Commission for
Communications Regulation

Proposed Multi Band Spectrum Award

Non-confidential Submissions to Document 19/124

Reference: ComReg 20/56s

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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’

eir

Response to ComReg Consultation:

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

ComReg Document 19/124

10 February 2020

DOCUMENT CONTROL

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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). [✂] 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.

2 Imagine Communication Group

Imagine

Imagine's response to the Proposed Multi Band Spectrum Award –

(ComReg 19/124)

Contents

1. Introduction

Having provided a response to ComReg 19/59 Imagine welcomes the opportunity to respond to the recent consultation ComReg 19/124 "Proposed Multi Band Spectrum Award".

2. Imagine Comments

2.1. Preferred Assignment Process

Imagine agrees with ComReg's updated position stated in section 3.3.3 of the document[1] to make available all relevant spectrum rights in the Proposed Bands using an open appropriate auction format (i.e. Assignment Option 1).

2.2. Time Slices

Imagine is disappointed that ComReg proposes to award the 2.3 and 2.6GHz bands in the same time slices defined for the 2.1GHz band. In common with all mobile operators that responded to ComReg 19/59 (Vodafone, Eir and Three) Imagine does not believe that time slices are necessary or appropriate for the 2.3 and 2.6GHz bands.

2.3. Eir 2.3 GHz Transition

With regard to ComReg's statement regarding transitional rights in section 8.243 that:

> *"there would be a clear end-date for all transitional rights. ComReg observed that based on current information and noting the rural locations of the existing customers, this could be informed by the ability of the RurTel customers to avail of the services that would be provided via the NBP."*

Imagine is concerned firstly that services provided via NBP are not equivalent to the voice services provide via RurTel and secondly that the timeframe for provision of NBP services to these specific locations is not known.

Imagine believes that equivalent voice services should be possible via one of the existing mobile networks, perhaps with a suitable outdoor CPE and repeater solution, and that the transition timeframe should be as proposed in section 9.3.2 of ComReg 19/59R namely:-

> *"until Eir migrated these customers onto an alternative platform/s, or sufficiently comparable services became available to these customers from another provider/s – which ever was the earliest"*

[1,2,3] ComReg 19/124 "Proposed Multi Band Spectrum Award"

3 Mr Liam Young

Submission in Response to Comreg's Consultation Response & Draft Decision Document dated 20th December, 2019

on the

Proposed Multi Band Spectrum Award

Including the 700MHz, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands

Comreg Document Reference 19/124

Submitted by

Liam Young

10th February, 2020

This document contains a Non-Confidential Submission for Unrestricted Publication

1. Introduction

This document has been prepared in Response to Comreg's Consultation Response & Draft Decision Document dated 20th December 2019, dealing with the proposed multi-band spectrum award in Ireland, including the 700MHz, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands.

2. Major Issues Relating to this Consultation Process

2.1 Industry Bias

In my submission to Comreg's consultation document 19/59R, I expressed the view that Comreg's approach to this public consultation was lacking in some respects, and that "Comreg should ensure that the decisions it makes are made having taken proper account of the ***significant potential for industry bias*** in the responses it receives to this consultation."

In particular, I expressed a concern that Comreg may, in this instance, be under-exposed to the views of Irish consumers and taxpayers, and Irish citizens generally, views which may contrast significantly from the views of industry players with significant commercial and financial interest in the outcome of Comreg's deliberations and decision-making.

My submission included a number of constructive suggestions that Comreg could adopt in order to ensure that it receives a broad representation of views, to ensure that the views of consumers and businesses are adequately represented.

As I predicted in my original submission, Comreg's failure to bring this consultation process to the attention of interested parties outside of the telecoms industry, has now directly resulted in an outcome and a series of draft decisions that are, in my view, heavily biased in favour of industry players, and, at least partly to the detriment of consumers, mobile network users, and Irish taxpayers.

An analysis of the submissions received by Comreg on which its decisions are influenced or based, reveals that ***all*** of the submissions were made by industry players (one respondent has requested anonymity, and so it's motivation and background is unclear), with the exception of my own submission. For your convenience, *Appendix A* contains the section of my original submission dealing with this issue.

Given the complete absence of stakeholder views other than those from the telecoms industry, it is quite shocking that Comreg would proceed to use this consultation process to justify making far-reaching decisions and commitments regarding the use of highly valuable national resources for the next twenty years, decisions that are clearly influenced by a demonstrable industry bias, and which fail to take any account of the views of Irish consumers or businesses.

In my submission, I put forward a number of specific proposals, responses and suggestions which were summarised into eleven specific points in the document's introduction. Most of the views put forward

in my submission related to the adoption by Comreg of licence conditions to ensure better coverage, better download speeds and better quality services for Irish mobile network users. All of these proposals have been either rejected or ignored by Comreg, with Comreg preferring to adopt the views of the industry or industry consultants in coming to its draft decisions.

Of most concern is Comreg's justification of its draft decisions at least partly on the basis of the weight of respondent opinions, opinions which are clearly biased in favour of the industry's own financial and commercial interests, and not those of consumers and mobile network users.

It is difficult, therefore, not to come to the conclusion that Comreg's consultation process was not in fact designed to be a genuine public consultation, and a perception that Comreg may have intended from the outset to proceed with a number of pre-determined decisions regarding licence conditions that the industry is happy to accept, but which are not at all favourable to other stakeholders, who have not been consulted with. One would be forgiven for concluding that this public consultation has been conducted in name only, and without genuine regard to the views of Irish consumers and businesses that will be significantly affected by these decisions for years to come.

2.2 Comparing and Contrasting Comreg's Multi-band Spectrum Consultation and the Government's recent Water Management Consultation

The Department of Housing, Planning and Local Government recently published a public consultation document entitled "Significant Water Management Issues in Ireland," and a website link is contained below:

https://www.housing.gov.ie/water/water-quality/water-framework-directive/public-consultation-significant-water-management

The consultation process was launched on the home page of the Department's website, and a prominent notice publicising the consultation and inviting submissions was placed in all of the national print media *(See Appendix B).*

The Department of Housing's process gives potential respondents a choice of mechanisms to respond to its consultation, including a user-friendly document response template and an online survey, and gave respondents 20 weeks in which to respond.

By way of contrast, it is likely that only industry players would have been aware of Comreg's consultation process, as apparently no media activity was employed, and Comreg inexplicably failed to mention the existence of the consultation in any part of the consumer section of its own website, thereby ensuring only industry responses would be received. Furthermore, Comreg's consultation document was couched in excessively technical terms, contained numerous references to separate documents, consultations and consultant reports, rendering the document and process very inaccessible to non-industry parties.

2.3 Comreg and Government Consultation Guidelines

As part of its statutory obligations, Comreg is required to act fairly and transparently in coming to its decisions, and Comreg itself has published guidelines on its website as to how its consultations should be conducted. *Table 1* below contains important and relevant sections of these guidelines, with my emphasis on the most relevant text.

Table 1: Information Notice on Comreg Consultation Procedures

"Principles of Consultation

As set out in the Department of the Taoiseach's guidelines on consultation[4], consultation is about seeking the views of those outside the decision-making process in order to better inform that process. Consultation is not intended to be a substitute for decision-making, but reflects the fact that the decision-making process benefits from ***having the widest range of views*** and fullest information on a particular issue.

ComReg is fully committed to a transparent consultation process and recognises that public policy-making can be enhanced through the active involvement and contribution of all stakeholders with an interest in particular policy developments. By ensuring that interested parties can express their views about a particular proposal, the decision-making process becomes better informed, more rigorous and more accountable.

Consultation processes should recognise that there may be a wide range of stakeholders on any particular issue, not just those with a direct financial or other interest.

ComReg will at all times seek to ensure that all of its consultations are as ***open, transparent, fair and complete as possible***, and ComReg will take proper consideration of all submissions that are received."

Source: *Comreg Consultation Procedures 11/34a published on 06/05/11*

It is difficult to escape the conclusion, in the case of this particular consultation process, that Comreg's failure to consult with all stakeholders, and to effectively focus its communications about the consultation to industry players only, is not only in direct breach of the Taoiseach's guidelines, but is clearly in breach of its own guidelines.

3. Conclusions

Having carefully reviewed Comreg's consultation documents, industry responses, subsequent analysis, and draft decisions, it seems clear to me that Comreg's consultation process is fatally flawed as a direct result of its failure to make reasonable efforts to consult with all stakeholders, in breach of both Government and Comreg's own consultation guidelines. A public consultation process that focusses its attention on the views of industry players and consultants that have a sectional financial and commercial interest in the outcome is not in reality a public consultation process at all, and should not, in my view, be represented as such.

My original submission was made on the basis that Comreg was genuinely interested in considering the opinions of all stakeholders, and was made in good faith. Given that my assessment of this process is one of being neither open, transparent, fair, or complete in many respects, I wish to formally request that my original submission not be used to justify any of the decisions now being made by Comreg in respect of this process.

Liam Young

10th February, 2020

Appendix A – Original Submission to Comreg regarding the Consultation Process

1. Comreg Consultation – User Representation of Views

As outlined in the Executive Summary of this submission, the author's primary motivation in submitting a response to Comreg's consultation is a concern that Comreg may, in this instance, be under-exposed to the views of Irish consumers and taxpayers, and Irish citizens generally, views which may contrast significantly from the views of industry players with significant commercial and financial interest in the outcome of Comreg's deliberations and decision-making.

As I am sure the Commission is aware, Comreg is required to seek the views of all stakeholders, and to ensure that a broad spectrum of interests is considered before making decisions that, in this case, will have wide-ranging implications for Irish society for decades to come. In the case of this particular consultation, it appears that the consultation process is aimed primarily at seeking responses from industry players, with little evidence of efforts by Comreg to stimulate public awareness that this process is underway or even exists.

For example, the Comreg Consultation document inviting responses only appears within the "Industry" section of Comreg's own website, and seems to have been excluded from all sections of the "Consumer" section, including the "Consumer News" section, "Consumer Information" section, the "Consumer Engagement" section, and is even excluded from the "Open Consultations" tab within Comreg's Consumer microsite. While this may be an inadvertent omission on Comreg's part, the general sense conveyed is that Comreg is primarily interested in the views of industry players, and is not especially interested in the views of other stakeholders.

In addition, and reinforcing this impression, the very detailed technical content of Comreg's consultation document, coupled with multiple references to previous consultations, and consultant reports, while very important and useful in teasing out issues with industry players and especially from intending spectrum award applicants, has less relevance and renders less accessible the process to other stakeholders who may wish to have an input to some of the more important general policy-making aspects of Comreg's decisions relating to the forthcoming frequency awards.

While this may not be Comreg's intention, the fact remains that it is very likely that a significant proportion of the respondent submissions to this consultation will be industry players, and that those responses will be prepared using deep access to information and resources. While these industry players may be more knowledgeable and undoubtedly possess a high degree of technical, human and financial resources to research and respond to Comreg's consultation in an articulate and insightful way, the problem for Comreg is that the analysis and views received will be naturally designed towards influencing a decision outcome that maximises their own commercial interests. While this is of course each respondent's right, the net effect of this set of circumstances is the possibility that the views received by Comreg in response to this consultation are skewed in favour of the interests of industry players, views which are unlikely to reflect the views of other stakeholders.

Comreg must already be aware that this "motivated to respond" bias from industry stakeholders brings with it the danger that the views of other less vocal or even silent stakeholders are not given the same level of attention or consideration in a detailed and complex process such as pertains in decisions relating to frequency spectrum awards.

To put this simply, the detailed technical and economic issues, and the complex nature of the considerations and technical jargon that are inherent in this process, and as set out by Comreg and its consultant reports, are not likely to be easily understood by the average citizen or mobile user, and will very likely discourage many from responding to Comreg's consultation invitation.

However, the decision outcomes of this process have significant implications for Irish users and even non-users of mobile and broadband services in Ireland for at least the next 15 years, and therefore requires that that the views of all stakeholders are sought, fully understood and carefully considered before action is taken.

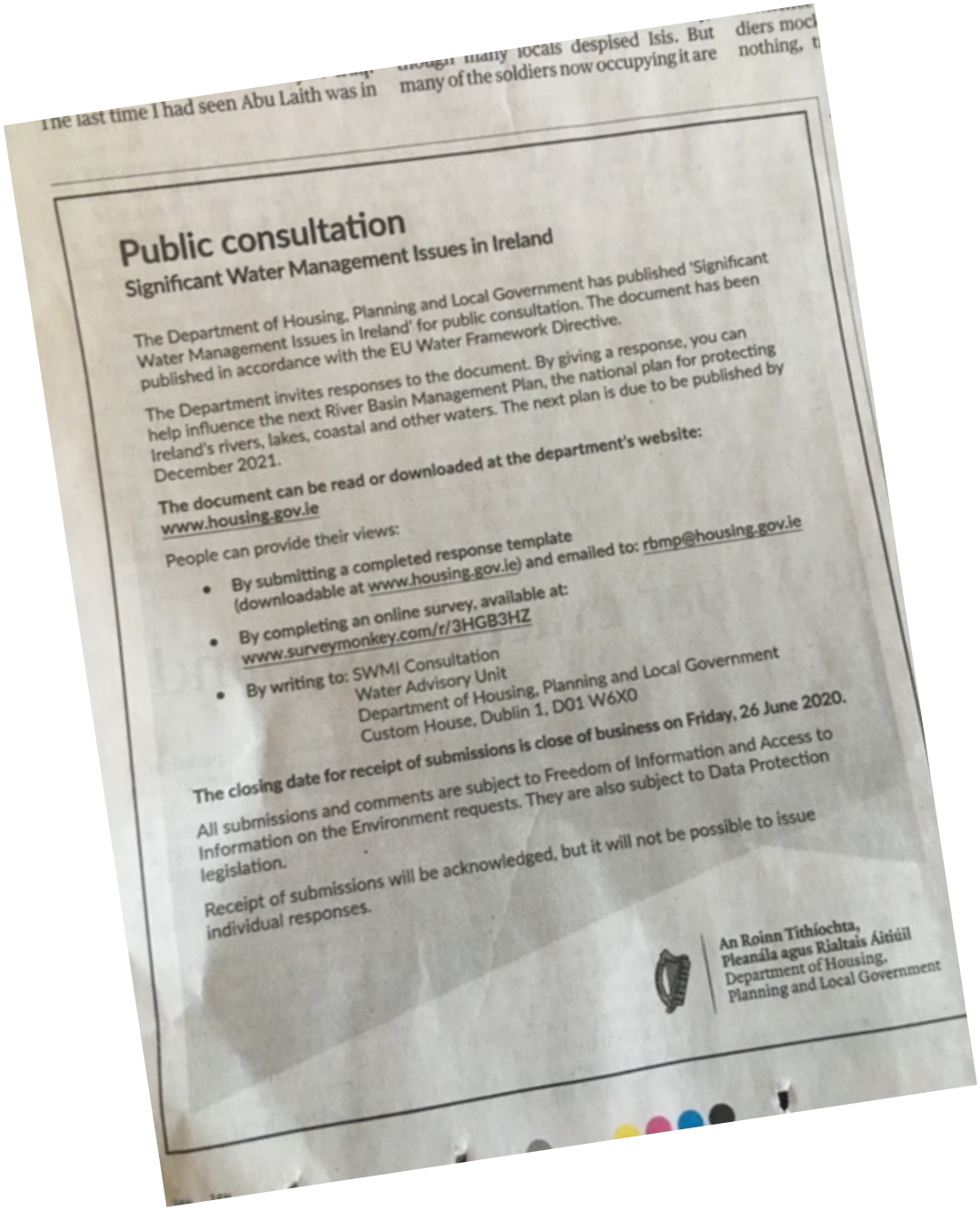
Without wishing to second-guess Comreg's means of addressing the problem described above, if it recognises that a problem exists at all, the submitter respectfully suggests that Comreg should actively review the proportion of industry and non-industry representation of the responses it receives to this consultation, and consider the consequent weight with which it attaches to those responses. It should also consider consulting further, in an effort to address the imbalance which I believe may occur.

Given the importance of the issue being considered, I would suggest and recommend that the Commission consider the possibility of adopting more accessible mechanisms to consult more widely with non-professional and non-industry stakeholders on this topic, possibly using an emailed multi-choice survey method regularly adopted by business and non-business organisations to research consumer views, or possibly using focus groups to elicit the views of a broader section of stakeholders.

I do appreciate that Comreg does have mechanisms in place to ensure it receives input from non-industry sources, such as the Consumer Advisory Panel, and also receives reports also from specific groups such as the Mobile Phone and Broadband Taskforce. However, the existence of these mechanisms should not reduce or negate the need to ensure that the particular issues being canvassed and addressed in this consultation are made as accessible as possible, and that the resulting views of non-industry stakeholders are given sufficient regard in coming to decisions.

In any case, the issues raised in this response are intended to be constructive, and not intended to diminish the important work of Comreg, nor its efforts to consult with stakeholders. I hope that this submission will help to provide balance to the Commission in coming to conclusions and making important decisions regarding the optimal plan to award frequency spectrum licences in Ireland to the benefit of all stakeholders.

Appendix B – Copy of Recent Public Notice Relating to Water Management Public Consultation



The last time I had seen Abu Laith was in ... many locals despised Isis. But many of the soldiers now occupying it are ... diers moc... nothing, t...

Public consultation

Significant Water Management Issues in Ireland

The Department of Housing, Planning and Local Government has published 'Significant Water Management Issues in Ireland' for public consultation. The document has been published in accordance with the EU Water Framework Directive.

The Department invites responses to the document. By giving a response, you can help influence the next River Basin Management Plan, the national plan for protecting Ireland's rivers, lakes, coastal and other waters. The next plan is due to be published by December 2021.

The document can be read or downloaded at the department's website:
www.housing.gov.ie

People can provide their views:

- **By submitting a completed response template (downloadable at www.housing.gov.ie) and emailed to: rbmp@housing.gov.ie**
- **By completing an online survey, available at: www.surveymonkey.com/r/3HGB3HZ**
- **By writing to:** SWMI Consultation
  Water Advisory Unit
  Department of Housing, Planning and Local Government
  Custom House, Dublin 1, D01 W6X0

The closing date for receipt of submissions is close of business on Friday, 26 June 2020.

All submissions and comments are subject to Freedom of Information and Access to Information on the Environment requests. They are also subject to Data Protection legislation.

Receipt of submissions will be acknowledged, but it will not be possible to issue individual responses.

An Roinn Tithíochta, Pleanála agus Rialtais Áitiúil
Department of Housing, Planning and Local Government

4 Three Ireland (Hutchison) Limited

Multi-Band Spectrum Award

Response to Document 19/124 from Three

10th February 2020

1. Executive Summary

Background

ComReg is the manager of the radio spectrum on behalf of the State and has proposed to award licences for access to a number of "bands" suitable for mobile and fixed voice and broadband services. The licences will have a duration of up to 20 years to 2040 and will play an important role in facilitating roll-out of 5G services in Ireland. Access to such spectrum is essential for mobile network service providers, and ComReg has specific objectives to meet in any process it uses to award licences: the process must be objective, non-discriminatory, proportionate, and transparent; ComReg is required to act in a lawful and fair manner; and the award must promote the efficient use of available frequencies.

ComReg has proposed to use an auction to award the licences. The outcome of the auction will determine which bidders win spectrum, how much, and what price they must pay. There are several different auction formats that could be used for this award. ComReg proposes to use a Combinatorial Clock Auction (CCA). In addition, it proposes to apply a "cap" on the amount of spectrum that bidders can win (or bid for) that takes into account existing mobile licences. The purpose of the cap is to prevent any single operator having "too much" mobile spectrum, but in the context of the auction, the cap also has the effect of restricting Three's bid options relative to its two main competitors.

CCA is the wrong auction format

The choice of the CCA auction format is incorrect and the wrong format to achieve ComReg's stated objectives for this award process. In this document we show why a different format (a Simultaneous Multi-Round Ascending Auction or SMRA) is more appropriate in the current circumstances. Notably, we show that, given the structure of available spectrum in this award and the profiles of the likely bidders, a CCA will favour the strongest MNO over smaller MNOs and aspiring entrants.

The proposal places Three at a severe disadvantage

ComReg's proposal to apply a spectrum cap based on existing holdings in combination with a CCA auction places Three at a material disadvantage in the auction, which cannot be in line with ComReg's objectives. The impact of this disadvantage is most severe for spectrum in the 700MHz band, which is a pilot band for 5G services. Three is disadvantaged both with respect to its ability to access spectrum through the auction and its exposure to paying a significant premium over its competitors. This approach is discriminatory and unfair. It is also disproportionate and fails to meet ComReg's objectives for spectrum awards. In Annex A, we present plausible scenarios for the auction in which Three is at risk of being "knocked out" of the contest for 700MHz spectrum inefficiently, or to paying a premium of as much as [✂ Confidential section ✂] for winning the same as its competitors.

There are remedies available

It is possible to eliminate the above problems while meeting ComReg's objectives for the award. They would not arise if ComReg adopted an SMRA format with its proposed cap. If ComReg proceeded with an CCA, it is also possible to remedy the worst of the harm by the addition of some simple changes to the activity rules for bidding at 700 MHz and to winner and

price determination. We set out these rules in our submission. Our proposed changes would allow ComReg to keep the other aspects of its auction design, including the cap as currently proposed.

Liberalisation of 2.1GHz should not be delayed any longer

Three agrees with ComReg's proposal to liberalise existing 2.1GHz licences. ComReg should take the steps necessary so that these licences can be liberalised from the date of the decision arising from this process. The interim licence fee proposed is excessive, and ComReg should instead use the methodology it has developed to determine if Eir should pay a liberalisation fee to also determine the licence fee for interim licences.

Some corrections are needed to the coverage calculation

Three agrees with ComReg's overall approach to adopt precautionary rather than interventionist roll-out and coverage obligations, and the overall target is consistent with this. ComReg has erred significantly in the conversion of its 30Mbit/s throughput into received power level. This has the effect to overstate the required received power by up to 18dB in Three's opinion.

2. Introduction

The radio spectrum is a finite natural resource, and there is a limit to the number of service providers who can use any particular band. In this award, ComReg is planning to issue licences for spectrum in four different bands, 700MHz, 2.1GHz, 2.3GHz, and 2.6GHz. With the exception of the 2.1GHz band, the spectrum to be awarded is "new" in that it has not been available for mobile or broadband services before. The 2.1GHz band was previously licenced for 3G mobile services and those licences expire in either 2022 or 2027. A distinction is generally drawn between the spectrum below 1GHz and that above 1GHz because there is less sub-1GHz spectrum available in this award and it gives some advantages for providing coverage. In addition, 700MHz is one of the "pioneer" bands for new 5G services.

ComReg's Role

ComReg is the manager of the radio spectrum in Ireland on behalf of the State and controls access to this valuable State asset by way of licensing. Access to the spectrum is an essential input to the provision of mobile network and other wireless network communications services. It is not possible to enter this market without access to spectrum in the bands allocated to those services. ComReg is the "gatekeeper" who sets the rules on behalf of the State to determine which service providers do or do not get to operate in this particular market and how effectively those operators can compete in this market.

ComReg's objectives are laid down in law in primary legislation, and regulations. At a broad level, they include, promoting effective competition, promoting the interests of users, and ensuring the efficient use of the radio spectrum in Ireland. There are also more specific obligations on ComReg that must be taken into account when licensing access to the radio spectrum; these include a requirement that the licensing process and associated decisions are objective, non-discriminatory, proportionate, and transparent. Further, as an agent of the

State, controlling access to an essential input necessary to provide services, ComReg is required to act in a lawful, proportionate and fair manner and to consult interested stakeholders (taking into account the views of interested parties), to be consistent in its decision-making and to provide an unbiased process.

Interested parties have a legitimate expectation that ComReg's licensing treats them fairly, while meeting all of above objectives. There are currently 6.5 million subscriptions for mobile service in Ireland[1], and this number is growing. The radio spectrum plays an important role in the Irish economy and according to ComReg's Spectrum Strategy it "*accounts for around 17 000 full time equivalent jobs, €4 billion Gross Value Added and an estimated total contribution of spectrum-dependant activities of €6.2 billion – amounting to 3.5% of Irish Gross National Income*". Clearly, there is the potential for significant adverse consequences for consumers, businesses and the State arising from any decision or licensing process if ComReg does not adopt the best approach to spectrum licensing.

It is Three's view that ComReg's proposal (as it currently stands) is fundamentally wrong, in breach of ComReg's statutory obligations and objectives (as discussed in Section 3) and will have significant adverse consequences for Irish operators and consumers. The most serious policy error is the proposal to use a Combinatorial Clock Auction (or CCA) to determine the licensees in combination with caps that restrict Three to bidding for less spectrum than its main competitors. This combination of policies, proposed without any mitigating rules, exposes operators to paying highly asymmetric prices (beyond what might be justified on the basis of actual value differences) and opens the auction up to gaming that could prevent spectrum being allocated efficiently to the operators that can provide the greatest benefits to consumers. This policy error is particularly concerning in relation to the 700MHz band, given its unique status as the pioneer band for wide-area 5G coverage.

The CCA Auction Mechanism

While Three agrees with the use of an auction to award the licences, we do not agree that a Combinatorial Clock Auction is an appropriate mechanism in this case. As we discuss in more detail in Section 4, we believe that a CCA auction is not the appropriate mechanism to meet ComReg's obligations and objectives for the award process. A Simultaneous Multi-Round Ascending auction (SMRA) is a more appropriate mechanism: it would be more likely to deliver outcomes consistent with ComReg's obligations and objectives; and it is also the format adopted by every other Member State to date for their 5G awards.

On close analysis, many of the reasons given for selecting a CCA do not withstand scrutiny. In this specific case, the CCA fails to meet ComReg's objective and obligation to maintain and foster competition. Notably, it fails to protect smaller mobile network operators (MNOs) and other market entrants, instead exposing these bidders to paying significantly higher prices than Vodafone.

The CCA Auction where some bidders are restricted

[1] According to ComReg's latest Quarterly Data Report, 12/12/2019

While Three disagrees with the proposed use of a CCA auction and considers it to be fundamentally wrong in this case, it is not the use of a CCA on its own that causes the most significant problem. An even bigger policy error is ComReg's plan to use a CCA auction and to also impose caps on bidders in such a way that Three would be restricted relative to its main competitors. That is unacceptable to Three and raises serious concerns in relation compliance with ComReg's objectives and obligations under law, guidance and codes. The interaction of the proposed caps with the CCA auction exposes Three to paying significantly more than its two rival bidders for the same thing (or being knocked out of the 700MHz contest altogether), not because of the different positions of the three bidders before the auction, but because of the structure and rules of the award itself. This is discriminatory and is unfair. It is anathema to ComReg's statutory objectives in awarding licences, and also its obligations as an agent of the state providing access to a critical resource. This is particularly the case for the 700MHz band because of the small amount of spectrum that is available for award and its special role for 5G, which exacerbates the impact for Three. This problem is explained in greater detail in Section 5 below and also in a short paper attached at Annex A. This annex has been prepared by NERA Economic Consulting for Three and it shows, giving specific examples, the undesirable outcomes delivered under ComReg's proposed auction rules. The examples that NERA present demonstrate how the proposals are biased against smaller bidders, and how the rules expose Three to being inefficiently "knocked out" of the 700MHz band or otherwise having to pay a significant premium over its competitors.

Three has a strong objection to ComReg's proposal because it combines the use of a CCA auction combined with asymmetrical caps, noting that such a combination has a significantly more severe impact on Three than a scenario where the proposed caps were combined with a different award mechanism. Three has previously pointed out the problems with the auction as proposed; however, it seems ComReg has been determined to make minimal changes to its original proposal and is at best indifferent to the negative impact that it will have on Three and on competition in the market. By embracing an auction process that favours the largest operator, ComReg is directly distorting competition in the market. It does not appear that ComReg has carefully considered the likely impact on Three of the proposal, or the downsides for Eir and new-entrant bidders, contrary to ComReg's objectives.

It is important that ComReg carries out the analysis that is warranted before setting the final auction rules, and clearly explains the rationale for adopting various options and the implications of its decisions. If an inefficient outcome does emerge, it will be very difficult for ComReg to identify this as no one will be aware of the bidding strategy and valuations of all bidders. Even if an inefficiency can be identified it might be impossible to remedy afterwards. ComReg is required to take due cognisance of the comments received from interested parties during the course of its consultation to give proper effect to the duty to consult.

Remedies to the problem

Notwithstanding Three's view as to the errors made by ComReg, in order to be pragmatic, Three has identified easy remedies to the most significant problem, either through the use of a different auction format or through additional rules that would work together with its sub-1 GHz cap to put bidders on a more level playing field. At this time, ComReg should reconsider the proposal to use a CCA auction mechanism in favour of one that that is consistent with ComReg's objectives. In the event that ComReg decides to maintain the current proposal regardless, then, at a minimum, ComReg must introduce some modifications to mitigate the

inevitable competitive harm. In Section 5 below we propose a set of modifications to the current rules that can mitigate the worst of the harmful outcomes. These additional rules preserve ComReg's design, but have the benefit of mitigating the worst of the harmful outcomes.

2.1GHz Interim Licences

While three of the four bands of spectrum to be included in this award are "greenfield", 2.1GHz is a "brownfield" band in that it is already in use to provide mobile services and most likely will be re-awarded for this purpose. This causes some particular problems for the award because the four existing licences have four different expiry dates. ComReg has formed the view that the three licences that expire in 2022 could be aligned by providing an option for Three to apply for short interim licences to provide continuity to the same final date as Vodafone's. This gives a common start date for new licences in the award for nine out of the total of twelve blocks of 2.1GHz spectrum available.

This requires that Three applies for, pays for, and is granted interim licences in order to provide continuity of licensing through the period of expiry to the commencement of the new licences. ComReg's objectives, including those relating to efficient use of spectrum, protection of users' interests, and avoidance of inefficient investment require that provision is made for such continuity. Three has a commercial requirement to continue to use this spectrum through the expiry of the existing licences into the new licence period. Without provision for continuity Three would be required to "switch-off" its equipment that uses this spectrum during the two gap periods, only to switch it back on again later. This would in turn mean loss of service to some existing customers and that Three would be required to take measures to try to mitigate that loss of service, which would also entail an unnecessary and inefficient investment.

ComReg proposes to issue interim licences to Three that are unchanged from the original A licence and B licence, save for the removal of obsolete conditions and for price. It should be noted that these licences will only be applied for and issued in 2022, which is some time after the auction will have been completed (in contrast to the situation in 2012). It would be wrong to go back to an outdated licensing framework to provide this continuity, and ComReg should instead issue any interim licence based on the same template that is to be used to issue all licences under this consultation.

It is further noted that by the time these interim licences are to be issued, ComReg will have completed the auction and awarded spectrum in the 2.1GHz band in Time Slice 1, which will have established the market value for this spectrum. This can be used to establish the relevant upper-bound opportunity cost for the interim licences in the same way as it is to be used to determine if Eir is required to pay a liberalisation fee for its 2.1GHz licence during Time Slice 1. Three believes this is a reasonable basis on which to determine the interim licence fee, and is confident that it will be significantly less than the fees currently proposed by ComReg. ComReg's own estimate as provided by DotEcon supports this conclusion.

Three remains of the view that ComReg's proposed interim licence fees are excessive, and that the basis for deriving them is erroneous. This is explained further in Section 6 below. However, if ComReg does not amend the current proposed pricing for interim licences they would likely prohibit Three from seeking interim licences for all 6 blocks for the full extent of the licence gap. This would unnecessarily leave useable spectrum fallow for a period (contrary

to ComReg's objective to ensure efficient use of spectrum), would cause unnecessary cost to Three, and would cause significant customer disruption. Rather than charge an excessive licence fee, it would be better to include all of the 2.1GHz spectrum in the award with different commencement dates as determined by the expiry of the current licences. This approach may add some complexity to the award but is superior to ComReg's current proposal.

2.1GHz Liberalisation

The proposal is that all licences are available to be liberalised on the making of the decision following this consultation. There will be no fee for Vodafone or Three, and Eir will only pay a fee if the opportunity cost is greater than the current licence fee. We agree with this proposal and (having seen the explanation) with the method for determination of the licence fee (which Three is confident will be zero).

Three would like a simple and straightforward process. As discussed in Section 7, ComReg needs to explain what is required and how long the process will take, and to publish the text of the liberalised licences. ComReg also needs to explain if there are any other contingencies, such as an amending Statutory Instrument, or whether operators can simply declare a desire to liberalise. In our view, the 2.1 GHz licences should have been liberalised already so no further delay should be tolerated.

Coverage and Quality of Service

Three agrees with ComReg's overall approach to adopt precautionary rather than interventionist roll-out and coverage obligations, and the overall target is consistent with this. ComReg has erred significantly in the conversion of its 30Mbit/s throughput into received power level. This has the effect to overstate the required received power by up to 18dB, which would move the coverage obligation from precautionary to interventionist. We also reiterate that ComReg is wrong to propose a VoLTE licence condition. This is contrary to a service and technology neutral licensing approach. VoLTE is not yet a suitable replacement for circuit switched voice, and MNOs should be left to implement it at the time that is most efficient for their own network. Further details are provided in Section 9.

3. ComReg's Objectives

Raising revenue from the auction is not one of ComReg's objectives, so long as the outcome is an efficient allocation of the spectrum among bidders.

ComReg should take due account of the views of interested parties, in particular those who have responded to the consultation. We do not believe ComReg has given adequate weight to the responses in relation to the use of a CCA – while there is general support for use of an auction, almost all respondents do not favour a CCA, and no arguments in favour of it were made by any respondent.

In addition to the comprehensive legal and regulatory obligations and objectives as set out in detail in our response to document 19/59, ComReg, in managing such a valuable State asset, is obliged to adhere to the principles of fairness, non-discrimination and obligations under the Code of Practice for the Governance of State Bodies 2009 (in particular Section 8.34 and the

obligation that "*the method used should be both transparent and likely to achieve a fair market-related price*".

In addition, ComReg has strict obligations in managing State assets under State aid law. By creating an award structure (in such a disproportionate and discriminatory manner despite evidence being supplied) to deliver State assets that clearly benefit one or two operators above another operator (Three) and have the effect of distorting competition in the market, Three believes ComReg is in violation of Article 106(1) TFEU.

Where ComReg is proposing a regulatory change with significant impact on the market, operators and consumers, it is obliged and best practice dictates that it conduct a detailed regulatory impact assessment (RIA) to identify if the proposed measure would have the desired impact and any effects / costs associated with this. ComReg, in exercising decisions relating to spectrum (a material State asset) is obliged to engage in a detailed RIA as provided for under: (i) Policy Direction issued by the Minister for Communications, Marine and Natural Resources (as it was then) to ComReg in 2003, (ii) Better Regulation White paper issued by the Department of the Taoiseach in 2004, (iii) ComReg's own Guidelines on its approach to Regulatory Impact Assessment (Doc 07/56a) and (iv) the RIA Guidelines issued by the Department of the Taoiseach in 2009.

ComReg has not carried out a RIA that specifically compares its proposed auction format with alternative formats or modified versions of ComReg's proposal. Given that it is controversial and that two of the current MNOs have argued against it, a RIA that takes into account the specific circumstances of the current award is warranted.

4. A CCA is the wrong auction mechanism for this award

ComReg has expressed a strong preference for using a CCA format rather than an SMRA format for this award. At paragraph 6.3, ComReg summarizes its reasons why it believes the CCA is the most suitable format for this award. A number of the stated advantages, including managing substitution risks and promoting transparency, are common to the SMRA as well, so appear less relevant to ComReg's decision.

Four factors stand out as ones where ComReg believes there is a significant difference between the CCA and other formats:

1. **Aggregation risk.** ComReg believes that bidders in this auction face significant aggregation risk. It believes that allowing bidders to make package bids will mitigate this risk, thereby enabling a set of bids that is reflective of valuations and is likely to support an efficient outcome.

2. **Demand reduction and tacit collusion.** ComReg argues that the CCA creates stronger incentives for bidders not to engage in demand reduction and makes it harder for bidders to tacitly collude to keep prices down. It believes that discouraging such behaviour may promote a bid set that better reflects valuations, and thereby making it more likely that the final assignment is efficient.

3. **Non-uniform prices.** ComReg believes that allowing for the possibility of non-uniform prices "*might be the only way of supporting an efficient outcome when valuations are synergistic, and avoiding inefficiently unsold lots*."

4. **Promoting smaller bidders.** ComReg believes that entrants and smaller MNOs may be particularly disadvantaged by aggregation risk, demand reduction and uninform prices. It concludes that the CCA is pro-competitive on the basis it will particularly help smaller bidders.

Three is not arguing in theoretical terms about whether package bidding can mitigate aggregation risk. Neither are we arguing about whether the second price rule can weaken incentives for bidders to engage in either unilateral or tacitly coordinated demand reduction. We also recognise that there are circumstances when an efficient auction outcome is not possible with uniform prices. This is not a dispute over auction theory.

Where we disagree with ComReg is with respect to the weight it puts on each of these issues and its failure to consider the downsides associated with using a CCA for this award. This is not an academic discussion, but a decision on which is the most appropriate auction format to use in ComReg's multi-band award in Ireland at this time.

As we explain in the following paragraphs, we believe that:

- ComReg's concerns about aggregation risk are wrong, have been given too much weight, and can be substantially addressed by doing away with time slice lots;

- demand reduction in an SMRA is very unlikely to prevent an efficient outcome, but there is a real risk that prices and allocation in a CCA are distorted because bidders adopt very different strategies;

- the efficiency case for allowing non-uniform prices is rather unlikely to apply in the specific circumstances of this award; and

- given the structure of this award, the CCA predictably advantages the strongest MNO, while exposing smaller MNOs and entrants to paying significantly higher prices for any spectrum they may win, which cannot be in line with ComReg's obligations and objectives.

We elaborate on each of these points in the following paragraphs.

There are better options than package bidding to help bidders manage aggregation risk in this award

We reiterate our position that, given the large amount of spectrum available in this auction, bidders should be well equipped to manage their own aggregation risk in the context of an SMRA. This is certainly true for all three MNOs who are acquiring additional spectrum to supplement their existing portfolios and investing in their 5G infrastructure. We recognise that a completely new entrant might be somewhat more exposed than an MNO to winning a less profitable subset of their demand in an SMRA. However, we would still expect the SMRA format to benefit a market entrant over CCA for this award, as the incentives for MNOs to accommodate their demand are greater, and entrants are less exposed to over-paying for any spectrum they do win (see discussion of weaker bidders below).

The requirement for package bidding is an artefact of ComReg's proposal to impose time slicing in multiple bands. We accept that if ComReg insists on time slicing, then bidders will face some aggregation risk across time, and that package bidding would address this. We also understand the reasoning used by ComReg that if the 2.1GHz band is time-sliced, then this creates some rationale to time slice 2.3GHz and 2.6GHz so as to prevent gaming at 2.1GHz. However, time slicing is unnecessary and there are simpler ways to manage the differences in start dates in the 2.1GHz band.

Starting from the assumption that ComReg modifies its pricing proposals for the interim 2.1GHz licences to reflect the actual opportunity cost, then instead of having time sliced categories, we proposed that there should be two categories of lots, each with different start dates but a common expiry date. This was the approach taken in Germany, which faced exactly the same issue with differential expiry dates at 2.1GHz, and adopted an SMRA format to award the spectrum. Our understanding is that, prior to the auction, BNetzA consulted with all MNOs over whether they preferred this structure or one more similar to that proposed by ComReg, and that this approach was accepted by all parties involved.

In its response, DotEcon expressed concern that "*Three's proposal would present Eir with a risk of strategic bidding by other bidders*.[2]" This is incorrect – DotEcon does not appear to have thought this through properly from a bid strategy perspective. While it makes sense that Eir would likely favour acquiring the shorter licences, they would have an obvious defensive strategy if other MNOs sought to drive the price of lots in this category; Eir could simply switch demand to the longer licences. As the shorter licences are strictly a subset in time of the longer licences, they are a superior substitute, so Eir would face no downside from switching if the price differences is attractive. If anything, this tactical option means Eir would be advantaged relative to Three and Vodafone by changing to the German approach (as the shorter licences are not a good substitute for longer ones, so it is more risky for Three and Vodafone to switch back and forth than Eir). Nevertheless, from our perspective, this seems a small price to pay if it means we can all avoid the unnecessary complexity of time slicing multiple bands.

Separately, DotEcon also expressed concern that Three's approach might encourage tacit collusion in the 2.1GHz band, given the predictable preferences of the MNOs. However, the risk that MNOs identify a natural split of lots in the 2.1GHz band is a general issue that applies regardless of how the lots are packaged. As we discuss below under demand reduction, it is not obvious to us why ComReg thinks this is a problem, given it has set a robust reserve price. Certainly, it is not, in our view, a sufficient justification for changing the lot structure for multiple bands, including creating artificial short term lots at 2.3GHz and 2.6GHz that no one will want to acquire in isolation.

For this award, demand reduction is a greater threat to efficiency under a CCA than under a SMRA

ComReg devotes considerable attention to the risk that the auction outcome could be negatively affected by demand reduction and considers that adopting a CCA with a second price rule is the best way to address this risk. We believe that ComReg's concerns about demand reduction have been given too much weight in the current proposed award, and that

[2] ComReg Document 19/124a, Paragraph 58

its proposed CCA format introduces other threats to allocative efficiency which would not be present with an SMRA format.

ComReg is very clear on its priorities for this award. It wants to support the deployment of world-class 5G mobile across Ireland and believes that this can best be achieved by promoting an efficient and pro-competitive allocation of spectrum. It has no objective to raise revenues.[3] ComReg has also proposed substantial reserve prices that will provide the state with a sufficient return for allocating a valuable scarce resource. Any revenues ComReg may raise above this are needed only as a mechanism to identify the most efficient winners of the available spectrum. We agree that this focus on efficiency and competition over revenues is correct and is consistent with the approach taken by many other regulators in Western Europe – all of whom to date have adopted SMRA-type auctions for their 5G auctions.

We conclude from this that ComReg's concern with respect to demand reduction (and its multilateral version, tacit collusion) is focused on allocative efficiency. For the reasons we set out below, we think the risk that demand reduction in an SMRA leads to an inefficient allocation is low especially in the current circumstances. We acknowledge that there is a greater risk that demand reduction leads to lower prices. However, ComReg has been very clear that revenue is not a concern. Furthermore, to the extent that lower spectrum prices mean MNOs have greater funds available to invest in networks, including on 5G deployment, there may be an upside for everyone from realising an efficient outcome at a lower price.

When discussing demand reduction, it is helpful to keep in mind that such behaviour is quite normal and occurs to a greater or lesser extent in most spectrum auctions. It is a strategy used by bidders to manage risk, in particular to protect profitability, preserve scarce capital and manage exposure to winner's curse (overpaying). Demand reduction only becomes an issue for the seller if it leads to potential winning bids exiting the auction (which would lead to inefficiency) or marginal bids exiting too early (which reduces revenues). Only the efficiency concern is relevant here.

In the context of a 5G-era spectrum auction, where the main combatants are established MNOs and the possibility of a small number of new entrants, the scope for inefficiency under a SMRA should typically be narrow:

1. Bidders enter a 5G spectrum auction with realistic views on plausible allocation outcomes, based on past experience and familiarity with competitors. They take this information into account when determining to what extent to "shade" their bids for larger quantities relative to value. Bidders typically do not give up spectrum they expect to win without a fight.

2. Sometimes, there are obvious focal points for sharing demand in a band that all parties independently perceive as being a reasonably efficient outcome. In these situations, such outcomes may be realised with very little competitive bidding, and without any loss of allocative efficiency. In other cases, bidders may have different perceptions of the market or may have demands that fundamentally conflict. In this case, significant

[3] For example, in ComReg Document 19/124, Paragraph 6.32 of the consultation, ComReg states that it "*does not have a revenue raising objective, therefore issues around generating a realistic revenue are not relevant for ComReg in determining an appropriate award format*."

competition and much higher prices may be necessary to determine the efficient outcome.

3. In auctions where there is a lot of spectrum available (like this one), the incentive to moderate demand may be greater. One or more bidders may decide to surrender some marginal lots that they could have won in the hope of realising a better price. Almost certainly, these will be lots that are marginal to the bidder's business case, and will be picked up by rivals with similar values. Accordingly, while this demand reduction may result in a degree of inefficiency, most likely the economic impact of this inefficiency will be small.

4. An SMRA tends to encourage bidding based on intrinsic values rather than anti-competitive premiums that may derive from blocking rivals from accessing spectrum. This is because, if a bidder tries but fails to execute a blocking strategy, it will have greatly increased its own price. Hence, the SMRA format provides some protection against highly asymmetric (and likely inefficient) spectrum allocation outcomes, even with lax spectrum caps.

If there is a bias in SMRAs it is not towards inefficient outcomes but rather towards outcomes that reflect the consensus view of the market. If ComReg was hoping to use this auction to bring about radical change in the competitive structure, such as knocking out one of the MNOs or exploring the potential for significant asymmetry in spectrum holdings, then an SMRA might not be a good choice. It is clear however from ComReg's approach to that its primary goal is to preserve the three players currently in the market while also allowing for the possibility of new entry. We conclude that an SMRA is the more appropriate choice of award, fitting with ComReg's objectives, so it is perplexing to us that ComReg has the incorrect and hostile approach to this established family of auction formats.

The CCA is a very different beast. Under the second price rule, bid values that bidders express for lots that they do not win have no direct impact on their own price, but do affect competitor's prices. Naturally, this makes it more attractive for bidders to express demand for packages they do not expect to win, and to bid a higher proportion of value for all packages than under an SMRA format. However, bidders must also consider the risk that if they bid more aggressively, this may also induce rivals to bid more aggressively. A likely outcome of such behaviour is that you get the same allocation outcome as an SMRA but all bidders pay a higher price (leading to knock on impacts on investment, infrastructure and consumers). For this reason, demand reduction incentives persist, even under a CCA, but the pay offs are less certain.

The change in incentives introduces two risks that may distort auction outcomes when using a CCA:

1. **Bidders may adopt very different approaches to demand reduction.** The CCA rules create a "prisoner's dilemma"[4] type choice for bidders considering whether or not to engage in demand reduction for spectrum they do not expect to win but might be

[4] "*The prisoner's dilemma is a paradox in decision analysis in which two individuals acting in their own self-interests do not produce the optimal outcome. The typical prisoner's dilemma is set up in such a way that both parties choose to protect themselves at the expense of the other participant*." See, for example: https://www.investopedia.com/terms/p/prisoners-dilemma.asp

relevant for price setting. If they reduce demand and rivals reciprocate, then everyone wins. However, if rivals do not respond, they are likely to end up paying a much higher unit cost for spectrum than other bidders. In a one-off game, such as a 5G spectrum auction, bidders may choose very different paths, with profound implications for the auction outcome. Suppose, for example, that one MNO has a cash-constrained parent company, so is under pressure to target a cheap auction outcome – such a company is particularly likely to be tempted to lead on demand reduction in the hope that others follow. However, if rivals do not reciprocate, an artificial opportunity cost difference will emerge between the bidders. This will not necessarily change the auction outcome but will almost certainly result in asymmetric prices that are driven by differences in bid strategy not actual valuation differences.

ComReg has further attempted to argue that such price differences do not matter much because money spent on spectrum is sunk, so has no impact on downstream pricing and service decisions. This is not correct. The full value of licences are capitalised and amortised over their lifetime, so they have an ongoing impact on the business. ComReg's position is based on an overly simplistic interpretation of economic theory that ignores real world financial pressures on MNOs. The reality is that operators have limited access to capital to finance 5G and spending more on spectrum may constrain other investments as well as willingness to engage in pricing competition.[5] In particular, ComReg should keep in mind that the bidders most vulnerable to overpaying relative to rivals under a CCA are those operating under tighter financial constraints, as they are the ones more likely to gamble on adopting accommodating bid strategies.

2. **Bidders may be tempted to adopt conquering bid strategies.** Spectrum suitable for mobile use is a scarce resource: when one bidder acquires a spectrum lot, it is denying another bidder from using that spectrum. This ability to block rivals can give rise to ulterior motives for acquiring spectrum, based on expectations that a rival MNO's ability to offer equivalent services at similar cost will be diminished. As discussed above, the uniform price rule under an SMRA creates a powerful disincentive for bidders to express inflated values if they are not sure they are strong enough to win. This disincentive is, however, much weaker under a CCA, as a bidder may be able to drive an opponent's price at no cost if they later decide to drop demand. In particular, in certain situations, where a bidder has observed a rival irrevocably dropping demand or if caps prevent a rival expressing opportunity cost, it may even be a dominant strategy to inflate the price for other bidders or to acquire more spectrum than is needed with the intention to deprive competitors of the spectrum.

   The extent to which these risks apply are very specific to the local situation and may vary across bands. They are also affected by the level of spectrum caps. For this auction, we think ComReg should be most worried about the 700 MHz band, where the values that MNOs express for their third lot may be pivotal in setting each other's

[5] See Section 2.2 of the NERA report on preparing for the 2019 Irish multi-band spectrum award previously submitted to by Three to ComReg is response to the first consultation on this award. For further explanation and links to supporting academic papers, please refer to: NERA report for GSMA, February 2017, *Effective Spectrum Pricing: Supporting better quality and more affordable mobile services* (the "global report"); and NERA report for GSMA, September 2017, *Effective Spectrum Pricing in Europe: Policies to support better quality and more affordable mobile services* (the "Europe Report"). The full reports as well as summaries can be downloaded from the GSMA website at: https://www.gsma.com/spectrum/effective-spectrum-pricing/

prices and where there may be anti-competitive value from blocking a rival from having early access to the pioneer wide-area 5G band. We anticipate that the impact is not so great for higher frequency bands, as the scope for asymmetric price outcomes and anti-competitive bidding is somewhat mitigated by the larger amount of spectrum available and the tight spectrum caps.

Non-uniform prices are rarely necessary for allocative efficiency

In ComReg's consultation document, Three is characterised as being opposed in principle to auction formats that allow for similar spectrum to sell at different prices. This is not correct. In general, formats with uniform price are more appropriate and our position is that it is fair that established MNOs pay similar prices for the same thing. We also do not think that situations where some parties pay significantly more than others for equivalent spectrum are good for downstream competition, particularly where this is as a result of the rules of the award process. Nevertheless, we recognize that there are circumstances where price variation could be helpful to produce an efficient outcome (e.g. the Danish 2.6 GHz in 2010). However, ComReg has not demonstrated that such circumstances are likely to apply in this auction. Absent such evidence and regulatory impact assessments, prudent policy is to favour uniform prices.

ComReg makes the argument that non-uniform prices may be required to support efficient outcomes whenever valuations are "synergistic". However, synergies are not by themselves a sufficient condition to require deviation from uniform pricing. It must also be the case that these synergies are sufficiently large that bidders have ascending incremental values, rather than the usual declining value profile, or that bidder demands are "lumpy". Furthermore, to be relevant to the auction outcome, these ascending incremental or lumpy values must be ones that are relevant to determining the efficient outcome.

It is not reasonable for ComReg to assume a second-price auction format is required just because there are synergies between available lots. There are almost always synergies between spectrum lots and spectrum bands in auctions. This inference would likely lead to ComReg selecting a CCA format every time it runs a spectrum auction. Rather, ComReg needs to get down into the detail of thinking about the likely demands and valuations of potential bidders, and whether or not incremental values that are potentially pivotal to the auction outcome have ascending value profiles. ComReg does not appear to have done this analysis.

DotEcon and ComReg highlight the Danish 2.6 GHz auction in 2010 as an example of a spectrum award where the CCA pricing rule was helpful. However, this situation is not analogous to the current spectrum award of 5G spectrum in Ireland in 2020 (and it is wholly incorrect for ComReg to suggest so). In the Danish auction, a total of 2x70 MHz of spectrum was available and there were four MNO bidders. Consequently, at most three bidders could win 2x20 MHz, the ideal carrier size for 4G, and either one bidder (2x10 MHz) or two bidders (2x15 MHz each) would have to settle for a smaller quantity of spectrum. Given that, in 2010, 2.6 GHz was the only available option for deploying a larger block of spectrum for 4G, it was anticipated that bidders would place a large premium on acquiring 20 MHz over smaller quantities, i.e. they had ascending values for incremental spectrum that would be pivotal to the auction outcome. In this situation, an opportunity cost pricing rule was effective because it encouraged the marginal bidder (Three Denmark) to bid strongly for 2x20 MHz while

preserving an option to fall back to 2x10 MHz at the reserve price. The price outcome, with the three MNOs that won 2x20 MHz paying more than twice the cost of Three's 2x10 MHz, was recognised as fair because a 2x20 MHz block was seen as having more than twice the value of 2x10 MHz.

The situation in Ireland in 2020 is not equivalent to Denmark in 2010. Although there are synergies across lots, we expect most incremental values to be descending. In particular, we expect a descending incremental value profile for all bids that are likely to be pivotal in determining allocation and price outcomes:

- At **700 MHz**, the most likely outcome is three bidders winning 2x10 MHz each, which is the typical outcome in European auctions to date. In this case, prices will most likely be set by the winning bidders dropping demand from 2x15 to 2x10, which we anticipate will happen at values strictly less than the average value of a 2x10 MHz lot. Alternatively, the price may be set by a fourth (entrant) bidder dropping from two lots to zero. We concede that bidders may have ascending incremental values for a second lot, but we think these values are unlikely to be pivotal. Furthermore, as ComReg appears to think that Three is the MNO that is most likely to drop below two lots (because of our extra lot at 900 MHz), it should place weight on the fact that we are willing to forego the flexibility to be able to place a lower value per lot on one lot than two lots.

- Across the 2.1GHz, 2.3GHz and 2.6GHz bands, there is a large amount of capacity spectrum available, and bidders likely have strictly descending values once they reach a critical mass (c. 10 MHz) in each band. We therefore see no efficiency case for having non-uniform pricing for these bands. (If ComReg was concerned that the critical mass for some bidders in some bands may be greater than 10 MHz, it could always increase the lot size to 20 MHz).

Given this set up, we strongly believe that the uniform price structure of an SMRA will not preclude bidders from submitting bids consistent with their valuations, so there is no good reason to expect an SMRA to produce an inefficient auction outcome. The evidence that an opportunity cost price rule is necessary to support efficiency in this auction is lacking. In this situation, the only appropriate approach is to stick with uniform prices and an SMRA format, given the broader risks associated with the CCA.

ComReg's CCA design disadvantages smaller bidders

In a number of places in its consultation document, ComReg has attempted to advance the case that the CCA format is good for smaller MNOs and is good for entrants. We think this is a major failing, that ComReg has got this backwards and is (unintentionally) misleading stakeholders. While we do not think the CCA is a good format for any potential bidder, we firmly believe that *in relative terms* it benefits Vodafone the most and entrants the least. Three, as the second largest MNO, would be *relatively* advantaged by ComReg's proposals except that any upside is more than offset by the gross disadvantage of being uniquely constrained by the sub-1GHz cap.

We believe that smaller bidders are disadvantaged by a CCA for the following reasons:

- **700 MHz.** At 700 MHz, the three MNOs are expected to be the major bidders and their values for third lots to be pivotal is setting prices. Vodafone predictably has a higher value than Eir for a third lot, given that it starts with the same level of sub-1 GHz holdings but has a much larger customer base. This has the following implications:
    - If bidders simply bid to value and each wins 2x10 MHz, Eir will likely end up paying a significant premium relative to Vodafone.
    - If Eir is tempted to drop demand early to 2x10 MHz, in the hope of reducing its overall spend, but Vodafone does not reciprocate, the price discount for Vodafone will be even larger.
    - If Vodafone thinks there is an anti-competitive value to acquiring a third block, so as to prevent one of Eir or Three securing early access to 2x10 MHz of low band 5G spectrum, its incentive to express this value is enhanced. This is even more true if Eir drops demand early. In this case, there is a risk that Vodafone is able to inefficiently grab three lots at low relative prices.

- **Higher frequency bands.** Across the 2.1 GHz, 2.3 GHz and 2.6 GHz band, there is a large amount of capacity spectrum and the MNOs may face competition from one or more entrant bidders. The likelihood of entrants securing spectrum is lower under a CCA than under an SMRA. This is because, with an SMRA, demand reduction incentives may encourage MNOs to give up on marginal lots at moderate prices, potentially creating room for an entrant. In contrast, with a CCA, MNOs have much stronger incentives to hang on to larger quantities of demand until later in the auction, because of concern that dropping them may lead to a bad relative price outcome. In addition, Eir may be tempted to hang on to excess spectrum in higher bands so it has some ability to retaliate if Vodafone drives prices at 700 MHz. From an entrant perspective, we anticipate that the downside of being less able to exploit demand reduction pressure on MNOs would more than offset any upside from reduced aggregation risk owing to package bidding.
- **Price bias against bidders winning small quantities of spectrum.** Successful entrant bidders are also vulnerable to paying higher unit prices than MNOs under ComReg's CCA format. Given the predictable large appetite of the three MNOs for more capacity spectrum, a successful entrant may only secure a modest quantity of spectrum. Under the second price rule, a bidder buying a smaller quantity will tend to pay the maximum possible opportunity cost for all their lots. In contrast, bidders buying larger portfolios face lower average costs, as the losing bids setting their opportunity cost stretch further back in in the auction price history. This is not a speculative point: in the Irish 3.5 GHz auction, entrant winners paid more for less even though their spectrum included the isolated 25 MHz A block, which was widely recognised as having inferior value. As illustrated in

- Figure **1**, the three MNOs paid average upfront fees of 3.6 euro cents /MHz/pop whereas Airspan and Imagine paid an average of 4.5 euro cents /MHz/pop, a 25% premium.

Figure 1: New entrants in 3.6 GHz auction paid a 25% premium for spectrum

		Total MHz won				
Region	**Population**	**Eir**	**Three**	**Vodafone**	**Airspan**	**Imagine**
Border, Midlands & West	1,136,093	80	100	85	25	60
South-West	711,786	80	100	85	25	60
East	632,133	80	100	85	25	60
South-East	432,824	80	100	85	25	60
Dublin City & Suburbs	1,192,531	85	100	105	60	0
Cork City & Suburbs	225,086	85	100	105	60	0
Limerick City & Suburbs	105,135	85	100	105	60	0
Galway City & Suburbs	92,623	85	100	105	60	0
Waterford City and Suburbs	59,159	85	100	105	60	0
Upfront auction fee		€ 11,498,400	€ 15,313,700	€ 17,968,712	€ 7,556,700	€ 8,128,800
Total MHz pops		375,362,270	458,737,000	423,417,130	173,292,940	174,770,160
Price/MHz/pop (by bidder)		0.031	0.033	0.042	0.044	0.047
Price/MHz/pop (by type of bidder)		**All MNOs:**	**0.036**		**All entrants:**	**0.045**

In light of this evidence, ComReg is required to revisit its conclusion that a CCA is the appropriate format for smaller MNOs and entrants participating in this award. It is not. If ComReg decides to proceed with a CCA, it must explain how a format that is predictably likely to sell 700 MHz spectrum at a discount to the largest MNO and sell higher frequency spectrum at a premium to entrants is consistent with its goal of promoting downstream competition.

In keeping with its regulatory obligations, ComReg should now carry out a Regulatory Impact Assessment that compares the two auction types under the specific circumstances that apply for this award and takes into account the above points.

5. The Specific Problem - CCA Auction with Unequal Caps

Notwithstanding our general comments in Section 4 above, the specific proposals of ComReg to use a CCA in this award and to set caps which count existing spectrum holdings are likely to have to have a disproportionate and significant negative impact on Three and also in a different way on Eir. In Annex A we set out an analysis with examples that show how ComReg's proposal builds-in:

- the possibility for Three to win no sub-1GHz spectrum in this award;
- a pricing bias against Three that would see Three exposed to paying significantly higher prices for buying the same thing as its main rivals where this is not created by valuation differences and does not create any assignment efficiency as shown in Annex A, ComReg's current award proposal could leave Three exposed to paying a premium of up to [✂< (confidential section) (end confidential section) ✂<]under plausible circumstances;
- the possibility for Eir to win less spectrum than both Vodafone and Three, thereby increasing the asymmetry in sub-1GHz spectrum holdings from that which exists today; and

- a pricing bias against Eir, albeit less significant than the one against Three.

Given that ComReg's stated objectives are to choose an award process that allocates spectrum efficiently, and that ComReg has rejected symmetrical caps above of above 70MHz for sub-1GHz spectrum on the basis that it "*risks their being only two winners for 700MHz spectrum in this award",* it would be wholly incorrect and inappropriate for ComReg to proceed with its proposals without amendment. They fail to meet their stated objective and in particular they treat Three in an unfair and discriminatory fashion without any regulatory impact assessment or justification.

Indeed, given ComReg's stated position that the current asymmetry in spectrum holding between MNOs is not harmful to competition, and that ComReg sees "*no justification for either effectively reserving spectrum for entrants or non-mobile operators, or for seeking to reduce asymmetry between MNOs"*, it is difficult to see why ComReg has persisted with this proposal. ComReg and DotEcon seem to have erroneously underestimated the negative impact of the proposals. No assessment of the effect of the proposal on competition and no Regulatory Impact Assessment has been carried out. This means ComReg is unaware whether its proposals will have the desired effect, or of the downside of the same proposals. DotEcon states that it did not believe such an assessment is necessary[6], however, if it had been completed, we do not believe the proposals would have persisted.

ComReg has accepted that its proposals can have the effect that Three is required to pay more than its competitors for its spectrum allocation, however "*ComReg does not believe that its proposal would impose a burden on Three that would be excessive to the objective sought*[7]". The examples given in Annex A show that the potential price burden is not trivial. ComReg's position is a subjective opinion that has been adopted without any supporting analysis. It is not acceptable and is disproportionate so is contrary to ComReg's obligations. Indeed, ComReg's position on this matter seems to contradict its position as stated in Annex 7 that the proposals adopt "*the general principle that equivalent charges should be applied to competing operators for the use of scarce resources whose values appear to be 'equivalent in economic terms".*[8]

ComReg and DotEcon have made numerous references to the belief that Three has argued for uniform prices in all cases, but this is a mistaken understanding of our position. Three can accept that in some circumstances price differences may emerge from auctions arising from different valuations, and that this is acceptable if necessary to facilitate an efficient outcome; however, we cannot accept that this is the same as is currently proposed in ComReg's award, where a significant price bias against Three is built in to the process itself.

It is incorrect to say that Three is bidding for something different than the other MNOs in the auction[9]. The reason Three is currently licensed to use one lot of sub-1GHz spectrum more than the other two MNOs is as a result of a merger in which spectrum acquired at auction by two entities, O2 and Three, was consolidated. Those parties paid the full auction price for this spectrum at the time. Furthermore, when Three acquired O2, it implicitly had to pay O2's parent company Telefonica full market value for all its spectrum holdings as part of the

[6] ComReg 19/124a, paragraph 96
[7] ComReg 19/124, paragraph 6.210
[8] ComReg 19/124, paragraph A 7.19
[9] ComReg 19/124a, paragraph 108

transaction price. It would therefore be double-counting to apply an additional price premium on Three in this auction over-and-above what Eir and Vodafone pay for any 700 MHz spectrum that they may win.

Two further issues of timing reveal an inconsistency in ComReg's underlying logic for treating Three differently:

(i) The 700MHz band is a pioneer band for 5G services. In the short term, spectrum at 800 MHz and 900 MHz is not a substitute for 5G roll out. DotEcon has stated that it will be substitutable in the long run; however:

(ii) The current sub-1GHz licences expire in 2030, a full 10 years before the 700MHz will. There can be no guarantee that the 800MHz or 900MHz spectrum will be available to mobile or any particular MNO beyond the current expiry (and ComReg offers no certainty that spectrum acquired in this award will be taken into account in subsequent awards). This means the bands are not reliable substitutes in the longer term. It also means that the effect of the bias against Three will last for a full decade beyond the expiry of the current licences that caused it in the first place. The only way to avoid this under ComReg's currently proposed auction rules would be to introduce another time-slice for the sub-1GHz spectrum covering the period from July 2030 to December 2040. Similar consideration might apply to the supra-1GHz spectrum.

The response to consultation indicates several misconceptions and misunderstandings on the part of both ComReg and DotEcon in relation to the effect of its proposal and Three's position:

1. **Uniform prices.** Three does not call for uniform prices as an absolute requirement. Even if a CCA was used for this award (which Three regards as incorrect), Three understands that each of the existing MNOs will have different valuations for 1, 2, or 3 lots of sub-1GHz spectrum (and also for different quantities of super-1GHz spectrum). These valuations are derived from current market position, growth plans, network load, and also existing spectrum holdings. The fact that Three currently holds one sub-1GHz lot more than Vodafone and Eir might well mean that they each have a higher valuation for an incremental lot driven by a desire to correct or reverse that difference, and this could be expected to be reflected in the opportunity costs. This could be the case with symmetrical caps and (notwithstanding our comments in Section 4 it is not this difference in pricing that is of most concern to Three, but one that is derived from the fact that Three has been restricted in its ability to express opportunity cost relative to its competitor MNOs.

2. **Paying opportunity cost.** Three is <u>not</u> seeking to have other bidders pay "*above their respective opportunity costs*", as is claimed by DotEcon.[10] ComReg understands full well that its caps would restrict Three from expressing a value for a third lot of sub-1GHz spectrum, while that restriction does not apply to the two other MNOs. This means that the true opportunity cost will not be determined for the other bidders as Three has not been given the opportunity to express its full value.

[10] ComReg 19/124a, paragraph 105

ComReg seems to accept that this could undermine an efficient outcome:

> "*This means that each winner (and group of winners) needs to pay at least its opportunity cost, otherwise there would be alternative higher value users and an efficient assignment would not have been achieved"*[11]*; and*

also recognises the possibility of this occurring under the proposed auction rules:

> "*At some point, (where some bidders can bid for more spectrum and Three cannot) this will result in Three imposing less of an opportunity cost on those bidders compared to the opportunity cost others impose on Three*[12].

It is difficult to square these two points with ComReg's and DotEcon's argument that the additional pricing asymmetry against Three created by implementing the sub-1GHz cap in the context of a CCA is legitimate.

3. **Bidding for equivalent spectrum.** Three is not bidding for something different than the other bidders. ComReg is to award generic lots by way of an auction. As acknowledged above, Three's valuation for different quantities of those lots might well be different than other bidders for various reasons (including Three's current spectrum licences) and this could well lead to different price outcomes under a CCA. This is not the most significant problem with ComReg's proposed rules. It is not varying competition derived from the varying demand of different bidders that drives the most concerning disadvantage for Three, but the relative restriction on Three that prevents this from being expressed in the bidding. The requirement to provide a non-discriminatory and fair process cannot be side-stepped by stating that Three is somehow in a different position to the other bidders.

   Put differently, as NERA state in the Annex: "… *with a symmetric cap, the CCA pricing rule fully addresses the fact that, when bidding for a third 700 MHz lot, Three is bidding for its eighth sub-1 GHz lot, whereas Vodafone and Eir are bidding for their seventh lots. Introducing an asymmetric cap tilts the playing field much further in favour of the bidders with smaller holdings, enabling them to escape paying Three's (likely lower) value for a third lot*."

   It is not for ComReg to "pick winners". One of the stated benefits of an open and non-discriminatory auction is in:

   > "*removing the burden on the regulator to make complex judgements (based on incomplete/imperfect information) in relation to assigning the spectrum and the suitable level of fees*".

   The aim in designing the process should be to deliver an auction that is open and non-discriminatory, and that delivers an efficient outcome through competition among bidders. ComReg seems to have a preference to avoid certain outcomes which conflicts with these objectives:

[11] ComReg 19/124, paragraph 6.59
[12] ComReg 19/124, paragraph 6.63

> "*ComReg would be primarily concerned with a situation where the two larger MNOs could bid up to a sub-1 GHz cap in order to make the smallest MNO (i.e. Eir) a more marginal player by denying it 700 MHz rights of use.*[13]."

This, it seems extends to protection of Eir in circumstances where there is competition in bidding from new entrants:

> "*ComReg considers that an overall spectrum competition cap of 375 MHz would, compared to alternative caps within the 380 – 420 MHz range, better guard against distortions to competition arising from extreme asymmetries in post-award spectrum holdings, particularly in light of:* ,,,*the significant potential for non-MNO bidders to acquire spectrum in the Proposed Award and thereby exacerbate the level of asymmetry between Three and Eir post-award*[14]".

4. **Vulnerability of CCA to gaming.** Regarding ComReg's understanding that a CCA is not susceptible to price-driving strategies or manipulation, we disagree, and refer to Annex A. This is an old argument that was frequently put forward by regulators and their advisors when CCAs were first introduced. It is now widely understood that gaming does take place in CCAs, especially in more complex multi-band settings, just as it does with other formats. In particular, it is generally accepted that, relative to the SMRA family of formats, the CCA is particularly vulnerable to strategies aimed at driving prices of rival bidders. It is absurd to pretend that this is somehow a problem in other jurisdictions, such as the Netherlands, but not in Ireland.

   Even DotEcon, who has been a leading advocate of the CCA, has acknowledged the risk of price driving in auctions that use a second price rule:

   > *"Price driving strategies may be more of an issue when bidders are not purely motivated by surplus maximisation, as the theoretical auction literature assumes, but are also concerned about the outcome they achieve relative to those obtained by competitors. Paying less – or certainly not more – than other winners may be more important than the absolute price level. This is especially relevant in second-price auctions, where the prices paid by winners are determined by the bids made by others for additional spectrum. In such formats, bidders may have an incentive bid for more spectrum than they wish to acquire in order to drive the price paid by competitors, though of course the risk of winning unwanted blocks acts as a corrective. One needs to acknowledge that with bidders being concerned about relative performance rather than purely maximising their own surplus, even auction formats that in theory should provide strong incentives for truthful bidding (such as the generalised Vickrey auction) are not immune to strategic bidding."*[15]

5. **Comparison to other European countries.** The reason for rejection of a CCA in the Netherlands also applies under ComReg's proposals. ComReg and DotEcon's reasons for stating that Ireland is different miss the point. In its advice to the Dutch

[13] ComReg 19/124, paragraph 6.186
[14] ComReg 19/124, paragraph 6.247
[15] DotEcon, Recommended auction model for the award of 700, 1400 and 2100 MHz spectrum, prepared for the Dutch Ministry of Economic Affairs, July 2019, page 13.

Ministry for Economic Affairs, DotEcon specifically recommends against the use of an auction mechanism that uses a second-price rule in circumstances where there were asymmetries in the amount of spectrum that different bidders could acquire.

DotEcon explains that:

> "*Under such asymmetric constraints the ability of bidders to set each other's prices is uneven and attempts to exploit this asymmetry through strategic bidding may result in inefficient outcomes"*.[16]
>
> "*As a final point for discussion, we consider what our recommendation would be if synergies were sufficiently strong to justify the use of a combinatorial auction format. In this case, we would have concerns about the CCA/ECCA owing to its use of a second-price rule, given that the effective spectrum caps in the auction are asymmetric. Though the second-price rule removes the incentives for strategic demand reduction and thus may be considered to be more conducive to achieving realistic revenues, the magnitude of opportunity costs that are reflected in final prices is linked to the extent to which bidders can compete for additional spectrum and therefore, in total, to the amount of spectrum on which bidders could place bids under their respective caps relative to the total spectrum available*."[17]

ComReg has not addressed this point in its response to consultation. The claim that ComReg is less adverse to complexity is unconvincing and in any case is beside the point. ComReg needs to explain specifically why it is proposing to use an auction mechanism that DotEcon recommended against using in the Netherlands for the very same reason that Three objects to its use in Ireland.

We note that DotEcon has attempted to explain that its recommendation in the Netherlands was based on the premise that there "*were no significant synergies between the lots on offer and without any explicit concern about possible complementarities for new entrants*."[18] However, this is at odds with its explicit statement above that it would still have concerns about using a CCA if there were strong synergies in a situation where there asymmetries in the ability of bidders to express values for packages owing to spectrum caps.

In relation to comparisons with the UK, we note that Ofcom has decided not to use a CCA.

6. **Sunk costs.** Regarding ComReg's understanding that spectrum costs are sunk investment and do not influence competition in the downstream market afterwards, we disagree. The full value of licences are capitalised and amortised over their lifetime, so they have an ongoing impact on the business. ComReg's position is based on an overly simplistic interpretation of economic theory that ignores real world financial pressures on MNOs.

[16] Ibid, page 21.
[17] Ibid, page 25.
[18] ComReg 19/124a, paragraph 176

7. **CCA impact on entrants.** On ComReg's view that CCA auctions are good for new entrants, we disagree and refer to further detail in Section 4 above.

8. **Existing competition.** To avoid any confusion in relation to paragraph 6.184, Three agrees with ComReg's view that "*the existing spectrum asymmetry does not appear to be harming competition";* however, Three did not request that ComReg should be "artificially retaining that asymmetry in the future" (emphasis added).

Overall, we find that ComReg's proposal to use a CCA auction and to include bidding caps that restrict Three relative to its competitors is fundamentally incorrect as it exposes the award to an inefficient allocation outcome. increases the potential for an inefficient outcome (relative to an SMRA); exposes Three to paying higher prices than its competitors because of that restriction, and is likely to fail to meet its apparent objective (protection of Eir). The harm caused to Three is significant, and is not caused because Three is in a marked different position to other bidders or because Three is bidding to buy something different. The process is discriminatory and unfair and fails to meet the minimum requirements for a spectrum award. The proposal is also disproportionate because there are other options available that meet ComReg's objectives without causing such harm. ComReg, in meeting its objective and obligations, must now reconsider these alternatives

Some of the options available to ComReg are to use a different auction mechanism (as described in Section 4 above and in Annex A). In Three's opinion, a well-designed SMRA format (such as the hybrid SMRA-clock format that DotEcon developed for UK regulator Ofcom and has proposed for forthcoming awards in Austria and the Netherlands) would deliver an appropriate outcome. If ComReg for whatever reason finds itself unable to break away from the use of a CCA, and also wants to retain its asymmetric caps, then at the minimum it should amend the auction rules to reduce the risk of a bad or discriminatory auction outcome.

We asked our expert auction advisors, NERA, what changes could be made to ComReg's CCA design to address the discrimination against Three and reduce scope for gaming while preserving the sub-1 GHz cap. They identified two remedies which should be implemented together:

1. **Joint cap on two winners.** NERA propose a joint cap of 2x25 MHz at 700 MHz across any two bidders, as implemented in the Swiss 700 MHz auction, to be implemented alongside the sub-1 GHz cap. This would have the effect of removing scenarios where both Vodafone and Eir each win 2x15 MHz in the winner and price determination. In a three-player scenario, this would place Three on a more level playing field with Eir and Vodafone with respect to pricing, as Three would also de facto be guaranteed to pay reserve price for its first lot in the event that there are only three bidders for 700MHz.

   If ComReg adopted this change, the stopping rule for the clock rounds would need to be amended so bidding would continue if two bidders remained each still competing for three lots each. ComReg might also consider some other rule changes to ensure that the auction outcome was not distorted by missing bids (see paragraph 2 below). ComReg might reasonably require that bidders bidding for packages containing three 700 MHz lots also bid for equivalent packages with two 700 MHz lots, with a price difference no greater than the final clock price for 700 MHz.

One effect of this rule change would be to diminish the likelihood of an auction outcome in which there were only two winning bidders. We suppose that ComReg may view this as an upside, given that it has separately argued that "*a cap above 70 MHz risks there being only two winners for 700 MHz spectrum in this award*" (ComReg 19/124a §74). However, if ComReg was not prepared to eliminate an outcome where Eir and Vodafone each win three lots each, then it could opt to only apply the proposed joint cap for the purposes of price determination (i.e. identifying alternative bid sets used to calculate opportunity cost) not winner determination. Such a rule would address the price setting asymmetry without foreclosing allocation outcomes.

2. **Price cap for 3rd lot.** NERA propose a cap on the marginal value that a bidder can express for its 3rd lot in the 700 MHz band, such that it cannot be higher than the final clock price for 700 MHz. [✂ Confidential ✂]

   We think this a reasonable restriction based on the general expectation that the focal point for demand at 700 MHz is 2x10 MHz and incremental values for additional spectrum, while potentially large, are strictly descending.

The introduction of these two rules would preserve the structure of ComReg's current proposal, and continues to meet ComReg's desire to protect against an increased asymmetry in sub-1GHz spectrum where Eir is not a winning bidder in the same way as the current proposal does. Crucially however it mitigates the harm to Three that is an undesired collateral outcome if the modifications are not made. Example 6 in the Annex A illustrates the effectiveness of these remedies.

Three respectfully requests that ComReg gives due consideration to the above modifications to its award.

6. Interim Licences

While three of the four bands of spectrum to be included in this award are "greenfield" the fourth (2.1GHz) is a "brownfield" band in that it is already in use to provide mobile services and most likely will be re-awarded for this purpose. This causes some particular problems for the award because the four existing licences have four different expiry dates. As we said in response to document 19/59, if other considerations are left aside, then it would be preferable in the interests of simplicity to have the maximum number of these licences expire at the same time. Three of the four existing licences expire within approximately 3 months of each other: Three's A licence which expires on 24th July 2022; Three's B licence which expires on 1st October 2022; and Vodafone's B licence which expires on 15th October 2022. The fourth licence is Eir's B licence which expires almost 5 years later, in March 2027.

ComReg has formed the view that the three licences that expire in 2022 could be aligned by providing an option for Three to apply for short interim licences to extend its two expiring ones to the same final date as Vodafone's. This gives a common start date for new licences in the award for nine out of the total of twelve blocks of 2.1GHz that are available. It is also considered that the time difference to expiry of Eir's licence makes it impractical to create a uniform expiry date for all twelve lots.

There are a couple of significant consequences that arise from this proposal. First it means that three of the twelve lots will have a different commencement date, and ComReg has taken the view that this requires the division of licences for all of the lots which are above 1GHz into two time-slices. Three does not agree that this is necessary, and this matter is dealt with in Section 4 above. Second, it also requires that Three applies for, pays for, and is granted interim licences in order to provide continuity of licensing through the period of expiry to the commencement of the new licences. ComReg's objectives, including those relating to efficient use of spectrum, protection of users' interests, and avoidance of inefficient investment require that provision is made for such continuity. Three has a requirement to continue to use this spectrum through the expiry of the existing licences into the new licence period. Without provision for continuity, Three would be required to "switch-off" its equipment that uses this spectrum during the two gap periods, only to switch it back on again later. This would in turn mean loss of service to some existing customers and that Three would be required to take measures to try to mitigate that loss of service, which would entail an unnecessary and inefficient investment.

ComReg proposes to issue interim licences to Three that are unchanged from the original A licence and B licence, save for the removal of obsolete conditions and for price. It should be noted that these licences will only be applied for and issued in 2022, which is some time after the auction will have been completed (in contrast to the situation in 2012). By this time, all licences for mobile and broadband services will be liberalised-use licences. ComReg has clarified that it does not plan to amend the expiry date of the old licences (for which the access fee has already been paid), but to issue new licences. In this circumstance, is makes no sense to issue an interim licence which is based on the old ones from the 3G era and whose terms were derived from a now outdated award process. ComReg should instead issue any interim licence based on the same template that is to be used to issue all licences under this consultation – liberalised use licences.

It is further noted that by the time these interim licences are to be issued, ComReg will have completed the auction and awarded spectrum in the 2.1GHz band in Time Slice 1, which will have established the market value for this spectrum. This can be used to establish the relevant opportunity cost for the interim licences in the same way as it is to be used to determine if Eir is required to pay a liberalisation fee for its 2.1GHz licence during Time Slice 1. Three believes this is a reasonable basis on which to determine the interim licence fee and is confident that it will be significantly less than the fees currently proposed by ComReg.

Three remains of the view that ComReg's proposed interim licence fees are excessive, and that the basis for deriving them is erroneous. There are several important considerations that have been overlooked in developing this proposal:

- Both ComReg and DotEcon have indicated that the price to be charged for licences should be derived from the opportunity cost, and not the value to the licensee itself. Three agrees with this point and further adds that the price imposed should be no greater than the opportunity cost. This is the optimum price to ensure efficient assignment, as ComReg has no revenue generating objective and any charge above this would divert funds away from investment in services.

- Both ComReg and DotEcon have indicated their expectation that the current market value of 2.1GHz spectrum is likely to be less than the fees based on the 2002/2007

licences[19]. Three agrees that this is the case, and is confident that the current market price is significantly lower than that which the historical 3G era licences would indicate. On this basis, the proposal to charge interim licence fees based on the 2002/2007 licences seem immediately to be at-odds with a price based on opportunity cost.

- Given that no other operator will be in the position of being required to apply for interim licences, it is unlikely that any other user would place a significant real value on obtaining them, and so the opportunity cost can be expected to be quite low.

- ComReg has mistakenly assumed that there is no market mechanism available to determine the prices that should apply for these interim licences. There will exist information on market derived prices for this spectrum in this same time slice by the time it is necessary for Three to apply for the interim licences. Given the consideration in the previous bullet, it is safe to say that these prices would represent an upper-bound limit for the opportunity cost of the interim licences.

- ComReg and DotEcon have already proposed a detailed methodology to extract the market based price for 2.1GHz spectrum from the award for the purpose of determining if it would be necessary for Eir to pay an additional fee to liberalise its licence in Time Slice 1. This same methodology, adjusted for duration, can be applied to determine the upper-bound of the interim licence fee.

There are inconsistencies in ComReg's approach to setting the interim licence fees:

- It is proposed to set the fee by reference to the remaining Vodafone and Eir licences, adjusting for CPI. Those licences differ in their commencement date by approximately 5 years, meaning there is no single appropriate time over which a CPI adjustment can be calculated.

- No operator currently pays 2.1GHz licence fees on the same basis that ComReg proposes, because there is no index adjustment to the Vodafone or Eir licence.

- The two licences that will expire are different, one was an A licence and the other a B licence. The terms and conditions are different and so the original values and licence fees are different. If reference is to be made to the historical licences for price, then the same price cannot be applied to both.

- When the time comes to issue these licences it would not seem to make sense to want to revert back, "skipping over" the more recently issued licences in favour of the ones that are from a bygone era.

If ComReg does not amend the current proposed pricing for interim licences they would likely prohibit Three from seeking interim licences for all 6 lots for the full extent of the licence gap. This would unnecessarily leave useable spectrum fallow for a period, would cause unnecessary cost to Three, and would cause customer disruption. On this basis it would be better for ComReg to include all of the 2.1GHz spectrum in the award with different commencement dates as determined by the expiry of the current licences. This would allow all bidders including Three to bid for and obtain the spectrum as soon as the current licences

[19] ComReg 19/124, paragraph 4.38; 19/124a, paragraph 8

expire. It would add some complexity to the award, which is undesirable but is better than ComReg's current proposal.

In summary, Three believes ComReg's proposal to derive interim licence fees delivers excessive prices, and is erroneous. It would likely leave useable spectrum fallow and cause service disruption. Three believes the market price as determined from the award itself and using the same methodology as proposed for the liberalisation fee for Eir's licence would deliver an appropriate interim licence fee. Three believes an interim licence with prices determined on this basis would deliver the optimum solution for all concerned. Failing this, it is preferable to avoid the interim licences altogether and make the spectrum available for re-award from each respective expiry date.

We further note:

- ComReg's spectrum management functions require that unnecessary disruption to consumers is avoided, and that inefficient investment is avoided. The gap in availability would cause unnecessary loss of service to some of Three's customers in circumstances where spectrum is available, equipment is installed and available to provide service, and Three is willing to provide service.
- This consumer disruption is unnecessary.
- It would be caused by ComReg setting an excessive spectrum fee.

Alternative proposal for interim licence fee

In the alternative, Three proposes that any licence fee for interim licence should be set on the same basis that ComReg propose to determine if Eir should pay a liberalisation fee – opportunity cost as determined in the award. It is noted that the award will have concluded at that time, so the basis for this fee will have been established before it is necessary for Three to apply for the Interim licences.

7. Liberalisation of 2.1GHz

In relation to the liberalisation of current 2.1GHz licences, ComReg has made the following proposals:

- That existing licensees should have the option to liberalise some or all of the current 2.1GHz licences from the date of the substantive decisions on the award process.
- That no liberalisation fee should apply for the period up to 15th October 2022.
- For the period from 15th October 2022 to March 2027 that a liberalisation fee might apply and that this would be depend on whether the fees currently being paid by Eir are above the market price for a liberalised licence as determined by reference to the price paid for liberalised 2.1GHz spectrum in the award process.
- That licensees should have the option to decide whether or not to proceed with liberalisation at any point during the remaining term of their licences.

ComReg has further clarified that it is not necessary to delay liberalisation until the publication of the final Information Memorandum as ComReg is already of the preliminary view that no competitive distortions would arise from providing the option to liberalise at any time following the substantive decisions.

Both DotEcon and ComReg have indicated their belief that it is unlikely that the market price for liberalised 2.1GHz spectrum will be above the current price applicable to the 3G licences. Three is confident that this is the case and that Eir will not be required to pay any liberalisation fee. Nevertheless, having seen ComReg and DotEcon's further explanation of the logic underpinning the proposal, Three sees that it is appropriate as it allows for the minimum additional fee to be applied, subject to avoiding distorted incentives. On that basis, Three supports ComReg's proposals, subject to our further points below.

Bearing in mind that:

- European Commission Decision (2012/688/EU) required that the 2.1GHz spectrum should have been liberalised from 30th June 2014, subject only to a review to ensure that no competitive distortions arise from such liberalisation;
- ComReg has now concluded that no competitive distortions arise; and
- substantial consumer benefits arise from the early liberalisation of the 2.1GHz band, as this allows network operators to select the appropriate mix of 2G, 3G and 4G across different bands on their network,

ComReg should now take the steps necessary to avoid any further delay in the availability of liberalised 2.1GHz licences.

Some steps that should be taken now include:

- Preparation of a draft statutory instrument / regulations (if required) to amend or replace SI 340 of 2003, and relevant briefing material for the Minister as required;
- Preparation and presentation of the draft liberalised version of the licences to each respective licensee so that the amendment is transparent and capable of being accepted without delay. This should occur no later than the making of the substantive decision from the current consultation;
- In the case of Vodafone and Three, where no liberalisation fee will apply, it should simply be necessary for the licensee to confirm acceptance of the amended licence so that they can proceed immediately to use liberalised 2.1GHz spectrum from the date of their choosing;
- In the case of Eir, an additional confirmation might be required. That is acceptance to pay the liberalisation fee (if relevant), to be determined by ComReg using the methodology proposed in this consultation;
- No further administrative process should be required, and ComReg should commit that it will issue the liberalised 2.1GHz licences within a reasonable time of receiving confirmation from licensees. Three is of the view that a maximum of 5 working days is reasonable in this case.

8. Minimum Fees

ComReg has stated that the minimum prices will be set at a conservative estimate of the market value that balances the risk of setting the price too high so as to choke off demand of serious bidders against the risk of the price being so low such that there is participation by frivolous bidders. If these two prices represent the upper limit and lower limit for minimum prices, then we note the following:

- It can be expected that a significant margin would exist between the upper and lower limit above;
- Significant negative consequences arise from setting the minimum too high – in particular the risk of choking off demand would leave spectrum unsold;
- The consequences of setting prices too low are not significant, as low-value bidders are likely to be out-bid anyhow;
- ComReg does not have a revenue-raising objective for the auction;
- The benchmarking exercise carried out by DotEcon uses market clearing prices from other auctions to estimate the value of the licences on offer by ComReg. No reduction has been introduced to allow for bidding or price discovery;
- Using the benchmarking results to directly set the minimum prices actually sets them at the market clearing price, not at a conservative estimate of it;
- For this reason, ComReg needs to introduce a margin to ensure that the minimum price is below the market clearing price for all lots.

Three again advises that a margin should be introduced to ensure that the minimum prices are below market clearing prices in order to avoid choking off demand. We again reiterate our proposal that this margin can be achieved by setting the minimum price at one standard deviation below the market clearing prices as determined using DotEcon's benchmarking exercise. We have seen no arguments to say that this is wrong in principle or that it would produce a negative result.

9. Coverage and Quality of Service

Coverage and roll-out

ComReg has set out its proposed coverage obligations for the licences which contains many elements but is intended to be a precautionary rather than an interventionist approach. The target speed to be achieved is 30Mbit/s (single user throughput or SUTP) for outdoor coverage in the case of a licensee holding two or more lots of 700MHz spectrum. ComReg also propose that the appropriate reference signal receive power (RSRP) to deliver this speed would be -95dBm.

While we understand the logic for setting a reference receive power as a proxy for the throughput, we believe ComReg has made a significant error in proposing that an RSRP of -95dBm is an appropriate proxy for 30Mbit/s SUTP. This receive signal level is significantly higher than that required and does not correspond to the target speed proposed. It would actually move the licence condition from precautionary to interventionist, and might actually make the 700MHz licences unattractive for most bidders. Assuming that the coverage was to be delivered using 5G-NR technologies and is based on Comreg's confirmed 75% coverage probability at cell edge, Three's calculations show that a RSRP between -109dbm (Dense Urban) and -113dBm (Rural) is more appropriate as a proxy for 30Mbit/s single user throughput using a 10MHz downlink carrier at 700MHz. We have asked our radio supplier Ericsson to independently review these calculations and they agreed with Three's calculations. Three is happy to explain the basis for these calculations to ComReg.

Furthermore, Three believe ComReg is wrong to assume that carrier aggregation can be easily used to achieve these requirements. This is not possible in non-standalone mode due to technical limitations on the uplink for handsets. They cannot use a below 1GHz band spectrum band (e.g. 800MHz) as an anchor signal supporting the control plane if they need to aggregate with another below 1GHz spectrum band (e.g. 700MHz) supporting the user plane.

ComReg is also wrong in assuming that the migration of current handsets or devices using the 800MHz spectrum band or even the 900MHz band can be done quickly to allow a licensee to re-farm its low band spectrum and aggregate it with 700MHz whilst all using 5G-NR technology. It takes a lot of time to retire legacy technologies. That is why all MNOs in Ireland are still supporting old GSM mobile phones and will do so for several years to come. Similarly, that is why all MNOs use Circuit Switched Fall Back to provide voice services over 3G WCDMA technology and will continue to do so for many more years. It is also why LTE technology will exist for a long time before 5G become mainstream for our customers. These points are not particular to Ireland and each licensee should be free to choose the most appropriate mix of technology in their network according to their own strategy and competitive market conditions.

The use of Reference Signal Receive Power (RSRP) as a proxy for a 30Mbit/s Single User Throughput (SUTP) using a 10MHz downlink carrier should only take into account the 700MHz spectrum band awarded in this auction, and set a realistic RSRP at a level that a fully functioning competitive market can deliver. For 5G-NR it should be between -109dBm and -113dBm and for LTE it should be a proxy for 30Mbit/s with a 10MHz carrier and a RSRP between -108dBm (Dense Urban) and -113dBm (Rural).

Three believe ComReg's coverage obligations are too ambitious in terms of rollout and MNO investment capabilities for 5G technologies. They go beyond the principle of precautionary and are interventionist by their nature, and Three believes they would be a deterrent to acquisition of 700MHz spectrum. Three believes that the targets shown in the table below are more appropriate. Note that the actual targets are unchanged, but the time to reach the milestones is longer.

Outdoor coverage service	Coverage dimension	Coverage level to be met in:	
		5 years	**10 years**

(SUTP Cell edge)			
30 Mbit/s	Population	85%	95%
30 Mbit/s	Motorways	75%	90%
30 Mbit/s	Primary Roads	60%	80%
3 Mbit/s	Population	99%	99%
3 Mbit/s	Geographic area	90%	92%

What	Where	When
Outdoor: 700MHz band 2x10MHz BW 30Mbit/s SUTP (Cell edge)	• **Business and Technology Parks (including strategic sites):** The IDA identifies a list of 31 businesses and technology parks and 9 strategic sites • **Hospitals:** The Health Service Executives (HSE) identifies a list of 48 public and 17 private hospitals • **Higher Education Campuses:** The Higher Education Authority (HEA) identifies a list of 8 Universities, 11 Institutes of Technologies, and 5 other colleges • **Air and Sea Ports:** The Department of transports tourism and sport (DTTAS) identifies a list of the 7 main airports and Irish Maritimes Development Offices (IMDO) identify a list of the 7 passenger sea ports • **Train and Bus Stations:** The National Transport Authority identifies the busiest 144 train stations and Bus Eireann identifies a list of the main 16 bus stations • **Top visitor attraction information points:** Failte Ireland identifies a list of the top (21) fee charging and (21) free entry visitor attractions	For each category: • **70% in 5 years** • **100% in 10 years**

For reasons similar to those above, we believe the appropriate RSRP level for lower speeds are also incorrect. They should be:

- For a 5G-NR 20Mbit/s service at 700MHz it should be between -101dBm (Dense Urban) and -107dBm (Rural) for a single user throughput using a 5MHz downlink carrier.
- For a 5G-NR 3Mbit/s service at 700MHz it should be between -118dBm (Dense Urban) and -122dBm (Rural) for a single user throughput using a 10MHz downlink carrier.

Quality of service and VoLTE

We have previously discussed our concerns at ComReg's proposals to include a VoLTE obligation in the licences. As previously explained in response to document 19/59, Three is of the view that a proposal to require VoLTE is in direct contradiction to the principle of service and technology neutrality. Voice over LTE is one technology among many others to support voice calls, that include circuit switched voice, Voice over Wi-Fi, Voice over IP through dedicated APP, etc. ComReg has placed far too much weight on VoLTE, and this proposal is not supported by evidence of benefit. We do not believe that it is appropriate to depend on a web article from Deloitte giving predictions for 2016 to support this decision.

Three believes ComReg is seriously mistaken about the quality of service offered through VoLTE services. This opinion is based on the experience of VoLTE from other MNOs, which has shown that the quality deliverable is not yet equivalent to circuit switched voice. Three has access to reports on VoLTE implementation that are confidential, however we would be happy to discuss with ComReg how we might share this information on a confidential basis. If VoLTE was a suitable replacement for circuit switched voice, then MNOs would have generalised its implementation already on the vast majority of their customer base as this would have allowed for the re-farming of spectrum to LTE.

In the short term (3-5 years), it will not be possible to maintain and guarantee the minimum dropped call and call blocking rates currently experienced by MNOs providing the service with circuit switched calls. Three again urges ComReg to revisit this licence condition and to allow each MNO to decide for itself when the introduction of the technology is suitable for its customers based on real customer benefits and real end-to-end quality of service.

Notwithstanding the above comments, Three does not agree that it is appropriate to include a roll-out obligation for VoLTE within 2 years. Experience from other countries show that it can require extended projects to bring VoLTE from a starting point to where it delivers an acceptable end-to-end quality of service. Three is of the view that in Ireland a minimum rollout period of 3 years is more appropriate.

Network availability and QoS

ComReg itself will be aware from its work in coordinating responses to severe weather warnings that the frequency of these events is growing. Network unavailability following storms or other extreme events is significantly impacted by loss of power when battery back-up and generators are exhausted. This is often a matter that is completely outside of an MNO's control as access roads to sites may be impassable and the ESB struggles to restore power. We propose that the network unavailability should exclude those periods that have arisen as a result of weather conditions for which Met Eireann has issued a weather warning.

NERA
ECONOMIC CONSULTING

Annex A - How ComReg's sub-1 GHz cap interacts with a CCA to disadvantage Three

This annex has been prepared by NERA Economic Consulting on behalf of Three Ireland. Its purpose is to walk the ComReg team through a series of plausible worked examples to demonstrate how Three Ireland (and other bidders) may be disadvantaged if ComReg proceeds with implementing its proposed format and rules for the forthcoming 5G multiband auction.

The lead author of this annex is Richard Marsden, Managing Director and head of NERA's spectrum auctions practice. Richard has exceptional experience with the CCA from both the auctioneer and bidder perspective. From 1999-2010, he was at DotEcon, where he worked with Dr Dan Maldoom on the design of the CCA and pioneering implementations in the UK, Denmark and the Netherlands. In that period, Richard also worked for ComReg on design and implementation of the 26 GHz auction, which used a sealed bid combinatorial design. At NERA, he has supported bidders in more than ten CCAs in Australia, Canada and countries across Europe, including both the 4G and 5G awards in Ireland. He has also implemented a CCA for AWS spectrum in Mexico. Richard would be happy to respond to any questions you may have about the examples in this annex and NERA's conclusions.

[✂ Confidential section]

Key conclusions

The key conclusions from the examples are as follows:

1. In the 700 MHz band, the CCA pricing rule favours larger bidders over smaller ones with respect to expected price outcomes. Specifically, the choice of format predictably favours Vodafone over Eir and Three, because Vodafone likely has a higher value than others for a third lot at 700 MHz, and third lot valuations are the values most likely to set prices.

   Asymmetric price outcomes that favour stronger bidders over smaller ones are arguably unfair. While ComReg has advanced an argument why it may be reasonable for Three to pay more than others for the same spectrum (as it would have more sub-1 GHz spectrum overall), it has not articulated why it is fair for Eir to pay more than Vodafone.

2. The sub-1 GHz cap accentuates Three's disadvantage relative to Vodafone and also disadvantages it relative to Eir. The cap removes Three's ability to impose any opportunity cost on the first lot acquired by Eir and the first lot acquired by Vodafone. In a three-player scenario, this de facto introduces a one lot set aside at reserve price for Eir and Vodafone, with no equivalent concession for Three. Given that ComReg has not advanced any competition-based rationale for favouring Eir and Vodafone in this way, this looks like discriminatory treatment.

   Adding a fourth bidder for 700 MHz only eliminates the price difference if the new bidder's value for 1 or 2 lots is competitive with the MNO's values for a 3rd lot. This is not a likely scenario.

3. We have identified a material risk that gaming behaviour under ComReg's proposed auction rules could exaggerate price asymmetry and/or undermine the efficiency of the auction outcome. Specifically, we are concerned that the strongest bidder for a third lot at 700 MHz may have flexibility to manipulate their bid values to load price on to rivals and/or try to

grab a third lot inefficiently. The likelihood of such behaviour is greater if ComReg proceeds with its proposed sub-1 GHz cap, as gaming may have a more pronounced impact on relative outcomes and is less risky.

4. The bias at 700 MHz against weaker bidders is intrinsic to the use of a second price rule. It could only be addressed by switching to a different format, such as SMRA. However, if ComReg decides this degree of price asymmetry is acceptable, the other concerns could be addressed through rule changes within the framework of a CCA and sub-1 GHz cap.

   We have identified two remedies that could respectively address the cap-related price discrimination against Three and the scope for gaming:

   a) A joint cap of 2x25 MHz on any two winners; and

   b) A price cap on the value of a third lot linked to the final clock price.

Approach to constructing the examples

The examples are focused on the 700 MHz band. There are two reasons for this. Firstly, the 700 MHz band is the one where Three is most exposed by the rules to asymmetric pricing and (if there is gaming) inefficient allocation outcomes. Secondly, by limiting the examples to a single band, it is easier to demonstrate the potential harm to Three that flows from the proposed rules. Where relevant, we discuss the implications of there being other bands included in the auction.

The values we present are intended to be plausible, but are not based on an actual valuation model for mobile spectrum in Ireland. We recognize that actual valuations could vary significantly from the numbers we present and that this may have an impact on how bidders actually behave in the auction. Nevertheless, we believe that the values are fit for purpose with respect to demonstrating the potential for the current rules to generate “unfair” or “discriminatory” price outcomes, and inefficient allocations.

The following assumptions were used to construct the indicative valuations for Examples 1-6:

- We assume all three MNOs have equivalent valuations for 2x10 MHz. We set this at a robust [✂Confidential section ✂]
- We assume that each MNO’s values are weighted towards the second lot, i.e. the value of 2x10 MHz is more than twice the value of 2x5 MHz.
- We assume that the third lot is worth less than half the value of the first two lots:
  - We model Vodafone predictably as having the highest value for a 3rd lot, owing to high market share and its starting position with one less sub-1 GHz lot than Three; we set Vodafone's third lot value equivalent to the price paid in Canada for 600 MHz.
  - We model Eir (starting with less sub-1 GHz spectrum) and Three (higher market share) as having the same value for a 3rd lot; [✂Confidential section ✂]
- In one of the examples, we add an entrant with values above reserve price for up to two lots but significantly lower than the third lot values of the MNOs.

For Example 7, we use an alternative valuation set in which Three has lower values for the second and third lots, such that the efficient outcome is for Vodafone to win three lots, Eir two lots and Three one lot. We use this valuation set to demonstrate that the price discrimination against Three flowing from the sub-1 GHz cap is not specific to our valuation assumptions.

For the avoidance of doubt, all indicative valuations take into account Irish annual fees, which would be additional to values and bids set out below.

Example 1: How ComReg's choice of CCA favours stronger bidders at 700 MHz

Based on precedent elsewhere in Europe, the typical outcome in a 3-player market is that the 700 MHz band is divided equally three ways, i.e. 2x10 MHz per operator. We suppose this is the expected outcome in Ireland, given that:

- the operators start with fairly equal sub-1 GHz holdings (as equal as it can be given the existing number of 2x5 MHz lots is not evenly divisible by three);
- 700 MHz is a pioneer band for wide-area 5G deployment, so existing holdings at 800 MHz and 900 MHz are not good short-term substitutes even if they are long-term substitutes;
- each operator likely prefers a 2x10 MHz block to 2x5 MHz, because 2x10 MHz is perceived as a critical mass of capacity necessary to justify investment in a new frequency band and taking on associated coverage obligations; and
- new entrants are likely to target higher frequencies where more spectrum is available and scope for launching alternative business cases appears stronger.

In an auction for six lots (2x30 MHz) in which there are only three bidders and each one wins two lots (2x10 MHz), prices will be set by the value they expressed for a third lot. In an SMRA, everyone would pay (roughly) the same unit price, based on the highest value expressed for a third lot. The pricing outcome in a CCA is potentially very different, as each bidder pays the combined value of denying the other two from winning a third lot. If bidders express very different values for a third lot, then prices could vary significantly.

In the context of the Irish market for 700 MHz, we are concerned that the use of a CCA introduces predictable differences in price outcomes between the bidders. Our view (likely shared by all) is that Vodafone predictably has the highest value for a third lot. This is because they start with one less sub-1 GHz lot than Three but have the highest market share, roughly twice the level of Eir. Hence, if all three bidders simply express their values for up to three lots but ultimately win two lots each, then Vodafone can be expected to pay the lowest amount.

Consider the following Example 1 in which there are three strong MNOs, each of which have similar values for two lots, but one of them has a higher value for the third lot.

Example 1: *Suppose that ComReg proceeds with an auction for the 700 MHz only, with a symmetric cap of 3 lots per bidder and a reserve price (RP) of* [✂Confidential section ✂]

We understand that, from ComReg's point of view, an advantage of the CCA format in this case is that it encourages Vodafone to test whether it is has enough value to secure a third lot. However, if (as seems likely) the efficient outcome is an even three-way split, then the downside is that the strongest bidder predictably gets a price discount relative to its competitors. This may be perceived as unfair, as the award process is predictably advantaging the strongest MNO, Vodafone, over the weakest MNO, Eir. The approach also seems inconsistent with ComReg's general objective of fostering competition, as its rules impose higher costs on the smaller operator.

As we will show in subsequent examples, Eir's price disadvantage versus Vodafone is general to any scenario where the efficient auction outcome is an even three-way split. We believe that ComReg should give particular weight to this scenario, as [✂Confidential section ✂]. We recognise, of course, that Vodafone's unit price advantage over Eir would disappear if it won three lots (see Example 7), [✂Confidential section ✂]. Regardless, we think it important that ComReg

acknowledge and consider the fact that if MNOs win the same quantity of spectrum, the CCA may deliver asymmetric prices that likely favour the largest bidder.

DotEcon has separately argued that some degree of price differentiation against Three may be fair because Three starts in a different spectrum situation from Vodafone and Eir, having one more sub-1 GHz block (ComReg 19/124a §108). However, this line of argument does not apply to Eir versus Vodafone, as Eir enters the auction with the same amount of sub-1 GHz spectrum as Vodafone. In this context, we were not surprised that Eir (like Three) strongly opposed the choice of a CCA for this award, whereas Vodafone neither supported nor opposed the CCA.

ComReg has further argued that "*there is no particular reason to expect that auction outcomes in which winners pay **somewhat differen**t amounts would have an adverse effect on competition in downstream service markets, as when service pricing decisions are made, spectrum access fees are a sunk cost and the primary determinant of pricing is the competitive environment*" (ComReg 19124 §6.66). We respectfully disagree. There is a growing literature, based on theory and empirical research, that suggests that, contrary to standard economic theory, operators do not in practice behave as if large upfront payments for scarce inputs are sunk, and the level of these fees does matter for future decisions on investment and pricing.[20] It is difficult to assess whether the CCA could produce price differences in Ireland that are sufficient to have an impact on the downstream market. Regardless, we think that ComReg should consider the possibility that the CCA pricing rule places a disproportionate financial burden on smaller winners as a disadvantage of its proposed approach.

Example 2: How ComReg's sub-1 GHz cap interacts with the CCA to disadvantage Three

The impact of ComReg's sub-1 GHz cap is to accentuate Three's disadvantage relative to Vodafone and also disadvantage it relative to Eir. Specifically, it removes Three's ability to impose any opportunity cost on the first lot acquired by Eir and the first lot acquired by Vodafone. Absent participation by a fourth bidder, the cap de facto provides Vodafone and Eir each with a guaranteed option to take one 2x5 MHz block at the reserve price, and ensures they will only pay opportunity cost on their second or third blocks. In contrast, Three must pay an opportunity cost based on every block it buys.

This is illustrated in Example 2:

***Example 2:** Suppose that all bidders have exactly the same values as in Example 1, but, owing to the sub-1 GHz cap, THR is no longer allowed to bid for or express any value for a 3rd lot.*

[✂Confidential section ✂]

Our view is that this cap discriminates against Three, for the following reasons:

1. By preventing Three from expressing a value for a third lot, ComReg is in effect awarding one block of valuable spectrum at a discounted price to the two other MNOs. ComReg has not

[20] See Section 2.2 of the NERA report on preparing for the 2019 Irish multi-band spectrum award previously submitted to by Three to ComReg is response to the first consultation on this award. For further explanation and links to supporting academic papers, please refer to: NERA report for GSMA, February 2017, *Effective Spectrum Pricing: Supporting better quality and more affordable mobile services* (the "global report"); and NERA report for GSMA, September 2017, *Effective Spectrum Pricing in Europe: Policies to support better quality and more affordable mobile services* (the "Europe Report"). The full reports as well as summaries can be downloaded from the GSMA website at: https://www.gsma.com/spectrum/effective-spectrum-pricing/

advanced any competition-based rationale for why Vodafone and Eir (but not Three) are deserving of such assistance.

2. The 2012 Irish multi band award established a precedent for setting a sub-1 GHz cap at a level that de facto guaranteed that every MNO could secure at least one 2x5 block at the reserve price. In that case, the spectrum cap was symmetric across all four bidders, so no single bidder was disadvantaged.

3. Three starts the auction with one more sub-1 GHz block than its rivals. Three acquired this block when it merged with O2, and therefore (implicitly) paid full market price for its 5th lot as part of the acquisition cost. It is therefore inequitable to allow Vodafone and Eir to pick up their 5th lot at a discounted price but offer no equivalent discount to Three.

ComReg and DotEcon have put forward a counter argument that the cap is not discriminatory because Vodafone and Eir start the auction in "*in objectively different situations*" to Three (ComReg 19124a §105). We recognise this as a potential rationale for having a second price rule, but we do not agree that this provides a justification for implementing a CCA with an asymmetric in-auction cap. In a CCA with symmetric caps, (other things being equal) bidders that enter with smaller holdings have a built-in opportunity cost advantage because they will likely have higher marginal values for incremental spectrum. Consequently, with a symmetric cap, the CCA pricing rule fully addresses the fact that, when bidding for a third 700 MHz lot, Three is bidding for its eighth sub-1 GHz lot, whereas Vodafone and Eir are bidding for their seventh lots. Introducing an asymmetric cap tilts the playing field much further in favour of the bidders with smaller holdings, enabling them to escape paying Three's (likely lower) value for a third lot. In the absence of any competition-based rationale to subsidise Vodafone and Eir's acquisition of spectrum, it is not clear to us how this advantage can be justified.

Example 3: The potential participation of a fourth bidder is unlikely to mitigate Three's disadvantage

If a fourth bidder submitted bids for 700 MHz above the reserve level, this would diminish the price discount for Eir and Vodafone. However, the likelihood that a non-MNO bidder bids for 700 MHz (especially given the associated coverage obligations) seems rather small. Even if a fourth bidder does target the band, it is very likely that their marginal value for a first or second lot will be well below an MNO's value for a third lot, and likely not much above the reserve price. Therefore, as illustrated in Example 3, a fourth bidder is most unlikely to mitigate Three's disadvantage. Accordingly, it would be prudent for ComReg to proceed with a policy that is robust to the possibility of there being only the three MNOs competing for 700 MHz.

Example 3: *We assume the same conditions as Example 2 but add an unsuccessful new entrant bidder that expresses a value of* [✂Confidential section ✂]

Examples 4 & 5: The CCA and caps may encourage gaming behaviour which could undermine the efficiency of the auction outcome

In our analysis of the proposed auction rules, we have identified a material risk that gaming behaviour could exaggerate price asymmetry and/or undermine the efficiency of the auction outcome. The strategy, which we set out in the examples below, describes a situation where the strongest bidder for a third lot at 700 MHz exploits its position as the marginal bidder to manipulate its bid set. This tactic could be used simply as a tool to load price on to rivals but is most attractive if the bidder anticipates anti-competitive benefits from prising a third lot from its rivals and is willing to deviate from intrinsic value bidding to achieve this.

Our initial assessment is that this risk in particular to the 700 MHz band, owing to the relative scarcity of this spectrum and predictable demand profiles of the three MNOs. We see much less scope for such behaviour in the higher frequency bands, given lower scarcity, more balanced caps and potential for non-MNO demand.

The potential for gaming behaviour to disrupt the auction exists whether or not ComReg applies a sub-1 GHz cap. However, the incentive for a strong bidder to engage in gaming is greater with the asymmetric cap, as this removes Three's option to retaliate and thus reduces the risk that the tactic just drives prices with no pay off. Owing to the sub-1 GHz cap, Three is the MNO that is most vulnerable to paying more or to losing spectrum as a result of such behaviour. [✂Confidential section ✂]

In Example 4, we explore the impact on auction outcomes if only [✂Confidential section✂]engages in gaming. In Example 5, we consider a sub-case where [✂Confidential section ✂] leads and [✂Confidential section ✂] retaliates.

Example 4: *Suppose that only EIR, THR and VOD participate in the auction and have the same intrinsic values as in the previous examples. Further, suppose that* [✂Confidential section ✂] *anticipates an anti-competitive upside from blocking either* [✂Confidential section ✂] *from having 2x10 MHz for 5G, over and above its intrinsic value for the spectrum, and is permitted to explore this within a budget of 102 (i.e. an* [✂Confidential section ✂]

Example 5: *All previous examples assumed a single band 700 MHz auction for simplicity.*

[✂Confidential section ✂]

In our previous response, both Eir and Three independently argued that the scope for asymmetric prices could incentivise strategic bidding and thus lead to inefficient outcomes. On behalf of ComReg, DotEcon was dismissive of such arguments, on the basis that "*price driving strategies in a CCA where there is limited information available about competitors' demand and valuations would be risky*" (Comreg 19/124a §182). However, DotEcon does not appear to have considered the type of behaviour that we outline in Examples 4 and 5, where price driving is focused on the third lot only and largely takes place in the supplementary bid round. In our examples, [✂Confidential section ✂] is taking a calculated decision to prioritise winning three lots (at a price well within its budget) over winning two lots at a lower unit price. It is exposing itself to paying a higher price if it wins three lots instead of two lots, but this is a manageable risk given it knows its maximum price exposure and can keep this within a budget that is well below its total value. The use of the CCA makes this a more attractive strategic play because, unlike in an SMRA, the gamer does not pay any more for two lots if it fails to win the third lot. The asymmetric cap on Three also

makes the strategy more affordable than it would otherwise be, as the gamer knows that one of its lots will always be priced at reserve.

It is important to understand that we are not suggesting that [✂Confidential section ✂]will necessarily engage in this type of behaviour if the auction continues under the current rules. Rather, our point is that such behaviour is possible and, in our view, the risk is manageable. We perceive that there is a real possibility that [✂Confidential section ✂]could behave in this way, with potential negative implications for efficiency and competition, and/or grossly asymmetric prices that are not aligned with ComReg's competition goals. If we were designing this auction, we would advise ComReg that it should act to prevent such behaviour.

Example 6: There are remedies available to ComReg to remove price discrimination and gaming options

In this paper, we have identified three issues with ComReg's proposed rules in relation to the 700 MHz band. Firstly, the pricing rule introduces a predictable pricing advantage for a larger MNO (Vodafone) over a smaller one (Eir), which is arguably unfair. Secondly, the sub-1 GHz cap interacts with the CCA rules to create a potential set aside of one lot each for Eir and Vodafone, but not for Three, which faces paying a steep price premium if it secures the same spectrum. This may be discriminatory. Thirdly, the CCA format has a vulnerability to gaming, and the risk this disrupts the auction is greater under the proposed sub-1 GHz cap. Given these concerns, Three asked us to consider what rule changes ComReg could adopt to mitigate them.

The first concern about pricing asymmetry between a large and small MNO is generic to the second price rule of the CCA. If ComReg decided this asymmetry was not desirable, then it would be advised to switch to a uniform price format. The obvious choice would be a variant of the SMRA, as proposed in similar circumstances in Austria, the Netherlands and the UK. A further benefit of switching to a uniform price format would be that Three would no longer be exposed to paying an exaggerated price premium over its rivals owing to the sub-1 GHz cap. We recognise, however, that a switch to an SMRA would raise other challenges, such as how to adapt the lot structure to mitigate concerns about aggregation risk.

To mitigate the second concern, ComReg could proceed with a CCA but switch to a symmetric in-auction cap of 2x10 MHz or 2x15 MHz. However, ComReg has already made it clear that for competition reasons, neither of these approaches are acceptable, as it believes that (a) Eir and Vodafone must be allowed the possibility of catching up with Three's total sub-1 GHz holdings ComReg 19/124 §6.65); and (b) no bidder should be allowed to acquire more than 2x35 MHz across 700, 800 and 900 MHz (ComReg 19/124 §6.128). Therefore, an alternative approach is required that mitigates the price discrimination against Three without removing the constraint of the sub-1 GHz cap.

Removing the price discrimination against Three may reduce the likelihood that gaming distorts the auction outcome, but would not eliminate this risk. To foreclose gaming, ComReg would need to impose additional constraints on the bids that each bidder can express so as to close off options to deviate from straightforward bidding. Here, there is always some risk that ComReg inadvertently closes off some bid options that can be justified by intrinsic valuations. Therefore, ComReg should only take actions that appear sensible given what is generally known about the structure of bidder valuations for 700 MHz.

We have identified two alternative remedies which, if implemented together, would address the discrimination against Three and close off the gaming example set out above:

1. **Joint cap on two winners**. We propose a joint cap of 2x25 MHz at 700 MHz across any two bidders, as implemented in the Swiss 700 MHz auction, to be implemented alongside the sub-1 GHz cap. This would have the effect of removing scenarios where both VOD and EIR each win 2x15 MHz in the winner and price determination. In a 3-player scenario, this would place Three on a more level playing field with Eir and Vodafone with respect to pricing, as Three too would de facto be guaranteed to pay reserve price for its first lot.

   If ComReg adopted this rule, it might also consider some other rule changes to ensure that the auction outcome was not distorted by missing bids. ComReg might reasonably require that bidders bidding for packages containing three 700 MHz lots also bid for equivalent packages with two 700 MHz lots, with a price difference no greater than the final clock price for 700 MHz. Also, the stopping rule for the clock rounds would need to be amended so bidding would continue with two bidders remained each still competing for three lots each.

   One side effect of this rule change would be to diminish the likelihood of an auction outcome in which there were only two winning bidders. We suppose that ComReg may view this as an upside, given that it has separately argued that "*a cap above 70 MHz risks there being only two winners for 700 MHz spectrum in this award*" (ComReg 19/124a §74). However, if ComReg was not prepared to eliminate an outcome where EIR and VOD each win three lots each, then it could opt to only apply the proposed joint cap for the purposes of price determination (i.e. identifying alternative bid sets used to calculate opportunity cost) not winner determination. Such a rule would address the price setting asymmetry without foreclosing allocation outcomes.

2. **Price cap for 3rd lot**. We propose a cap on the marginal value that a bidder can express for its 3rd lot, such that it cannot be higher than the final clock price for 700 MHz. [✂Confidential section ✂] We think this a reasonable restriction based on the general expectation that the focal point for demand at 700 MHz is 2x10 MHz and incremental values for additional spectrum, while potentially large, are strictly descending.

The effectiveness of these two remedies in addressing the second and third concerns is illustrated in Example 6.

Example 6: *Continuing Example 4, we consider the impact on final prices for 700 MHz of adopting a 2x25 joint cap across any two winning bidders and* [✂Confidential section ✂] *imposing a price cap on incremental bids for a 3rd lot.*

[✂Confidential section ✂]

The two remedies proposed above would have to implemented together to address fully the second and third concerns. As illustrated in Example 6, neither remedy can address the first concern about potential unfairness against smaller bidders, as the price discount for the MNO with the strongest value for a third lot is a feature of applying the second price rule in his context.

Example 7: The price discrimination against Three applies whether it wins one or two lots

All examples above were based on a "central case" in which all three MNOs win two lots each. In Example 7, we use an alternative valuation set in which Three has lower values for the second and third lots, such that the efficient outcome is for Vodafone to win three lots, Eir two lots and Three

one lot. The example demonstrates that the price discrimination against Three endures even if the efficient outcome is for it to only win one lot.

Example 7: *Suppose that Eir (EIR), Three (THR) and Vodafone (VOD) are the only bidders and have revised lot valuations and package valuations as follows* [✂Confidential section ✂]

The key observation from Example 7 is that the sub-1 GHz spectrum cap provides a price benefit to Eir and Vodafone over Three that applies even in scenarios where Vodafone secures spectrum leadership at sub-1 GHz, instead of Three. This reinforces our point that the higher price that Three may have to pay relative to its competitors cannot be justified based on the competition rationale for having a cap.

5 Vodafone Ireland Limited

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

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

ComReg Document 19/124
Response to Consultation

Executive Summary

I. Vodafone welcome the opportunity to respond to ComReg consultation 19/124– 'Proposed Multi Band Spectrum Award – Response to Consultation and Draft Decision.

II. We would like to acknowledge the comprehensive work that ComReg have completed, building on earlier Consultations on which bands to include and the previously published Connectivity Studies. 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. This has ensured a comprehensive analysis of the current state of coverage in Ireland and a more considered quantification of the additional investment needed to increase coverage to higher levels.

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 that in these other countries and so 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. From a Cullen report on a recent "Challenges for 5G" conference in Brussels 29-30 January. Pearse O'Donohue (European Commission, DG Connect, director, future networks) said in his keynote speech that the Commission is worried about the slow speed of assigning 5G pilot bands (i.e. 700 MHz, 3.5 and 26 GHz). According to article 54 of the European Electronic Communications Code, member states have to allow the use of the 700 MHZ band by 30 June 2020. The Commission hopes member states will speed up and assign the spectrum this year. Mr O'Donohue said that the Commission will continue to put "massive emphasis" on this issue.

VI. In our response below, we provide commentary on specific areas of the ComReg paper; however, the primary consideration for all stakeholders must be to ensure Ireland is at the forefront of Europe and to achieve this objective this award process must progress promptly and with certainty on timelines. We note that it is now more than 5 years since ComReg published the document "Spectrum award - 2.6 GHz band with possible inclusion of 700 MHz, 1.4, 2.3 and 3.6 GHz bands" Reference Number: 14/101 Posted: 30th September 2014. In order to attract

Vodafone Response

Ireland's share of the investment across Europe in rollout of 5G we must progress with pace to complete this Award.

VII. We are pleased that ComReg acknowledge in their proposal document the benefit of alignment with European norms for volume of spectrum assigned and timing of awards and suggest that this should be a key part of the decision-making as the award format is finalized.

VIII. In addition, we strongly support ComReg's approach in aligning with European standard band plans. This is key to having effective networks in Ireland, as the scale of our customer base cannot drive technology development of base-station or terminal equipment. We therefore must make maximum use of international standards to benefit from the rapid developments that are being made in new technologies.

IX. Many of the principles issues surrounding this auction have been consulted on a number of times and suitable formats are now well established. This should facilitate the production of a reasonably accurate timetable of forthcoming awards. As stated above, certainty will ensure Ireland is in a position to secure investment for future spectrum allocation and network rollout.

Vodafone suggest that there are a small number of areas where Comreg can usefully improve the Award Process.
The removal of the time-slices would greatly improve the simplicity and transparency of the process for bidders. We note the representation from others to replace the CCA auction format, but believe that CCA must be used if the Award contains a Time-Slices element.

In addition, we offer some suggestion on how the technical detail of the Coverage requirements can be defined.

Chapter 2

We note that over a number of rounds of consultation ComReg has given extensive consideration to the bands to be included in the proposed award.

The priority for ComReg should now be to complete the execution of the award process. In particular, we note that in Annex 4 Table of awards in 20 European countries demonstrates that the 2.6GHz band is now assigned in all other European countries.

Vodafone welcome the Connectivity Studies published by ComReg in December 2018. We have supported the work of the Governments Taskforce on Mobile and Broadband Coverage and believe that these studies make a strong contribution to the understanding of the quantity of work required to increase coverage from current levels.

We fully agree with the conclusions on support for BB-PPDR position, i.e. to include the full 2x30 MHz of the 700MHz Duplex band in the Proposed Award.

Chapter 3

Band Plans ComReg's updated position (section 3.2.4)

We note that ComReg have published their band plans in the 700MHz, 2.1 GHz, 2.3 GHz, and 2.6 GHz bands. In each of these bands, we agree with the proposed band plan structure.

In particular, Vodafone agree with the proposal to include the renewal of the 2.1GHz band in the award process.

We can work with the proposed compatibility considerations in the 700MHz, 2.1 GHz, and 2.6 GHz bands.

We also agree that the 700 duplex gap, guard bands, 1.4 GHz and 26GHz bands can be considered at another time.

It is not efficient use of spectrum to retain the proposed geographic restrictions proposed for the 2.3GHz band. The proposed re-use distances are considerably higher than the practical re-use distances that operators use. .

In Chapter 5, we discuss in more detail the restriction that the very small number of rurtel customers place on potential use of this band by the rest of the population and submit that this does not fairly balance the benefit of the served customers with the general population.

Preferred Assignment Process

We agree with 3.3.3 ComReg's updated Position, to make the band available in an open auction format.

Chapter 4

Issues concerning the proposal to include the 2.1GHz band.

In our experience, the CCA auction type that ComReg propose is complex. It is key to the effective running of a CCA auction that operators bid to the value of lots offered. To do this, operators need to be able to value correctly the different lots and the combinations of different lots that are on offer.

DotEcon judge that the burden of this complexity falls on the auctioneer only but we still believe that the large number of lots that will be presented in this award will create complexity for the bidders.

We submit that the two Time Slices proposed in this auction cause more difficulty than arose with the time-slices used in the 2012 auction. As we describe in more detail in our previous submission the two Time Slices that are approximately 7 and 8 years long. We understand the argument that we could bid for packages that are equal in both time-slices only, but as the cost of different spectrum may vary by significant amounts between time slices we need be prepared to bid for differing packages. It is entirely feasible that any bidder could miss-value spectrum in one of these time-slices and there could be an inefficient outcome.

We note that ComReg state they do not have a mandate to promote a simpler process but we would argue that the basic principle that ComReg should achieve an efficient use of spectrum should be enough to mandate working towards a simpler process.

We note in addition that this proposal would address some of the issues raised by eir in their submission, as they would not have to bid for and pay for spectrum in 2020 that would not be used until 2027.

Time slice in 2.1GHz band

In our submission to 19/58, we proposed that simplification would be achieved if eir were to surrender their 2.1GHz licence and we also referred to the greater gain if they also offered a date for surrender of the 2.3GHz spectrum use for Rurtel. All new 2.1 GHz assignments could then

begin on a single date. This major improvement in auction simplicity still worth pursuing and would produce a much simpler auction and potentially a more efficient outcome.

We repeat our belief that the proposed award will run more efficiently if award of the high band spectrum was reduced to one time slot.

Alternative to Time-Slice Section 4.26

We note the proposal from Three to address the differing licence lengths by generating two different lot types with different licence lengths (paragraph 4.26). This solution was used in Germany. Having engaged with our experts who participated in the auction, we would strongly believe that it is not a good solution. The issues noted by DotEcon played a significant part in the auction – where parties bid for lots that were desired by others, causing significant distortion in the auction.

Alignment of two operators

If eir's licence is not surrendered early, then it would be appropriate to proceed with the award of the 2.1GHz spectrum in two timeslice combined with a CCA auction.

DotEcon comments on time Slice Section 4.53

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 increased 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).

All MNOs Reaching agreement on early surrender & Alternative Process

ComReg have suggested a joint operator submission on early surrender and common date in paragraph 4.114. Given the normal competitive tension between operators, it is challenging for us to propose meeting without reference to Network roll-out and business plans. Hence, a joint submission is not feasible particularly in the short timescale offered.

Nevertheless, from submissions made to ComReg we can see that all operators recognise the potential gains of a more simple auction process. We suggest that ComReg could progress this in a reasonably short period by completing a series of one-to-one meetings with operators. .

Alignment of Vodafone and Three dates.

If eir do not agree to early surrender of their 2.1GHz licence then Time Slices are required but at a minimum the alignment of start dates for both Three licenses in the 2.1GHz band and Vodafone's license should be completed

We would support the ComReg proposal that the expiry dates for Vodafone and Three licences in the 2.1GHz band should be aligned by the extension of both Three licences. Applying a fee for the extension of both Three licences with reference to the SUF currently paid by Vodafone and eir appears be a fair and reasonable proposal.

Whether "Time Slices" should be applied to any of the other Award Bands. (Section 5.5)

We note the further consideration that ComReg have given to whether "Time Slices" should be applied to the other Award Bands 2.3 and 2.6GHz.

In considering whether, to apply Time Slices to other award bands Vodafone believe that ComReg overstate the interchangeability of equipment.

From discussions, we have had from our BTS equipment suppliers we understand that radio equipment now available has very limited flexibility to work in multiple bands. Whereas 1800 and 2.1GHz can operate from the same BTS, no other band switching is available. In addition, this dual-band BTS equipment is only available at a 100% premium. In practice, therefore operators will likely purchase band specific BTS radio equipment.

This will limit options in moving from band to band between Time Slices, as both the proposed Time Slices are too short to economically use equipment in spectrum unavailable in the other Time Slice. We recommend therefore that Time Slices are not applied to Other Bands in this award process.

We still believe that not time slicing the 2.6GHz and 2.3 GHz would lead to a significantly simpler auction. The gain in simplicity is important to bidders. DotEcon justified splitting these bands for fear of exposure of eir to gaming behaviour. However, as eir support not splitting these bands (Paragraph 4.97) there does not appear to be a justification for ComReg to maintain this split.

4.4.2 Early Liberalisation

We note the eir comments on spectrum imbalance in the 2.1GHz band and the obstacle that this places to spectrum liberalisation and we agree that spectrum imbalance in the 2.1GHz band remains a significant issue.

We note the DotEcon proposal that "On the basis of the above, we therefore recommend that the MNOs would be allowed to liberalise their existing 2.1 GHz licences at any time from the point at which ComReg publishes its final decisions in relation to this proposed award until the expiry date of the corresponding licence"

On basis that the Final Decision will be approximately 6 weeks from the publication of the IM and auction timetable (footnote 57) we agree with ComReg's proposal for the timing of liberalisation. .

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Chapter 5

Key aspects of award

National Basis

We strongly agree with the award of these licences on a national basis as per ComReg's preliminary decision Paragraphs 5.41. The existing national mobile licences have supported the development of common services with common price plan on a national basis. This has ensured consistent service for customers in all parts of the country. .

Band plans agreed

Vodafone supports the band plans now chosen for the 700MHz, 2.1GHz, 2.3GHz and 2.6GHz bands. As per our previous submissions, alignment with European norms will bring the best benefits for mobile customers in Ireland due to the common market for terminals, network equipment, and services.

Transition Licence for 2.3GHz band Paragraph 5.11

We note that in paragraph 5.116 that ComReg propose to grant eir a transition licence in the 2.3GHz band. ComReg must set a time limit on this transition licence. As ComReg note in paragraph 5.115 full migration may not occur before the award but it is reasonable and proportionate for ComReg to set a fixed duration for the proposed transition licence.

ComReg have acknowledged that eir have alternative spectrum available to provide a replacement service but the proposal to give eir a Transition licence post auction gives no incentive to eir to replace the old rurtel equipment. The appropriate solution is that in advance of the auction ComReg should set a fixed date by which eir have ceased the rurtel service. At the very least ComReg should set a licence fee for the use of this 2.3GHz spectrum in line with price outcome for the auction. This would be in line with the auction principles that efficient use of spectrum is measured by bidding price. Setting this price will give eir a reasonable incentive to move to a more efficient use of spectrum.

In our experience of the slow pace of 3.6GHz transition, an incentive is needed for legacy users to commit the required capital to move from historic assignments.

We repeat our contention that absent change in the proposals ComReg afforded eir a significant commercial advantage in bidding for this band as they can value full nationwide access to the band whereas others candidates have to value the spectrum as geographically restricted.

Licence duration – 5.3

We note ComReg's revise proposal in 5.3.4 to extend the licence duration to 20 years. This change is very welcome, in line with EC Code, and will support network investment.

Chapter 6 Award Type and Format.

We note the extensive discussion on auction format in chapter 6.

In line with our response to previous documents Vodafone support the view that open, simultaneous, multi-round auctions (whether SMRA or CCA) are the most efficient way to assign new spectrum.

This has been an effective assignment mechanism in the Irish market. In addition, both the GSMA and RSPG support the view that simultaneous, multi-round auctions (whether SMRA or CCA) are the most efficient way to assign new spectrum.

Comparing the proposed Award to other auctions Vodafone participated the use of time-slots will contribute significantly to auction complexity in the primary stage and in the assignment stage.

Complexity is principally driven by the Time Slice structure of the lots available but also by the varying lot sizes in the 2.3GHz band. Apart from the advantage that a single Time Slice would bring to encouraging investment and to simplifying Transition, offering the spectrum across a single Time Slice would greatly simplify the auction by reducing the number of possible combinations of lots that could be bid for. This would enable operators to value effectively both the lots on offer and the value of different outcomes of the Assignment stage.

Price Transparency

In our previous submission, we spoke about the lack of price transparency in the CCA auction format. It remains the position that large and unpredictable differences between final bid and final price creates governance issues for bidders and is a major disadvantage of the CCA format.

We note that in Paragraph 6.19 ComReg and DotEcon appear to be unclear on what the budget constraint issues arise. To explain further, the final bids in the CCA auction exceed the actual final price by a large and unpredictable factor. Both final bids and final prices from previous auctions are available to ComReg. It would be useful for ComReg to review these figures even though we understand that they will not be published.

We urge ComReg to seek improvements in transparency to address the issue of final price versus final bid.

Preferred Auction format

Notwithstanding the above issues with CCA, we have discussed the planned auction in Ireland with our auction experts. Our view is now that the CCA format is preferred if parts of the spectrum are to be awarded in two time-slices. From their experience only the CCA format can deal efficiently with Aggregation risk that arises where spectrum in offered in more than one time-slice.

As an additional support for CCA, we submit that there is extensive experience in Ireland of using this auction format in Ireland. We

Therefore, while noting the requirement for additional transparency, in the absence of removal of time-slices we agree with ComReg updated position in paragraph 6.1.5, that a CCA auction will best deliver on its objectives and deal with the considerations that arise in the proposed award process.

Lot size of generic spectrum

Vodafone agree that frequency generic spectrum should be offered using lot sizes of 5 MHz or 2×5 MHz These lot sizes accommodate all likely types of users and technologies given that smaller lots can be aggregated to satisfy larger demands.

The relevant European harmonization measures for mobile broadband use of the proposed bands specify frequency arrangements of 5 MHz blocks.

Frequency-Generic or Frequency-Specific Lots

From our experience in the 2012 MBSA and subsequent auctions run by ComReg, we submit that the process of running a Primary Round with Frequency Generic lots and a separate Assignment round has worked well and where possible this should be the design used.

In ComReg's current proposals, we note that some frequency specific lots are proposed for the 2.3GHz band. If no progress is made on an alternative solution for the RurTel co-ordination then we agree that it is best to award these as Frequency Specific lots.

Spectrum Competition Caps

Vodafone agree that Competition Caps are a necessary part of the award process to ensure that extreme asymmetric results are not produced.

We support ComReg's proposal to have separate Competition Caps for the sub-1GHz band and an overall cap for spectrum to support mobile services.

In addition, we support the inclusion of existing spectrum in the caps. This practice has been the norm in other countries and, as noted by ComReg in paragraph 6.181, supported by Three in auctions in other countries.

Sub 1GHz -

1. Given Ireland's low population density it is likely that any service for mobile units will use frequencies below 1GHz. To support competition these sub-1GHz frequencies should be distributed among operators.
2. We agree with the value 70MHz (2x35) proposed for sub-1GHz spectrum, for the reasons given in Document 19/59.

Overall Cap:

For the overall spectrum figure, we supported the range 375-420 identified by ComReg in their last Consultation. ComReg have now chosen a value at the lower end of this range.

In deciding on an appropriate figure ComReg appear to have set the cap value with reference to inputs from small players and by calculation of the most extreme possible outcome of Three versus eir. We do not believe that this is the appropriate measure for the calculation of the overall competition cap value. It would be more appropriate to use market percentages as were used previously.

We would also note we disagree with eir's proposal to have a Band specific cap for the 2.1GHz band.

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"

Chapter 7

Service and Neutrality good

Vodafone support the granting of Services and Technology Neutral licenses. This is well established in the Irish market and Europe wide.

Coverage Rollout Obligations

General elements of coverage proposal

ComReg include a very extensive section on coverage requirements that may attach to the new licence. We agree with the general design of the coverage proposals

- Population is a better driver of coverage than geographic area.
- Measuring outdoor coverage gives the most consistent results.
- Including a requirement for WiFi and VoLTE is appropriate.

700MHz

In principle, Vodafone agree that any coverage requirements that ComReg attach to this award process should be on a precautionary principle. We note from ComReg's Proposals for the 700MHz band

> "As outlined in its draft Regulatory Impact Assessment (RIA) of the various options, ComReg's proposed approach is to set coverage obligations which are precautionary"

And also

> "Precautionary' coverage obligations refer to obligations which do not exceed the levels of coverage that might be expected anyway from well- functioning competition between network operators; "

Having set this as a principle we still believe that ComReg have incorrectly predicted a future high level of coverage. This high level is in excess of the roll-out that we expect to happen without intervention.

Our position remains that there is no commercial incentive to roll-out coverage beyond a figure in the lower 90% range of population

We note that ComReg quote Oxera's position that the figures for coverage obligation are "feasible" for an operator to achieve (as described in Options 3 in A9.6). This does not translate to these targets being precautionary, and we believe they will exceed the level that a competitive market will produce.

In a discussion of coverage targets ComReg reach the conclusion in Section 7.25 that operator's preferred option is Option 3 – 95%. This is not the case, and in our view the most appropriate option is Option 2 90%.

Existing Coverage levels and Operator Public statements

In support of the 95% target level ComReg, quote from public statements made by several operators, including Vodafone, quoting current coverage levels in excess of 90%. These percentages do not refer to 30Mbit at cell edge and are not relevant to the proposed higher standard coverage targets. It is clear from Oxera's own analysis of current coverage which identifies current coverage at the required specification at much lower percentage figures.

RSRP Levels.

In Annex A Vodafone present detailed technical analysis of a suitable specification for the definition of the RSRP level at cell edge that can be used for compliance measurement for a 30Mbit cell edge service

Based on the link budget presented in Annex A, Vodafone proposes an RSRP level of -105dBm as an appropriate proxy for a 30 Mbit/s SUTP for a 10 MHz downlink carrier, and further, that this can be lowered by 5dBm for each additional 2x10MHz band that is deployed with similar propagation characteristics

Timing of Rollout, 3 year target.

Vodafone have worked on a nominal roll-out plan, refreshing our radio equipment to best use the spectrum we may acquire in the award. 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. Changing antennae and equipment on a large number of sites inevitably introduces new interference areas and new blackspots. These can be dealt with through a concentrated focus on a limited geographic area with cycles of antenna and parameter adjustment. In previous RAN refresh projects, we received strong negative customer feedback where service is disrupted and we urge ComReg to amend the timescales to ensure we can minimise disruption in future projects.

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 our view is that we cannot meet the proposed ComReg target of 85% population at 3 years and ensure a program minimising customer impact.

We suggest therefore reducing or removing the 3 year element of the coverage targets listed in Table 4. A reduction to 75% pop would fit in with an efficient program and, we believe, still allow us to reach the proposed numbers at the 5 year and 7 year points

Coverage at specific locations. Section 7.100

ComReg propose that a coverage obligation of 100% of the specified locations in a 7 year period. We suggest reducing this figure to 95%. There is still a risk that some individual locations will refuse access or set unreasonable conditions such as high rent for access to locations.

For example, if the management of the Cliffs of Moher Visitor Experience in Co. Clare do not give us access to their property then is unlikely that we could construct an alternative site in the area, as it is a Special Protected Area (SPA) under Irish & EU legislation.

We fully support the work of the Mobile and Broadband Taskforce; we note that progress is good but slow. In many of the areas under discussion, the operators have no control. For example, recent changes to planning exemption took more than 7 years. In these circumstances, setting short-term targets for very high percentage roll-out targets is not appropriate.

Vodafone will continue to cooperate with the governments Mobile and Broadband Taskforce, to assist with the rollout of additional coverage and to help seek solutions for access to state lands for enable-increased coverage. However, solutions to many of these issues are not within the control of operators and it unsafe at this stage to set a timescale in which the Taskforce will succeed in solving these issues.

Without a solution to these site access and planning permission issues, we do not think any operator can guarantee coverage of 100% of these locations. If these sites were made available to us by the State, we would be happy to commit to covering 100% of these locations in 7 years but without a prior commitment on site access, the requirement should be marginally less than 100%

Targets in Other bands

Roll-out for other bands (also refers to Annex 9)

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.

Vodafone submit that these proposed obligations are excessive, considerably more than the Precautionary level that ComReg claim as their objective.

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 11.

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 role 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.

Timing:

We welcome the change made in moving the target for completion of the Other Bands target listed in *Table 11: Base station Rollout obligation for the Performance Bands* from 3 years to 4 years. It would be better 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, ie enabling us to make a single site visit to site to equip them to meet coverage and rollout conditions

MVNO Ref 7.248

We agree with the position in paragraph 7.248 that it is not appropriate at this time to attach MVNO access obligations for the reasons quoted by ComReg. No market failure has been identified and no effective MVNO conditions have been identified.

Interference with Cable paragraph 7.287

We agree with ComReg's position that issues with installation of equipment and potential interference with cable networks are best handled by local co-operation rather than trying to define obligations.

We note that when LTE equipment was being installed in the 800MHz band similar concerns were expressed but no significant interference occurred in practice.

Chapter 8

Transition

We agree that the Transition Process in the 2012 MBSA worked well. However, we submit that the Transition of 3.6GHz spectrum has not worked well and it is important that lessons be learnt from both events. .

In 2012, the transition plan was agreed with 2 months from the end of the auction. (Vodafone wrote to ComReg confirming agreement to the plan 12 Dec 2102)

The Plan proposed all that changes were completed in a six-month period, January to June 2013.

By contrast, the Transition of 3.6GHz spectrum has not worked well. It is now two and a half years past the start date of the licenses and we do not have completed Transition.

To avoid this ComReg should seek to have equal motivation for all parties to complete any Plan produced and they should strictly define the time to produce a Transition Plan as part of the Award process.

The time for execution of the Transition Plan should also be defined. There appears to be no reason why this period should be longer than one year.

RurTel transition (Section 9.3)

An open-ended Transition in respect of RurTel is wholly unacceptable. We can reasonably anticipate that many of the issues that arose with the Transition of 3.6GHz will occur again.

ComReg are not giving adequate weight to one of the four Principle governing Transition that they list in paragraph 5.108 i.e. “ensuring the efficient use of spectrum”. Without adding realistic incentives for eir to move from the current inefficient use of spectrum to support Rurtel ComReg will have failed in the efficiency test.

As the proposal stands, there is no incentive for eir to commit any capital to providing alternative solutions for these Rurtel users.

Given that a basic justification of the spectrum auctions is that market pricing of spectrum will drive its efficient use, we suggest that ComReg set prices for any Transition Licence with reference to the market value revealed in the Proposed Award. This would give eir the correct incentive to use the spectrum efficiently.

Annex A Coverage Definition

Vodafone supports 30 Mbit/s coverage target for the 700 MHz band in a single user scenario

However as one can clearly see from the tables below extracted by the 3GPP TS 37.910 and used as a reference for the submission of the NR as candidate for the IMT-2020 submission, even considering not practical antenna configuration in the 700 MHz band (Massive Mimo or 8T8R) and Massive Mimo in 3.5 TDD, the practical spectral efficiency at cell edge (5% percentile) is 0.15-0.5 bit/s/Hz so you need typically 200/280 MHz of bandwidth to get 100 Mbps and consequently 60/80 MHz to give 30 Mbps.

This is because in a realistic multi-cell environment you will always have areas with 0 or slightly negative SNR (due to the unavoidable overlap between cells). This means that in these areas (5% percentile) the spectral efficiency will not ever be better that 0.5 b/s/Hz (or even below for traditional FDD system and low bands) ; moreover in a relative big area the SINR will not be anyway sufficient for ensuring the spectral efficiency required to get 30 Mbps (> 3 b/s/Hz)

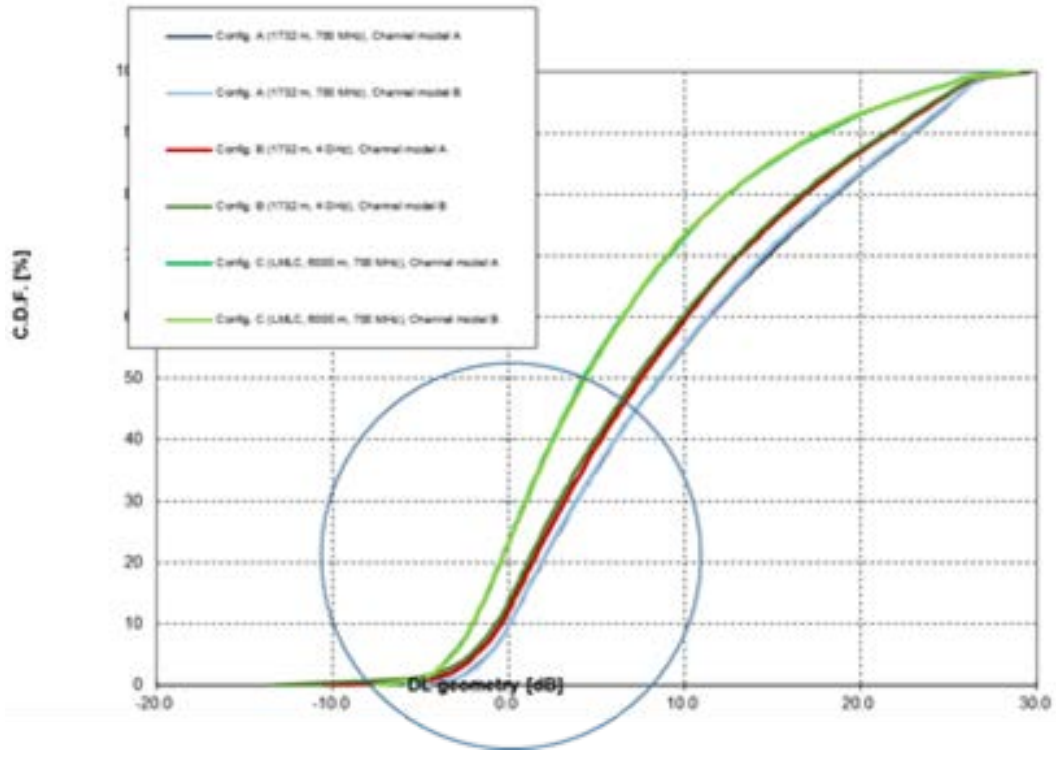

Table 5.4.1.3.1-1 DL spectral efficiency for NR in Rural – eMBB (Evaluation configuration A, CF=700 MHz)

3. (a) NR FDD

Scheme and antenna configuration	Sub-carrier spacing (kHz)	ITU Requirement		Channel model A				Channel model B			
				Number of samples	BW= 10MHz	BW= 20MHz	BW= 40MHz	Number of samples	BW= 10MHz	BW= 20MHz	BW= 40MHz
8x2 MU-MIMO Type II Codebook; gNB Config = (8,4,2,1,1;1,4)	15	Average [bit/s/Hz/TRxP]	3.3	9	5.92	6.66	7.1	7	5.83	6.53	6.94
		5th-tile [bit/s/Hz]	0.12		0.16	0.18	0.20		**0.17**	0.19	0.20
16x2 MU-MIMO Type II Codebook; gNB Config = (8,4,2,1,1;2,4)	15	Average [bit/s/Hz/TRxP]	3.3	1	7.48	8.39	8.94	2	8.83	9.96	12.64
		5th-tile [bit/s/Hz]	0.12		0.15	0.17	0.18		0.20	0.22	0.24
8x4 MU-MIMO Type II Codebook; gNB Config = (8,4,2,1,1;1,4)	15	Average [bit/s/Hz/TRxP]	3.3	1	9.42	10.66	11.40	1	9.08	10.27	10.99
		5th-tile [bit/s/Hz]	0.12		**0.16**	0.18	0.19		**0.17**	0.19	0.21
16x4 MU-MIMO Type II Codebook; gNB Config = (4,8,2,1,1;1,8)	15	Average [bit/s/Hz/TRxP]	3.3	1	15.28	17.37	18.61	/	/	/	/
		5th-tile [bit/s/Hz]	0.12		0.47	0.54	0.57		/	/	/
16x2 MU-MIMO Type II Codebook; gNB Config = (4,8,2,1,1;1,8)	15	Average [bit/s/Hz/TRxP]	3.3	1	9.58	10.81	11.55	1	10.02	11.23	11.96
		5th-tile [bit/s/Hz]	0.12		0.25	0.28	0.30		0.27	0.30	0.32
8x2 MU-MIMO Type I codebook; gNB Config = (8,4,2,1,1;1,4)	15	Average [bit/s/Hz/TRxP]	3.3	2	6.08	6.82	7.27	/	/	/	/
		5th-tile [bit/s/Hz]	0.12		**0.15**	0.17	0.19		/	/	/

Table 5.5.1.1.1-1 DL user experienced data rate for NR in Dense Urban – eMBB (Evaluation configuration A, CF=4 GHz)

4. **(a) NR FDD**

Scheme and antenna configuration	Sub-carrier spacing	ITU Requirement [Mbps]	Channel model A			Channel model B		
			Number of samples	Assumed DL system bandwidth [MHz]	User exp. data rate [Mbps]	Number of samples	Assumed DL system bandwidth [MHz]	User exp. data rate [Mbps]
32x4 MU-MIMO Type II Codebook; gNB Config = (8,8,2,1,1;2,8)	15	100	11	240	108.33	8	240	105.30
32x4 MU-MIMO Type I Codebook; gNB Config = (8,8,2,1,1;2,8)	15	100	2	280	112.86	/	/	/
32x4 MU-MIMO Type II Codebook; gNB Config = (8,16,2,1,1;1,16)	15	100	1	160	104.66	/	/	/
32x4 MU-MIMO Type II Codebook; gNB Config = (16,8,2,1,1;2,8)	15	100	1	200	107.02	1	200	105.81
4x4 MU-MIMO Type II Codebook; gNB Config = (8,8,2,1,1;2,1)	15	100	1	240	112.64	/	/	/
32x8 MU-MIMO Type II Codebook; gNB Config = (16,8,2,1,1;2,8)	15	100	1	280	111.68	/	/	/

Given this, Vodafone believes 30 Mbit/s coverage target for the 700 MHz band can only be considered in **a single-user and single-cell scenario** without intra and inter-system interference and assuming nominal power for the BS (no power reduction due to EMF or external causes)

This can be considered as a “nominal” 30 Mbps service, Vodafone proposes the following link budget

Bandwidth	TDD DL	Link adaptation correction (Shannon x 0.75)	SNR	Linear
9	1	0.75	**13.2**	20.893
Bit Rate	**30.1**			

Link Budget(single cell/SU)	**FDD (10MHz)**
Frequency	700
Noise Figure	7
Effedcive Bandwidth	9
Bit-rate [Mbps]	10
SNR (0.75 x Shannon)	13.2
Thermal Noise	-97.5
RX diversity	0
Receiver sensitivity(P_{min})	-84.3
Transmitter	
Nominal Power	46
Tx Losses (0 for RRH)	0
Transmitter antenna gain dBi (Tag)	15
EiRP ($P_t + G_t - L_t$)	61

Receiver

Receiver antenna gain (Gr)(10 FWA, 0 Mobile)	**0**

Margin

Shadowing margin (Lt)	**7**

Max Path Loss (Pt + Gt – Lt) - Lsh + Gr-Pmin	**138.3**

RSRP threshold (RS EPREn = 18 dBm)	**-105.3**

Based on this link budget Vodafone proposes an RSRP level of -105dBm as an appropriate proxy for a 30 Mbit/s SUTP for a 10 MHz downlink carrier and this can be lowered by 5dBm for each additional 2x10MHz band that is deployed with similar propagation characteristics.