to request bidders to increase their deposit amount where necessary. This does not mean that deposit calls will necessarily occur, but the auction rules must provide for all eventualities, including the possibility of price increases far above reserve prices.

321. Eircom raised the point that "[Deposit calls] *also create potential scenarios where the spectrum regulator is obliged to expel a bidder from the auction for failing to make a deposit call, even though both economic efficiency and revenue maximization would be better served by keeping the bidder in the auction"*. We would consider that this is no worse an outcome than waiting until the auction is complete only to find that the bidder does not have sufficient funds to pay its winning bid and subsequently defaults on this obligation. Indeed, such a situation would have a highly negative impact on the outcome of the auction as there would be potentially unsold spectrum which could otherwise have been bid for and possibly won by other bidders in the auction. Such an outcome would be inefficient and highly undesirable given the importance of this award process for the emergence of advanced mobile data services and the development of the market for these services. Moreover, revenue maximisation is not an objective of ComReg.

322. Noting that there may be some inconvenience associated with deposit calls we acknowledge that it is necessary to provide some period of time to allow a bidder subject to a deposit call to provide the funds necessary to continue participating in the auction process. In the Draft IM ComReg proposes that

bidders be given at least three business days to meet the requirements of a deposit call and that ComReg reserves its right to not schedule further primary bid rounds during this period. We recommend that ComReg do not schedule any further primary bid rounds until it has successfully received the bidder's increased deposit amount, or until the passing of the deadline for receipt of an updated deposit, whichever comes first.

323. While H3GI asserts that it would require fourteen Business Days in order to increase its deposit due to the need for "*formal shareholder approval by the relevant funder and transfer to ComReg's bank account*" we would note that:

- The three business day rule proposed by ComReg is not an upper limit, but a lower bound – that is, the bidder will be allowed "*not less than three Business Days from giving notice*".[56] However, ComReg has discretion over the period of time (above the minimum specified) it allows between notification and the deadline for receipt.
- This grace period for deposit top-up is not intended to provide a window for discussions with shareholders, but rather to provide sufficient time for cleared funds to be transferred to ComReg's bank account. As all bids are binding, bidders need to ensure that they have appropriate authorisations in place *prior to placing a bid* and before deposit calls occurring.[57] Accordingly, the only effect of a deposit call is to bring forward by a short period of time the transfer of funds that the bidder has already committed to paying. This should not present insurmountable corporate governance issues. Moreover, it should be possible to anticipate funding requirements given the bidding strategy and valuations that a bidder adopts.

324. However, we consider that it may be useful to provide further clarity on when bidders will be required to increase their deposits to allow bidders to anticipate the deposit call with a greater level of certainty and so begin taking the necessary steps to gain approval from high-level decision makers within their organisation. We note that Telefonica suggested that specific 'trigger points' should be defined in advance of the auction in order to minimise disruption. We consider that while we should not specify hard caps, there are benefits to providing some further clarity to bidders in advance of the auction. This may in part assist bidders in being aware of when they are likely to need to undertake the necessary internal processes in anticipation of a deposit call, so that the process is already underway in advance of official notification by ComReg.

325. We would consider that an appropriate 'trigger point' would be that where a bidder's deposit falls below 50% of their highest bid placed in the auction so far, ComReg would reserve the right at any time to require that such a bidder increase its deposit to at least 50% of its highest bid. In the case of a bidder

[56] See paragraph 4.114 of the draft Information Memorandum

[57] See paragraph 4.95 of the draft Information Memorandum

that is in the course of a restructuring process ComReg could also reasonably reserve the right to make such deposit calls as it deems appropriate.

326. However, in response to Telefonica's suggestion that bidders should be prevented from placing any bid in the supplementary bids round which in aggregate exceeds 200% of their standing deposit, we would consider that such a requirement may be overly restrictive on the amounts that bidders can place on their supplementary bids. Given the fact that the supplementary bids round is a single round, there would be no opportunity for bidders to increase their deposits mid-round and as such may find they are unable to make the bids they wish to place. However, if after the supplementary bids round there is at least one bidder whose deposit is less than 50% of its highest bid, ComReg should consider reserving the right to issue a deposit call for one or more deposits to be topped up to at least 50% and up to 100% of a bidder's highest bid before the announcement of the results of the main stage of the auction. In this case, ComReg would not release the results of the main stage until it has received the funds required, or the deadline set by ComReg has passed and it is clear that the bidder is unable to satisfy its deposit call. If at this point a bidder did not top up its deposit to the required level, that bidder could be excluded and the auction outcome calculated excluding such a bidder's bids.

327. In summary, we would consider it necessary for ComReg to maintain its proposal to allow for deposit calls during the auction. However, we believe that there are benefits to providing some further clarity around the point at which ComReg may make such a request. We consider that a bidder's deposit should not normally fall below 50% of their highest bid placed in the auction so far. ComReg should reserve the right to require such a bidder with an existing deposit falling below this level to increase its deposit to at least 50% of its highest bid placed in the auction so far. ComReg should only issue a deposit call between rounds, and where it does issue such a call it should reserve the right not to schedule any further rounds in the period provided for the deposit call to be satisfied. The auction will progress following receipt of the funds required, or passing of the deadline set by ComReg, whichever comes first. In addition, bidders may be required to increase their deposits following the supplementary bids round to ensure that the deposit held by ComReg covers up to 100% of the highest bid made by the bidder. In this case, ComReg should not release the results of the main stage until it has received the funds required, or the deadline set by ComReg has passed, whichever comes first. In the case of a bidder that is in the course of a restructuring process ComReg could also reasonably reserve the right to make such deposit calls as it deems appropriate.

4.2 The supplementary bids round

328. Following the end of the final primary bid round the main stage will include one further round of bidding - the supplementary bids round. The supplementary bids round allows bidders to bid for multiple packages of lots including packages that they may not have bid for in any primary bid round. However, such bids are still subject to the spectrum caps and the initial eligibility of the bidder. Furthermore, the amount of any supplementary bid (other than for the final primary package) will be subject to activity rules.

329. In subsection 4.4.2 of the Draft IM, ComReg outlined the detailed auction rules for the supplementary bids round which, in addition to the restrictions on bid amounts,[58] outlined the following rules in detail:

- Schedule for the supplementary bids round;
- Bid submission; and
- Validity of supplementary bids.

330. In this subsection we consider the views of respondents on these issues as submitted in their responses to the Draft IM.

4.2.1 Schedule for the supplementary bids round

331. The Draft IM proposed that the start time and duration of the supplementary bids round would be announced by ComReg after the completion of the primary bid rounds, and that there would be at least one clear business day between the last primary bid round and the start of the supplementary bids round.

332. While maintaining discretion over the start time and duration of the round, ComReg anticipated that the round would take place between 9.00 and 18.00 hours on a single business day, and last for at least 3 hours and no more than 6 hours. Furthermore, a single extension right would be available to all bidders in the supplementary bids round, and where relevant would not be longer than 30 minutes.

Respondents' views

333. In their response to the Draft IM, one respondent stated their support for the schedule arrangements for the supplementary bids round. In particular, Telefonica expressed its support for the proposals to:

- '*Schedule at least one clear business day between the final primary round and start of the supplementary round, and between the supplementary round and the assignment round. It should be noted that this time might need to be extended in the event of a deposit call*'; and
- '*Schedule the supplementary round with a minimum duration of 3 hours*'.[59]

334. Further, in a letter to ComReg dated 13 March 2012[60] Telefonica provided further views on the time between auction stages. Telefonica commented that, in the auction proposed by ComReg, "*a practical matter arises whereby a number of significant decisions must be made by all bidders when submitting the supplementary round bids.*" Telefonica noted that given the complexity of the

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[58] In Sections 2.2 and 2.4 of this report, we have addressed issues relating to the restrictions on bid amounts for supplementary bids and we do not consider the issue further here

[59] See page 29 of Telefonica's response to the draft Information Memorandum

[60] although sent to ComReg on 13 April 2012

auction, "*a minimum of five working days is required between conclusion of the primary clock rounds and submission of the supplementary round bids.*"

335. No other respondents raised any concerns regarding the issue of the supplementary bids round schedule.

DotEcon commentary

336. Telefonica is the only respondent to pass comment on this issue, and while initially supporting the proposals put forward by ComReg in the Draft IM relating to the scheduling of this round it now proposes a significant extension of the minimum time required between the completion of the primary bid rounds and the start of the supplementary bids round.

337. Although Telefonica provides the "*complexity of the auction*" as its reasoning behind this proposal, we believe that a balance must be struck between allowing bidders a sufficient amount of time to consider the supplementary bids they may wish to place and unnecessary delay of the progression of the auction.

338. However, given that bidders will have to consider a potentially large number of bids and the resulting restrictions on bids as a result of the final price cap and the relative caps, we believe that bidders may benefit from a guaranteed period of time greater than one business day between the end of the primary bid rounds and the supplementary bids round.

339. We note that bidders will have access to the supplementary bids editor within the EAS throughout the primary bid rounds. In the supplementary bids editor, bidders will have access to the following information regarding its own bids:

- its current highest bid for each package X for which a bid has been submitted by it in the auction to that point;
- for each package X, the package Y constraining the permitted bid amount for X (where relevant); and
- the minimum and maximum supplementary bid that may be submitted for each package bid on to that point given all bids submitted in the auction so far.

For the avoidance of doubt, bidders will only be presented with information regarding their own bids, and will not be provided with any information about the bids submitted by other bidders in the auction.

340. This information will be updated with information from a round once the round results are released. Bidders will also be able to enter other packages not bid on in the auction so far into the supplementary bids editor at any time throughout the auction and the same information will be provided for these packages. Once the results of the final primary bid round are released, the supplementary bids editor will be updated to reflect the minimum and maximum bid information that will apply during the supplementary bids round.

341. Until the supplementary bids round is in progress, although bidders will not be able to submit bids, the supplementary bids editor will allow them to check the validity of bids and their consistency with the auction rules.

342. We recommend that ComReg allow for a period of at least 3 business days between the end of the primary bid rounds and the start of the supplementary bids round. We consider that this amount of guaranteed time between the final primary bid round and the supplementary bids round should provide bidders with sufficient time to consider the supplementary bids they wish to submit and to use the supplementary bids editor of the EAS to check the validity of these bids. Further, it may be prudent to extend the minimum duration of the supplementary bids round to at least 6 hours allowing bidders much longer to submit their supplementary bids. These proposals would provide a guaranteed minimum of nearly four business days in total for bidders to consider and submit supplementary bids in the auction.

4.2.2 Bid submission

343. In the Draft IM, ComReg proposed that lots in all lot categories would be available for bidding on in the supplementary bids round subject to:

a) the restriction that only the appropriate bidder may bid on lots in a party-specific lot category;

b) the general provisions of the spectrum caps;

c) no package having activity exceeding the bidder's initial eligibility.

344. A bidder may submit only one bid form in the supplementary bids round. However, this may list many bids on different packages. ComReg proposed that a bid form may consist of bids for up to 2,000 packages (including those packages on which bids were submitted during primary bid rounds). ComReg also noted that while the bid amount associated with each supplementary bid is discretionary, it would be subject to the restrictions (as described in subsection 4.4.2 of the Draft IM and discussed in detail at Sections 2.2 and 2.3 of this report) and would be in units of 1,000 euros.

Respondents' views

345. In its response to the Draft IM, eircom Group provided comment on the number of packages that a bid form may contain. eircom commented that while bids for 2,000 packages seem large enough to satisfy bidders in the auction, it is a concern for bidders who have spectrum that is subject to early liberalisation options. Furthermore, it noted that it has twelve different release scenarios, and should it bid to liberalise its GSM spectrum eircom would effectively have only 166 bids per release scenario whereas bidders without any release options, or bidders with less release options, are advantaged in the auction since they can take advantage of more bids per release scenario.[61]

346. eircom considered that there would be no additional computational burden on ComReg (or its auction consultant) as a result of increasing the number of supplementary bids permitted by a bidder subject to multiple potential release scenarios because the winner determination and second pricing procedures

[61] See page 9-10 of eircom Group's response to the draft Information Memorandum

only consider bids that correspond to a particular release scenario per bidder, not the total number of bids per bidder. eircom Group recommended that the cap should be restated in terms of bids per release scenario per bidder, not the total number of bids per bidder, and provided the following options as examples:

- Bidder without existing holdings in T1: 2,000 bids
- eircom Group (12 release scenarios): 12*2,000 = 24,000 bids
- Vodafone and O2 (3 release scenarios): 3*2,000 = 6,000 bids[62]

347. However, whilst observing that, owing to the inclusion of party-specific lots, the number of theoretical package bid options varies by bidder, with the implication that the cap affects bidders differently, Telefonica supported the proposal for a common cap of 2,000 bids on the basis that this should give all bidders sufficient flexibility.[63]

DotEcon commentary

348. In response to the comments raised by eircom, we note that the maximum number of supplementary bids that would be permitted, as presented in the Draft IM, was intended to be set much higher than the level bidders would realistically wish to use. Therefore, we would not expect the cap to 'bite'.

349. Considering the approach suggested by eircom, different caps on the number of bids per bidder in the auction raises issues of fairness. Based on eircom's suggestion some bidders would be allowed to make up to 12 times more supplementary bids than bidders without early liberalisation options. While we acknowledge that there should be a reasonable level of certainty that bidders with several different release scenarios can express the breadth of its demand fairly comprehensively, it would be difficult to justify such asymmetric application of auction rules.

350. On this basis, we consider that if this cap is set sufficiently high we would not need to differentiate between bidders given the significant degree of flexibility afforded by allowing for a maximum number of bids that is a reasonable degree greater than any bidder may be expected to require in practice.

351. In addition, in terms of practicalities in the auction, there are limits on the number of supplementary bids that can be submitted in terms of reasonable system load and the time required to upload, check and process bids. However, we do not anticipate these practical constraints being relevant at the currently proposed limit of 2,000 bids or indeed if this limit were increased somewhat.

352. In the light of the comments received, we would recommend that ComReg permit a greater number of supplementary bid packages than that currently proposed in the Draft IM, as this accommodates the concerns expressed

[62] See page 10 of eircom Group's response to the draft Information Memorandum

[63] See page 28 of Telefonica's response to the draft Information Memorandum

without creating any significant practical problems. We consider that allowing for a maximum of **3,000** packages should provide sufficient flexibility for all bidders in the supplementary bids round to express their demand comprehensively.

353. We note that recent auctions place (or propose to place) the following restrictions on the number of supplementary bids allowed in the supplementary bids round:

- Switzerland = 3000 packages
- Australia = 500 packages
- Netherlands = 2000 packages

These auctions included or will include multiple lot categories and, as such, represent auctions where the number of alternative packages that bidders may wish to bid for is large. As such, we consider that our recommendation is consistent with norms in similar awards.

4.2.3 Validity of supplementary bids

354. Given that there were no specific responses to ComReg on the issue of validity of supplementary bids, we consider that the proposals made in the Draft IM should remain unchanged.

5 Winner and price determination

355. Details of the winner and price determination were outlined in the Draft IM and subsequently clarified in Annex A of our most recent report for ComReg (document 12/24). The description provided in Annex A of ComReg document 12/24 presented a revised and detailed description of the winner determination and pricing method correcting for a previously identified deficiency.

5.1.1 Respondents' views

356. In a supplementary response to the Draft IM submitted to ComReg on 12 March 2012, Vodafone provided a number of further comments in relation to the proposed winner and price determination, namely points 2, 3 and 4 of its response.

357. Vodafone submitted that:

- Additional lots for sale can lead to a lower value outcome – Vodafone described what they considered to be a "*surprising*" property of the auction arising from the opportunity for incumbent operators to bid to liberalise existing holdings. Providing a simple example, Vodafone suggested that in some cases, an increase in the number of generic lots available would lead to a lower value outcome of the auction. Vodafone asked, "*Can ComReg confirm if it was previously aware of the feature of the auction design, which has the potential to lead to what be regarded as counter-intuitive and unsatisfactory outcomes from the perspective of total amount of spectrum awarded and total revenue raised from the auction process?*";[64]
- Adding liberalised lots to the spectrum supply when calculating opportunity costs – Vodafone note a "*subtle difference*" between the way that prices are determined as specified in the Draft IM relative to those presented in ComReg document 11/58, namely the way that the minimum total price is computed for each subset of winning bidders. Vodafone asked, "*Can ComReg explicitly confirm that, under the new rules, the supply of generic lots is not increased by the number of liberalised lots when computing the opportunity cost for a subset of winning bidders? If so, is the reason for this change as we have described – to avoid the possibility of negative opportunity costs?*";[65] and
- There is an equivalent algorithm for winner and price determination that is in general much faster – however, Vodafone note that this is mentioned only "*in case it is useful to ComReg and we are not asking for any information or action on this specific issue*".[66]

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[64] See page 3 of Vodafone's supplementary response to the Draft IM

[65] See page 4 of Vodafone's supplementary response to the Draft IM

[66] See page 4 of Vodafone's supplementary response to the Draft IM

358. Further, in a letter to ComReg dated 13 April 2012, H3GI passed comment on Vodafone's supplementary response. In relation to the Vodafone comments provided above, H3GI stated its disagreement with and support for, the first and second comments respectively. In particular, in relation to Vodafone's comments that additional lots for sale can lead to lower value outcome, H3GI noted that this feature of the price rule is neither counterintuitive nor unsatisfactory. H3GI commented further that *"the feature represents the intention that if existing license holders want to win their party-specific lots they must pay a price equivalent to what they would have paid for the licenses in fair competition with the other bidders."* Then, in relation to Vodafone's comments relating to adding liberalised lots to the spectrum supply when calculating opportunity costs, H3GI stated its agreement with Vodafone's main point. However, H3GI notes on this point that *"[p]resumably, this has however already been done by DotEcon in ComReg document 12/24."*

359. Finally, in a supplementary response to ComReg 12/25, in a letter dated 2 May 2012, Telefonica sought clarification on the determination of opportunity cost. Telefonica provided a simple example in which a bidder, bidder A, denies another bidder, bidder B, liberalisation of its party-specific lots. Specifically, Telefonica stated that "*Bidder A wins a particular package of lots in the main stage of the auction. Bidder B in this example is entitled to bid to liberalise existing party-specific lots. It is possible that Bidder A's winning bid prevents Bidder B from winning a package that includes liberalised lots. In this case, it seems that ComReg will determine the price to be paid by Bidder A by reference to opportunity cost or the net value denied to other bidders. ComReg has not stated whether in this case the calculation will include the full value of the opportunity cost associated with the denial of liberalisation of Bidder B's party specific lots.*"

5.1.2 DotEcon commentary

360. In relation to the first of Vodafone's questions, we note that H3GI is correct in noting that this feature is present to ensure that bidders wishing to gain party-specific lots only win if they are willing to pay a price that would otherwise be achieved on the open market. We do not consider that the outcome of the auction under this rule would lead to *"counter-intuitive and unsatisfactory outcomes"* from the auction process. Further, we note that revenue maximisation is not one of ComReg's objectives.

361. In relation to the second of Vodafone's questions and for the avoidance of doubt, at paragraph 261 of ComReg document 12/24 DotEcon stated that *"we have identified a deficiency in the detail of the pricing algorithm described. In particular, at present, the calculation of opportunity costs is achieved by the hypothetical elimination of one or more bidders and then the recalculation of the winning bidders. When recalculating the winning bidders, it is important that the supply scenario – the situation with regard to the allocation of party-specific lots, determining the total number of lots available – is not changed to an alternative scenario that was initially infeasible when the winning bids were originally determined. At present, the Draft Information Memorandum suggests that the supply scenario should be reoptimised along with the winning bids in these hypothetical situations without any further constraint, which is incorrect."*

362. Annex A of ComReg document 12/24 went on to provide further clarification of the pricing methodology with party-specific lots and thus provides the

necessary detail in relation to the calculation of winner determination as implemented through the expression of notional release scenarios.

363. With regard to the 're-optimisation recipe', we propose a slight modification that should better reflect the opportunity cost for a set of winners. In ComReg document 12/24, DotEcon summarised the re-optimisation recipe as follows: *"In order to define opportunity cost for a set of bidders S, we need to specify the procedure to be used for calculating $V(I \backslash S)$, the counterfactual value on excluding the bidders in S and re-determining the winning bids. The procedure described below conforms to the three principles discussed above:*

- *that the notionally released lots of the bidders in the set S, (whose opportunity cost is being calculated) should be available for allocation within the relevant release scenario to all bidders not in the set S for excluded bidders;*
- *that the release of existing spectrum corresponding to party-specific lots won by bidders not in the set S should be re-determined in this counterfactual situation, but subject to the requirement that only notional release scenarios that were initial feasible (i.e. feasible in the original determination of winners) will be considered;*
- *we maintain a requirement that any bidders not in the set S notionally releasing spectrum win back a package including this spectrum (as in the initial determination of winners)*."

364. The last bullet point suggests that we would, similar to the original winner determination, find the winning combination of a relevant scenario first, check that the releasers which are included in the re-optimisation win their liberalised lots back and, only if this is the case, consider this relevant scenario in the determination of the re-optimised value.

365. Yet, such a pricing rule can lead to negative Vickrey prices for individual bidders when there exists a coalition of releasers which need to jointly pay enough to outbid a third bidder on their liberalised lots. However, the determination of their joint opportunity cost is correct and will require them to pay jointly the third bidder's bid for their liberalised spectrum. A simple example illustrates this.

366. Suppose that there are four bidders, with bids submitted as shown below. There are six lots for award that are available to all bidders with a reserve price of zero. Bidder A and Bidder B have existing spectrum and make a bid to liberalise this spectrum within bids to each acquire an additional lot. Bidder C and D are only interested in 3 lots and 4 lots, respectively.

Bidder	Open lots (6 available)	Bidder A specific lots	Bidder B specific lots	Bid amount
A	1	1	0	6
B	1	0	1	5
C	3	0	0	10
D	4	0	0	15

367. There are four notional release scenarios according to whether or not bidder A and B notionally release their bidder-specific lots. These are shown in the table below. The winning outcome is that A and B each liberalise one lot and win one additional lot and D wins four lots.

Scenario ID	A releases	B releases	Notional supply	Winning bids for scenario	Feasible?	Value
0	0	0	6	4 lots to D	Yes	15
1	1	0	7	4 lots to D, 3 lots to C	No	25
2	0	1	7	4 lots to D, 3 lots to C	No	25
3	***1***	***1***	***8***	***4 lots to D, 2 lots to A, 2 lots to B***	***Yes***	***26***

368. There are only two feasible release scenarios, scenario 0 and scenario 3. The latter generates a higher value and is thus the winning scenario.

369. To determine the individual opportunity cost of bidder A using the suggested method above, we would exclude this bidder's bids and re-optimise over the initially feasible scenarios in which bidder A does not notionally release more than it won. The following table summarises the re-optimisation when excluding bidder A.

Scenario ID	A releases	B releases	Notional supply	Winning bids for scenario	Feasible?	Value
0	***0***	***0***	***6***	***4 lots to D***	***Yes***	***15***
3	1	1	8	4 lots to D, 3 lots to C	No	25

370. In the re-optimisation, scenario 3 is now infeasible, as the releaser that is included in the re-optimisation, bidder B, does not win its liberalised lot back in this scenario. The only feasible scenario in the re-optimisation is thus scenario 0. The Vickrey price for A would then be 6 - (26 -15) = -5. Similarly, when

bidder B is excluded, the re-optimised value falls to 15 as release scenario 3 becomes infeasible in the re-optimisation (as A does not win back its liberalised lot) and bidder B's Vickrey price would thus be 5 - (26 - 15) = -6

371. Note that when both bidders are excluded to determine their joint opportunity cost, scenario 3 will remain feasible in the re-optimisation. The following table summarises the re-optimisation when both bidders are excluded in the re-optimisation.

Scenario ID	A releases	B releases	Notional supply	Winning bids for scenario	Feasible?	Value
0	0	0	6	4 lots to D	Yes	15
3	***1***	***1***	***8***	***4 lots to D, 3 lots to C***	***Yes***	***25***

372. A and B would thus be required to jointly pay bidder C's bid as their joint opportunity cost is 6+5 - (26 - 25) = 10.

373. The Vickrey prices that are determined in this way take into account the fact that a winner's bid may actually make the liberalisation bidder-specific lots of another winner feasible. In the example above, bidder A's liberalisation is only feasible because it can jointly outbid bidder C with bidder B and vice versa. The Vickrey price of B therefore would take into account the loss in value from liberalisation of lots that were made possible by bidder B's bid. In this example, the additional value created from that is bidder A's bid (6) which is why bidder B's Vickrey price is -6. Similar considerations apply to bidder A's Vickrey price.[67]

374. However, the Vickrey price for a winner should always reflect the counterfactual of simply withholding this winner's lots and not re-optimising at all. In order to represent the alternative of simply withholding the liberalised lots when excluding a bidder, the re-optimisation needs to be run with the additional requirement that in any relevant scenario over which we re-optimise, the relevant releasers win their liberalised lots back. This can be achieved by changing the re-optimisation within the relevant scenarios. Instead of checking after the re-optimisation whether the included releasers win their liberalised lots back, we will require that they win one of their bids for liberalised lots back in the re-optimisation. In other words, we will optimally select one winning bid for each of the included bidders subject to the requirement that the winning packages can be satisfied from the notional supply in the scenario and that all releasers which are included in the re-optimisation and who release spectrum in the scenario win it back. All other bidders included in the re-optimisation are allocated optimally one of their compatible bids for this scenario which may be the zero bid.

[67] This argument can be extended to the joint opportunity costs of sub-groups of coalitions of winners. Also, it is possible to create similar situations for coalitions of releasers and non-releasers.

375. In the example above, the winner determination would still be the same. To determine the individual opportunity cost of bidder A using the updated method, we would exclude this bidder's bids and re-optimise over the initially feasible scenarios in which A does not release more than it won. In release scenario 3, we would require bidder B to win back its release. The following table summarises the re-optimisation when excluding A.

Scenario ID	A releases	B releases	Notional supply	Winning bids for scenario	Value
0	0	0	6	4 lots to D	15
3	***1***	***1***	***8***	***4 lots to D, 2 lots to B***	***20***

376. The Vickrey price for bidder A would then be 6 - (26 - 20) = 0. Similarly, when bidder B is excluded, the re-optimised value will be 21 and its Vickrey price would therefore be 0. When both bidders are excluded in the re-optimisation to determine their joint opportunity cost, we will find the same answer as before. They both need to jointly pay bidder C's bid (10).

377. Turning then to Telefonica's question, we note that if a bidder A denies another bidder, bidder B, the liberalisation of a particular combination of lots, bidder B's unsuccessful bids for this particular combination of party-specific lots will not be taken into account when determining bidder A's opportunity cost in this particular example. This is because bidder A has rendered the notional release scenarios which are related to this particular combination of liberalised lots infeasible as it prevents bidder B from winning back its lots on a liberalised basis. In general, only feasible notional release scenarios will be taken into account when (joint) opportunity cost is determined.

5.1.3 Tie-breaking

378. The Draft IM provided for a tie-breaking rule in the winner determination. In the event of a number of tied winning scenarios, a selection would be first made to maximise the number of party-specific lots awarded. If tied optimal scenarios still remained, one would be selected at random. The winning combination of bids is the solution to the winner determination problem for the winning scenario. In the event of there being multiple winning combinations of bids, we only consider outcomes in which every bidder notionally releasing spectrum wins at least this. Ties amongst these combinations would then be broken randomly. This approach ensured that existing spectrum holdings of GSM licensees would always be liberalised where there was no efficiency loss.

379. In order to buttress the activity rules, we propose a slight modification to the selection of the winning combinations of bids for the winning scenario. We propose that in the event of there being multiple winning combinations of bids for the winning scenario, we consider outcomes in which every bidder notionally releasing spectrum wins at least this. Ties amongst these combinations are then broken by first maximising the number of bidders winning packages that contain at least as many lots in each category as bid for

in the final primary bid round. If a tie still remains, this is broken at random amongst the remaining winning combinations of bids (having applied the previous criteria).

5.1.4 Software for winner determination and pricing

380. A technical description of this update to the price determination will be available in a technical annex to the Information Memorandum.

381. In order to allow interested parties to familiarise themselves with the winner and price determination for the main stage of the auction, we will make available a beta version of the winner and price determination software on ComReg's website following the presentation on the award process and auction rules.

382. The winner and price determination software can only be used with a 64bit version of Ubuntu Linux 10.04 LTS. The software should only be run on a machine with a processor that contains at least 4 cores and 16GB of RAM. We recommend the use of a machine with a processor that contains eight cores and 64GB of RAM for running very complex cases.

6 Process overview and indicative timeline for the award process

383. In Section 3.2 of the Draft IM, ComReg provided an overview of the award process with regard to the various stages that may be required including the application stage, qualification stage, main stage, assignment stage and the notification and grant stage. Further, at Table 9 of the Draft IM, ComReg proposed a timeline with indicative milestones for the award process.

6.1 Respondents views

384. In their responses, three respondents (eircom, Vodafone and H3GI) provided comments on the timetable provided in the Draft IM.

385. Vodafone and H3GI welcomed the information provided by ComReg with regard to an indicative timeline and considered that this gave further clarity around the steps in the process and the timeline expected for the award process. While H3GI noted that ComReg's analysis is still on-going, Vodafone acknowledged that specific dates could not have been given along with the Draft IM due to the need for ComReg to consider all submissions from respondents in relation to ComReg document 11/60 and the Draft IM itself. eircom Group commented that ComReg should establish a high level project plan incorporating the information published in the Draft IM, but indicating a best estimate of the commencement date 'X', given its significance.

386. While welcoming ComReg's provision of an indicative timeline, respondents passed comment on the specific time periods provided for each step of the process, and where relevant, suggested revision of the timing.

387. Generally, Vodafone considered that, *"the timelines set out for the process steps are unrealistically short and unlikely to be met. If these demanding timelines are adhered to then Vodafone considers that they are unlikely to provide sufficient time for prospective licence applicants to provide effective feedback, obtain necessary clarification, or make optimal preparations to participate in the auction stages".*[68]

388. Further, Vodafone submitted that "*it is essential that ComReg ensure that there is a full understanding by all Interested Parties of how the auction format will operate, and the issues for bid management that could arise, significantly in advance of the commencement of the auction…"*.[69] In addition, Vodafone provided specific comments on the timing of particular milestones:

- the two week period envisaged by ComReg for Q&A on the award process, following the publication of the final Information Memorandum, is too short and should be extended to 4 weeks;

[68] See page 4 of Vodafone's response to the draft Information Memorandum

[69] See page 3 of Vodafone's response to the draft Information Memorandum

- ComReg should schedule at least one mock auction session well in advance of the actual auction; and
- ComReg should make clear the timeframe that will be given for examination of bidding materials and access to the EAS. Due to the high level of auction complexity proposed, Vodafone believes that up to three weeks may be required.[70]

389. Similarly, in a letter to ComReg on 12 December 2011, eircom Group raised concern with the currently proposed timeline, namely that the mock auction is scheduled only one week prior to commencement of the start of the auction. eircom proposed that, "*Interested Parties should be afforded an early opportunity to familiarise themselves with the auction software in order to ensure that their understanding of the auction mechanism, gleaned from the written material matches, the actual mechanism…As such we request that additional mock auctions be scheduled to take place for Interested Parties very soon after publication of the final Information Memorandum.*"

390. H3GI also proposed some revised timing, and produced a revised version of the table relating to the indicative timeline provided by ComReg. In its revised version of the timeline, H3GI proposed that ComReg allow an extra week before the 'Deadline for submission of Application Forms and Deposits' meaning that the timing for such a stage would fall 8 weeks after the publication of the IM rather than 7 weeks. Subsequently, all other milestones would be shifted by an additional week such that the time permitted between each milestone would remain as proposed by ComReg in the Draft IM.

391. Furthermore, Vodafone considered that ComReg should provide public notification of the specific start dates of the main stage and assignment stage at least 14 weeks in advance of the date for which they are scheduled. Vodafone considered that 14 weeks is the minimum time necessary for interested parties to prepare for auction stages, if required.[71]

6.2 DotEcon commentary

392. Following consideration of the views of respondents presented above, and the indicative timetable set out by ComReg in Section 3.2 of the Draft IM, we consider that the award process may benefit from a number of minor revisions relative to the timetable presented in the IM.

393. We recognise that interested parties may benefit from a period following the publication of the IM to submit their questions regarding the award process of longer than 2 weeks. If extra time were to be provided at this point, respondents would have more time to consider the information on the award process and the detailed auction rules provided in the final IM so as to allow a full assessment of any further clarification points that may reasonably be required. Therefore, there would be benefit in making this extra time available,

[70] See page 4 of Vodafone's response to the draft Information Memorandum

[71] See Vodafone's response to the draft Information Memorandum

subject to this not affecting the rest of the timetable for the award process. We note that respondents have been relatively modest in their requests for additional time for Q&A.

394. On this basis, we consider that ComReg should consider allowing an additional 2 weeks for interested parties to submit questions regarding the award process. For the avoidance of doubt, this would mean that interested parties would have a total of 4 weeks following the publication of the IM in which they could submit questions to ComReg. Responses to these questions could then be published on ComReg's website within 2 weeks, leaving the rest of the timetable unchanged. It should be noted that responses to questions may be published before this date, and this would be the case in particular for questions submitted early in this process.

395. We also consider that H3GI's request for an extra week before the deadline for submission of application forms and deposits could be met without significant impact on the overall timetable. Given this, we recommend that the deadline for application forms and deposits be set 8 weeks following publication of the final IM.

396. We believe that these adjustments will provide potential bidders sufficient time to ensure that they fully understand the auction rules and how the auction format will operate. In addition, the presentation to interested parties, the distribution of bidder material and the opportunity for a mock auction should provide plenty of opportunity for bidders to consider the auction format and prepare for the auction.

397. However, having considered the responses to the Draft IM we recommend ComReg revise the timing of some of these milestones so as to allow bidders access to bidder material and the auction system as soon as is appropriate. Given that the final IM has been published alongside this document, it is not possible to hold any mock auctions prior to its publication. Furthermore, we consider that bidders ought to have sufficient time to attend the information presentation and process the responses to any questions they may have raised before a mock auction is held. However, we agree that given the auction rules, and that an open auction such as that proposed has not been held in Ireland before, bidders could benefit from the holding of a mock auction in advance of the main auction and that such a mock auction should take place at the earliest opportunity. Given that access to the EAS in the form of a mock auction would usefully be restricted to qualified bidders only, we consider that such an event can only occur following the deadline for applications. As can be seen in the revised timeline proposed in Table 15 below, we suggest that a mock auction be run 2 weeks following the deadline for applications, that is, 10 weeks following the publication of the final IM. This would mean that bidders would have access to the EAS and gain first hand experience of how to use the system and what it will look like in advance of the auction itself. Given the proposed notification to bidders in week 13 and at least a 2 week notice period would be given to bidders prior to the start date of the auction, this would mean that the mock auction will occur at least 4 weeks in advance of the auction, a time period we consider to be sufficient for the purposes stated above.

398. Given that bidder materials will be made available for the mock auction, the newly proposed timeline allows bidders a minimum of 4 weeks to examine the bidding materials (which will include a detailed manual with instructions of how to use the system, including screen shots of what the bidder will see) prior to the beginning of the main stage of the auction. This provides potential bidders longer than the minimum period of three weeks proposed by Vodafone, and we consider this should give bidders sufficient time to study the material and use their experience of the EAS to prepare for the main stage of the auction (if required).

399. Further, we have added a number of additional milestones that were not included in the equivalent table presented in the Draft IM. For example, following the discussion provided in Section 3.2 of this report on the information policy that will be in place during the award process, we note that the restrictions on communication between interested parties will come into force at the time of deadline for submission of application forms.

400. Our proposed revised timetable is set out below.

Table 15: Proposed revised timetable[72]

Stage of process	Indicative Milestone	Timing in Draft IM	Timing proposed for IM
Application	Publication of Final Information Memorandum on ComReg's website	X	X
	Presentation to Interested Parties on the Award Process and the Auction Rules	X + 1 weeks	X + 1 weeks
	Deadline for submission of questions regarding the Award Process	X + 2 weeks	**X + 4 weeks**
	Final date for responses to questions on the Award Process to be published on ComReg's website	X + 4 weeks	**X + 6 weeks**

[72] The specific dates are detailed in the IM.

Stage of process	Indicative Milestone	Timing in Draft IM	Timing proposed for IM
	Deadline date for submission of Application Forms and deposits	X + 7 weeks	**X + 8 weeks**
	Restrictions on auction-related communications come into force		**On submission of first Application to ComReg**
Qualification	**Circulation of Bidder Materials for accessing and using the EAS to Applicants; and** **Mock Auction for Applicants**		**X + 9 weeks** **X + 10 weeks**
	Deadline for withdrawals	X + 12 weeks	**X + 12 weeks**
	Each Applicant to be informed by ComReg about whether it has become a Qualified Bidder or not; Confirmation of the requirement for a Main Stage of the Auction and notification to Bidders of scheduled start date of the first Primary Bid Round; or Confirmation that there is no requirement for a Main Stage and notification to Winning Bidders of Winning Bids	X + 12 weeks	**X + 13 weeks**

Stage of process	Indicative Milestone	Timing in Draft IM	Timing proposed for IM
	and start date for the Assignment Stage; or Confirmation that that there is no requirement for a Main Stage or an Assignment Stage and notification to Winning Bidders and progression to Notification & Grant Stage		
	Return of Deposits to Applicants that have not become Qualified bidders	X + 12 weeks	**X + 14 weeks**

401. Given the proposed timetable presented above and the publication of the final IM alongside this document, and in relation to Vodafone's comment that specific start dates of the main stage and assignment stage of the auction should be provided at least 14 weeks in advance of the date for which they are scheduled, we would note that bidders would have at least 14 weeks to prepare for the main stage of the auction. In relation to the start date of the assignment stage, we consider that it is currently not possible to announce a specific start date for this stage of the award process as the timing of this stage of the auction will depend entirely on how long the main stage takes to complete.

402. In relation to eircom Group's comments that a specific date for X should be specified, as noted above, DotEcon notes that the final IM has been published alongside this document. Using the publication date of the final IM of the Friday 25th May 2012 this would mean that the main stage of the auction (if required) would not begin before Friday 31st August 2012**.**

403. In sum, we consider that the timelines specified above are realistic. In making the revisions we have taken into consideration the views of respondents and consider that potential bidders should have sufficient time to prepare for the auction and have access to the EAS and bidder material well in advance of the proposed start of the main stage (if the main stage is required).

404. In addition to the key milestones above, we note that in its response to the Draft IM, Telefonica commented that ComReg should provide bidders with access to standalone winner and price determination software at least 3 months in advance of the auction. We note that given the currently proposed timetable this suggestion will be met.

7 Other Issues

405. This report has so far considered the main issues arising from consideration of respondent's views to the draft Information Memorandum. Having considered:

- the activity rules to be applied in the primary bid rounds, and restrictions on bid amounts in the supplementary bids round;
- the information policy to be applied during the award process;
- issues related to the main stage of the auction, including round scheduling, round prices, deposit calls and bid submission; and
- indicative timeline and milestones for the award process

there remain a number of other subsidiary issues raised by respondents that we aim to address in this section.

406. While issues related to licence conditions applicable to liberalised-use licences were addressed by ComReg in ComReg document 12/25, and issues related to legal terms and conditions and the draft regulations should be considered directly by ComReg, we consider the following outstanding issues in this section:

- exceptional circumstances, specifically, issues related to the actions taken if a bidder is excluded from the auction and ComReg's discretion throughout the process;
- scope for strategic bidding in the auction;
- issues related to the determination of winners and prices; and
- issues related to the calculation of 'knock out bids'.

407. Further, where respondents have posed specific clarification questions we provide our response in the subsection 7.4 below. These are purely matters of clarification and do not raise new substantive issues.

408. In addition to those issues raised by respondents in relation to the Draft IM, following publication of ComReg's Response to Consultation and Decision on Multi-band Spectrum Release[73] ComReg has received additional material from some respondents. While ComReg has provided an initial and direct response to these letters, we consider that it is appropriate to provide our view on some of the issues raised. These comments, as they relate to the Decision, are considered in Annex A of this report.

7.1 Exceptional circumstances

409. At subsection 4.1.4 of the Draft IM, ComReg outlined the options available to it in the case of exceptional circumstances, including its discretion to:

[73] ComReg documents 12/25 and Decision D04/12

- postpone the end of a round in progress or the release of results of a round;
- postpone the scheduling of further rounds;
- cancel a round that is either underway or which has finished but for which round results have not yet been released, and re-schedule that round;
- void one or more rounds and the bids made therein, and resume the auction from an earlier round;
- void all bids received in the auction, and either suspend the auction or restart the auction;
- end the primary bid rounds early (i.e. while there is still excess demand in one or more lot categories), and proceed directly to the supplementary bids round; and/or
- take any other steps or measures in running the award process which are appropriate and proportionate to the exceptional circumstances which have arisen and which further the objectives of the award process and ComReg's objectives.

410. ComReg noted that in the event that a bidder is excluded from the auction and some, or all, of its bids so far deemed invalid, it would not typically expect to use any of its exceptional powers to modify the auction outcome or any intermediate state of the auction insofar as it affected other bidders.[74] However, ComReg held discretion on the steps it may take in such a situation.[75]

7.1.1 Respondents' views

411. In their response to the Draft IM, one respondent (Telefonica) commented on ComReg's approach in the event of bidder exclusion. Telefonica submitted that in the event that a bidder is excluded from the auction when bids have already been made it will be necessary to remove their bids entirely from the auction as it would be *"fundamentally erroneous to continue the auction without*

[74] At paragraph 4.23 of the draft Information Memorandum ComReg stated, "*In the event that a Bidder is excluded from the Auction and some, or all, of its Bids so far deemed invalid, ComReg would typically expect not to use any of its exceptional powers to modify any Auction outcome or intermediate state of the Auction as it affects other Bidders. However, ComReg does not fetter its discretion in this regard."*

[75] At paragraph 3.73 of the draft Information Memorandum ComReg stated, *"If a Bidder is excluded from the Award Process, then ComReg, at its discretion, may void all Bids made so far by the Bidder in question, in addition to preventing further Bids from that Bidder. For the avoidance of doubt, on exclusion of a Bidder, ComReg may continue with the Auction unchanged, save for the exclusion of that Bidder. In this event, all Bids and calculations made up to that point remain valid and binding, although it reserves the right to make such alterations to the Auction as it considers appropriate at its discretion. For example, if a Bidder were excluded after the Main Stage of the Auction, ComReg would not typically expect to re-run the Main Stage or to re-compute the Winning Bids and Prices determined by the Main Stage, though reserves the right to do so. If a Bidder were excluded during the Primary Bid Rounds, ComReg would typically expect not to re-run Primary Bid Rounds already completed, through reserves the right to do so."*

removing their bids".[76] Further, Telefonica commented that, "[t]*his would cause the winner and price determination process to deliver the wrong result, and would undermine the whole auction process."*[77]

412. While acknowledging that there may be some cases where the removal of bids would not affect progress of the auction,[78] Telefonica considered that otherwise, the auction would not be able to determine the correct winner and price, and to continue while leaving these "ghost bids" present would corrupt the round by round price discovery.[79]

413. In proposing a solution to the problem, Telefonica considered that:

- *"In most cases, the removal of a bidder would require the auctioneer to "step back" perhaps to the first round of the auction and to re-run each round that might have been impacted by their presence."*
- *"ComReg should notify all continuing bidders immediately on exclusion of a bidder, and of the action ComReg intends to take in order to ensure their presence does not influence the auction outcome."*
- *"If ComReg was to attempt to continue the auction without taking steps to cleanse the bidding record, this would likely lead to a legal challenge either during or after the process and would ultimately lead to greater overall delay."*[80]

414. H3GI also called for some additional clarity on the issue of bidder exclusion and remedies available to ComReg under exceptional circumstances. In its response to the Draft IM, H3GI commented that, "*ComReg should, in the interests of clarity and fairness, provide further guidance on the exercise of its discretion in the various circumstances noted."*[81] H3GI specifically enquired as to under what circumstances it would be appropriate to end the primary bid rounds early and proceed directly to the supplementary bids round.

415. Similarly, H3GI provided comments in relation to ComReg's discretion in the case where a bidder's lot application form included lots that, if awarded, would exceed the relevant spectrum caps, or are within a party-specific lot category not available to the applicant. While paragraph 3.21 of the Draft IM proposed that if this situation were to arise ComReg may: (a) contact the applicant and seek to resolve the issue; (b) unilaterally reduce the number of lots bid for so that the spectrum caps are not exceeded and treat the application as valid and

[76] See page 19 of Telefonica's response to the draft Information Memorandum

[77] See page 9 of Telefonica's response to the draft Information Memorandum

[78] *"…for example if it were to occur at the beginning of the auction, and the removal of bids meant that there remained an excess demand for all lots in all rounds up to that point."* See page 19 of Telefonica's Response to the draft Information Memorandum

[79] See page 19 of Telefonica's response to the draft Information Memorandum

[80] See page 19 of Telefonica's response to the draft Information Memorandum

[81] See page 18 of H3GI's response to the draft Information Memorandum

binding with the necessary amendments; or (c) declare the application invalid. In its response to the Draft IM, H3GI noted that given the severity of declaring an application invalid, or unilaterally reducing the number of lots bid for, and given the importance of bids H3GI considered that, "*ComReg should contact the applicant and seek to resolve the issue.*"[82]

7.1.2 DotEcon commentary

416. The basis for intervention by ComReg and whether or not bids are excluded from the auction (and possible re-running of some previous rounds) is likely to depend on the reason for exclusion and the extent to which the current state of the auction will affect the remaining bidders. As it is not appropriate to provide an exhaustive list of when ComReg might have cause to use its exceptional powers in the case of a bidder being excluded, ComReg should retain full discretion in this regard.

417. In respect of this policy and notwithstanding the discretion retained by ComReg to decide on how to proceed in the case where a bidder is excluded during the auction, we note the following:

- It is important to distinguish between excluding some or all of a bidder's bids from the determination of winning bids and base prices on the one hand, and revising the current state of a primary bid round to retrospectively reflect the exclusion of a bidder. If, for example, a bidder were excluded for gross breach of the auction rules in the course of the primary bid rounds, we would typically expect no further primary bids to be possible and for the bidder's bids to be disregarded for winner determination and pricing; however, the current state of the auction in terms of the round prices would typically not be revised.
- In the case where a bidder is excluded during the open rounds of the auction, we do not consider that leaving the current round prices unaltered would corrupt round by round price discovery as suggested by Telefonica. Bidders will have been making all bidding decisions based on prevailing round prices at that time. If bidders are willing to pay at least the prevailing round price regardless of the presence or absence of "ghost bids". If bidders had been placing bids in line with their valuations up to the point of exclusion of another bidder then we do not consider that these rounds would need to be re-run as these valuations and subsequent bids will be included and accounted for in determining the results of the auction. Moreover, it would be impossible to wipe out the information that had already been revealed by the open rounds run so far, so simply restarting the auction does not mean that the effect of excluding a bidder would be entirely obliterated.
- In the case where a bidder is excluded during the open rounds of the auction, the auction may go from a state of excess demand for lots to one of excess supply for at least one category of lot, implying unsold lots. In

[82] See page 18 of H3GI's response to the Draft IM.

this case, if ComReg were not to re-run any particular rounds in the auction, there are factors that mitigate against bidders still in the auction being penalised on account of the excluded bidder's behaviour. For example, subject to constraints imposed by spectrum caps and initial eligibility, bidders in the auction may still be awarded lots in excess supply at the end of the primary bid rounds based on their bids in the supplementary bids round.

- In relation to the issues raised by H3GI we first note that it is not possible to provide an exhaustive list of possible events in the auction that would result in ComReg using its exceptional powers. In the specific case of ComReg's discretion to end the primary bid rounds early (that is, while the is still excess demand in one or more lot categories) we would note that this would only occur if appropriate and proportional to the exceptional circumstances which would have arisen and if such an approach would further the objectives of the award process and ComReg's objectives. As noted in the Draft IM, ComReg will determine whether a situation of exceptional circumstances had arisen before using its discretion to intervene in the auction process. Exceptional circumstances are by definition impossible to predict. However, as a simple example, exceptional circumstances could include widespread technical failure or material concern about collusion amongst bidders.

418. In relation to ComReg's discretion where a bidder's lot application form includes lots that, if awarded would exceed the relevant spectrum caps, or are within a party-specific lot category not available to the applicant, we would consider that it would be reasonable for ComReg to first contact the bidder to seek to resolve the issue. However, if the bidder is uncontactable or a resolution not achieved it may be necessary to pursue the alternative approaches as proposed by ComReg.

7.2 Strategic bidding

419. Throughout the consultation process, ComReg has paid careful attention to ways in which collusive or strategic behaviour during the auction could be mitigated. A package of measures to mitigate the possibility of such disruptive behaviour has been proposed including a strict information policy, detailed activity rules aimed at promoting straightforward bidding, a second price rule and market-based minimum prices. However, following the outcome of a recently held CCA in Europe, some respondents have questioned the possibility of strategic bidding in the auction.

7.2.1 Respondent's views

420. In a letter to ComReg dated 3 April 2012, eircom Group restated previously raised concerns regarding the possibility that there may be an auction outcome with "*significant asymmetries in the price paid by bidders for similar quantum of spectrum*" referring to the results of the recent Swiss auction.

Further, eircom submitted that ComReg's Decision[83] "*does not include any mechanisms that would prevent such an outcome as a result of strategic bidding*" and that, *"[i]t remains accordingly possible that a participant bid in such a way as to inflate the final price paid by other participants without affecting its own price."* In its letter, eircom proceeded to suggest further spectrum caps that it considered would address the risks posed by strategic bidding in the auction.[84]

421. Further, in a letter to ComReg dated 13 March 2012,[85] Telefonica stated a concern that CCA auctions may be subject to 'strategic manipulation'. Telefonica considered that this was specifically the case in the auction proposed by ComReg as "*the time-slicing creates certain categories of lot where demand is easy to predict.*" Telefonica submitted that it "*expects that appropriate activity rules will be adopted to eliminate the possibility of strategic manipulation of the outcome.*"

7.2.2 DotEcon commentary

422. First, we note that at Section 6.4 of our most recent report (published as ComReg document 12/24) we considered that the Swiss auction result does not raise any concerns regarding the appropriateness of a CCA format. While we do not repeat our analysis here, we note that it was shown that the 'disparity' in the prices paid was not a result of successful strategic behaviour, and furthermore, possible gaming strategies such as 'strategic demand reduction' are not typically beneficial in a CCA, whereas they would be possible in alternative auction formats such as an SMRA auction.

423. In relation to the specific points made by respondents in their recent submissions, we do not see how it is possible that time-slicing "*creates certain categories of lot where demand is easy to predict*", and how this can be used for the 'benefit' of strategic manipulation of the auction outcome. No specific examples have been provided by respondents to substantiate these concerns.

424. Further, while eircom considers that a bidder may be able to inflate the final price paid by other participants without affecting its own price, it does not provide further explanation of how this may happen, neither does it provide its reasoning behind its consideration that the risk of this happening would be addressed by the introduction of alternative spectrum caps. However, we note that if a bidder attempted to place supplementary bids with the aim of increasing the payments of rivals, the rules proposed by ComReg introduce some degree of risk that bidders might win the alternative package to which

[83] "Multi-band Spectrum Release – Release of the 800MHz, 900MHz and 1800MHz Radio Spectrum Bands – Response to Consultation and Decision." Published as ComReg document 12/25 and Decision D04/12

[84] eircom proposed that ComReg introduce a cap specific to the 1800MHz band of 2x30MHz, and, while retaining the sub-1GHz cap at 2x20MHz in the second time slice, introduce caps on each of the 800 and 900MHz bands.

[85] Sent to ComReg on 13 April 2012

such bids relate. This should act as a significant disincentive for such behaviour.

425. In addition, we believe that ComReg and DotEcon have already provided clear and justified reasoning for the spectrum caps chosen for this award taking into account all relevant factors and ComReg has already made a decision on this issue. The package of proposals made by ComReg, in combination with the changes proposed in this document, should be sufficient in mitigating strategic behaviour in the auction.

426. Specifically, in relation to Telefonica's comment on the need for '*appropriate activity rules'* we note that, subject to the revisions presented above in Section 2.3, the activity rules proposed in the Draft IM are appropriate for achieving the aims of the auction, meet the objectives of ComReg more generally and address many of the issues raised by stakeholders in their responses to consultations on this award.

427. As noted in the activity rules section of this report, some small modifications to the activity rules have been proposed in this report to ensure that strategic bidding cannot take place and that there is no opportunity for bidders to 'hide demand' during the primary bid rounds as may previously have been possible given the way in which eligibility was maintained after submitting a relaxed primary bid.

7.3 "Knock out" bids

428. Throughout the consultation process, and in designing the auction rules, ComReg has been cognisant of the need to minimise the likelihood of disruption to business continuity. As part of this recognition, as described above, we propose activity rules that minimise the scope for the outcome of the final primary bid round being overhauled as a result of supplementary bids.

429. At Section 3.2 and 3.3 of Annex 8 to the Draft IM, ComReg outlined a 'knock-out strategy' first ignoring party-specific lots and then generalising to the case of party-specific lots. It was noted that when considering the number of unsold lots, it would be necessary to include any lots in party-specific categories that have not been subject to bids in the final primary bid round. This analysis omitted to consider the case in which a bidder's final primary bid is a RPB (as noted by eircom). This case is dealt with fully in Section 2.4 and Annex C of this document, including the case of a final RPB.

7.3.1 Respondents' views

430. In supplementary letters to ComReg, Telefonica raised a number of comments in relation to the 'knock out bid' strategy, mainly in relation to the treatment of party-specific lots.

431. Firstly, in an email to ComReg dated 5 March 2012, Telefonica asked, "*Can ComReg confirm that all unsold lots (including unsold party-specific lots) need to be counted when calculating the knockout bid?*"

432. Subsequently, in a letter to ComReg dated 13 March 2012[86] Telefonica commented that:

- *"in this particular auction, the presence of a large number of party-specific lots (2x900MHz, and 9x1800MHz) in the first time-slice can have the effect to inflate the knock-out bid significantly and could increase the value of a knock-out bid beyond a bidder's valuation or budget";*
- *"no information regarding eligibility/activity for party specific lots will be revealed to bidders, so they must assume the worst case when calculating the knock-out bid. The absence of this information unnecessarily increases the bid that any bidder must place in order to be sure to win their final primary package, and could lead to a wrong decision being taken at the supplementary bidding stage";*
- *"ComReg should reveal the bids placed for all party specific lots in each clock round. It is not necessary to reveal this information on a round by round basis, however all rounds should be revealed following conclusion of the primary stage, and before submitting the supplementary round bids. This information would allow bidders to calculate the true knock-out bid value as opposed to the worst case value."*

7.3.2 DotEcon commentary

433. In response to Telefonica's question regarding the need to confirm that all unsold lots (including unsold party-specific lots) need to be counted when calculating the knockout bid, we can confirm that this is the case. While Telefonica consider that "*no information regarding eligibility/activity for party specific lots will be revealed to bidders, so they must assume the worst case when calculating the knock-out bid*" we note that at the end of the final primary bid round, and prior to the supplementary bids round, bidders will be notified of the demand on each party-specific lot. Further, aggregate demand in each of the regular categories is released to all bidders at the end of each primary bid round. In combination, this means that all the information necessary for following the strategy discussed in Section 2.4 will be available to bidders ahead of the supplementary bids round. However, bidders should keep in mind the possibility of a deposit call after the supplementary bids round that could change the situation with regard to the effective number of unallocated lots at the end of final primary round if a bidder is eliminated due to failure to top up its deposit.

434. While Telefonica calls for more details of bids on party-specific lots, there is no clear benefit to releasing information about bids placed for party specific-lots on a round by round basis and considerable risk that this may permit tacitly

[86] Sent to ComReg on 13 April 2012

coordinated behaviour, signalling or other gaming. By taking such an approach, limited information regarding bidder strategy during the primary bid rounds would be maintained, however there does not seem to be any apparent benefit to revealing this information and it is not necessary for applying the formula outlined in the Draft IM for the knock-out bid strategy. Given that such information is specific to individual parties, revealing a complete set of party-specific bids in each round of the auction could give a clear indication of individual bidder strategy. By revealing only the demand for party-specific lots in the final primary bid round, following the closure of the primary bid rounds, we strike a balance between providing the necessary information to allow bidders to follow the proposed 'knock-out strategy' while minimising the amount of information regarding specific bid strategies that is released during the auction that may otherwise prevent an efficient outcome.

435. Section 3 of Annex 8 of the draft Information Memorandum discussed the impact of the final price cap for bidders seeking to win their Final Primary Packages in the Supplementary Bids Round. Section 2.4 of this report updates this analysis to the case of a final RPB. While the analysis provided may aid bidders' consideration of appropriate bidding strategies there was no warranty or representation that any strategy suggested would be necessary or sufficient to ensure winning.

7.4 Further clarification points as raised by respondents

Question	Answer
In the event that a bidder chooses to bid to liberalise one of their party specific lots, how does ComReg decide which one of their party specific lots is to be liberalised, or how does the bidder indicate which one they are bidding to liberalise – there are price implications depending on whether a fully occupied lot or a partially [sic] lot is chosen[87]	In the event that a bidder liberalises some of but not all of the Party-Specific Lots, the Lot partially held under the GSM licence shall be the first Lot to be relinquished in exchange for the right to use a 2x5MHz Lot in the same band and Time Slice. For the avoidance of doubt where this partial liberalisation relates to: • Party-Specific Lot Category 7, the first Lot to be relinquished will be that relating to 2x2.2MHz of the Bidder's Existing GSM Licence; and • Party-Specific Lot Category 8, 9 or 10, the first Lot to be relinquished will be that relating to 2x4.4MHz of the Bidder's Existing GSM Licence. All further spectrum relinquished by Existing GSM Licensees will be in 2x5MHz

[87] Telefonica email dated 5 March 2012. See ComReg document 12/21 item 10. Telefonica: email to ComReg "Questions on the Proposed Multi-Band Auction" (email dated 5 March 2012)

	Lots. Any Party-Specific Lots retained as part of the Existing GSM Licence will be required to comply with the technical co-existence rules as set down in EC Decision 2009/766/EC as amended and the GSM raster plan. This may require the Existing GSM Licensee to relinquish one or two additional GSM channels of 2x200kHz as the maximum amount of GSM channels that can be maintained in a 2x5MHz Lot is: • 24 GSM channels (i.e. 2x4.8MHz) where no adjacent Lots are assigned to another Licensee; and • 23 GSM channels (i.e. 2x4.6MHz) where one adjacent Lot is assigned to another Licensee.
ComReg should clarify when the bid options for the assignment round will be released. It should be at the same time as the results from the main stage, so that bidders can use the gap to prepare their bids.[88]	As noted in Section 4.5 of the draft Information Memorandum, *"An assignment option is a specification of a frequency for each Time Slice corresponding in size to the number of Lots won (or unliberalised spectrum retained in the case of 900MHz and 1800MHz Lots) in that Time Slice and forming one contiguous block."*[89] For each spectrum band included in the Assignment Round, ComReg will determine a set of frequency assignment options available to each Winning Bidder. Winning Bidders will then be able to submit Bids for specific frequency assignment options during the Assignment Round. In relation to the schedule for the Assignment Round, this will be announced following the Completion of the Main stage and there will be at least one clear business day between the Supplementary Bids Round and the Assignment round. Whilst ComReg did

[88] See page 29 of Telefonica's response to the draft Information Memorandum

[89] See paragraph 4.206 of the draft Information Memorandum

	not explicitly state when the bid options would be released, it would be appropriate for ComReg to release the bid options to Winning Bidders along with the schedule for the Assignment Round. ComReg has also stated its intention that the Assignment Round will last for at least 2 hours. Thus bidders should have sufficient time to consider the options available and place their bids.
Can ComReg now confirm what the bidder interface will look like for supplementary bid entry and validation? In particular, can ComReg specify what information will be presented to a bidder if she enters a set of bid values that violate one or more caps? If this design work has not yet been done, when does ComReg anticipate that it will be completed? Can ComReg publish a description of this, or make an early version of the software available, without delay?[90]	For the avoidance of doubt, when submitting supplementary bids, bidders will be notified if their bid violates any of the caps. While, at this moment in time, we are not able to provide a finalised version of the interface that bidders will be presented with, we note that, based on the indicative timeline (as discussed in Section 6.2 of this report), bidders will have sufficient time in advance of the auction to familiarise themselves with the system. There will be a bidder presentation and bidders will have access to bidder material (that will provide screen shots of the interface at various stages of the auction) and will gain first hand experience of using the electronic auction system during the mock auction. As such, bidders should be familiar with the bidder interface in advance of the main auction.

[90] See point 5 of Vodafone's supplementary response to the draft Information Memorandum, as published by ComReg in ComReg document 12/21

Annex A Issues related to the Decision, as submitted by respondents

A.1 Overview

436. Following publication of ComReg document 12/25 and the associated decision D04/12 as published on 16 March 2012, ComReg has received some further submissions from interested parties in relation to a number of aspects of the award process as discussed in that document, and associated documents as written by DotEcon.

437. We understand that ComReg has provided a direct response to each of these letters and that, where relevant in this report, we have commented on issues from these letters where they relate directly to issues concerned with the draft Information Memorandum. However, we believe there are some issues that would usefully be further discussed by DotEcon for the sake of providing clarity and thus we provide our commentary on some of these issues below.

438. ComReg has provided us with letters from the following parties:

- Eircom Group letter submitted to ComReg 28 November 2011, Re: Multi-Band Spectrum Release - Response to Draft Information Memorandum
- eircom Group – letter submitted to ComReg, Re: Multi-band Spectrum Award, dated 3 April 2012;
- eircom Group – letter submitted to ComReg, Re: Multi-band Spectrum Award, dated 5 April 2012;
- H3GI – letter submitted to ComReg, Re: ComReg Doc. No. 12/25, dated 5 April 2012;
- H3GI – letter submitted to ComReg, Re: COMREG DOC NO. 12/21, dated 13 April 2012;
- H3GI – letter submitted to ComReg, Re: 800, 900 AND 1800 MHZ AUCTION, dated 20 April 2012;
- Vodafone – letter submitted to ComReg, Re: Commission for Communications Regulation ("ComReg") Response to Consultation and Decision on Multi-band Spectrum Release (ComReg document Do4/12), dated 11 April 2012;
- Telefonica – letter submitted to ComReg, Re: Multi-band Spectrum Release, dated 13 March 2012[91];
- Telefonica – letter submitted to ComReg, Re: Multi-band Spectrum Release – Opportunity Cost and Rebates, dated 2 May 2012;

[91] Sent to ComReg on 13 April 2012

439. We consider that many of the points raised by these respondents have already been dealt with sufficiently and a clear, reasoned and justified decision already been made by ComReg.

440. We believe that the issues raised in the letter submitted by eircom in relation to 'potential asymmetries in the price paid by bidders for similar quantum of spectrum' have been addressed by DotEcon previously, notably in Section 6.4 of ComReg document 12/24 and in subsection 7.2 of this report.

441. We believe that H3GI's letter dated 5th April mainly relates to policy issues, or issues that have been discussed in full by ComReg on numerous occasions. In relation to H3GI's comment that the spectrum caps are such that, "*spectrum will be unallocated or a bidder will be allocated one block of spectrum. The former is not an efficient outcome and both would put an operator at a significant competitive disadvantage*" it should be noted that we provided extensive discussion surrounding the necessary requirements for a bidder to win only 2x5MHz of sub-1GHz spectrum in section 4.2 of ComReg document 12/24. We discuss issues related to unsold lots in section A.1.2 below.

442. We have discussed comments raised by H3GI in its letter dated 13 April 2012 in section 2 of this report.

443. Further, in relation to the issues raised by Telefonica in its letter dated 13 March, we believe that the majority of these issues have previously been addressed by DotEcon or ComReg and are mainly relating to policy issues, for example transitional issues, and the potential gap in licensing of some 1800MHz spectrum in advance of the second time slice. Other issues raised in this letter have been discussed throughout this report, namely:

- Time between auction stages – see subsection 4.2.1;
- Knock-out bids – see subsection 7.3; and
- Strategic bidding – see subsection 7.2.

444. Further, in relation to the issues raised by Telefonica in its letter dated 2 May 2012, we note that clarification of the method for winner and price determination, including the calculation of opportunity cost has been provided in subsection 5.1.2 of this report.

445. As such, we believe that the only issues outstanding are those raised by Vodafone in it letter of 11 April 2012. We consider that points 1, 2, 6 and 7 of Vodafone's letter are policy related or of a legal nature, and thus, we consider these are for direct consideration by ComReg. However, we provide commentary on points 3, 4 and 5 below. For the avoidance of doubt, these comments relate to:

- excessive level of minimum licence prices based on benchmarking approach;
- treatment of any unallocated lots arising from award process; and
- excessive complexity of auction process.

We consider each of these issues in turn below.

A.1.1 Vodafone's views

Excessive minimum licence prices based on benchmarking approach

446. In its letter to ComReg, Vodafone stated its view that the approach taken to setting the minimum prices for spectrum lots in the proposed multi-band auction is inappropriate and has subsequently resulted in prices being set at a level that poses "*significant risk of choking off demand*" such that spectrum will be inefficiently allocated in the auction.

447. Referring to the Fifth Benchmarking Report (published as ComReg document 12/23) Vodafone considered a number of 'features' that lead it to question the appropriateness of the benchmarking approach. Vodafone asserted that:

- DotEcon itself in paragraph 75 of its report refers to the fact that the regression equations have '…not provided a particularly stable forecast of spectrum value' and their high sensitivity to the inclusion of the most recent spectrum auction results in the dataset;
- the sign of the co-efficient on the key explanatory variable of GDP per capita has changed from positive to negative is simply accepted without any apparent concern or attempt to provide a compelling theoretical explanation;
- DotEcon's assessment of the issue of using GNP per capita rather than GDP per capita as an input to the benchmarking model is not credible; and
- ComReg ought to revise its entire approach to the setting of the minimum licence price and move instead to a non-trivial minimum price for spectrum lots in the auction.

Treatment of any unallocated lots arising from award process

448. In its letter to ComReg Vodafone noted the decision by ComReg to shorten the period within which it will not re-auction any spectrum lots that remain unallocated in the upcoming auction process. Vodafone expressed a concern that this position reflects *"an implicit recognition by ComReg that the current levels of the proposed minimum prices for spectrum lots, and 1800MHz lots in particular, are such that they pose a major risk of choking off demand for spectrum and leading to spectrum going inefficiently unallocated as an outcome of the auction process."*

449. Further, Vodafone considered that DotEcon and ComReg had assessed that if spectrum goes unsold in the auction then the award process has determined that there is no efficient way of allocating it. Further, they consider that *"ComReg now appears to implicitly accept that this high level of the minimum price poses a major risk of leaving spectrum unsold, but in Vodafone's view is wrongly seeking to characterise such an auction outcome where spectrum goes unallocated as not constituting what all reasonable observers would conclude as being a failure of the auction."*

450. Based on the arguments presented by it, Vodafone considers the most practical step to minimising the risk of unsold lots would involve a "*significant reduction"* in the minimum prices from the currently proposed levels.

Excessive complexity of the auction process

451. Vodafone considers that the inclusion of the feature to allow relaxed primary bids has further increased complexity but has not been adequately justified by ComReg. It considered that ComReg could reduce the complexity of the auction by removing the proposed feature to allow for relaxed primary bids.

A.1.2 DotEcon commentary

452. In response to Vodafone's comments on minimum prices and the Fifth Benchmarking Report (published as ComReg Document 12/23), we would consider that the aim of the DotEcon benchmarking reports throughout the process has been to present a conservative lower bound estimate of market value for sub-1GHz spectrum and, from ComReg document 10/105 onward, the relative value of 1800MHz and sub-1GHz spectrum.

453. As illustrated in Table 1 of DotEcon's Fifth Benchmarking Report (published as ComReg document 12/23) we note that there has been a general downward trend in the estimates of market value throughout the period from ComReg document 09/99c through to ComReg document 11/59, with the range remaining unchanged following the most recent updates to the data and analysis as presented in ComReg document 12/23. The downward trend throughout the process reflects recent economic trends and, with the inclusion of 800MHz and 1800MHz spectrum in a joint award process and in line with a more conservative approach, our recommendations have been targeted at the lower end of the proposed ranges.

454. The ranges presented by DotEcon and the associated recommendations consider a balance between moderating incentives for strategic behaviour whilst reducing the risk of discouraging serious bidders from participation in the auction.

455. Vodafone asserts that in the latest report, the coefficient on GDP per capita changed sign from positive to negative is "a highly perverse outcome". The sign of the GDP coefficient was only negative in one of the three samples - the sub-1GHz and 1800MHz auctions regression. Whilst Vodafone is correct in noting that some of the regressions presented in ComReg document 12/23 are not particularly stable (as noted by DotEcon itself in ComReg document 12/23), we note that in arriving at the final range presented to ComReg we considered a number of different inputs from the simple average benchmarks, our regression analysis to the most recent data of 800MHz auction prices across Europe to ensure that our recommended range is suitable.

456. By using a range of samples and methods we are able to provide a more informed view of the most robust minimum price range for the proposed auction. Indeed, this was noted in ComReg document 12/23 where we acknowledged that the regression models and their outputs are sensitive to the sample used and that changes to the data will affect the regression results. We therefore placed more weight on the largest and most stable sample of global mobile auctions, which has a positive GDP coefficient and predicted licence value that falls within the previously recommended range of €15 – 26m. The regression model predictions allow us to ensure that our proposed range is robust to the economic and market conditions in Ireland. To further

ensure that our range is robust, the average benchmarks were used to cross-check our results across the various cuts of data.

457. While respondents asserted that there are considerable uncertainties over both approaches, DotEcon has mindfully considered the uncertainties surrounding the results of the regression and benchmarking analysis when recommending a suitably conservative minimum price range. Furthermore, the results were compared to the most up to date information available on awards of sub-1GHz spectrum in Europe so as to provide a more like-for-like comparison to the likely value of sub-1GHz spectrum in Ireland. Given that the majority of these sub-1GHz auction prices fall within or in some cases exceed our recommended price range, we consider that the minimum prices proposed do present an appropriate level and are not “excessive” as perceived by Vodafone.

458. Regarding reference to the use of GNI versus GDP, as stated in the Fifth Benchmarking Report, estimates based on a GDP or a GNI figure both fall within the range proposed by us (€15m-€26m). As such, having considered the impact of using GNI rather than GDP, we do not find grounds to alter our recommended range of €15m-€26m.

459. As there is little in the form of new data since the Fifth Benchmarking Report, we do not consider it necessary to provide a further update to the analysis at this point. Since the Fifth Benchmarking Report (published as ComReg document 12/23) we note that results from the Swiss multi-band auction and the Hungarian 900MHz auction have not been included in our analysis. However, we have assessed the Swiss result qualitatively in ComReg document 12/23 in deriving our range and we note that the average price in the Hungarian 900MHz auction in January 2012 was approximately €0.80 per MHz per head of population, which far exceeds the upper end of our recommended range. Therefore, we believe that our conservative estimate of sub-1GHz value of €15m - €26m is valid in light of these recent auction results.

460. In relation to Vodafone’s comments on treatment of unallocated lots we note that as part of its Decision, ComReg has stated its position on the treatment of any unallocated lots arising from the award process, stating that re-auction of any unsold lots will occur at least 1 year after the upcoming multi-band spectrum award process.

461. We do not consider this statement to give any indication of, or present an implicit recognition that, the proposed minimum prices pose a risk of choking off demand. It is necessary for ComReg to specify how it would proceed to allocate any un-allocated spectrum in the event where some lots remain unsold following the results of the proposed multi-band auction as a matter of completeness of the award process and for providing a degree of certainty following the award process. As discussed in ComReg document 12/24, a minimum period of time is required before a follow-up sale of any unsold spectrum so as to provide a disincentive to any strategic reduction of demand in the proposed award process. Furthermore, this time will allow for ComReg to respond to changing circumstances over that period and consider the details of the follow-up process given the circumstances prevailing at that time. In any case, the speed at which any unsold spectrum could be brought

back to market will also be limited by the time required to prepare and consult on proposals for any subsequent award of spectrum.

462. We note that there are a number of reasons as to why there may be unsold lots at the end of the upcoming award process. Spectrum may be unsold due to insufficient demand overall, or because there are lots that cannot be fitted into the optimal winning combination. For example, if all bidders were to place a high value on two lots but no value on one lot in the 900MHz band, the efficient outcome generating the great value for society would be where two lots each were to be awarded to three operators.[92] Thus, contrary to Vodafone's comments in its recent letter it is not necessarily true that an auction outcome where spectrum goes unallocated would present a failure of the auction. While demand expressed by bidders in the auction will of course be based on the prices prevailing in the auction, we note that the minimum prices proposed by ComReg fall within the range produced as part of the benchmarking exercise aimed at producing a conservative lower bound estimate of market value.

463. In its recent letter, Vodafone comments that ComReg and DotEcon considered that "if spectrum goes unsold in the auction then the award process has determined that there is no efficient way of allocating it." However, this presents a misinterpretation of the points considered by DotEcon in ComReg document 12/24.

464. As stated by DotEcon in ComReg document 12/24, in either of the cases under which spectrum may be unsold, the outcome is still efficient given the demand for spectrum as stated by bidders via bids submitted during the auction. Further, it must be true that given the results of the auction there would be little benefit from re-auctioning any unsold spectrum immediately as there is little reason to believe that bidders' valuations for the lots will have changed, especially where the unsold lots are to be auctioned on the same terms (a necessary requirement to ensure that bidders are not incentivised to employ a "wait and see" strategy if they believe they may be able to acquire spectrum on better terms, or for a cheaper price immediately following the initial auction). On this basis, there would be no efficient way of allocating spectrum immediately following the proposed auction given that the results of the recently completed auction will present the most efficient allocation of lots given bidders' demand as presented by bids submitted.

465. On the basis of its apparent misunderstanding of DotEcon's explanation, Vodafone further comments that this reasoning is "profoundly misguided" commenting that demand for spectrum cannot be treated in isolation from the price at which it is made available. However, as stated above, the outcome of the proposed multi-band auction will be efficient given the demand stated by bidders even in the unlikely event of unsold lots, and were a re-auction of unsold lots to take place immediately following the auction, the terms of the

[92] Note that this point is for illustrative purposes only; it does not infer any view on the demand by bidders in the auction for different amounts of spectrum in the 900MHz or any other band in the auction.

auction (including prices) would have to remain untouched, and thus it is highly unlikely that these unsold lots would be re-allocated in an efficient way given that the bidder valuation and demand will likely remain unchanged.

466. In response to Vodafone's proposal that ComReg should take all reasonable steps to minimise risk, suggesting a "significant reduction in the minimum price from current proposed levels" we note that in setting minimum prices both DotEcon and ComReg have considered the need to ensure that serious bidders are not discouraged from participating in the auction, and that these concerns are already incorporated in the minimum prices proposed.

467. Finally, with respect to the comments raised in relation to the inclusion of relaxed primary bids, we consider that concerns relating to the need for such a feature have been addressed in section 2 on activity rules, namely that the proposed activity rules were modified to reduce uncertainty of the auction outcome relative the result of the final primary bid round. Given the tighter restrictions on supplementary bids to ensure that the provisional position in the final primary bid round cannot be too readily overturned, it is necessary to allow greater flexibility for bidders to bid on their most preferred packages when making primary bids. Whilst this does create some increase in the complexity of the rules, it provides significant additional flexibility and predictability for bidders. We thus believe that there is sufficient justification for the inclusion of these new activity rules.

Annex B New data available since publication of DotEcon's Fifth Benchmarking report

468. DotEcon's Fifth Benchmarking Report was published as ComReg document12/23 in March 2012. Mobile spectrum auctions dated up to November 2011 were included in the benchmarking analysis in this report. In addition, we noted the results of the French 800MHz beauty contest in December 2011 where tenders were evaluated based on terms of MVNO access, commitment to rural coverage and a financial offer as well as the results of the Swiss Auction, which were announced in February 2012.[93] The prices in the French 800MHz award were consistent with our benchmark range of sub-1GHz value. We were not able to infer from the Swiss auction results what the specific average price paid for each band was due to the combinatorial nature of the auction prices; however, a brief analysis of the results was included in our report.

469. Since publication of our Fifth Benchmarking Report in March, there have been few relevant mobile spectrum auctions completed; only the Hungarian 900MHz auction has been completed. Therefore, in terms of the sample of mobile auctions considered, there is little to add to the analysis presented in our Fifth Benchmarking Report. We note that the average price in the Hungarian 900MHz auction in January 2012 was approximately €0.80 per MHz per head of population[94], or equivalently €36.6m for a 2x5MHz licence adjusted to Irish population[95]. The Hungarian auction result far exceeds the upper end of our recommended range, supporting our conclusion of a conservative estimate value for sub-1GHz spectrum of €15m to €26m.

470. In addition to considering the input of recently completed auctions that are new to our sample of mobile awards, when updating our benchmarking analysis, we also take account of the current market conditions in Ireland, namely by utilising up-to-date information about GDP and population in our analysis. In our Fifth Benchmarking Report, we noted that GDP estimates up to the third quarter of 2011 were available, yielding an estimate of 2011 GDP of €156,349 million and a GDP per capita of €34,128 with a population figure of 4,581,269.

471. At present, the Central Statistics Office has released GDP figures for Q4 of 2011 and updated equivalent figures for Q1 through to Q3, yielding a GDP figure of €156,438 million for 2011,[96] which is marginally higher than that in our Fifth

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[93] http://www.bakom.admin.ch/dokumentation/medieninformationen/00471/index.html?lang=en&msg-id=43520

[94] Assuming an exchange rate of €1 to 280 Hungarian Forint

[95] Based on Ireland's 2011 population of 4.58 million.

[96] See 2011 GDP figures in Table 2 of CSO's Quarterly National Accounts: http://www.cso.ie/en/media/csoie/releasespublications/documents/latestheadlinefigures/qna_q42011.pdf

Benchmarking Report. In addition, the published 2011 Census of Ireland reports a population figure of 4,588,252[97]. Therefore, updated GDP and population figures for 2011 yields a GDP per capita of €34,095 which is marginally lower (€33 or less than 0.1%) than that used in our Fifth Benchmarking Report.

472. The GDP per capita figure would influence our regression benchmarks through the GDP per capita explanatory variable in our regression models. However, the magnitude of the coefficient of this explanatory variable in all our regression models is small:

a) Global mobile auctions regression model: 0.00000112

b) European mobile auctions regression model: 0.00000439

c) Sub-1GHz and 1800MHz auctions regression model: 0.0000163

Therefore, a 0.1% decrease in GDP per capita will not result in any significant changes to our benchmarks.

473. Therefore, we believe that our conservative estimate of sub-1GHz value of €15m - €26m is valid in light of recent auction results and updated economic and demographic data of Ireland. As such, we consider that there is no need to publish a new benchmarking report alongside the Information Memorandum.

[97] See http://www.cso.ie/en/media/csoie/census/documents/census2011pdr/Census%202011%20Highlights%20Part%201%20web%2072dpi.pdf

Annex C Implications of the final price cap

474. This annex considers the implications of the final price cap for bidding strategies in the supplementary bids round.

475. Let $\beta i \quad (x)$ denote the highest bid of bidder i for package x. Let $xi \quad f$ denote the package bid for by bidder i in the final primary round. Let X be the available supply of lots and

$$x_0^f = X - \sum_i x_i^f$$

be the number of unallocated lots in the final primary round. Let p^f be the lot prices in the final primary bids round.

476. We focus on one particular bidder j. Suppose that this bidder increases it bid for its final primary package by the value of any unallocated lots

$$(A) \quad \beta_j\left(x_j^f\right) = p^f \cdot x_j^f + p^f x_0^f + \epsilon$$

where ϵ is some small amount.

477. Regardless of the bidding strategies adopted by other bidders $i \neq j$, their bids are bounded by the final price cap. Therefore, for any packages x_i, by adding these final price caps we have that

$$(B) \quad \sum_{i \neq j} \beta_i(x_i) \leq \sum_{i \neq j} \beta_i(x_i^f) + \sum_{i \neq j} p^f \cdot (x_i - x_i^f)$$

478. For any feasible outcome giving package x_i to bidder i,

$$\sum_i x_i \leq X$$

479. Therefore, from the definition (A) of $\beta_j\left(x_j^f\right)$ we have that

$$\beta_j\left(x_j^f\right) = p^f \cdot \left[x_j^f + X - \sum_i x_i^f\right] + \epsilon \geq p^f \cdot \left[\sum_i x_i - \sum_{i \neq j} x_i^f\right] + \epsilon$$

which on rearranging gives that for any feasible outcome $(x_i)_i$

$$(C) \quad \beta_j\left(x_j^f\right) - p^f \cdot x_j \geq p^f \cdot \sum_{i \neq j}(x_i - x_i^f) + \epsilon$$

Combining inequalities (B) and (C) implies that for any feasible outcome $(x_i)_i$ and regardless of the bid strategy adopted by bidders $i \neq j$

$$(D) \quad \sum_i \beta_i(x_i^f) \geq p^f \cdot x_j + \sum_{i \neq j} \beta_i(x_i) + \epsilon$$

480. Now suppose that in the alternative feasible outcome $(x_i)_i$ bidder j has a bid with $\beta_j(x_j) \leq p^f \cdot x_j$. It follows immediately from inequality (D) that $(x_i)_i$ cannot be an optimal outcome as the total value of winning bids is strictly

lower than in the outcome $\left(x_i^f\right)_i$ in which each bidder receives its final primary package.

481. Therefore, we have shown that provided bidder j makes a bid for its final primary package x_j^f according to the rule (A), then an optimal outcome in which bidder j does not win its final primary package must result in bidder j winning some alternative package $x_j \neq x_j^f$ where $\beta_j\left(x_j\right) > p^f \cdot x_j$. No assumption has been made about the bids of bidders $i \neq j$ other than that they satisfy the final price cap.

482. An implication of this result is that if bidder j makes a bid for its final primary package x_j^f according to the rule (A), then it cannot win a package $x_j \neq x_j^f$ which is subject to a primary bid, but for which no further supplementary bid. This is because such a primary bid must have been placed in a round prior to the final round at prices no greater than p^f and so $\beta\left(x_j\right) \leq p^f \cdot x_j$.

483. Finally, note that the analysis above holds equally in the case of there being party-specific lots.