Commission for
Communications Regulation

Multi Band Spectrum Award

Updated Versions of Non-confidential Submissions to Document 19/124, 20/32 and 20/56

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1 Eircom Limited and Meteor Mobile Communication Limited (trading as 'eir' and 'open eir'), collectively referred to as 'eir Group' or 'eir'

Updated submission to ComReg Document 19/124

eir

Response to ComReg Consultation:

Proposed Multi Band Spectrum Award –
Response to Consultation and Draft Decision

ComReg Document 19/124

10 February 2020

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The comments submitted in response to this consultation document are those of Eircom Limited and Meteor Mobile Communications Limited (trading as 'eir' and 'open eir'), collectively referred to as 'eir Group' or 'eir'.

Summary

eir acknowledges the opportunity to respond to ComReg's Consultation in relation to the proposed Multi Band Spectrum Award (MBSA2). However we are disappointed that ComReg has largely dismissed concerns raised in our previous response to ComReg 19/59. In doing so ComReg does not appear to have either fully considered the concerns raised or given detailed reasons for dismissing them.

It should be noted from the outset that we remain of the view that ComReg's proposed manner to address early liberalisation of eir's existing 3G licences is disproportionate and while we offer comments on elements of ComReg's proposed award process our position is reserved accordingly. In that regard we note that ComReg is legally required to act proportionately and this requires ComReg to assess whether its proposal is the least restrictive means of achieving the required goal and to assess whether the burden outweighs the benefit of the proposed approach. ComReg has not carried out this assessment.

Critical concerns remain regarding the proposed CCA format. Of particular note is the effect of pricing uncertainty. eir is pleased to learn that DotEcon is investigating if "*information could be given to bidders during the clock rounds that would allow them to anticipate if they might need to pay the full amount of a bid if won.*" Improved transparency to address pricing uncertainty would be a substantial improvement and we look forward to further engagement with DotEcon and ComReg on this important matter. However absent material improvements to the CCA format eir is unable to support its use. eir reserves its position on the choice of auction format accordingly.

As noted in our previous response there continues to be no description of the detailed auction rules (such as how the activity rules will operate with time-sliced and non-time-sliced lots). Many of the elements of the proposed Decision are subject to being '*further particularised*' in the MBSA2 Licence Regulations and/or the 2.1 GHz Band Interim Licence and Early Liberalisation Regulations and/or the Information Memorandum. Absent a clear description of the detailed measures it is impossible for eir to offer a view on these elements of the proposed Decision in the abstract. Our position is reserved accordingly. In this regard eir would stress that the current consultation on the draft Decision is too early as interested parties cannot form an opinion on the overall merits of many of the proposed elements of the draft Decision. eir expects this lacuna will be adequately addressed with effective consultation on the Information Memorandum and Regulations.

Of the elements that are not subject to further particularisation eir welcomes ComReg's proposal to adopt 20 year licence durations from the date the 700MHz licences are issued. eir agrees with the

proposed spectrum caps noting that the proposed overall spectrum cap of 375MHz is the highest amount that can be reasonably justified taking account of all relevant factors.

Comments on the draft Decision

As a general observation eir's ability to agree or disagree on many aspects of the draft Decision is critically hampered by a scarcity of information on relevant details, with many elements left blank and/or in square brackets, and Annex A referred to but not included. eir has not had sight of a draft Information Memorandum with detailed auction rules. Nor has eir had sight of draft proposed MBSA2 Regulations, 2.1GHz Interim Licence and Early Liberalisation Regulations (referred to collectively as the Regulations), or draft licence conditions. eir's position is fully reserved accordingly. Comments in this document on particular draft provisions should not be taken as a wider acceptance of aspects not yet provided or consulted upon, including how they may interact with these draft provisions.

Section 1: Award Spectrum

eir agrees with the proposed definition of the Award Spectrum in respect of the 700MHz, 2.3GHz and 2.6Ghz bands and the proposed Lot defintions. As noted below eir has reservations regarding the inclusion of the 2.1GHz band and our position is reserved accordingly.

Section 2: Decision Making Considerations

It is proposed that the decision will be made in accordance with ComReg's duties and that ComReg has "*given all interested parties the opportunity to express their views and make their submissions in accordance with Regulation 11 of the Authorisation Regulations and Regulation 12 of the Framework Regulations*." In light of the deficiencies already identified with many important matters to be '*further particularised*' ComReg cannot rely on this consultation alone to meet its duties to ensure that an effective consultation process has been completed. ComReg 19/124 contains insufficient detail to allow interested parties to form a view on the points of principle in the proposed Decision.

Section 3.1

eir is unable to comment on the merits of ComReg's proposal "*to proceed with the proposed release of the Award Spectrum*" in the absence of a detailed specification of the proposed award process in the form of an Information Memorandum and the relevant Regulations.

Section 3.2

eir notes ComReg's intention to bring forward 2.1 GHz Band Interim Licence and Early Liberalisation Regulations and looks forward to sight of the draft Regulations and the opportunity to comment on their merits.

Section 3.3

eir assumes the proposed granting of licence(s) is to grant, in effect, an extension of Three's existing licences (or part(s) thereof) and will be undertaken in accordance with the principles in ComReg 19/124. If that is the case eir would have no issue with the proposed decision text provided it is made explicit that any such licence will expire on or before 15 October 2022. Please note eir's position on this matter is reserved until we have sight of and the opportunity to comment on the proposed 2.1 GHz Band Interim Licence and Early Liberalisation Regulations.

Section 3.4

This section is proposed to address early liberalisation and is subject to details that will be provided in proposed 2.1 GHz Band Interim Licence and Early Liberalisation Regulations. As noted previously eir has not yet had the opportunity to review and comment on draft Regulations.

Section 3.4.2 relates to the scenario (referred to by ComReg as Early Liberalisation Option 2) where a licensee has a 3G licence expiring after 15 October 2022, i.e. the Meteor 3G licence. eir raised a number of concerns regarding Option 2 in its response to ComReg 19/59.

eir welcomes ComReg's confirmation (para. 4.61) "*that the liberalisation option may be exercised at the licensee's discretion at any point from when the option becomes available.*" That said Option 2 is of little benefit to eir until after the Award has been completed and any liberalisation fee is known.

It is still not at all clear to eir how the liberalisation fee will be calculated in a fair manner. ComReg has a statutory obligation to act fairly, and any pricing approach that (a) does not take account of the value of 5G spectrum during the first five years and (b) creates scope for competitors to artificially inflate the price to be paid by eir, cannot be deemed fair. eir agrees with the fundamental principle expressed in paragraph 4.36 that "*it would be appropriate to charge a liberalisation fee based on the going market rate (i.e. in line with what operators are likely to be paying for the first 5 years of any new 2.1 GHz licences they are awarded)*". However the DotEcon / ComReg proposal to calculate the fee based on final clock round prices across both time-slices is not consistent with this principle.

The proposed approach is questionable from the perspective of attempting to discern the perceived value of the spectrum in the first 5 years. Any new technology such as 5G will go through a period of adoption before it achieves mass market appeal. This may take some years. Consequently the business case benefits will not accrue evenly each year and will likely be back-ended. How does ComReg intend to ensure that eir only pays the value relative to the use of the spectrum in the first 5 years?

ComReg states (para. 4.69) "*that using this overall price point covering both time slices (rather than just considering one of the two time slices) helps to minimise incentives for other bidders to seek to manipulate the liberalisation fees and impose additional costs on Eir.*" This is based on DotEcon's views expressed at paragraph 34 of their report to ComReg. "*In this case, using only the time slice 1 clock price could lead to distorted bidding incentives and risk exposing Eir to gaming by other bidders. If the liberalisation fee is not based on an average of prices across both time slices, other bidders could have an incentive to bid up the price of 2.1 GHz lots in time slice 1 simply to manipulate the liberalisation fee and impose a cost on Eir.*"

It is not clear that there is an easy solution to the problems arising from ComReg's proposed approach focussing only on 2.1GHz spectrum in the auction. Accepting the view of ComReg / DotEcon that the 2.1GHz, 2.3GHz and 2.6GHz bands are substitutable then it would be reasonable to consider starting the liberalisation fee computations from the basis of the average price for all time-slice 1 spectrum above 1GHz. This would reduce the risk of gaming and strategic bidding to unfairly drive up the fee eir may be required to pay should it decide to exercise the early liberalisation option.

eir remains of the view that the 3.6GHz approach to issuing refunds is not appropriate for the calculation of a liberalisation fee. The 3.6GHz approach relies on final clock round prices. The very nature of a combinatorial auction is to allow bidders to express values for packages of spectrum. In this context the value of 2.1GHz spectrum in a bidder's package will be related to the other spectrum bands included in that package. As such the value of the package will be what drives the bidder's behaviour relative to their valuation rather than the relative value of each component Lot of the package to the clock round price of each Lot. Focussing solely on the final clock round prices of the 2.1GHz spectrum (in one or both timeslots) may encourage gaming.

Section 3.5

eir notes ComReg's intention to bring forward MBSA2 Licence Regulations and looks forward to sight of the draft Regulations and the opportunity to comment on their merits.

Section 3.6

eir agrees in principle that it is appropriate to award a limited number of individual rights of use.

Section 3.7

This section refers to Annex A of the Decision. eir has been unable to locate Annex A. Thus whilst we have had no material concerns regarding ComReg's previous proposals on band plans and

relevant guard bands we are unable to comment further regarding the draft Decision absent sight of Annex A.

Section 3.8-3.10

These sections propose to allow ComReg to attach conditions to various types of licence subject to further particularisation in the Regulations. eir looks forward to the opportunity to comment on the draft Regulations.

Section 3.11

eir has no issue in principle with eligibility for licences in the 700MHz, 2.3GHz and 2.6GHz bands being determined by means of a competitive selection procedure. eir looks forward to reviewing the proposed Information Memorandum in due course.

Section 3.12

eir agrees with ComReg's proposal to make the licences available on a national basis. This is the most efficient geographic scope for the bands in question.

Section 3.13

eir welcomes ComReg proposal for 20 year licence durations, commencing from the date the licences are issued for spectrum other than in the 2.1GHz band.

Section 3.14

As noted in respect of Section 3.13 eir agrees that licences awarded in this proposed process should cover a 20 year period and be co-terminus. However eir has reservations regarding the appropriateness of including the 2.1GHz band in this process in its entirety for the reasons previously explained.

Section 3.15.1

eir has no objection to the selection procedure comprising an application stage, a qualification stage, a main stage (if needed) and an assignment stage. eir looks forward to reviewing the proposed Information Memorandum which will set out the details of each of the proposed stages in due course.

Section 3.15.2

eir continues to have significant reservations regarding the appropriateness of a Combinatorial Clock Auction in the main stage for the reasons stated in its previous response.

eir welcomes Dotecon's statement (para. 6.20) that "it is undertaking a separate study for ComReg looking at whether ancillary information could be given to bidders during the clock rounds that would allow them to anticipate if they might need to pay the full amount of a bid if won. If this approach proves feasible, DotEcon advises that it could be implemented through a minor revision in the information policy of the Proposed Award." This might go some way to addressing concerns regarding pricing uncertainty, but without further details of what is proposed it is impossible for eir to assess the potential value of such information. Improved transparency to address pricing uncertainty certainly might be a substantial improvement and we look forward to further engagement with DotEcon and ComReg on this important matter. However absent material improvements to the CCA format eir is unable to support its use. eir reserves its position on the choice of auction format accordingly.

In our previous response we also raised concerns regarding the potential need to submit bids for an amount that is significantly in excess of the price that the bidder is likely to have to pay if the bid wins (e.g. knockout bids). ComReg attempts to dismiss this concern on the basis that "it would be irrational for that bidder to bid in excess of its valuation as that would expose the bidder to a risk of winning the package and paying more than the package was worth to it (in which the case the bidder would have been better off it had lost entirely)" (para. 6.77). This does not address the core of eir's concern which is based on observations from the MBSA and the 3.6GHz auctions. [✂] The outcome of the subsequent supplemental round in both cases was that there were no unsold lots. If there are excess Lots available at the end of the final clock round this can require bidders to increase their final round bids substantially in order to guarantee that they will win. [✂] It is therefore concerning that ComReg dismisses the potential effect of gaming activity and suggests that the impacted bidder would be better off if it lost. eir also questions ComReg's logic in paragraph 6.78 where ComReg suggests that knockout bids aid bidders with budget constraints without having to bid at full value whilst at the same time acknowledging that a knockout bid above budget would mean a bidder is unable to bid to its valuation.

ComReg concludes its consideration of this issue in paragraph 6.79 that "some of the problems for budget constrained bidders are intrinsic to being budget-constrained, rather than specifically related to the auction format used. No amount of additional information or design elements can entirely overcome this." However what ComReg has failed to address and properly consider is the fact that existing CCA design elements may be being gamed by bidders potentially undermining the efficiency of the award process. In addition to reserving its position on choice of auction format, eir looks forward to the opportunity to comment on the proposed auction rules, and requests that in drafting them that ComReg take account of the serious concerns outlined above.

Section 3.15.3

eir has no objection to the 700MHz band being made available in one temporal period. From a drafting perspective section 3.15.3 is unnecessary as the substantive point is addressed in Section 3.13.

Section 3.15.4 & 3.15.5

In its response to ComReg 19/59 eir raised concerns regarding the added complexity introduced into the award process with time-slicing. eir notes this concern was shared by other respondents albeit different suggestions were made as to potential solutions. eir notes ComReg's suggestion (para. 4.93) "*that Eir does not appear to have recognised certain issues associated with the need for time slicing the other bands*" and consequently additional information is being published by DotEcon. eir was aware of the issues relating to spectrum caps and the substitutability with other bands and balanced these relative to the benefits of simplicity.

For example, DotEcon illustrate how eir's competitors might be able to bid strategically to increase the price eir has to pay to re-acquire its existing 2.1GHz licence if the spectrum is split into long and short licences, rather than time-slices. However in eir's view its competitors will have almost exactly the same opportunity (and incentive) to drive up the price eir has to pay for 2.1GHz time-slice 2 spectrum in a CCA. DotEcon do not seem to have recognised this risk (their analysis of the issue seems to be based on what might happen in a uniform price auction with time slices). DotEcon's suggestion that eir can switch demand into 2.3GHz time-slice 2 or 2.6GHz time-slice 2 spectrum if the price of 2.1GHz time-slice 2 spectrum becomes relatively high [✂]. This appears to be acknowledged by Dotecon who argue that operators do not have to worry about winning spectrum in only time-slice 1 as the combinatorial nature of the auction means that this cannot happen if they always bid for the same amount of spectrum in both time-slices, but then they ignore this reality when considering the merits of time-slicing vs long and short licences.

The drafting of these sections does not provide sufficient clarity when the definition of time-slice dates can be varied by ComReg in accordance with conditions in the Information Memorandum which we have yet to have the opportunity to review.

Sections 3.15.6 to 3.5.10

These sections relate to aspects of the operation of the auction process which will be 'determined by detailed rules and /or methodologies to be set out in the Information Memorandum'. eir looks forward to reviewing the proposed Information Memorandum in due course and our position is reserved accordingly.

Section 3.15.11

eir has considered the arguments and has no objections to the proposed 70MHz sub 1GHz cap.

eir agrees that the aggregate spectrum cap should be set at no higher than 375MHz (in total) and that allocations in the 3.6GHz band should be measured by reference to the highest holding in any region.

eir agrees that existing holdings in the 2.3GHz band should not count towards the spectrum cap particularly as the spectrum is used for non-mobile / non-broadband services and its use is transitory in nature.

It is conceivable that one or more operators could surrender some of their existing holdings in advance of the proposed spectrum award. eir requests ComReg to clarify what steps it will take should such an event arise, specifically:

- The transparency measures it will deploy. eir expects that should such an event occur it will be communicated transparently and publicly in advance of the award process commencing. As such it may be appropriate for ComReg to set a moratorium during the award process during which existing holdings may not be relinquished. This may be the effect of ComReg's intention when reference is made to "existing holdings…at the time of the procedure". However this is not clear because "time of the procedure" is not defined.
- In the event that an operator surrenders some of their existing holdings in advance of the "time of the procedure", eir would expect that the spectrum be included in the award process. If not, how would such spectrum be made available to interested parties, other than the operator that has surrendered the spectrum.
- Will ComReg revisit the proposed spectrum caps if such an event arises?

Section 3.15.12

eir notes ComReg's intention to set reserve prices and SUFs by way of benchmarking. eir's position is reserved until the details can be seen in the draft Information Memorandum for our consideration.

Section 3.15.13 to 3.15.16 & 3.16 to 3.17

These sections relate to transition activities which will be subject to detailed rules set out in the Information Memorandum and the Regulations. eir looks forward to the opportunity to comment on the draft Regulations and Information Memorandum in due course.

Section 3.19

eir agrees that consideration of unsold lots will take place at least two years after the award process has concluded.

Comments on other matters

Coverage obligations

eir has a number of concerns regarding the proposed coverage obligations which could create a requirement for substantial unnecessary investment in network upgrades. Our analysis is ongoing and we reserve the right to make further submissions regarding the definitions for coverage obligations.

For the 700MHz band ComReg states compliance will be through prediction using the ComReg Atoll prediction tool as well as measurement. ComReg proposes using -95dBm as a proxy for a 30Mb/s service. Feedback from our RAN vendor on the 30Mb/s service as -95 dBm suggests this is doubtful as the reduction in inter site distance due to smaller cell sizes for -95dBm cell edge results in increased noise floor.

ComReg suggests by upgrading existing sites with 700MHz equipment could yield a cell edge single user throughput of 30Mb/s but they do not seem to account for the fact that current inter site distance for MNO's may not be based on such a throughput and by moving to -95 dBm cell edge further infill sites will be required.

ComReg also wish to have dedicated sites of importance covered. ComReg discount the argument these sites may well become subject to high rent as the site owners will be aware of the requirement to deliver these. ComReg claim it is the coverage that is required at the location and not the site, but by reducing the intersite distance the search ring for such new sites is limited.

MVNO Study

eir notes ComReg's preliminary position (para. 7.256) "*it is not appropriate at this time to attach MVNO access obligations to some or all of the 700 MHz rights of use. Notwithstanding, ComReg is of the view that there would be benefit in commencing a study that considers the current and future*

role of MVNOs in the Irish mobile market ("MVNO Study")". eir agrees that this is the appropriate approach and looks forward to engaging in the MVNO Study due to commence this quarter.

Staged Decision making

eir trusts that in accordance with its legal obligations, ComReg will consult on those aspects of the proposed Decision not included in the present draft, prior to adoption, and that it will also engage in effective consultation on the proposed Information Memorandum and Regulations. eir notes that to the extent that ComReg purports to engage in 'staged' decision making whereby certain aspects of MBSA2 are partially decided now, while other, inextricably related issues are deferred to a later decision, such an approach may not operate to deprive any party affected of a meaningful right of appeal, as provided for in Regulation 4 of the Framework Regulations 2011. eir's rights in that regard are fully reserved.

Updated submission to ComReg Document 20/56

eir

Response to ComReg Consultation:

Proposed Multi Band Spectrum Award -
Request for views from interested parties on auction formats including potential alternative options or modifications to ComReg's proposed auction format

ComReg Document 20/56

17 August 2020

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The comments submitted in response to this consultation document are those of Eircom Limited and Meteor Mobile Communications Limited (trading as 'eir' and 'open eir'), collectively referred to as 'eir Group' or 'eir'.

Summary

- eir agrees that an Auction Format Regulatory Impact Assessment (RIA) should be undertaken by ComReg.
- eir notes the sequencing of this request for views on auction formats so soon after its consultation on the draft detailed rules to implement a specific format. eir is approaching the request for views with an open mind and expects that ComReg will too.
- The Auction Format RIA must consider all potential options. The list of options in the Information Notice is significantly deficient.
- In particular, the Auction Format RIA must consider all possible combinations of auction format and spectrum packaging (in particular as regards time-slicing or not the 2.3GHz and 2.6GHz bands, and packaging of the 2.1GHz spectrum) and not only a subset thereof.
- The Auction Format RIA should also consider the option of auctioning the 700MHz spectrum on its own.
- ComReg's proposed packaging of the available spectrum is unnecessarily complex. It could be simplified by awarding the 700MHz band separately and not time-slicing the 2.3GHz and 2.6GHz bands.
- Whilst ComReg's proposed enhancements to the CCA are welcome, they still do not fully address the risks of gaming and inefficient outcomes raised by eir in previous responses. In this submission we propose some additional measures that would enhance a CCA. However eir remains of the view that the Simple Clock Auction (SCA) is the best approach in the Irish circumstances.
- eir does not believe that Three's concern regarding the potential for asymmetric pricing of 700MHz spectrum is a relevant or material consideration.
- Should ComReg conclude that Three's concern regarding the potential for asymmetric pricing in the 700MHz band requires changes to the auction format the list of options put forward is, in our view, materially incomplete – it only includes changes to a CCA format auction and does not consider other options, such as the use of an alternative auction format for the award of all of the spectrum, or just the 700MHz spectrum.
- eir has reviewed each of the options set out in Information Notice and has rejected them for the reasons detailed in this submission.
- There remains a lot of work to be done on auction design and eir looks forward to further engagement with ComReg on these important matters. The Auction Format RIA is a critical component of this.

Views on Auction formats / design

The need for a full regulatory impact assessment

1. ComReg states (para. 2.3) it "*is considering whether it may be appropriate to consider the auction format options for the Proposed Award in a RIA format ("Auction Format RIA")*". Given the very great importance of the award of 700MHz, 2.1GHz, 2.3GHz and 2.6GHz spectrum to the future of the electronics communications market in Ireland, it is essential that ComReg undertake a comprehensive, systematic and robust evaluation of all options for all aspects of the award design, and not just the choice of auction format. Moreover, this must be undertaken with an open mind as to the eventual conclusions, without any preconception as to which option might be best in each case. ComReg has to date failed to undertake such a comprehensive, systematic and robust evaluation.

2. eir notes the sequencing of this request for views on auction formats so soon after ComReg's consultation on the draft detailed rules to implement a specific format. eir is approaching the request for views with an open mind on the basis that ComReg will undertake an auction Format RIA starting from first principles and that this request for views is not simply an administrative exercise by ComReg.

3. Each and every possible combination of options, for example as regards spectrum packaging and auction format, needs to be considered and evaluated in the round – it is not acceptable for some combinations to be ignored because of a preconception about the merits of one particular option in respect of one particular aspect of the award design. No one aspect of the award design should take precedence over all others. All aspects need to be considered together and the best overall combination of choices identified based on the specific circumstances in Ireland.

4. As such it is essential that ComReg properly considers and evaluates all possible choices of auction format(s) not only in combination with its preferred time-slicing approach, but also with alternative options for the packaging of the available spectrum, including with the 2.1GHz spectrum being time-sliced but with no time-slicing of the 2.3GHz and 2.6GHz spectrum, and with the 2.1GHz spectrum being packaged into two categories differing by start date and duration, also with no time-slicing of the 2.3GHz and 2.6GHz spectrum. Consideration should also be given as to whether the 700MHz band should be awarded separately, to further simplify a multi-band spectrum award for the higher frequency bands. ComReg's current list of options for evaluation is therefore significantly deficient and will

need to be expanded for the Auction Format RIA. We look forward to further engagement with ComReg when the draft Auction Format RIA is published for consultation. For the avoidance of doubt eir believes that the most appropriate auction format in the circumstances is a Simple Clock auction (SCA).

Spectrum packaging options

5. As regards packaging approaches, as noted above, as part of its regulatory impact assessment we believe ComReg needs to consider not only its preferred time-slicing approach, but also at least two other potential approaches, and to do so in the context of all potential auction formats – with the objective of identifying the combination of spectrum packaging approach and auction format that together provide the best choice for this award.

6. The two other potential approaches that we believe ComReg needs to consider are:
   - Where the 2.1GHz spectrum is time-sliced but the 2.3GHz and 2.6GHz spectrum is not time-sliced.
   - Where the 2.1GHz spectrum is split into two categories according to the start date and duration of the licences, i.e. one category for licences that start in 2022 and are of ~18 years duration and a second category for licences starting in 2027 and of ~13 years duration (again with no time-slicing of the 2.3GHz or 2.6GHz spectrum).

7. eir continues to disagree with DotEcon and ComReg's analysis of the need to time-slice the 2.3GHz and 2.6GHz spectrum. eir also continues to disagree with DotEcon and ComReg's analysis of the relative merits of time-slicing the 2.1GHz spectrum vs packaging the 2.1GHz spectrum according to licence start date and duration, at least in the case of a CCA format auction.

The need to time-slice the 2.3GHz and 2.6GHz spectrum

8. As regards time-slicing of the 2.3GHz and 2.6GHz spectrum, eir continues to maintain its view that this will be of little if any practical benefit to any bidder, and will add significant unnecessary complexity to the auction process for all concerned – in particular if this is what tips the balance in favour of a CCA format auction rather than a simpler format, such as a SCA.

9. Whilst we are grateful to DotEcon and ComReg for their concern over the potential for other bidders to bid strategically to drive up the price that eir might have to pay to re-acquire the

2.1GHz spectrum that it currently holds, as noted in our response to ComReg 19/14, we see little if any benefit in being able to bid for 2.3GHz or 2.6GHz spectrum in time-slice 2 only (at least in the context of a CCA) when we do not expect any bidder to be interested in acquiring 2.3GHz or 2.6GHz spectrum in time-slice 1 only (and hence bidding for this spectrum in time-slice 1 only). In this case (a) there is little prospect of eir actually winning 2.3GHz or 2.6GHz spectrum in time-slice 2 only, and (b) any bids by eir for time-slice 2 only spectrum are unlikely to even be price-setting for the winners of 2.3GHz and 2.6GHz spectrum, given that the inclusion of any such bid in a feasible combination of bids will almost certainly involve valuing the corresponding spectrum in time-slice 1 at the reserve price.

10. The only potential use we see of time-slicing the 2.3GHz and 2.6GHz spectrum in these circumstances is that it might allow [✂], although what the benefit of this might be to eir is not entirely clear to us at present – in particular, given the rules of the CCA, we would not expect this to have any material impact on the final outcome of the auction (we do not believe it would stop competitors from driving up the price that eir would have to pay for 2.1GHz spectrum in time-slice 2 for example).

11. Strangely enough, the circumstances in which we think there might be merit in time-slicing the 2.3GHz and 2.6GHz spectrum is if a uniform price auction format is used (such as an SMRA or SCA, but not a CMRA). In this case we agree with DotEcon that there could well be benefit to eir in being able to switch from 2.1GHz time-slice 2 spectrum into 2.3GHz and/or 2.6GHz time-slice 2 spectrum – the reason being that in this case [✂] (which incentive will in any case be moderated if there is also a uniform price for all 2.1GHz time-slice 2 spectrum).

12. A further risk with time-slicing the 2.3GHz and 2.6GHz spectrum, that ComReg does not appear to have considered, is the risk that some bidders may decide that the reserve price for this spectrum in time-slice 1 is too high relative to its expected value in time-slice 1, as estimated at the time of the auction. Demand in time-slice 1 may therefore be less than the available supply, leading to some of this spectrum remaining unallocated in time-slice 1. Whilst reputationally this might be unfortunate, more worrying is the risk that those bidders might subsequently discover that they did actually have a valuable use for this spectrum in time-slice 1, but were unable to use it because they had not acquired it in the auction. Surely it would be better therefore for the 2.3GHz and 2.6GHz spectrum to be sold in lots covering the entire ~20 year period from 2021, so as to ensure that bidders did not find themselves unable to make use of this spectrum from the earliest possible date because of underestimating its value at the time of the auction.

13. In eir's view therefore it is essential that ComReg (a) properly assesses the likely risks and benefits of time-slicing the 2.3GHz and 2.6GHz spectrum in the context of this specific award, taking into account all aspects of likely demand (in particular the likelihood that anyone will bid for spectrum in time-slice 1 on its own), and also (b) evaluates all potential spectrum auction formats both with and without time-slicing of the 2.3GHz and 2.6GHz spectrum, in order to identify the best possible combination of options for this particular spectrum award.

Packaging of the 2.1GHz spectrum

14. As regards the packaging of the 2.1GHz spectrum, either in two time-slices or as two categories of licence with differing start date and duration, eir continues to believe that there is far less difference between the two options than DotEcon and ComReg suggest.

15. In particular eir believes that, if a CCA is used, there is just as much opportunity for competitors to drive up the price that eir has to pay for 2.1GHz spectrum from 2027, irrespective of the way in which the 2.1GHz spectrum is packaged. Time-slicing the 2.1GHz spectrum will not prevent bidders from driving up the price that eir has to pay for 2.1GHz spectrum in time-slice 2 – all that they will have to do is [✂].

16. ComReg has previously proposed that the Early Liberalisation Option (ELO) may be exercised by an existing 3G licensee from the date a Decision is issued regarding the MBSA2 and that eir should be required to pay an Early Liberalisation Fee (ELF) determined by the outcome of the auction. ComReg proposes that Three and Vodafone should not be required to pay an ELF. Consequently eir's competitors will be able to exercise the ELO without any uncertainty in advance of the Information Memorandum being published. This leaves eir in the invidious position of having to decide whether to exercise the ELO without any knowledge of the level of ELF it will have to pay until after the award process has been completed[1]. The time between the issuance of a Decision and the completion of the award process could be a significant amount of time particularly if any part of the award process is subsequently challenged [✂] To date ComReg has not addressed these concerns. Rather, Dotecon has sought to trivialise the issue by suggesting that a requirement for eir to

[1] It is also notable that the mechanism to calculate the ELF will be set out in the Information Memorandum. Given that the proposed mechanism was not included in the draft Information Memorandum it is not clear whether ComReg intends that eir must wait until publication of the final Information Memorandum before it will even have sight of the mechanism.

pay an ELF is highly unlikely. If that is the case then it should be established upfront that no ELF will apply. However if ComReg persists that the level of the eir ELF will be determined by the auction then the only reasonable and proportionate approach that ComReg can adopt is:

- The ELO can only be exercised by any operator after the award process has concluded.
- Appropriate safeguards that do not currently exist are built into the auction process to ensure that there are no opportunities for gaming by eir's competitors to inflate the ELF. This may include consideration as to whether a pro rata ELF mechanism based on the auction outcome should be established for Three and Vodafone for the early liberalisation period.
- The mechanism to calculate the ELF is designed to ensure that it is only based on the value of liberalisation in the period to 2027 and that the mechanism is subject to a proper consultation process.

To do otherwise places eir at an unacceptable disadvantage relative to its competitors.

17. Moreover, to the extent that there is any incentive for strategic demand reduction in the auction, eir likewise believes it would be just as easy for bidders to bid in a way that was consistent with an 'acceptable sharing' of the spectrum between them if the spectrum were packaged in time-slices, as if it were packaged by licence start date and duration.

18. In any case, eir strongly disagrees with DotEcon's suggestion that there is a clear split of the 2.1GHz spectrum between the existing MNOs that they would all find acceptable – certainly not the split put forward by DotEcon. [✂]. eir therefore expects there to be effective competition for all of the available 2.1GHz spectrum in the auction.

19. In eir's view, the circumstance in which the choice between time-slicing vs categorising the 2.1GHz spectrum according to start date and duration is material is, once again, if a uniform price auction format is used. In this case it is indeed preferable for the 2.1GHz spectrum to be time-sliced, since that would then ensure that all bidders pay the same price for 2.1GHz spectrum in each time-slice. By contrast, categorising the 2.1GHz spectrum by start date and duration in these circumstances would indeed put eir at risk of having to pay a higher price than its competitors for the same spectrum, as a result of price driving by one or more of its competitors. But to repeat, we believe that risk would exist in a CCA even if the

spectrum were time-sliced; it is only if a uniform price auction format is used that in our view there is any benefit from time-slicing as compared with categorising the spectrum by start date and licence duration.

20. Hence, once again, eir is of the view that ComReg needs to properly consider both of these options, alongside the choice of whether or not to time-slice the 2.3GHz and 2.6GHz spectrum, when considering each potential auction format.

ComReg's Options 1 to 4

21. As regards the specific auction format options listed by ComReg:

- **Option 1: CCA**

22. eir is grateful to DotEcon and ComReg for their work to date, in response to eir's concerns regarding the need for additional price information, and their proposal to provide bidders with additional information regarding the 'discount' that they would enjoy if this were to be the final primary round and there were no unallocated lots at the end of that round, and hence the 'exposure price' of each package that the bidder might bid for. eir strongly supports the provision of this additional information and believes it essential, at a minimum, that this information be provided if ComReg continues with its proposal to use a CCA format auction for this award.

23. eir is strongly of the view however that this change alone is insufficient to address its concerns with the efficacy of the CCA in the context of this specific award. eir's principal concern remains that budget-constrained bidders may find themselves (through no fault of their own) unable to bid in a manner that is consistent with them winning the spectrum package of most value to them, as a result of the rules proposed by ComReg (potentially winning nothing at all), and hence the outcome of the auction may be inefficient. eir believes therefore that further changes to the rules proposed by ComReg will be required if a CCA is to be used for this award, and if not, a different auction format that does not leave budget-constrained bidders facing such a risk must be used instead (such as an SCA, with or without a relaxed activity rule).

24. The specific further changes that eir considers essential if a CCA is to be used for this award are as follows:

- For the bid amount of each primary bid to be its exposure price.

- If there are any unallocated lots at the end of the final primary round, to replace the normal supplementary round by one or more 'additional rounds', in which each bidder would be able to place both a 'headline bid' (equivalent to a primary bid in a primary round) and, if they wished, a number of 'additional bids', with additional bids having to comply with the same rules as would apply in the supplementary round of a normal CCA if the additional round were the final primary round and a bidder's highest bid for its 'final primary package' were its headline bid in this round; such rounds to end when there is feasible combination of bids including exactly one bid from each bidder that is of maximum value amongst all possible feasible combinations of bids; winning bids and base prices to then be calculated in the same way as for a standard CCA based on all bids submitted in all rounds of the auction[2]. We call this an Iterative CCA.

We provide further details of these proposed changes, and a discussion of why we consider them essential, in the Annex to this document. However whilst our proposals enhance the efficacy of a CCA we remain of the view that this format is inferior to an SCA taking due account of the Irish circumstances.

[2] Such additional rounds would therefore be very similar to the rounds of a CMRA format auction, but such rounds would only be used if there were unsold lots at the end of the final primary round, and the auction would still use Vickrey-nearest minimum core pricing, rather than be pay-as-bid.

- **Option 2: SMRA**

25. Whilst eir would prefer a simple uniform price, pay-as-bid auction format for this award, eir believes that some form of simple clock auction would be preferable to an SMRA, an SMRA/clock hybrid or an Enhanced SMRA.

26. eir's specific concern with SMRA-type auction formats, in the context of this award, is the fact that bidders may not be able to switch their demand cleanly between lot categories – any attempt to switch entirely out of one category and into another may result in the bidder holding (and potentially winning) lots in both categories. Given that a number of the bands to be included in this award are potential substitutes for each other, and at the same time there are strong technical and economic reasons for preferring to hold a large block of spectrum in one band rather than two (or more) smaller blocks of spectrum in multiple bands, such switching risk is very likely to be problematic (and clearly could lead to an inefficient outcome).

27. If, despite our misgivings, ComReg were to decide to use an SMRA format for this award, we would urge ComReg to include rules that facilitate clean switching between lot categories, for example allowing an unlimited number of withdrawals with only a limited penalty being imposed on the bidder if some or all of the relevant lots remained unallocated at the end of the auction e.g. a penalty of only 10% of the withdrawn bid amount – see for example the rules of the ACMA's auction of 1800MHz spectrum in 2015.

- **Option 3: SCA with relaxed activity rule**

28. As previously noted, eir's principal concern with the CCA format proposed by ComReg is that budget-constrained bidders may find themselves (through no fault of their own) unable to bid in a manner that is consistent with them winning the spectrum package of most value to them, as a result of the rules proposed by ComReg (potentially winning nothing at all), and hence the outcome of the auction may be inefficient. The fact that the outcome of an SCA format auction, with or without a relaxed activity rule, could also be inefficient is not therefore sufficient reason to reject this format. ComReg needs to undertake a systematic and robust comparison of the merits and risks of each format in the context of this specific award, rather than in theory, before making its final decision as to the best auction format for this award.

29. As noted above, eir is now proposing some changes to the CCA format which we believe may ameliorate, but not entirely eliminate, our principal concern with that format. For the

avoidance of doubt eir remains of the view that an SCA format is superior taking due account of the Irish circumstances.

30. If ComReg does not accept eir's proposed changes however, we continue to believe that it should be more important to ComReg to ensure that all bidders in the auction (including budget-constrained bidders) are able to submit the bids that would allow them to win the spectrum package of most value to them in the final outcome (without having to pre-judge what that outcome might be), and not be restricted by the rules in a way that would prevent them from doing so, potentially leading to dissatisfaction and potential challenge to the final auction outcome (as well as an inefficient outcome). Notwithstanding any theoretical risk of inefficiency in other regards, we therefore continue to believe that an SCA (with or without a relaxed activity rule) would be a better choice in these circumstances.

- **Option 4: CMRA**

31. eir continues to believe that the CMRA would not be a good choice of auction format for this award, for the reasons stated in its response to 19/59R. Moreover, eir is now of the view that a number of the advantages of the CMRA, as compared with the standard CCA, could likewise be achieved through the use of an Iterative CCA. In eir's view therefore the Iterative CCA would be a better choice of format than the CMRA for this award. However as noted above we strongly believe that the SCA format is the most appropriate taking due account of the unique aspects of the proposed award.

ComReg's Options 5(a) to (g)

32. The list of options put forward by ComReg in response to Three's concern regarding the potential for asymmetric pricing of the 700MHz spectrum is, in our view, materially incomplete – it only includes changes to a CCA format auction and does not consider other options, such as the use of an alternative auction format for the award of all of the spectrum, or just the 700MHz spectrum. It would appear that ComReg has once again allowed its prejudice in favour of the CCA auction format to colour its thinking, rather than taking a dispassionate view of the potential options for dealing with Three's concern (if required).

33. Given that Three's concern relates specifically to the pricing of the 700MHz spectrum, in our view, to the extent that any change is necessary to deal with that concern, and on the assumption that ComReg is not willing to contemplate using a different auction format to award all of the available spectrum, the correct solution is to auction the 700MHz spectrum

separately from the other spectrum to be awarded, and for that auction to be a simple uniform price auction – for example perhaps an SMRA/clock hybrid auction. This would, in our view, wholly deal with Three's concern, and at the same time would significantly reduce the complexity of the auction process, without undue risk to ComReg's primary objectives for the award of the available spectrum. We believe this would be a far better solution than any solution that involves 'tweaks' to the CCA format, which risks distorting the outcome of the auction, either directly or through distorted bidding incentives.

34. As regards the specific options that ComReg has put forward:

Option 5(a): Prohibition on any two bidders winning more than 2x25MHz of 700MHz spectrum

35. Three's concern is about the potential for asymmetric pricing of 700MHz spectrum, not the potential for two bidders to win all of the available spectrum. Irrespective of the merits of Three's case there is no justification whatsoever for prohibiting two bidders from winning all of the available 700MHz spectrum (subject to the already proposed sub-1GHz cap). Such an additional 700MHz spectrum cap could clearly lead to an inefficient outcome, and there is no justification for this. This option would therefore, at the very least, be disproportionate and should be rejected by ComReg.

Option 5(b): Prices for 700MHz spectrum to be calculated as if there were a cap of 2x25MHz on any pair of bidders

36. Whilst this option would at first glance appear only to affect the prices to be paid by winning bidders and not the allocation of spectrum, this is incorrect. This proposed change to the pricing rule would mean that Three would not have to pay the full opportunity cost of its winning bid if it were to win 700MHz spectrum in competition with eir and Vodafone. Three would only have to pay what any fourth bidder for 700MHz spectrum was willing to pay, or the reserve price, for its first lot of 700MHz spectrum. As such, Three would in all likelihood be able to bid significantly above its true value for 700MHz spectrum in order to win that first lot, in the knowledge that it almost certainly would not have to pay the true opportunity cost of its bid. It is easy to see therefore how this could lead to an inefficient outcome in which Three won 700MHz spectrum that should have been won by either eir or Vodafone.

37. Again therefore, irrespective of the merits of Three's concern, this option cannot be justified, would at the very least be disproportionate, and should be rejected by ComReg.

Option 5(c): Cap on amount of supplementary bids for third 700MHz lot

38. Given the very limited description of this option in ComReg's Information Notice, we are unable to understand exactly how it is intended to operate. Any comments we make on this option are therefore preliminary only and eir entirely reserves its position on this option. To the extent that ComReg wishes to explore this option further we would expect full details to be provided for consideration by way of a separate consultation.

39. We note that a bidder whose final primary round package included at most two 700MHz lots would already be limited by the final price cap to bidding no more than the final round price for any additional 700MHz lots – this additional constraint therefore appears to be unnecessary in this case. As regards a bidder whose final primary round package included three (or more) 700MHz lots, the only way we can see in which such a bidder could be limited to bidding no more than the final round price for its third 700MHz lot would be to force that bidder to make a supplementary bid for a package identical to its final primary round package but with the number of 700MHz lots reduced to two, for an amount that was no less than its maximum bid for its final primary round package less the final round price for one (or more) 700MHz lot(s). We further note that, to be consistent with the final price cap, the amount of this mandatory supplementary bid would seem to need to be exactly equal to the bidder's maximum bid for its final primary round package less the final round price for one (or more) 700MHz lot(s).

40. It seems to us that this could potentially lead to such a bidder inefficiently not winning the third 700MHz lot in their final primary package since they would not necessarily be able to express their full willingness to pay for that third lot. We believe this could arise, for example, if there were an unallocated 700MHz lot at the end the final primary round (for example because another bidder had reduced their demand from two lots to zero lots in the final primary round). It seems to us therefore that this option also risks an inefficient outcome.

Options 5(d), (e) and (f): Increasing the prices that Three's competitors have to pay

41. Options 5(d), (e) and (f) all attempt to address Three's concern by increasing the price that competitors to Three will have to pay if there is weak competition for 700MHz lots. We see no objective justification for such an arbitrary price increase. In particular we see no mechanism by which such a price increase would lead to more efficient use of spectrum – on the contrary such a price increase could well lead to a reduction in the efficiency of spectrum use, as a result of lower investment in networks and services because of the

additional capital that such higher prices would take out of the industry. In our view therefore any such arbitrary price increase would be wholly unjustified and contrary to ComReg's statutory and regulatory objectives.

Option 5(d): Higher reserve price for 700MHz lots

42. As regards Option 5(d), ComReg is already proposing to set the reserve price for 700MHz lots at a level that is comparable with the likely market value of the spectrum. Indeed, given the reserve price that ComReg has already proposed for 700MHz lots, eir is of the view that any asymmetry in the pricing of 700MHz spectrum between eir and Vodafone on the one hand, and Three on the other, is in reality likely to be quite low. Any increase in the reserve price of 700MHz lots is therefore, in eir's view, more likely to lead to an inefficient choking off of incremental demand for 700MHz lots, rather than any material reduction in the asymmetry of pricing between winning bidders.

43. Of particular concern to ComReg should be the risk that any higher reserve price chokes off demand to the point where one or more 700MHz lots remain unallocated at the end of the auction. Given the already high level of reserve price proposed by ComReg[3], eir believes this is not an inconceivable possibility. eir is therefore strongly of the view that there is no room for any increase in the currently proposed reserve price for 700MHz lots.

Option 5(e): Higher value on unsold lots for 700MHz lots when price setting

44. ComReg provides very little detail of how this proposed option would work in practice, and hence it is difficult for eir to comment effectively. eir therefore reserves its position on this option until further details are provided. To the extent that ComReg wishes to explore this option further we would expect full details to be provided for consideration by way of a separate consultation.

45. For example, on the basis of ComReg's description it is very unclear to us what would happen if a bidder's winning bid was for an amount that exceeded the reserve price, but was for less than the higher value used for price setting. Would the bidder not win the spectrum? Or would the bidder have to pay a price based on the higher value even if that exceeded the amount of their winning bid? Or would they only have to pay the amount of their bid, even

[3] As noted in our response to ComReg 20/32, Draft Information Memorandum, ComReg has failed to provide any explanation regarding changes to the proposed reserve prices and these must be consulted on further.

though that could be less than the higher value used when setting base prices for other winning bidders?

46. Clearly, the answer to this question will have significant implications for how bidders choose to bid in the auction. We note in particular that if winning bidders only have to pay the amount of their bid if that is less than their base price based on a higher value for unsold lots, then that is a form of first-price or pay-as-bid pricing rule, and consequently it would not be surprising if bidders were to shade their bids, with the consequent risk of an inefficient outcome.

47. Similarly, as regards ComReg's second option for how such a higher value might be derived, given the very limited information provided by ComReg we are unable to deduce exactly how it would expect to derive a value based on "alternative valuations expressed by other bidders for a third lot". Surely that is what core pricing already does? Or is ComReg proposing to calculate some sort of 'average value' expressed for a third lot by all bidders, and then use that as the higher value for unsold lots when calculating the base price for each bidder? If so, one potentially significant problem with this approach is that the price to be paid by some bidders could well depend to a significantly greater extent on their own bids than it would using standard Vickrey-nearest minimum revenue core pricing. Given this potential, there will no doubt be an increased incentive on such bidders to shade their bids in order to reduce the amount they might have to pay, again potentially leading to an inefficient outcome.

48. Moreover, notwithstanding the lack of detail in ComReg's description of this option, we nevertheless note that this approach would not be consistent in principle with minimum revenue core pricing since it could require prices to be higher than opportunity cost. This approach would also almost certainly create incentives to deviate from truthful bidding – specifically it would almost certainly create incentives to bid shade with the potential for this to lead to an inefficient outcome. We find it hard to comment on whether this would create a contradiction in how ComReg assigns lots given our uncertainty over exactly what ComReg intends in this regard, but there certainly is the potential to create such a contradiction depending on exactly what ComReg decides to do. And finally, as already noted, ComReg has provided insufficient detail as regards how it would propose to estimate a suitable higher value for unsold lots when setting prices for us to be able to comment on the reliability and/or robustness of their proposed methods.

Option 5(f): Non-linear reserve prices for 700MHz lots

49. Again, ComReg has provided insufficient detail in its Information Notice on how this option would operate for eir to be able to comment effectively, and eir therefore reserves its position on this option until further detail is provided. To the extent that ComReg wishes to explore this option further we would expect full details to be provided for consideration by way of a separate consultation.

50. For example, would the round price for 700MHz lots be non-linear in the first round, and if so, how would ComReg then propose to increase round prices thereafter? Or would these non-linear reserve prices only apply to the pricing of winning bids? If the latter, what does ComReg propose to do if a winning bid is less than the non-linear reserve price for the winning package?

51. And even if we ignore these issues, it seems to us that non-linear reserve prices applying only to the pricing of spectrum would only have an impact on the final price of a winning package if the opportunity cost of the overall package were below the (non-linear) reserve price of the package – noting that in a CCA for multiple lot categories there isn't a price for each individual lot category. As such it seems unlikely to us that this option would do much if anything to address Three's concern (irrespective of its merits) except in very limited circumstances.

52. This option would also represent a radical change in policy as regards reserve prices (intentionally or otherwise) – from being an instrument intended to promote efficient use of spectrum and reduce the incentive to engage in certain types of gaming behaviour, to being a mechanism primary concerned with extracting value from bidders. All that is required to achieve ComReg's original objectives for a reserve price is to set a price that is somewhat below the likely marginal value of the spectrum – that is to say somewhat below the price at which demand would equal supply. Setting a reserve price that varies with the amount of spectrum that a bidder acquires does nothing more to promote efficient use of spectrum or reduce the incentive for gaming – all that it does is increase the price that a winning bidder has to pay, extracting a higher proportion of the value of the spectrum.

53. Moreover, the degree of confidence that ComReg will be able to attach to any estimate of the value of incremental lots to a bidder (which it will need to justify any non-linear reserve prices) will be significantly lower than the (already limited) confidence that it can attach to its

estimate of the likely marginal value of the spectrum overall. As such, the risk that it will mis-price marginal lots and thereby choke off incremental demand will be significantly increased.

54. eir's preliminary position therefore is that it does not support the use of non-linear reserve prices for any category of lot in this award (let alone all categories).

55. As regards the likely value of incremental 700MHz lots, [✂]. In which case marginal values for incremental 700MHz lots could be both increasing and decreasing.

Option 5(g): Weighted Vickrey-nearest pricing

56. We struggle to see how the use of a weighted version of Vickrey-nearest minimum revenue core pricing could have any positive impact on Three's specific concern (if it has merit) regarding asymmetric pricing of 700MHz spectrum except by chance, and ComReg provide no explanation in their Information Notice as to how this option might address Three's concern specifically. Unless and until such an explanation is provided, eir therefore reserves its position on this option. To the extent that ComReg wishes to explore this option further we would expect full details to be provided for consideration by way of a separate consultation.

Annex

1. Introduction

eir has repeatedly highlighted to ComReg the significant challenges that some bidders can face when bidding in a CCA format auction, and the risk that those challenges will lead to an inefficient outcome – not because the bidder has done anything wrong, but because they have had to make a choice between options when they have insufficient information to be able to know which option is the correct one (both for them individually, and for an efficient outcome).

Whilst we continue to believe that the best solution to this risk would be for ComReg to use a different auction format such as the SCA (alongside other measures to reduce the complexity of the award[4]), we have nevertheless developed some proposals for changes to the CCA format currently preferred by ComReg, which we believe would go some way towards ameliorating some of the challenges and risks that we have highlighted, without creating any additional risks so far as we can see.

In summary, those changes are as follows:

- For the bid amount of each primary bid to be its exposure price.
- If there are any unallocated lots at the end of the final primary round, to replace the normal supplementary bids round by one or more 'additional rounds', in which each bidder would be able to place both a 'headline bid' (equivalent to a primary bid in a primary round) and, if they wished, a number of 'additional bids', with additional bids having to comply with the same rules as would apply in the supplementary round of a normal CCA if the additional round were the final primary round and a bidder's highest bid for its 'final primary package' were its headline bid in this round; such rounds to end when there is feasible combination of bids including exactly one bid from each bidder that is of maximum value amongst all possible feasible combinations of bids; winning bids and base prices to then be calculated in the same way as for a standard CCA based on all bids submitted in all rounds of the auction[5]. We call this an Iterative CCA.

Our recommendation is that ComReg adopt both of these proposals.

[4] For example by awarding the 700MHz by a separate award process, and not time-slicing the 2.3GHz and 2.6GHz bands.

[5] Such additional rounds would therefore be very similar to the rounds of a CMRA format auction, but such rounds would only be used if there were unsold lots at the end of the final primary round, and the auction would still use Vickrey-nearest minimum core pricing, rather than be pay-as-bid.

2. Primary bid amounts equal to exposure prices

We propose that the amount of each primary bid be equal to the exposure price of the package as defined in paragraph 4.115 of ComReg 20/32, i.e. be equal to the sum of the round prices of the lots included in the bid minus the relevant bidder's 'discount' (as notified to that bidder before the start of the round), subject to that price being no less than the total of the reserve prices for the lots within the package.

The advantage of this change is that it would allow a budget-constrained bidder to continue bidding (efficiently) on a package whose total round price exceeded their budget (and/or their value), but whose discounted price did not. The problem with simply telling each bidder what their discount would be, but not reducing their primary bid amount by that amount, is that the bidder has to decide whether it can afford to take the risk that it will have to pay more than the discounted amount – for example if its discount subsequently goes down, or there are unallocated lots at the end of the final primary round – since their bid at the full round price will be binding on them for the rest of the auction. Setting the amount of each primary bid equal to its exposure price removes this problem.
Since the same discount would apply to all potential primary bids by a bidder in a round, this change should not otherwise affect a bidder's choice of primary bid package – relative prices of packages would remain the same (being equal to the difference in total round price between the packages). Bidders would in effect be bidding the full round price for lots they were still competing for, but would only be bidding the current maximum 'second price' for lots that were no longer subject to competition from other bidders.

As a side benefit, this would eliminate an inconsistency in ComReg's currently proposed rules whereby a bidder's ultimate knock-out bid amount may be less than the amount that they had to bid for the same package in the final primary round, for example if there are no 'unsold' lots at the end of the round and the bidder has a non-zero discount at the start of the round. A bidder's KO bid amount, in the case where there are no unsold lots at the end of the final round, is equal to the total round price of their final primary package less their discount, whereas under ComReg's currently proposed rules the same bidder would have to bid the full round price for their final primary package. This may be of no consequence to bidders who have an adequate budget (and deposit) to be able to make the higher bid, but for other bidders this may be material and lead to them unnecessarily reducing their demand, potentially leading to an inefficient result.

The fact that a bidder's discount may go down, or disappear completely in subsequent rounds, does not appear to us to be problematic. The amount of each primary bid made by a bidder would be

reduced by the amount of the discount applicable in that round. If a bidder's discount were to go down (or disappear completely) in a future round that would affect the amount of any primary bid that the bidder made in that future round, but would have no effect on the bidder's previous bids, which would stand as made. If a bidder wished to make a higher bid for a previously discounted primary bid package then they would be able to do so, subject to the activity rules.

The fact that different bidders may bid different amounts for the same package of lots in the same round also seems unproblematic to us. Any such difference could only arise as a result of a difference in the discount notified to each bidder before the start of the round, reflecting a difference in the current maximum 'second price' that those bidders would have to pay for the lots within their package that were no longer being (actively) competed for by other bidders. All bidders would still be bidding the same amount for the lots that were being (actively) competed for, being the round price of those lots.

Finally, we see no reason why this change should give rise to any issues with respect to the implementation of ComReg's proposed activity rules, chain bid requirements, or relative and final price caps. All of those rules are intended to ensure that all of a bidder's bids are consistent with their previously revealed preferences in eligibility reducing rounds (constraining rounds) or the final primary round. In all cases the relevant constraints are based on the difference in the price of two packages in either the relevant constraining round or the final primary round – see for example 4.79(b), 4.81(b), 4.85(b) and the second bullet of 4.142 of ComReg 20/32. Given that the same discount applies to all packages in a given round (for the same bidder), the difference in price between two packages in a given round will be the same whether that difference is calculated pre- or post-discount. For simplicity we suggest that the calculation be undertaken pre-discount, i.e. solely on the basis of round prices, and hence identically to the calculation required to implement the currently proposed rules.

What would be slightly different is that the bid amount of a proposed relaxed primary bid would be reduced by the relevant discount in the round. This would then mean that the necessary amount of any required chain bids would similarly be reduced by that same discount (see for example 4.79(a), 4.81(a) and 4.85(a) of ComReg 20/32). A bidder would only have to submit a chain bid for the relevant constraining package if its existing highest bid for that package were below this discounted amount. This is entirely consistent with maintaining consistency with a bidder's revealed preferences.

The condition for a bidder being able to submit a relaxed primary bid would continue to be that the amount of any and all required chain bids be no greater than the price of those bids in the current

round, but that price would now be the post-discount price[6]. Again, this is entirely consistent with maintaining consistency with a bidder's revealed preferences.

As regards the final price cap, for a bidder that submits a non-zero bid in the final primary round we envisage that the final price cap would apply in exactly the same way as it would without discounting – the amount of the bidder's final primary bid would be discounted, but they would have the option of increasing that amount in the supplementary round if they wished, and the final price cap on all other supplementary bids would be based on the bidder's highest bid for their final primary package, irrespective of how and when that bid was made.

For a bidder that did not make a non-zero bid in the final primary round however, we believe the final price cap on the amount of any supplementary bid should be reduced by the amount of the bidder's discount (if any) in the final primary round. Thus, a bidder that chose to make the zero bid (or did not submit a valid primary bid) in the final primary round would not be able to make a supplementary bid for an amount that exceeded the amount they would have been required to bid for the same package in the final primary round post-discount. Again, we consider this necessary to ensure consistency with the revealed preferences of the bidder.

3. Iterative CCA

Separately, but in addition to the above proposal, we propose a change to the CCA rules currently proposed by ComReg in the circumstances where there are unallocated lots at the end of the final primary round, affecting the supplementary round only (with no change if there are no unallocated lots at the end of final primary round).

Specifically, if there are any unallocated lots at the end of the final primary round, we propose that the supplementary round be replaced by one or more 'additional rounds' to elicit further bids from bidders and determine the winning outcome and base prices in an iterative manner, as follows:

- Before the start of each additional round, ComReg sets a round price for each type of lot and communicates those new round prices to the bidders
- Each bidder can submit at most one 'headline bid' in each additional round, in exactly the same way and subject to exactly the same constraints as primary bids in the primary rounds

[6] Again, given that the same discount would apply to the total round price of both the relaxed primary bid and all required chain bids, the test for whether or not a proposed relaxed primary bid was acceptable would be the same whether done pre- or post-discount. In this case however we think it is probably better to think in terms of the post-discount prices since that is what the bidder would actually be bidding.

- However, each bidder can also submit a number of 'additional bids' in each additional round, in exactly the same way and subject to essentially the same constraints as supplementary bids in the supplementary round of a standard CCA:
    - The bid amount of each such additional bid must be at least the greater of the reserve price of the package and the highest bid that the bidder has already made for the package
    - The bid amount cannot exceed the current round price of the package (which is equivalent to the final price cap in a standard CCA supplementary round)
    - For packages that exceed the bidder's eligibility in the round, the bid amount cannot exceed the relevant relative price cap.
- We propose that in the first additional round bidders be permitted to submit additional bids only (no headline bid) – their headline bid for this first additional round being the primary bid they made in the final primary round
- In subsequent additional rounds, a headline bid can be a relaxed bid (i.e. for a package that exceeds the bidder's eligibility in the round) provided that it complies with the relevant relative price cap, which may require the bidder to make one or more additional bids (as per chain bids in the primary rounds), and those additional bids must themselves be compatible with the constraints on additional bids
- Once each round has ended, ComReg to compute the highest total value across all feasible bid combinations (being bid combinations that include at most one bid from each bidder and whose combined demand is no greater than the number of lots available in each category)
- If that value is strictly greater than the value of all feasible bid combinations that include exactly one bid from each and every bidder (which can include the zero bid, but only if the bidder has made that bid) then there will be a further round of bidding in which some (or all) round prices will be increased - the round prices to be increased to be determined in the same way as in the most recent Danish CMRA, or some similar process[7]
- Otherwise (i.e. if there is at least one feasible combination of bids that includes exactly one bid from each and every bidder and has equal highest value amongst all feasible combination of bids), that was the final additional round; ComReg to then calculate the winning combination of bids and base prices in the same way as currently proposed (for the standard CCA), based on all of the bids made in all rounds of the auction (primary bids, chain bids, headline bids and additional bids).

[7] Bidders to be informed as to which round prices are to be increased and the new round prices before the start of the next additional round. We believe it could also be helpful to provide bidders with more information than this before the start of each additional round – which we discuss further below – but probably not aggregate and/or excess demand as those quantities are usually calculated following each primary round of a CCA (being the sum of the primary bid quantities) since those are no longer particularly useful indicators of demand in the context of additional rounds.

The key advantage of this proposed change would be that no bidder could come away from the auction with nothing, unless they had explicitly submitted the zero bid (or failed to make a primary or headline bid in a round and were therefore deemed to have submitted the zero bid).

Moreover, provided that the price increments used in the additional rounds were not overly large, bidders would be able to get a far more refined understanding of how much they would likely need to pay in order to win their final primary package, and if that were more than they were willing to pay (for example because the likely price exceeded their budget), be able to reduce their demand to a smaller package and potentially bid all the way up to their maximum willingness to pay for that smaller package (and so on if need be). Budget-constrained bidders in particular would therefore be in a much better position to make an informed choice about whether to continue bidding for the package they would ideally like to win, or to focus on winning a smaller package, without the risk that they might accidentally win nothing at all (or a subset of what they would ideally win) if they make the wrong choice.

We believe a further advantage of this approach is that it could reduce the incentive for some bidders to deliberately bid so as to increase uncertainty at the end of the final primary round – for example by bidding to leave a relatively large number of lots unallocated. We believe the benefits of doing this would likely be significantly reduced (if not entirely eliminated) since bidders would be able to learn more about the likely level of final prices through the additional rounds, rather than having to guess at what final prices might be within the potentially wide range between final round prices and the knock-out bid amount for their final primary package that could result from a large number of unallocated lots.

It occurs to us that it might also be helpful for bidders to be given certain additional information before the start of each additional round. For example, perhaps the highest total value among all feasible combinations of bids to date and the highest total value across all feasible combinations of bids that include the bidder's primary/headline bid from the previous round (in the case of a bidder that submitted a non-zero bid in that round). Note however that we do not consider the provision of this additional information to be an essential part of our proposal – if for any reason ComReg were to decide that the provision of this or any other additional information would not be appropriate for any reason, we believe that the Iterative CCA format we propose would still be a significant improvement on the standard CCA.

4. Combining our two proposals

We see no reason why it should not be possible to combine these two proposals and run an Iterative CCA in which primary bid amounts are equal to exposure prices – and indeed believe that this would be better than implementing either one of our proposals on its own. For consistency, we suggest that in this case each bidder's discount in the final primary round also apply to their headline bids (if any) in all additional rounds i.e. that the amount of each headline bid be equal to the total of the round prices of the lots included in the headline bid in the relevant additional round less the bidder's final primary round discount[8]. All round price increases in additional rounds would therefore apply equally (per lot) to all bidders that were still submitting headline bids.

[8] With the rules constraining the amount of additional bids being adapted to reflect this change in a very similar way to the way in which we have proposed that the rules for the amounts of chain bids and supplementary bids be adapted to reflect the discounting of primary bids in the standard CCA.

2 Three Ireland (Hutchison) Limited

Updated submission to ComReg Document 20/32

Multi-Band Spectrum Award – Draft Information Memorandum

Response to Document 20/32 from Three

24th June 2020

1. Executive Summary

The Covid-19 pandemic has brought forward increased demands on communications networks, many of which will remain permanently. Connectivity has proven to be essential during this time to allow people stay connected for work and social purposes. The Stay at Home policy would not have been possible without the current deployment of modern networks and other technology that has helped us through this stage of the crisis.

As Ireland and other economies struggle to deal with the economic fall-out of the pandemic, investment decisions are more uncertain - however ongoing investment in modern communications networks has never been so important. It is needed to help with the recovery, and ComReg must make sure that its decisions facilitate this investment. Getting the terms for access to spectrum right is one of the key areas where ComReg can facilitate this investment but equally if the terms are wrong it will be hindered.

Three has already pointed out (in response to previous consultations) that we have serious disagreement with the format and rules that ComReg has proposed to use in this award. Three would be placed at a disadvantage under the proposed rules, and this is a matter that needs to be remedied for the process to meet ComReg's objectives. We have already suggested some remedies to ComReg, which include the use of a different auction format, or the addition of two additional caps on bidders (that any two bidders cannot win more than 5 Lots of 700MHz and a price cap on marginal Lots). ComReg must move quickly to adopt these changes so as to avoid delay to the award process and availability of the spectrum.

We note that ComReg proposes to introduce a new element to the award process (if it is decided to proceed with a CCA), namely the introduction of Exposure information. This addition does not address the concerns we have already identified regarding the award process.

The Temporary Spectrum Licences issued by ComReg have been of considerable help to network operators in responding to new demands brought about as a consequence of Covid-19. They have allowed Three to increase its network capacity in areas that experienced congestion. We expect this changed demand will remain in the long-term, and we encourage ComReg to provide for maintenance of the Temporary Licences as close as is possible to the completion of the award. If this is not possible, then they should be continued at least up to the time when ComReg has finalised its Decision for the award process.

Introduction

The context within which ComReg is preparing this multi-band spectrum auction has changed dramatically in the last four months. The Covid-19 pandemic has brought about a drastic change to work and home life and has sent world economies into recession. The requirement for people to work from home, and the increased demand for connectivity has reminded us all of the importance of modern communications networks for people to be able to continue to work effectively and to stay connected with their friends and family. Voice and broadband services provided by wireless networks are critical in ensuring a functioning economy during the COVID-19 pandemic and they will have ongoing importance to ensuring economic recovery. During this time, it has been helpful to be able to boost network throughput by using

the Temporary Spectrum Licences issued by ComReg in April. We need to maintain this additional connectivity, but to support economic recovery, we also need investment to continually develop our communications networks. Just as is the case across multiple sectors of the economy, the investment climate for network operators is currently challenging.

ComReg must take these new circumstances into account in the current consultation process. Any decisions taken must avoid disruption to existing connectivity that customers have come to depend upon, including the continuation of the Temporary Spectrum Licences to as close as is possible to the conclusion of the award process. Further, ComReg needs to make sure that its process will facilitate continued network investment as this will be a critical requirement for growth of productivity and a return to growth in the Irish economy. Ensuring that it has chosen the most appropriate award process that will deliver a fair and efficient outcome should remain a priority, but it is also important that ComReg moves quickly to make the new spectrum available to network operators. Accordingly, it is more important than ever that ComReg adopts a carefully considered, fully reasoned and comprehensive approach to all aspects the proposed spectrum award. ComReg should also extend the Temporary Spectrum Licences so they continue in operation until the new award has been completed.

As ComReg will be aware, Three has some strong specific objections to the award process and rules as proposed by ComReg in document 19/124. There are fundamental issues that need to be resolved in order to deliver a fair award process that conforms to the requirements on ComReg. For this reason, it is surprising that ComReg has chosen to publish its Draft Information Memorandum (IM) without first taking account of the views of interested parties as submitted in response to the document 19/124 (the Previous Consultation). While a desire to progress to the award as quickly as possible might have led to the decision to publish the Draft IM before taking account of views on the award design, this risks causing further delay in the event that ComReg is required to again consult on the IM because of significant changes to the award process. If ComReg is truly open to considering those submissions, then some change is likely.

2. Prior Comments and Submissions

This Current Consultation process is intrinsically linked with the Previous Consultation process. We note ComReg's reason for proceeding with the Current Consultation before the appropriate step of reviewing the submissions to the Previous Consultation, providing its own response, and publishing a Draft IM for the final process to be used. We would caution that these issues cannot be side-stepped as they are of fundamental importance. ComReg needs to ensure that the views of respondents are properly taken into consideration, as is necessary in a genuine consultation process.

Specific concerns identified in Three's Earlier Response also affect aspects of the Current Consultation. In particular, Chapters 3 and 4 which relate to the auction format and proposed competition caps. A significant amount of time and expense was deployed by Three in submitting the Earlier Response (including providing solutions / mitigations to these serious issues) in order to ensure the award meets ComReg's objectives.

Three does not believe that it is appropriate for it to again repeat all the serious concerns expressed in its Earlier Response. Accordingly, while comments are provided on certain

aspects of this Consultation, such responses are entirely without prejudice to all the points made by Three in its Earlier Response and this response should not be interpreted as an acceptance of any element of the Previous Consultation including any element which impacts on the approach to the Current Consultation. This includes without limitation the following points:

- That a Combinatorial Clock Auction (CCA) is not the most appropriate format for this award;
- That the award caps place Three at an unfair disadvantage relative to its competitors;
- If ComReg, notwithstanding our objections, decided to press ahead with using a CCA for this award, there are remedies in the form of revisions to the caps and other rules available to ComReg which would be necessary to create a more level playing field for all bidders;
- That the proposed price for an Interim Licence in the 2.1GHz band is excessive, without logic and is unjustified;
- That ComReg has erred in its specification of receive power for the purpose of coverage obligations.

3. Covid-19 – New Context

Like many countries around the word, Ireland has experienced a massive shock. The health measures necessary to prevent spread of Covid-19 have forced us all to change our home life and work life. We have been reminded of the importance of modern communications networks and they have played a pivotal role in allowing people to continue work while staying at home but also to maintain vital connectivity for social purposes.

Economic Crisis

The measures taken to combat spread of Covid-19 have also caused a sharp compression of economic activity in Ireland and its trading partners. According to IBEC's latest Quarterly Economic Outlook[1] it is now expected that this effect will not be temporary but will last well into 2021 and the recovery will take until 2022/2023. A similar situation has been forecast by the ESRI[2] who note that "even for businesses that remain open, investment is likely to be curtailed significantly due to the large increase in uncertainty brought on by the pandemic". In addition, the Irish Fiscal Advisory Council (IFAC) advises that it might well take 2 to 3½ years to return to pre-crisis levels of activity[3]. We note that during this period, there is also a growing risk of a cliff-edge Brexit happening in December 2020.

IBEC reports that both consumer sentiment and business confidence are low bringing uncertainty into consideration of any significant investment projects. This uncertainty applies to communications network operators also, and ComReg must take it into account in its award proposals, avoiding discontinuity; inefficient investment; and excessive spectrum pricing

[1] IBEC Quarterly Economic Outlook, Q2 2020
[2] ESRI Quarterly Economic Commentary, Summer 2020
[3] The Fiscal Impact of Covid-19, Irish Fiscal Advisory Council, May 2020

Despite the uncertainty described above, shortening the road to recovery will require that wireless network operators ramp up investment in technology and modern infrastructure, including facilitating the development of modern fixed and mobile communications networks.

This can be achieved by extending the Temporary Spectrum Licences to provide continuity up to the new award, by ensuring excessive pricing for access to spectrum is avoided, and by ensuring that the award process itself gives confidence to investors. To do this, it must be fair and non-discriminatory and must determine the minimum prices that deliver an efficient outcome.

Changed Work Practices

The change to working practice that was forced upon us in recent months is likely to have a lasting effect. One of the side-effects of the Covid-19 crisis has been an acceleration of changes to work practices which would previously have been expected to take years to accomplish but have now been adopted in a matter of days. In a recent Ibec CEO survey, 73% of CEOs identified increased use of remote working as a significant change in their business organisation over the coming years and 56% expect that there will be an increase in flexible working practices as a result of the crisis. Working from home has become accepted as normal for a significant part of the workforce and will be expected to continue. This will only be possible through further investment in networks including wireless networks, particularly in the rural areas that do not currently have adequate connectivity.

Enabling the National Recovery

In launching its most recent Connectivity Report[4], John Griffin of Ericsson Ireland stated that "The potential for 5G is very exciting and it could add as much as €42 billion to Ireland's GDP by 2030, an important consideration in the country's economic recovery post Covid-19."

The Irish Fiscal Advisory Council has recommended that the new Government should:

- Mandate public sector employers, colleges and other public bodies to move to 20% home and remote working in 2021; and
- Examine the feasibility and merits of changing tax arrangements to encourage more people to work remotely.

Ibec's survey indicates the emergence of something of a regional divide with almost half of all workers in parts of Dublin having the potential to telework versus only 31% of workers in Monaghan. In general, existing commuter towns had the most significant share of workers who could potentially work from home. On the other hand, rural towns in the areas worst impacted by Covid-19 or by any Brexit fallout were the least likely to have workers who could potentially work from home. Wireless networks can help rebalance this divide, and in recent months, Three has reprioritised its network investment to meet these new demands. ComReg's priority should be to encourage on-going investment in modern wireless networks, not just to bridge current gaps, but to ensure we have in place the networks we will need in near future.

4

Spectrum Licensing is Critical

The Temporary Spectrum Licences issued by ComReg in April have helped in an important way to meet the new demands placed on mobile networks. In mid-March when measures to prevent spread of Covid-19 were announced, Three experienced an immediate and significant growth in average and peak throughput for both voice and data, with a number of peaks in this demand. At this time, we believe the changes to work and life practice has brought about permanent increase in demand for data of approximately [✂] overall. The physical location of the demand also changed – out of city centres to residential areas. The number of Cells on Three's network that we would classify as congested increased during that time [✂]. Three has to date rolled-out [✂] sites in the 700MHz band and [✂] sites with liberalised 2100MHz spectrum. This has brought a significant benefit to our customers as we have been able to re-establish pre Covid-19 network performances in the areas where the 2100MHz Temporary Spectrum has been deployed despite a [✂] increase of data traffic volumes. In the areas where the 700MHz Temporary Spectrum has been deployed, the daily average downlink user throughput increased by [✂].

It is important that ComReg should ensure that the current Temporary Spectrum Licences continue at least until ComReg has issued its decision for the award of spectrum, but ideally they would extend until the award process has completed.

ComReg must also ensure that it proceeds quickly to deliver the appropriate award process, and while it is important to progress without delay, it is critical that the process is appropriate. Getting the auction format or rules wrong at this point will deliver an inefficient outcome, delay investment in networks, and ultimately hinder the move to new ways of working in Ireland and slow down our national economic recovery.

4. Comments on the Draft Information Memorandum

As noted above in section 2, the following comments are provided without prejudice to Three's position as expressed in its Earlier Response.

1. In Table 13 and again in Table 16, the reserve price for the TDD guard band lots are given as €216,000 for TS1 and €245,000 for TS2. In addition, an annual SUF of €61,515 applies to each of these lots. Using a WACC of 7.13% for illustration, that is equivalent to a reserve price of EUR 1.5 million for a 20-year licence, or €0.06 /MHz/pop. This is an exceptionally high price for acquiring spectrum that is encumbered and cannot be deployed for high-power mobile services. We understand that in other European countries, these blocks were typically bundled with adjacent TDD spectrum to no additional cost.

   Three requests ComReg to review this price and explain the rationale for associating such high fees for guard band blocks, as it does not seem to make sense.

2. In Tables 12 and 13 (and other subsequent tables), the Reserve Prices for each Lot Category has been adjusted by ComReg and are different to those in document 19/124, without explanation. This adjustment is not consistent across all Lot Categories. While

we might speculate as to the reasons for these changes, ComReg should explain the reason.

3. In section 2.3.7 of the Draft IM, ComReg details the refunds of Licence fees payable to a Winning Bidder in the event of delayed access to Lots beyond the originally planned commencement dates as shown in Table 5. In paragraph 2.97, ComReg states that for the SAF the refund will be calculated based on "*a pro-rata portion of the SAF already paid by the Winning Bidder on a daily basis for each whole day following the commencement dates as set out in paragraph 2.23 and Table 5*".

   We note that the SAF must be paid by winning bidders up-front and in advance of the conclusion of the award process. The SAF represents a significant investment by the winning bidders and is for the purpose of obtaining an asset with a 20-year life span. The method of calculating refunds as proposed by ComReg simply assumes a linear division of the value of the licence across each day of its duration. This ignores the time-related discounting that will be applied by bidders when considering the investment. In reality the early days of the licence will make a significantly higher contribution to value for the winning bidder than the final days. As a consequence, ComReg's calculation under-values the loss to a winning bidder of delayed commencement of their licence.

   ComReg has applied discounted cash flows when deriving the minimum price and reserve price that should apply for each Lot. The same logic applies for estimating the value for each day of delayed commencement. ComReg should revise this part of the Draft IM accordingly to take account of these issues.

4. In Table 17, ComReg reports the licence duration for frequency genetic B-lots. The expiry date for generic paired and unpaired lots in the 2.6 GHz band is given as 30/11/2035. We assume that this is just an error (should read 30/11/2040) and that it will be corrected. If this is not the case, we request that ComReg explain.

5. In Table 8 and Annex 4, ComReg specifies multiple specific locations which must be covered by licensees. Most of these locations or campuses are State owned, and all are either or State Semi-State owned. To simply include an absolute list in this manner would leave licensees in a weakened position when it comes to negotiating access to the sites necessary to provide this coverage. This is particularly the case for large campuses where there might be no alternative to placing a site within the campus itself. It is already Three's experience that some of the locations listed in Annex 4 are difficult to negotiate access to.

   To restore the balance in negotiations, ComReg must make allowance for the fact that some of the sites listed might not be covered if it proves too difficult or expensive to do so. ComReg can maintain an incentive for both licensees and site owners to cover these sites by setting a quota of sites from the tables that must be covered. Three recommends this quota is set at 70%.

6. There is an inconsistency in the rules regarding bidder association and non-disclosure of participants. Paragraph 3.127 states that ComReg will not inform Bidders about the identity of other Bidders. Paragraph 3.78, states that if two Bidders have common insiders, ComReg will contact those two Bidders and notify them that they need to resolve this conflict. In so doing, however, ComReg will have provided information to the parties involved about each other's participation, which would mean they have information not

available to other Bidders. Furthermore, if ComReg discovers the conflict after the auction starts, one or both of the Bidders involved may be at risk of being excluded from the process, whereas had they known about the issue earlier, the two parties might have been able to avoid this.

It seems to us that the obvious solution to this problem is for ComReg to publish the identity of all applicants at the qualification stage, so that bidders have some ability to identify potential conflict issues and resolve them in a timely manner. Our understanding is that this is the approach adopted in many other European countries, including the UK, which otherwise has similar rules regarding insiders. ComReg could still keep confidential the information about the Initial Bids and the Initial Eligibility.

7. In Annex 9, ComReg describes the algorithm it proposes to use during the Assignment Round to identify potential band plans that are intended to minimise any misalignment between time slices. In our view, the proposed algorithm is unnecessarily complex for most likely assignment round situations. ComReg should instead adopt a simpler default approach, and only use this algorithm in situations where there are more than 6 winners in a band. In the event that such algorithm was to be used, then we have some specific concerns as follows.

   Paragraph A 9.3 states that "*For the 2.1 GHz, 2.3 GHz, 2.6 GHz FDD and 2.6 GHz TDD bands in the Assignment Stage, an algorithm will be used for the generation of Assignment Options that: […] gives Bidders a variety of options for location of contiguous frequency-generic blocks across the band, but also tries to minimize misalignment of frequencies between Time Slices*" [Our emphasis].

   We query why ComReg is using an algorithm that "*tries to minimize*" when, for most allocation outcomes, it should be able to use a brute force solving technique that will precisely minimize. ComReg's algorithm should identify each and every minimum misalignment band plan. It appears that the proposed recursive algorithm does not do this, but rather it produces a shortlist of band plans, from which bid options are derived. We request that ComReg clarifies if our understanding of this point is correct.

   For any allocation outcome, the number of feasible band plans across the two time slices is the factorial of the number of bidders (N) squared, i.e. $(N!)^2$. For example, with 4 winners in each time slice in a band, there are $(4!)^2 = 576$ potential band plans. In this case, a complex recursive algorithm is not needed to identify those band plan options that minimize misalignment, as a computer can quickly solve this with a brute force search across all 576 options.

   We recognise that the number of options grows very rapidly with the number of winning bidders in a band. Nevertheless, a brute force method should be straightforward up to about 6 winners (518,400 options). Given that ComReg is allocating national lots, it seems unlikely that there will more than 6 winners in the same band. Therefore, in all likely cases, a brute force search will be tractable. When tractable, brute force solutions are clearly preferable to more complex algorithms, which are hard to understand and verify, and by design may be less than 100% reliable. In particular, there is a risk that if ComReg's algorithm is applied in situations where brute force was tractable, appropriate assignment bid options are excluded or inappropriate bid options are included.

We propose that ComReg adapt the rules to:

- Use brute force to identify assignment round options if the number of winning bidders is in the same band is 6 or less; and
- Only use the algorithm described in Annex 9 in bands where there are 7 or more winning bidders in the same band.

8. In section 3.6 of the Draft IM, ComReg describes the process for the Assignment Round. In summary, it is proposed that there will first be an Assignment Stage in which Bidders may bid for their preferred frequency assignments for the frequency-generic B-Lots won in the Main Stage. It is proposed that the result of the Assignment Stage will form a Provisional Assignment Plan and will be notified to the Assignment Bidders. It will then be followed by the Negotiation Phase.

   During the Negotiation Phase, Assignment Bidders can negotiate with each other to develop an Alternative Assignment Plan, which will be accepted by ComReg if agreed by all relevant Assignment Bidders. Each Assignment bidder will be aware of the Provisional Assignment Plan and their own Additional Price when entering the Negotiation Phase.

   In the first place, it should be noted that it would be preferable if the Assignment Plan could be agreed entirely by the winners of generic B Lots in each band without need for an Assignment Phase at all. This would represent the most efficient outcome as no additional fees would be required, and all winning bidders would need to be happy with the outcome. In practice, we recognise that we cannot depend on a successful Negotiation Phase, so the Assignment Phase is necessary.

   Three's experience of the past has been that the Negotiation Phase has not been successful and that the reason for this is because the Assignment Bidders enter the negotiation already knowing the outcome of the Assignment Round, so there is a default option and each knows what their Additional Price will be. The Additional Price must be paid by each winning bidder regardless of the outcome of the Negotiation Phase and this has acted as a barrier to any further change – some bidders will not want to have to pay the opportunity cost for an assignment that they "give up", while others will perceive that their best advantage is to stick to the outcome of the Assignment Phase. This means the Negotiation Phase is unlikely to overturn the default outcome from the Assignment Round.

   Three proposes that ComReg should change the order of proceeding through the Assignment Stage slightly, in a way that is more likely to deliver a successful outcome. We still believe it will be necessary to receive bids for the Assignment Phase, however the results of this stage should not be notified to the Assignment Bidders until after the Negotiation Phase. If the Negotiation Phase produces an agreed Assignment Plan in any band, then that should be accepted by ComReg without running the Winner and Price Determination and with zero Additional Price. In any band for which agreement cannot be reached, ComReg should then run the Winner and Price Determination to determine the Assignment Plan and the Additional Price.

The above change would mean that the Assignment Bidders would be incentivised to reach agreement with no Additional Price and without requiring ComReg to determine the outcome. This would produce the most efficient result.

9. In paragraphs 3.100 – 3.108 and also 4.107, ComReg describes the procedure that it might follow if a bidder is excluded. ComReg has retained significant discretion in relation to the course of action that it might take in this circumstance, including keeping bids made up to that point or voiding them. We agree that circumstances might arise where a bidder should be restricted or excluded. Depending on the circumstances, it might be necessary to re-run part of the process or to remove bids previously submitted by the excluded bidder. This eventuality could have a significant bearing on the outcome of the auction and is particularly important in the Main Stage where there is a lot at stake for all bidders.

   The current process is lacking in transparency as it does not specify whether ComReg will inform the remaining bidders if one has been excluded. At the minimum, remaining bidders should be informed at the time that a bidder has been excluded, and whether or not their bids made up to that point remain valid or have been removed from the winner and price determination. This is the minimum level of transparency that is required for the remaining bidders to have confidence in the integrity of the award process. It would be wholly inappropriate for ComReg to suspend a bidder or exclude them from placing further bids without informing the remaining bidders of this fact, particularly if the bids already submitted by the excluded bidder cease to become valid bids.

10. In paragraph 3.167 in relation to the 2.6GHz band, ComReg states the following:

    "*In the 2.6 GHz Band, as the fixed frequency A-Lots are best utilised by Bidders also obtaining 2.6 GHz TDD Generic Frequency Lots, a Bidder will be prevented from submitting a Bid for a Package of Lots which includes the 2.6 GHz TDD Fixed Frequency Lot (Lower) and the 2.6 GHz TDD Fixed Frequency Lot (Upper) in a given Time Slice unless the Bidder also places a bid for all Lots in the 2.6 GHz TDD Band in the same Time Slice*".

    For the avoidance of doubt, our understanding is that this restriction only applies where a bidder submits a bid for both the Upper and Lower Fixed Frequency Lots. ComReg might confirm that this is the case.

11. ComReg proposes to introduce a new feature for this auction (if it chooses to use a CCA). It is an exposure tracker developed by DotEcon that calculates estimated bidder-specific price discounts after each clock round. This may provide some guidance for bidders regarding their potential final price if the clock rounds were to end and they were to win their final clock package. On balance, we think this might be useful, however the information obviously comes with certain caveats, such as the possibility of unsold lots, which limits its reliability.

    DotEcon argues that the exposure data is unlikely to introduce opportunities for gaming. Our position is that the format is already vulnerable to gaming, but we tend to agree that providing this extra information is unlikely to make the situation materially worse. On the other hand, we do not think this extra information does anything to address our broader concerns with the use of a CCA for the proposed award. A CCA with asymmetric caps is still the wrong format.

5. DotEcon Report in Annex 12

In document 19/124, ComReg has stated its intention to publish a paper on Exposure for consultation, and that paper has now been incorporated into the Draft IM as a report from DotEcon. We note that while the report does address the question of whether additional information can/should be provided to bidders during the Main Stage of the CCA, it also includes substantial argument on the merits of the CCA auction format. We asked NERA Economic Consulting to review Annex 12, and we provide the following comments following discussion of that review.

Overall, we note that the report contains a large amount of general material that is only loosely relevant to ComReg's proposed award. The paper is quite helpful in explaining the evolution of the CCA design but, in our view, the analysis paints an overly positive picture of the benefits and relevance of this particular auction format. We do not oppose the addition of an exposure tracker in ComReg's CCA implementation, but we also do not think that it meaningfully addresses the concerns about the format as already described to ComReg in detail in the Earlier Response.

Strengths and weakness of the CCA

We agree with DotEcon's starting position that spectrum auction design is necessarily a matter of "horses for courses" (page 1). We further agree that the CCA may be a viable candidate auction format in situations where (a) price discovery is beneficial; and (b) there are material complementarities between lots. For auctions of spectrum suitable for mobile, our view is that price discovery will almost always be desirable, so we have a general preference for open auction processes. We are much more sceptical regarding the case for package bid formats, such as the CCA, to address complementarities. In many situations, there may be other measures, such as spectrum packaging and activity rules, that are effective in diminishing aggregation risk. The CCA also introduces other risks, such as unduly high and asymmetric pricing, and governance challenges, which offset the benefits from its effectiveness in managing complementarities.

As we have set out in our Earlier Response, we do not think package bidding is really required to address aggregation risk in the proposed award process. The decision to use the CCA flows from ComReg's decision to use time slicing for 2100 MHz, which then leads it to adopt time slicing for other bands. The use of time slices creates an aggregation risk, which then led ComReg to propose the use of package bidding. However, as we pointed out, ComReg could have followed the German approach of having two separate categories of 2100 MHz lot based on start date, instead of time slicing. This would have hugely simplified spectrum packaging and would have diminished aggregation risk sufficiently that a simpler open auction format would be attractive. ComReg expressed concern that the German approach if implemented in Ireland might strategically disadvantage Eir but based on the reasoning we advanced in the Earlier Response, this is incorrect. If anything, Eir would be advantaged by our proposed change, but we judge the impact to be *de minimus* compared to the benefits for all from simplifying the award process.

ComReg has suggested that it would have picked the CCA regardless of the time slicing issue; however this would put it at odds with other regulators in Europe – such as Austria,

Luxembourg, Netherlands, Slovakia and UK – all of which have adopted hybrid clock-SMRA formats rather than the CCA for forthcoming 5G multi-band awards. This implies that a significant factor that has pushed ComReg towards the CCA for this auction is that it shares DotEcon's apparent belief that the CCA is more robust to strategic behaviour than other formats. We disagree with this view.

We recognise that DotEcon has considerable expertise with respect to auction design, however they are not entirely impartial as they seem to be invested in the CCA format. It is one they have helped develop and have championed since the late 2000s. It is important to understand that DotEcon's claims that to the effect that there are limited downsides to the CCA format are controversial. They are at odds with the emerging academic literature on the format, and largely gloss over the many peculiar outcomes associated with spectrum auctions using the CCA format outside Ireland.

DotEcon have three main blind spots when analysing the downsides of the CCA:

- They misinterpret the incentives for price driving behaviour;
- They fail to recognise that price driving in CCAs for spectrum is often low risk, owing to predictable demand profiles and asymmetries between MNOs, together with information learned during the clock rounds; and
- They understate the potential problem of 'missing bids' in more complex multi-band settings.

We welcome DotEcon's acknowledgement of the emerging literature showing how price driving behaviour can distort outcomes and prices in CCA. However, DotEcon is wrong to belittle the real-world relevance of these studies. DotEcon describes price driving as "*malicious bidding*" and argues that the importance of motives to make bids that make others pay more "*is highly debatable*" (page 7) - we disagree. Our concern is that the CCA often generates prisoner's dilemma-type situations in which bidders that do not price drive (i.e. behave 'cooperatively') are exposed to much worse outcomes than those that do price drive (i.e. 'do not cooperate'). As each auction is effectively a one-off game, this may create a strong incentive for all bidders to engage in price driving as a defensive strategy.

Marsden and Sorensen (2017) in the Handbook of Spectrum Auction Design describe this defensive rationale for engaging in price driving:

"*In practice, our experience is that bidders often engage in price-setting behaviour for two primarily defensive reasons:*

- *If they don't engage in such tactics, they fear that others will and they will pay much more for similar spectrum. In this context, the example of Sunrise, which paid more for a strictly smaller package of spectrum than Swisscom in the 2012 Swiss 4G auction, is often held up as an example of an outcome that no one wants to replicate.*
- *By over-bidding, it may be possible to exert price and budget pressure on a rival that would otherwise not exist, thereby increasing the chance that they surrender other target lots. This may be particularly relevant in a multi-band auction, when bidders are*

> *bidding on large packages of lots that are both substitutes and complements, and the value of the spectrum may account for a substantial proportion of enterprise value.*"[5]

In short, bidders engage in price driving because (a) they do not want to end up paying significantly more for the same thing as other bidders who they believe will price drive; and (b) in a multi-band auction, there may be opportunities to influence price growth in ways that increases strategic pressure on rivals.

DotEcon also over-estimates the risks for bidders engaging in price driving in a CCA. They say that "*bidders in CCAs will typically have limited knowledge of each other's demand structures*" (page 59), but this is obviously untrue for mobile awards. The reality of most mobile spectrum auctions is that there is a limited pool of bidders, many of whom have predictable baseline demands, and that winning bidders are often setting each other's prices. This is particularly true for smaller bands, like 700 MHz and 2100 MHz, where the number of realistic ways that lots could be arranged amongst three MNOs is limited, and MNO business cases are likely to be similar or differ predictably based on their existing spectrum deployments. In such situations, there are often predictable pressure points and MNOs may have a high degree of confidence about what bid sets are winnable or not. Furthermore, many price setting bids may be submitted in the supplementary round when bidders may have greater certainty about potential auction outcomes.

It is true that with multi-band awards in situations of bidder asymmetry, the potential for price driving may exist to some degree in all open formats, however DotEcon is wrong to say that "*[p]ricing driving is about objectives, rather than auction format*." With standard ascending open formats, such as the SMRA and clock, bidders that engage in price driving may be driving their own price. This is a powerful disincentive to engage in price driving, provided all bidders have substantial demand in each category. The problem with the CCA is that it is much easier for bidders to identify situations where (a) they can raise prices without driving their own price; or (b) if they drop demand, they are exposed to having their own price driven up by a rival without any further option to respond.

DotEcon is surprisingly quick to dismiss concerns about the use of the CCA formats in cases where it produced high and asymmetric price outcomes. For example, in the case of Austria 4G in 2013, they say that "*it is not clear how such bidding behaviour can be differentiated from bidders simply having value for larger packages of spectrum and competing for those. Therefore, these supposed examples of price driving behaviour are largely indistinguishable from bidders competing for additional spectrum*." This is true in the narrow sense that the data is not public. However, as representatives of the firms involved are on record saying that they thought that the Austrian 4G auction was a disaster, and blaming the format for high prices, we tend to believe that the auction was distorted by reciprocal price driving. We also note that the RTR has subsequently conducted a multi-region 3.5 GHz award and scheduled a multi-band 5G award; in both cases, after consultation with prospective bidders, it opted for simpler clock-based formats over the CCA. This is hardly a vote of confidence in the CCA.

As DotEcon points out, spectrum caps may be effective in curbing opportunities for price driving behaviour (page 73). We agree but ComReg must also be wary of caps introducing

[5] Richard Marsden and Soren T. Sorensen, Strategic Bidding in Combinatorial Clock Auctions – A Bidder Perspective, in Bichler and Goeree (Eds), Handbook of Spectrum Auction Design, p.756.

predictable asymmetries between bidders that may create lower or zero risk opportunities for price driving. Here, we refer ComReg to our Earlier Response where we explained that ComReg's low-band cap leaves Three unfairly exposed to price setting at 700 MHz.

Finally, we think that DotEcon underplays the risk of missing bids distorting the outcome of CCAs. As they point out, this may have been a contributing factor in the Swiss 4G auction in 2012, when one bidder (Sunrise) paid a much higher price than a larger rival (Swisscom) despite winning a strict subset of Swisscom's winning bid.[6] We agree that bidders have become more sophisticated since then, so it is less likely that bidders make poor choices. Nevertheless, the bottom line is that supplementary bidding in a large multi-band auction is complex, given the huge number of bid options, and bidders may make mistakes or simply take different approaches that can have significant implications for final prices.

ComReg's own example of winner and price determination in Annex 6 provides a textbook example of defensive incentives for overbidding in a CCA. In this example, there are four bidders who have 7 valid bids combining lots in two categories (A and B) at the end of the supplementary round. For convenience, we copy Table A6.1 from the consultation below. The auction ends with two bidders, Bidder 2 and Bidder 3, each winning the same package (1,1) with identical bids of 15 each, and a combined value of 30. However, owing to other bids submitted, Bidder 2 pays only 10.5, whereas Bidder 3 must pay 13.5. As we explain below, had Bidder 3 bid more aggressively, it would have achieved a better relative outcome [✂

✂].

Table A6.1 Valid bids at the end of the Supplementary Bids Round

Bidder	Lot Category A	Lot Category B	Bid Amount
Bidder 1	1	0	8
Bidder 1	1	1	10
Bidder 1	0	2	12
Bidder 2	2	0	16
Bidder 2	1	1	15
Bidder 3	1	1	15
Bidder 4	2	2	24

[✂

✂]

To repeat, we don't think this a rare situation. Indeed, it is easy to draw analogies with actual CCAs. For example, Sunrise's bad price outcome in the Swiss 4G auction is probably an example of one bidder 'cooperating' while others bid aggressively in the supplementary round.

[6] DotEcon refer various to the "early Swiss CCA in 2001" and the "Swiss 3G auction in 2000", but we assume this is a mistake as the CCA did not exist in the 3G era, and they mean the Swiss 4G auction in 2012.

Meanwhile, the inflated prices seen in the subsequent Dutch and Austrian 4G auctions can probably be attributed to situations where all bidders bid aggressively.

Again, we refer ComReg back to our opinion as submitted in response to Documents 19/124 and 19/59. The CCA auction is the wrong choice for ComReg's proposed award, and in particular the specific rules proposed by ComReg in this case would place Three at an unfair disadvantage relative to its competitors. The risks we identify are real and have been observed in practice.

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3 Vodafone Ireland Limited

Updated submission to ComReg Document 20/32

Non-Confidential Version

Proposed Multi Band Spectrum Award –
Draft Information Memorandum and Draft Regulations

The 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands

ComReg Document 20/32
Response to Consultation

Executive Summary

I. Vodafone welcome the opportunity to respond to ComReg consultation 20/32– 'Proposed Multi Band Spectrum Award – Draft Information Memorandum and Draft Regulations.

II. We would like to acknowledge the comprehensive work that ComReg have completed, building on earlier Consultations, the previously published Connectivity Studies, and previous Draft Decision. We believe that ComReg have comprehensively analysed both the drivers for allocating this additional spectrum and the appropriate mechanisms for assigning this spectrum in the market.

III. In our previous submissions, we discussed the vital role that spectrum plays in the communications value chain and submitted that the efficient allocation and assignment of spectrum, and efficient processes for the awards of mobile spectrum, are a key support to the Irish economy and should be a key policy priority for ComReg. We also illustrated that there is less spectrum allocated to mobile operators in Ireland than other European countries.

IV. This proposed spectrum auction provides the opportunity for operators to increase spectrum allocation to match the rest of Europe and therefore allow Irish consumers and business to gain access to high quality services, full use of available handsets and the advantage of pan-European services. We welcome the recognition that ComReg have afforded to the importance of benchmarking Irish spectrum allocations against European norms. This supports the capability of Ireland to avail of leading edge pan-European mobile services.

V. We must comment on this Draft IM in light of the current Covid Emergency and the role of the telecommunications sector in supporting the recovery of both our economy and society through infrastructure investment and digital acceleration. This investment in the mobile sector will greatly enhance long-term societal resilience. ComReg have a major role in encouraging investment to support infrastructure rollout a critical input over which ComReg have greatest control is certainty on auction timing. It is very important in this regard to adhere to the time plan outlined in this document.

VI. Our changed ways of working and living in the Covid Emergency drove very significant increase in demand for data and voice services, and clearly illustrated the central role that telecommunications plays in supporting both industry and society. We acknowledge that ComReg moved swiftly and efficiently to ensure access to greater network capacity through Temporary Spectrum allocations actions. In section 1 below, we discuss the further actions that ComReg should take in response to this ongoing Covid Emergency, and in particular the extension of the temporary measures up to the conclusion of this auction.

VII. In Section 2 below, we include commentary on Annex 12 of the Draft IM: "DotEcon Report on Exposure Pricing". This report contains a comprehensive overview of the theory supporting the planned auction format. We broadly agree with the conclusions of this report, firstly, that a CCA auction is appropriate for the complex multi-band auction planned, and secondly, we strongly support the addition of a process to provide Exposure Pricing information to the auction rounds.

VIII. The other aspects of the Auction Rules are broadly aligned with the previous 2012 MBSA and the 2017 auction of 3.5GHz spectrum. In relation to previous auctions we are of the view that the workshops, mock Auctions and electronic bidding processes all worked efficiently. In addition, the process of Main Stage, Assignment Stage, and Negotiation worked effectively.

IX. We raised a number of issue in our response to ComReg's Draft Decision of Dec 2019. The points we raised on Transition and the complexity of the planned auction are still relevant and we urge ComReg to address those issues.

X. A critical issue raised in the December 2019 response relates to the timing and detail of coverage obligations. Notwithstanding the points raised in our previous submission the emergence of the Covid 19 crisis further supports the position that in the shorter term we should focus on network capacity and resilience and that coverage targets should be moved to later in the overall coverage target program. We give more details of this in Section 1 below.

XI. Lastly, we urge ComReg to work to the timeline published in the Process Overview and Timeline Sec.3.2. of this Draft IM to complete the Award, process. This will facilitate effective and efficient investment by operators and produce the best services for all our customers

Section 1 The COVID Emergency: Temporary Measures, Roll-out Obligations, Time-Slices, and Cost

The COVID Emergency

In publishing its final position on Covid Temporary Measures in doc 20/27 Comreg stated those proposals were in recognition of the "exceptional and extraordinary situation raised by COVID-19 " Additionally ComReg did clearly state that those proposals were without prejudice to its MBSA proposals

It is now clear that the Covid Emergency will have longer-term effects on the Irish economy; effects that we believe will justify further action by ComReg to support required telecommunications industry investment in Ireland. The industry faces a demand from customers for much higher capacity resilient and secure services but in a challenged economy with resulting constraints on investment.

Our network investment therefore must be efficient and customer focussed. To achieve this there is a range of actions ComReg should take:

1. Make spectrum available to operators on an assured long-term basis by completing the auction process as with the timeframes committed in the Draft IM.
2. Extend the Temporary Spectrum Management Measures until that auction is complete.
3. Ensure that Network investment can adapt to short-term capacity and investment demand by extending the timeframe of planned 3-year coverage targets.
4. To ensure most effective network investment by replacing the coverage obligations on individual high bands with an aggregate target
5. Re-examine and reduce spectrum usage fees

Extending the temporary spectrum management Measures.

Connectivity is an essential policy and infrastructural tool for the economic recovery, as evidenced the European Commission's latest Country Specific Recommendations for Ireland in response to COVID-19, "The restart of the economy requires that Ireland advances on its ambitious environmental, climate, energy and infrastructure investments".

Since the introduction of COVID measures mobile speech or voice traffic has increased by 30%, fixed data traffic has increased by 50% and mobile data has increased by over 15% which we have supported on our network.

The extension of the temporary spectrum allocation measures will allow us to continue to provide high capacity data services to match the sudden increase in data capacity and ongoing changes to patterns of use in the network. It appears many businesses are preparing to support home

working for at least a majority of their staff. The ways of working, communicating, entertainment and socialising are increasingly reliant on resilient stable infrastructure and this presents new challenges to network capacity management . The steps taken by ComReg to release additional capacity have provided a critical input. In advance of the outcome of the planned MBSA we have no efficient way provide this capacity, and there is now a real requirement to extend the temporary measure out to the end of the MBSA process.

Coverage Rollout Obligations

Timing of Rollout, 3-year target.

In our response to ComReg 19/124, we detailed how Vodafone have worked on a nominal roll-out plan, refreshing our radio equipment to ensure the most effective and efficient use of the spectrum acquired. The most efficient process to follow in achieving this type of refresh is to complete equipment change and optimisation in a sequence of geographic clusters. This cluster-by-cluster approach is operationally efficient and has the added advantage of minimising customer service impact.

In addition, we anticipate that the completion of this RAN refresh will require more significant upgrade to our own and to third party tower infrastructure than previous RAN refresh projects. These structural upgrades will be driven by the increased number of antenna needed for additional frequency bands and by the by the move operators will make from ground based BTS deployments to tower based Remote Radio Head BTS deployments.

In analysing the practical time needed to complete this program (even advance of the demands arising from Covid) it is very clear that we cannot meet the proposed ComReg target of 85% population at 3 years and ensure a program minimising customer impact.

In our response to ComReg 19/124 we proposed reducing or removing the 3-year element of the coverage targets listed in Table 4 of that document. Given that the Covid Emergency will drive additional network capacity requirements in areas with more than adequate existing coverage areas it is even more appropriate to remove the 3 year coverage target points.

Targets in Other bands

Roll-out for other bands

ComReg have proposed an obligation to rollout large quantity of sites in the "Other bands", 2.1GHz, 2.3GHz and 2.6GHz. The obligation proposed is a rollout of 1200, 550, and 550 sites respectively in these bands.

It is inaccurate to label these bands as 'Performance Bands'. Generally, mobile operators will use these bands to provide high quality services matching the capacity demands of customers in each site area. Another use of these additional bands can be to provide high capacity solutions in areas such as railway stations. Because there are fewer customers per site, customers in rural areas can often obtain a better service (measured by data-rates) from sites with fewer frequency bands installed than customers in areas with higher population do.

These additional bands are best implemented through customer driven processes that dictate the bands required on each site from time to time depending on demand.

The quality of service experienced by the customer is driven by multiple factors among which the number of bands is not the most significant. In the past, a significant number of sites were equipped with 2.1 GHz equipment specifically to provide a 3G service. ComReg refer to the current number of site equipped with 2.1 GHz equipment but this is not a good measure of the optimum number of sites to be equipped with 2.1GHz in a multi-band technology-neutral network. In the context where lower and higher frequency bands will support the same services, the lower bands could more efficiently support customer services.

As all bands will, in the future, will be technology and service neutral the previous justification for having high site numbers equipped with specific bands will not apply. As a specific example, we do not anticipate that it will offer any service advantage to customers to equip 500 sites with 2.6GHz equipment within 4 years to meet the targets described in Table 10.

In addition these obligations make it very inefficient to procure small quantities of spectrum in a band (e.g. with 10 MHz of 2.3GHz an operator would have the full obligation) whereas this small quantity of spectrum could provide a useful function for operators in limited locations. This increases the risk of having blocks of spectrum in each band unsold in the auction process.

As ComReg recognise the interchangeable nature of the three bands 2.1GHz, 2.3GHz and 2.6 GHz, we suggest they set a single rollout target for use of spectrum from any of these performance/capacity bands. ComReg could set a condition that compels operators winning spectrum in these Other Bands to use at least one of these bands on 500 sites in within 5 years. This would be a suitable figure to prevent spectrum hoarding.

Equipping specific counts of sites with high band equipment in the 2.1GHz, 2.3GHz and 2.6GHz bands would be particularly inefficient if different amounts of spectrum are awarded in two time-slices. We suggest therefore that if ComReg do not accept our suggestion to award 2.3GHz and 2.6GHz spectrum in a single time-slice then it would be unreasonable not to change the target site count for other bands to an aggregate target.

We note also that Comreg are breaking the 2.6GHz and 2.3GHz bands into 2 time slices. The argument for that is that the bands are substitutable with the 2.1GHz band. If that is the case then it should follow that a single aggregate 'high-band' target for site roll-out should apply to these bands.

Timing:

The time given for completion of the target in Table 10 is 4 years. It would be more appropriate to change this timeline to 7 years to align with the coverage rollout conditions. This would allow operators to avail of greater deployment efficiencies in new site rollout and upgrades, i.e. enabling us to make a single site visit to site to equip them to meet coverage and rollout conditions

Alternative to Time-Slices

DotEcon comments on time Slice Section 4.53 of ComReg 19/124

In our response to 19/124 we highlighted that we do not agree with the position taken by DotEcon: arguing that multiple time-slices cause no issue as operators could bid for only packages that span both time-slots. In the auction process, very significant price differentials may occur between spectrum prices in both time slices and we need to understand the value of this spectrum, and combinations of different spectrum, in these time-slices.

This valuation will be difficult for all bidders, particularly in the short time slices and there is an increased and significant risk that someone will incorrectly value spectrum which will lead to inefficient outcomes and possible inefficient use of the spectrum.

Time slice in other band

Similarly we are still of the opinion that it would be better to offer the 2.6 and 2.3GHz spectrum in a single time-slice. We believe that the gains in auction simplicity outweigh the risk that there is gaming the 2.1GHz bidding process (outlined in paragraph 4.107 of ComReg 19/124).

The gain in simplicity is important to bidders. We note in addition that it appears unprecedented to split unused bands into separate time-slice lots.

Fees

We agree with the principal of splitting the fee proposed on a 40/60 basis between upfront and ongoing charges. ComReg should ensure that minimum prices are conservative.

In the 2.3GHz band, the various co-ordination restrictions and the uncertain transition will significantly reduce the value of this band. This reduction is not adequately reflected in the benchmark figure.

We agree the points Nera make, quoted in Section 7.318. "The significant increase in supply of spectrum and limited ability of operators to monetize 5G services means ComReg should expect spectrum prices per MHz to fall relative to the 2012 4G auction"

Section 2

Vodafone Commentary on Annex12: DotEcon Report on Exposure Pricing

"Vickrey and minimum revenue core pricing in combinatorial spectrum awards."

A report for ComReg 13 May 2020"

Introduction

Given the complexity of the lots on offer in this auction, we agree that a combinatorial clock auction (CCA) is the most effective auction format to use.

The principle difficulty we had with previous CCA auctions was the lack of price transparency. We welcome the study that has been completed on Exposure Pricing and we believe that including this mechanism would be a significant positive change in the auction design, with no apparent down-side for the auctioneer or the process.

In addition, the report includes a comprehensive review of other auctions completed, of pricing methodologies, and of activity rules. We broadly agree with the conclusions reached.

Comments on Sections of the DotEcon report

From Executive summary :

Combinatorial auctions and when they should be used

We agree that CCA auction are the most suitable format in a complex auction with multiple lot types.

Price driving bids

"The fact that bidders set rivals' prices has given rise to a variety of criticisms of the CCA on the grounds that it gives opportunities for malicious bidding."

While we recognise that price driving has been a factor in a number of CCA auctions in other countries we do not believe that price driving is a major factor in this planned auction.

All of the operators in Ireland currently have significant spectrum holding. This, combined with the competition Caps in the current planned auction, will mean that Bidders could not effect downstream competition by 'overbidding' for spectrum.

Missing bids

"Some experimental trials of CCAs have found that bidders tended to be reluctant to submit a full range of supplementary bids for packages they might win."

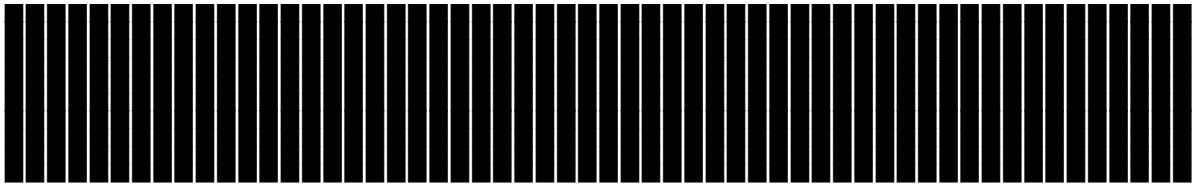
We do not believe that this is an issue, provided enough bids allowed and sufficient time to submit. There is sufficient experience with CCA auctions internationally and in Ireland to prevent this being a problem.

Exposure pricing

"One criticism of the CCA (and second-price auctions more generally) is that it creates practical problems for bidders, as they may need to make bids for a package higher than the eventual price they pay. In contrast, clock auctions and SMRAs are pay-as-bid, so bidders always know their financial exposure."

In our experience this has been a significant issue for us as a bidder.

[✂



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An additional [✂ ■■■■■■■■ ✂] challenge is the concern that a higher price for Spectrum may act as a price driver in other auctions internationally. This is because other countries use price outcomes in Ireland as a benchmark to set prices. Hence a high price set in Ireland could have much more expensive effects internationally if use as a benchmark.

"Information is typically available to bidders in the clock rounds of a CCA to allow them to understand the extent to which they might expect ultimately to pay close to their bids amounts, or might pay significantly less"

In our experience of CCA in Ireland, the information available has not been sufficient to allow us to calculate the likely final price we paid.

"It is not necessarily the case that bidder's discounts would always increase from one clock round to the next"

We understand the limitations of exposure pricing information, and that the discount may fall during the bidding process.

We note the comments on gaming potential.

We agree strongly that there is no downside to providing bidder specific discounts as additional information to bidders.

Relationship of this study to MBSA2

We note that the comment that this project was commissioned independently of ComReg's current on-going consultation process for the forthcoming Multiband Spectrum Award (MBSA2).

However, given the complexity of CCA and our previous experience, any move to assist would be most welcome.

3 The Combinatorial Clock Auction

3.1 Motivation for the CCA

"The Combinatorial Clock Auction was developed to deal with situations with multiple lot categories where bidders have complex demand structures with complementarity and substitutability and where pre-packaging is not feasible."

Given the complexity of the current planned auction, we agree that CCA is the most appropriate auction format.

The rest of chapter 3 has a discussion of the General Structure and Mechanics of CCA, we have not commented on these.

4 Advantages and disadvantages of the CCA

4.3 Governance issues

The multi-layered decision process where bid teams within bidding firms need to seek approval from management and shareholders for their budget and bid strategy and the firm may have to seek funds on financial markets, for either auction expenditures or further activity, may generate inefficiencies and practical difficulties.

We agree that this is a real issue. As noted above, Governance in an international company can be complex and any additional information we can bring to the Governance process sis useful.

4.3.1 Second prices and exposure

"The second price rule results in bidders not knowing how much they will pay for their chosen packages, both during the clock rounds and in the sealed-bid supplementary round."

"Therefore, one may prefer to find ways of bringing more price certainty to existing second-price formats such as the CCA. ".

We agree that this is an issue. Exposure pricing would certainly make a positive contribution to solving this. Given our lack of experience of Exposure Pricing in European auctions, and the small amount of other worldwide precedent, it is difficult for us to evaluate in detail how effective the Exposure Pricing information might be in a practical auction in Ireland, but, from the information in this study it is clear that the Exposure Pricing has at least some positive value with no apparent downside.

5 Alternative pricing methodologies

5.1 Providing information on price exposure

A common complaint about CCAs is that bidders do not know what they are likely to pay when they bid, as a result of the MRC pricing methodology determining winning prices after the supplementary bids round in the light of all bids received in the course of the auction. "

This is an issue for us. The range of possible outcomes in previous auctions very large.

5.3.3 Risks of gaming

We note the comment made in this section on the risk of gaming. We consider that this risk is low, there are too many lot types and the auction is too complex for this to be an issue.

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6 Simulations of exposure pricing

"In this section we present, as a proof-of-concept, evaluations of exposure pricing using both some bid data from real-world auctions and using simulated bid data."

We appreciate the efforts made to test Exposure Pricing, this is useful. It is difficult for us to evaluate the likely added information that this process could supply in a real Auction in Ireland, but as discussed elsewhere, there is no apparent downside to this added process.

7 Conclusions

We broadly agree with the conclusions of the report:

- There is little gain in using price driving strategies within CCAs

- Uncertainty about pricing can be addressed to some degree through providing bidders with additional information about what they might need to pay at most if their bid in a clock round of a CCA were successful.

- DotEcon have demonstrated that it is feasible to calculate these exposure prices and report them to bidders during the clock rounds. It seems unlikely that releasing exposure prices would create any gaming opportunities