Commission for
Communications Regulation

# Response to Consultation and Decision on Proposed 3.6 GHz Band Spectrum Award

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**An Coimisiún um Rialáil Cumarsáide**
**Commission for Communications Regulation**
Abbey Court, Irish Life Centre, Lower Abbey Street, Dublin 1, Ireland
Telephone +353 1 804 9600 Fax +353 1 804 9680 Email info@comreg.ie Web www.comreg.ie

## Additional Information

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# Contents

## Section Page

# Annexes

**Section** **Page**

# Table of Figures

**Section** **Page**

# Table of Tables

## Section Page

Chapter 1

# 1 Introduction

1.1 The purpose of this document is to set out the Commission for Communications Regulation's ("ComReg") response to submissions received to Document 15/140[1] and set out its final substantive decisions concerning its proposed award of a limited number of individual rights of use in the 3 400 – 3 800 MHz ("3.6 GHz") frequency band.

1.2 In arriving at the final substantive decisions set out in this document, ComReg has had regard to the statutory functions, objectives and duties relevant to its management of the radio frequency spectrum, the most relevant of which are summarised in Annex 2. ComReg has also had regard to all relevant information available to it, which includes *inter alia*:

- all submissions received throughout this consultation process[2];
- the independent expert advice and recommendations of its economic and award design consultant, DotEcon Limited ("DotEcon")[3], and technical consultant Plum Consulting London LLP ("Plum");[4]
- various international decision documents and technical documents relating to the 3.6 GHz Band (see Annex 3); and
- relevant international developments (see Annex 4).

1.3 ComReg is mindful of the complexities involved in an award process of this nature. ComReg has, therefore, sought to provide as much clarity as possible in the consultation process generally and is of the view that its proposals strike the right balance between managing this complexity and determining the appropriate award design for the 3.6 GHz Band.

1.4 ComReg set out in its draft Information Memorandum (Document 16/22) the envisaged processes, procedures and rules of the award and will, shortly, issue its response to the submissions received to Document 16/22 and its final Information Memorandum.

[1] ComReg Document 15/140 entitled "Response to Consultation and draft Decision – on Proposed 3.6 GHz Band Spectrum Award", published on 22 December 2015.

[2] Including submissions received to Documents 14/101, 14/126, 15/70, 15/140 and 16/22.

[3] Including Documents 14/102, 15/71, 15/72, 15/140a and 15/140b

[4] Including Documents 15/73, 15/74, 15/75, 15/140c and 15/140d.

1.5 ComReg is cognisant that some interested parties may not have previously participated in any similar process and, in that regard ComReg will provide a presentation on the Award Process and the rules of the Award Process which will seek to provide further clarity for interested parties[5]. ComReg will also facilitate the submission of questions regarding the Award Process and the rules of the Award Process and will respond publicly to these questions on an anonymous basis.

1.6 ComReg received submissions on Document 15/140 from six respondents[6], non-confidential versions of which have been published by ComReg in Documents 16/19[7] and 16/55[8]

1.7 ComReg is grateful for all submissions received in response to Document 15/140 and this consultation process more generally. ComReg has given careful consideration to all the material submitted as well as to other relevant information before it.

1.8 ComReg is publishing alongside this document an analysis prepared by its expert advisors, DotEcon, of the submissions received in response to Document 15/140 relating to the award design and format (published separately as Document 16/57a).

1.9 In the interests of clarity ComReg addresses all material[9] submissions received in the following way:

- where a respondent raises a point which has previously been considered and assessed by ComReg during this consultation process, ComReg provides a reference to where the issue has already been considered;

- where the same point has been raised in response to both ComReg's consultation on its Radio Spectrum Management Strategy (Document 15/131)[10] and Document 15/140, and the matter has been addressed in ComReg's response to Document 15/131 (Document 16/49), ComReg

[5] ComReg notes that Ripplecom and Permanet in their response to Document 15/140, welcome the provision of this presentation and ComReg's intentions more generally in relation to bidder training. ComReg will provide further detail on the bidder training arrangements in the Final Information Memorandum.

[6] Responses were received from: 3IHL, Eircom, Imagine, Permanet, Ripplecom and Vodafone.

[7] Submissions to ComReg Document 15/140 - http://www.comreg.ie/publications/submissions_to_comreg_document_15_140.597.105074.p.html

[8] This document contains an additional submission by Imagine dated 21 June 2016

[9] While ComReg has taken into account all relevant information provided by respondents, it is not in a position to provide commentary in this document on each and every point made. Instead, this document focuses on relevant material points raised by respondents.

[10] ComReg's Consultation on Radio Spectrum Management Strategy 2016 to 2018 - http://www.comreg.ie/publications/consultation_on_radio_spectrum_management_strategy_2016_to_2018.583.105008.p.html

does not reiterate its view in this document, but rather provides references to where this point has been addressed in the radio spectrum management strategy consultation process;

- where new material or reasoning is submitted in support of a particular view, ComReg references and assesses these submissions in the appropriate section of this document; and

- submissions received to Document 16/22 (the "Draft Information Memorandum") will be considered in a separate response document, save to the extent that they are relevant to ComReg's final substantive decisions (set out in Chapter 8).

1.10 The document is structured as follows:

- **Chapter 2**: provides:

  - an overview of relevant ComReg publications relating to its 3.6 GHz Band award; and

  - a brief background to the 3.6 GHz Band.

- **Chapter 3**: sets out ComReg's final regulatory impact assessments on the spectrum for award and the award mechanism and its assessment of the preferred option against other relevant statutory functions, objectives and duties;

- **Chapter 4**: sets out matters relating to the band plan and frequency arrangements, geographic scope of 3.6 GHz rights to be awarded, and duration of same;

- **Chapter 5**: sets out matters relating to award format, packaging of spectrum rights, competition caps and implementation matters;

- **Chapter 6**: sets out the licence conditions;

- **Chapter 7**: sets out how ComReg intends to handle transitional issues;

- **Chapter 8**: sets out ComReg's final substantive Decision on its 3.6 GHz Band spectrum award;

- **Chapter 9**: details next steps in the process;

- **Annex 1**: Glossary;

- **Annex 2**: Summary of ComReg's statutory functions, objectives and duties relevant to the management of Ireland's radio frequency spectrum;
- **Annex 3**: List of relevant EC/CEPT Decisions and technical documents;
- **Annex 4**: Update on international developments regarding the 3.6 GHz Band;
- **Annex 5**: Regulatory impact assessments on rollout and quality of service obligations.

Chapter 2

# 2 Background

## 2.1 Introduction

2.1 In this chapter, ComReg sets out:

- a brief background to the 3.6 GHz Band in Ireland; and
- an overview of relevant ComReg publications relating to the 3.6 GHz Band award.
- its consideration of further submissions received in relation to the National Broadband Plan

### 2.1.1 Background to the 3.6 GHz Band in Ireland

2.2 The 3.6 GHz Band is currently licensed in Ireland.[11] The frequency range from 3 410 – 3 435 MHz and 3 435 – 3 800 MHz is currently licensed for the provision of fixed wireless services on a local area basis and the remaining 40 MHz in the frequency range from 3 435 – 3 475 MHz is licensed for the provision of State Services.[12]

2.3 The Fixed Wireless Access Local Area ("FWALA") licensing framework, initiated by ComReg in 2003[13], has helped facilitate the provision of wireless broadband (WBB) services across Ireland. This has been particularly beneficial for the provision of these services in small towns and rural areas, while services are also provided in urban and sub-urban area.

2.4 There are currently thirteen 3.6 GHz FWALA operators, who together hold a total of 230 licences, providing services in the band to approximately 21,655 customers[14].

[11] Excluding the guard band 3 400 – 3 410MHz.

[12] State Services relate to airborne communication systems consisting of microwave links from aircraft to fixed and mobile receiving stations located around Ireland. The operation of these transmissions is generally transitory in nature.

[13] The regulations governing the issue of Fixed Wireless Access Local Area licences are the Wireless Telegraphy (Fixed Wireless Access Local Area licence) Regulations, 2003 (S.I. 79 of 2003) and Wireless telegraphy (Fixed Wireless Access Local Area licence) (amendment) Regulations, 2003 (S.I. 530 of 2003).

[14] This estimate is based on data from ComReg's latest Q1 2016 Quarterly Report. ComReg notes that it only collects information from FWALA providers that have annual turnover above €500,000 and thus accounts for 8 of the 13 3.6 GHz operators, hence the quoted figures may not accurately represent the total 3.6 GHz Band usage.

2.5 At a European level, the band has been fully harmonised for terrestrial electronic communications services (ECS), mainly targeting the provision of WBB services, since 2008 with European Commission ("EC") Decision 2008/411/EC. The more recently adopted EC Decision 2014/276/EU further strengthens the harmonisation of the band in Europe and its adoption is mandatory for all Member States including Ireland. Throughout the remainder of this document, the two decisions are referenced as "3.6 GHz EC Decision". Where ComReg references the specific 2008 or 2014 EC Decision, the term "2008 3.6 GHz EC Decision" or "2014 3.6 GHz EC Decision" is used, respectively.

2.6 The 3.6 GHz Band is considerably higher in frequency than the traditional, "core" mobile telecommunications bands assigned in Ireland (i.e. 800 MHz, 900 MHz, 1800 MHz and 2.1 GHz) giving it comparatively less favourable propagation characteristics for mobile applications. These limiting characteristics may have, so far, reduced the interest from mobile operators generally and limited the deployment of mobile services in the band internationally. In addition, the number of mobile devices available remains low relative to other bands.[15]

2.7 The 3.6 GHz Band has, however, been identified by the Radio Spectrum Policy Group ("RSPG")[16] as a suitable band for addressing the strategic challenges facing Europe in addressing the growing spectrum demand for wireless broadband[17]. This is recognised in the 3.6 GHz EC Decision. Further, the RSPG draft opinion on spectrum related aspects for next-generation wireless systems (5G) has identified the 3.6 GHz Band as the primary band suitable for the introduction of 5G in Europe, even before 2020[18], and the suitability of the current harmonised technical conditions in the 3.6 GHz Band for 5G is being assessed at a European level[19]. Given the quantum of spectrum in the band, the preferred TDD channelling arrangement[20] and developments at European level, the 3.6 GHz Band could be suitable for addressing mobile capacity

[15] The latest report from the global mobile suppliers association (GSA) on the status of the device ecosystem states that 64 LTE TDD devices are available for the 3.6 GHz Band as of 7 April 2016. While ComReg notes that this figure is relatively low compared to other bands (1136 in the 900 MHz band) it represents a 94% increase since November 2015.

[16] RSPG Website - http://rspg-spectrum.eu

[17] RSPG Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband - 13 June 2013 Document RSPG13-521 rev1

[18] DRAFT RSPG Opinion on spectrum related aspects for next-generation wireless systems (5G) http://rspg-spectrum.eu/. This is open for public consultation and the deadline for contributions is 31 July 2016.

[19] This was agreed at the 42nd ECC Plenary Meeting in Stockholm, 14-17 June 2016. http://cept.org/ecc/groups/ecc/news/42nd-ecc-plenary-meeting-14-17-june-2016-stockholm/

[20] The 2014 3.6 GHz EC Decision states that Time Division Duplex (TDD) shall be the preferred duplex mode of operation in the 3 400 - 3 600 MHz sub-band and the duplex mode of operation in the 3 600 – 3 800 MHz sub-band.

constraints or introducing new 5G services for operators with a portfolio of spectrum holdings, in addition to being a core band for providing fixed WBB services for other operators.[21]

### 2.1.2 Overview of relevant ComReg publications relating to its 3.6 GHz Band award

2.8 ComReg first signalled its intention to end the existing Fixed Wireless Access Local Area ("FWALA") licensing regime in the 3.6 GHz Band back in 2010 with a view to awarding new rights of use in the band from 2017 onwards. An overview of the key publications of relevance between then and now is provided below.

#### Document 10/29

2.9 In April 2010, ComReg highlighted important issues with the FWALA licensing scheme operating in the 3.6 GHz Band.[22] In particular, ComReg noted that the existing licensing regime does not provide for mobile wireless access services in line with the 2008 3.6 GHz EC Decision. Accordingly, ComReg made clear that existing FWALA licences in the band would not be renewed or extended beyond 31 July 2017.[23]

#### Document 14/101[24]

2.10 On 30 September 2014, ComReg published a consultation setting out its preliminary proposals on the details of a competitive award process for spectrum rights of use in the 700 MHz, 1.4 GHz, 2.3 GHz, 2.6 GHz and 3.6 GHz Bands. ComReg proposed the release of all of the above bands in the same award process, whilst noting certain peculiarities regarding the 3.6 GHz and 700 MHz bands which would require further assessment before coming to firm proposals[25].

2.11 For example, ComReg noted that, while there were potential benefits to the inclusion of the 3.6 GHz Band in the award process being considered in Document 14/101, the band also had certain characteristics (e.g. likely interest

[21] Fixed WBB services are also provided in Ireland via the licensed 10.5 GHz and 26 GHz bands and the licence-exempt 2.4 GHz and 5.8 GHz bands.

[22] Document 10/29 *"Fixed Wireless Access Local Area Licensing End date of the FWALA licensing scheme in the 3.6 GHz Band".*

[23] See also Section 5.2 of ComReg Document 11/03 for further consideration of this issue.

[24] ComReg Document 14/101 *"Spectrum award - 2.6 GHz band with possible inclusion of 700 MHz, 1.4, 2.3 and 3.6 GHz Bands"*.

[25] See, for example, paragraphs 3.74, 3.75 and Section 5.6 of Document 14/101.

from different types of users) which would differentiate it from, and might justify its separate treatment to, the other bands being considered for inclusion.

2.12 The responses received to Document 14/101 encompassed a wide range of issues. However, one of the more prominent issues raised by respondents related to the inclusion of the 3.6 GHz Band in the proposed award process. In particular, respondents highlighted the differences between the 3.6 GHz Band and the other bands being considered for inclusion and, a number of respondents strongly favoured the release of the 3.6 GHz Band in a separate award process.

### Document 14/126[26]

2.13 The EC's State Aid Guidelines on the rapid deployment of broadband networks[27] (SAG) identify that national regulatory authorities, such as ComReg, can have a role in assisting Member States, in particular, in the design of appropriate access obligations relating to State aid broadband projects. In that context, on 4 December 2014, ComReg issued a call for input with regard to the regulatory implications of the Government's National Broadband Plan. A number of the respondents to that call for input made submissions concerning radio spectrum-related matters, including in respect of the 3.6 GHz Band. ComReg took the latter submissions into account in the preparation of Document 15/70.

### Document 15/14[28]

2.14 In light of the submissions received to Documents 14/101 and 14/126, on 16 February 2015 ComReg published an Information Notice indicating that it intended to consider the possible release of rights of use in the 3.6 GHz Band in a separate competitive award process and further consult on this matter in the summer of 2015.

### Document 15/70[29]

2.15 On 10 July 2015, ComReg issued Document 15/70 being, firstly, a response to consultation dealing with certain issues raised by respondents to Documents 14/101 and 14/126 relevant to the release of the 3.6 GHz Band and, secondly,

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[26] Document 14/126 *"National Broadband Plan Call for Input on Regulatory Implications*".

[27] *"EU Guidelines for the application of State Aid rules in relation to the rapid development of broadband networks"* (2013/C 25/01).

[28] Document 15/14 "Spectrum award - 2.6 GHz band with possible inclusion of 700 MHz, 1.4, 2.3 and 3.6 GHz Bands (ComReg Document 14/101) – Update".

[29] Document 15/70 – *"Consultation on Proposed 3.6 GHz Band Spectrum Award"*.

a further consultation dealing specifically with the proposed award of the 3.6 GHz Band.

### Document 15/140[30]

2.16 On 22 December 2015, ComReg published Document 15/140 which: set out its response to the submissions received on Document 15/70; further consulted on detailed issues relating to the proposed award of the 3.6 GHz Band; and set out in draft form in chapter 8, a decision document (the "Draft Decision") concerning this proposed award. ComReg also indicated that it would set out further details on the specifics of the award by way of its subsequent publication of the draft Information Memorandum for this proposed award.

### Document 16/22[31]

2.17 On 16 March 2016, ComReg published in draft form the Information Memorandum for the proposed award of the 3.6 GHz Band, detailing the processes and procedures ComReg envisages it would employ in the implementation of its substantive proposals as detailed in its Draft Decision.

## 2.1.3 ComReg's consideration of further submissions received in relation to the National Broadband Plan

### Summary of ComReg's view in Document 15/140

2.18 In Document 15/140, ComReg provided additional clarity in respect of certain overarching concerns raised by some respondents to Document 15/70, in particular with respect to the interaction between ComReg's role as spectrum manager on the one hand and National Broadband Plan (NBP) and the SAG on the other.

2.19 ComReg provided, in section 2.1.4 of Document 15/140, a summary of the pertinent points on this matter and in Annex 6 of a detailed assessment and response to the individual submissions received.

### Views of respondents to Document 15/140

2.20 ComReg received two further submissions in response to Document 15/140 on this matter (from Imagine and Ripplecom).

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[30] Document 15/140 – *"Response to Consultation and draft Decision on Proposed 3.6 GHz Band Spectrum Award".*

[31] Document 16/22 – *"Draft Information Memorandum - Proposed 3.6 GHz Band Spectrum Award".*

2.21 The detail of Imagine's submission is as set out on pages 1-6 of its response to Document 15/140[32]. In summary Imagine reiterated its view with regard to how ComReg's award proposals should align with the NBP citing the Digital Agenda for Europe, the SAG and the purported obligations of ComReg as the national regulatory authority (NRA), under the SAG. Imagine also reiterated that ComReg, in its view, has failed to recognise the "NGA Market" as the relevant market in the wider and convergent fixed and wireless context and that ComReg in contravention to its remit and obligations, has failed to ensure effective competition in the market in terms of new entrants, infrastructure investment and innovation.

2.22 Ripplecom submits that it is opposed to the 3.6 GHz Band spectrum award process being run in parallel with the NBP procurement process. It further submits, that it would have preferred if the 3.6 GHz spectrum award process was completed prior to the running of the NBP process because companies operating on wireless platforms would know if they had access to licensed spectrum in advance of the NBP procurement process.

## ComReg's assessment

2.23 ComReg has considered the views submitted by Imagine and notes that these matters have been comprehensively addressed by ComReg in Document 15/140 and, in particular, in section 2.1.4, section 3.3 and Annex 6 of same. ComReg does not propose to revisit that assessment here.

2.24 In relation to Ripplecom's views, ComReg considers the following points to be relevant:

- ComReg is completely supportive of the NBP, a Government initiative to deliver high speed broadband to citizens and businesses in areas of Ireland where it is uneconomic for the commercial sector to invest in the provision of same;
- ComReg is fully engaged with the Government in fulfilling its role as the expert NRA and refers in particular to its observer status on the NBP's Steering Group Committee;
- However, ComReg has no decision making role with regard to the design, development or award of contracts under the NBP;

[32] Certain sections of Imagine's response to Document 15/140 on this matter, were also appended to its letter of 21 June 2016, published as Document 16/55, with emphasis added to certain parts of that response.

- ComReg is the statutory body for the management of the radio spectrum and must carry out its role in an independent manner and in accordance with its statutory remit; and

- Finally, ComReg observes that uncertainty around spectrum does not preclude wireless operators from being included on the High Speed Broadband 2020 map or from participating in the NBP procurement process.[33]

2.25 In light of the above, ComReg does not consider that the further submissions received from Ripplecom or 3IHL require an amendment to its proposals set out in Document 15/140. ComReg does not, therefore, consider these submissions, as they relate to the NBP, further in this document.

[33] See, in particular, the State Aid Compliance report at http://www.dcenr.gov.ie/communications/en-ie/Broadband/Pages/Intervention%20Strategy%20Updated%20December%202015-Reports.aspx (of July 2015 and December 2015). Specifically:

*"Uncertainty around spectrum does not preclude these operators [wireless operators], however, from being on the High Speed Broadband 2020 Map or from participating in the tender process. All future investors and operators were asked to submit concrete plans as to the intended roll-out of their networks. The credibility of these plans have been assessed assuming that spectrum was available. In other words uncertainty around future spectrum availability has not been used as a criterion to assess the credibility of a plan."* (page 37)

Chapter 3

# 3 RIA

## 3.1 Introduction and background

3.1 Annex 5 and Chapter 3 of Document 15/140 set out ComReg's draft 'Spectrum for Award' RIA and draft 'Assignment Process' RIA having regard to, among other things, the views received in response to the draft RIAs set out in Document 15/70.

### 3.1.1 'Spectrum for Award' RIA

3.2 In respect of the draft 'Spectrum for Award' RIA, ComReg identified the following regulatory options:

- Option 1 – a single multi-band award process as proposed in Document 14/101;
- Option 2 – an award of the 3.6 GHz Band alone; and
- Option 3 – an award of the 3.6 GHz Band with the 2.3 GHz and/or 2.6 GHz bands.

3.3 ComReg was of the preliminary view that, on balance, Option 2 (i.e. the release of the 3.6 GHz Band alone in a separate award process) was the preferred option in terms of its impact on stakeholders, competition and consumers.

### 3.1.2 'Assignment Process' RIA

3.4 In relation to the revised draft 'Assignment Process' RIA, ComReg noted that this was informed by, among other things:

- ComReg's consideration of administrative assignment proposals received in response to Consultation 15/70 in the context of service- and technology-neutrality and non-discrimination[34];
- ComReg's general observations regarding administrative assignment proposals and administrative assignment format[35]; and

[34] See Para 3.21 to 3.34 of Document 15/140.

[35] See Para 3.35 to 3.62 of Document 15/140.

- ComReg's general observations on auction format[36].

3.5 In light of these considerations, ComReg identified the following regulatory options:

- Option 1 – Regional assignment of all available spectrum in the 3.6 GHz Band using a Combinatorial Clock Auction (CCA);
- Option 2 – Regional assignment of some (e.g. 150 MHz) or all available spectrum in the 3.6 GHz Band by way of administrative assignment to FWA providers; and
- Option 3 – National assignment of 150 MHz (up to the proposed spectrum competition cap[37]) in the 3.6 GHz Band by way of administrative assignment to an FWA provider, and the remaining 200 MHz of spectrum to be assigned in line with Option 1.

3.6 On the basis of its assessment of each of these options, ComReg's preferred option was Option 1 (i.e. to offer all of the available spectrum in the 3.6 GHz Band on a regional basis using a CCA).

3.7 In light of the above, ComReg's overall preferred option was that the 3.6 GHz Band should be assigned by way of auction with no other bands included in the auction (the "Preferred Option").

### 3.1.3 Assessment against functions, objectives and duties

3.8 ComReg then assessed the Preferred Option against those functions, objectives and duties relevant to its management of the radio frequency spectrum.

3.9 For the purpose of this assessment, ComReg considered the following statutory provisions to be particularly relevant to the management of the radio frequency spectrum:

- general provisions on competition;
- contributing to the development of the internal market;
- promoting the interest of users within the Community;
- efficient use and effective management of spectrum;

[36] See Para 3.63 to 3.83 of Document 15/140.

[37] See Chapter 5 for a discussion of spectrum competition caps.

- regulatory principles;
- certain Policy Directions and Policy Statements; and
- general guiding principles (in terms of spectrum management, setting of fees and licence conditions):
  - objective justification;
  - transparency;
  - non-discrimination; and
  - proportionality.

3.10 Following this assessment, ComReg was of the preliminary view that the Preferred Option accords with its functions, objectives and duties.

## 3.2 Views of respondents to 15/140

### 3.2.1 'Spectrum for Award' RIA

3.11 ComReg received one response from Vodafone, in relation to the 'Spectrum for Award' RIA. Vodafone submits:

"*We agree the 3.6 GHz should be assigned* ***using an auction independent of other bands*** *(but this should not stop other bands being auctioned at the same time or in overlapping timescales*" [Emphasis added]

#### ComReg assessment

3.12 It appears from this submission, and the highlighted text in particular, that Vodafone agrees with the preferred option identified by the draft 'Spectrum for Award' RIA (i.e. the award of 3.6 GHz spectrum in a separate award process).

3.13 In relation to Vodafone's suggestion that this should not stop other bands being auctioned at the same time, ComReg refers to sections 3.1 and 3.3.3 of Document 16/49 and the appropriate prioritisation of ComReg's spectrum work activities.

#### ComReg's final position

3.14 ComReg did not receive any other submissions from respondents on the above proposals, nor is ComReg aware of any other information which would warrant an amendment to these proposals.

3.15 Accordingly, ComReg's final 'Spectrum for Award' RIA, set out in section 3.3 below, is substantially the same as that set out in Document 15/140.

### 3.2.2 'Assignment Process' RIA

3.16 ComReg received three responses in relation to the draft 'Assignment Process' RIA set out in Document 15/140 (from Vodafone, Imagine and Ripplecom).

3.17 Vodafone notes ComReg's comprehensive analysis of the possible assignment options and agrees that an auction is the best way of assigning the 3.6 GHz spectrum.

3.18 Imagine submits that the 3.6 GHz EC Decision, in its view, does not prevent ComReg from allocating specific frequency blocks to facilitate clearly different uses for fixed, nomadic and mobile services, which it contends would also comply with the service- and technology-neutral requirement.

3.19 Imagine also submits that the proposed auction process is flawed, in its view, and refers to Vodafone's response to Document 16/22, contending that the views of Vodafone further validate its submissions. In particular, it argues that:

- the proposed spectrum award is inappropriate, in its view, as it:
  - does not ensure effective competition in the fixed market and the market for NGA services; and
  - would crowd out investment and distort competition in the market;
- fixed wireless and mobile are distinct markets;
- the different economics of the mobile and fixed markets, if not treated separately, discriminates against fixed technology and services.

3.20 Ripplecom submits that:

- administrative assignments could fulfil the objective to have active competition in the marketplace; and
- as stated in its previous submissions, the auction process, in its view, will favour the larger ISPs.

#### ComReg Assessment

3.21 ComReg notes that the views submitted by Imagine have been addressed extensively in Document 15/140. In that regard, ComReg would highlight, in particular in:

- section 3.4 (Revised draft 'Assignment Process' RIA):

- where Options 2 and 3 of the draft 'Assignment RIA' (Chapter 3) considered the assignment of some or all of the available 3.6 GHz spectrum by way of administrative assignment to FWA providers; and
- where the potential impacts on competition and consumers of such options were considered;

- Part B of Annex 6 which addresses Imagine's views regarding the relevant market (including its submissions that ComReg has failed to define fixed NGA services as the relevant market);
- section 2.1.4 of Chapter 2 and Part A of Annex 6 which considers, among other things, the service- and technology-neutrality requirements of the 3.6 GHz Decision; and
- section 3.3 (Revised draft 'Assignment Process' RIA – Background) which considers among other things:
  - the principles and obligations in respect of service- and technology-neutrality; and
  - non-discrimination.

3.22 In relation to Ripplecom's submission, ComReg notes that:

- the issue of administrative assignments and the impact on competition were addressed by ComReg in the draft 'Assignment RIA' of Document 15/140, which considered the assignment of some or all of the available 3.6 GHz spectrum rights by way of administrative assignment; and
- its concerns in respect of complexity favouring larger operators were addressed extensively in Annex 8 of Document 15/140. In particular, ComReg noted that it will assist all bidders by developing workshops, seminars and providing the tools necessary for bidders to simulate auction conditions.

### ComReg's final position

3.23 ComReg did not receive any other submissions from respondents on the above matters, nor is ComReg aware of any other information which would warrant an amendment to these proposals.

3.24 Accordingly, ComReg's final 'Assignment Process' RIA, set out in section 3.4 below, is substantially the same as that set out in Document 15/140.

### 3.2.3 Assessment of the Preferred Option against functions, objectives and duties

3.25 ComReg did not receive any submissions on its assessment of the Preferred Option against its functions, objectives and duties as set out in Chapter 3 of Document 15/140. Accordingly, ComReg's final assessment, set out in section 3.7 below, is substantially the same as that set out in Document 15/140.

3.26 In light of the above assessment, the remainder of this chapter sets out ComReg's final RIAs and its final assessment of the Preferred Option against its functions, objectives and duties.

## 3.3 General RIA Framework

### 3.3.1 RIA Framework

3.27 In general terms, a RIA is an analysis of the likely effect of a proposed new regulation or regulatory change, and, indeed, of whether regulation is necessary at all. A RIA should help identify the most effective and least burdensome regulatory option and should seek to establish whether a proposed regulation or regulatory change is likely to achieve the desired objectives, having considered relevant alternatives and the impacts on stakeholders. In conducting a RIA, the aim is to ensure that all proposed measures are appropriate, effective, proportionate and justified.

### 3.3.2 Structure of a RIA

3.28 As set out in ComReg's RIA Guidelines[38], there are five steps in a RIA being:

Step 1: Identify the policy issues and identify the objectives.

Step 2: Identify and describe the regulatory options.

Step 3: Determine the impacts on stakeholders.

Step 4: Determine the impact on competition.

Step 5: Assess the impacts and choose the best option.

3.29 A focus of a RIA is to assess the impact of the proposed regulatory options available to ComReg on stakeholders (Step 3). A precursor to the subsequent steps in the RIA, therefore, is to identify the relevant stakeholders.

[38] See Document 07/56a - Guidelines on ComReg's approach to Regulatory Impact Assessment - August 2007.

### 3.3.3 Identification of stakeholders

3.30 Stakeholders consist of two main groups:

- consumers – which, for the purposes of the present RIAs, includes both business and residential end users of spectrum; and
- industry stakeholders.

3.31 There are a number of key industry stakeholders in relation to the matters considered in this chapter:[39]

- existing service providers;
- licensees with existing spectrum rights of use in the 3.6 GHz Band (e.g. FWALA licensees);
- parties who currently provide services using other spectrum (licensed or license-exempt) for whom the spectrum being considered for inclusion in the award may be of particular interest to satisfy existing and potential demand (e.g. mobile network operators or other wireless broadband providers); and
- potential new entrants who do not currently provide any services using spectrum in the State. ComReg is of the view that such potential entrants would most likely wish to deploy wireless broadband (WBB)[40].

3.32 The focus of Step 4 is to assess the impact on competition of the proposed regulatory options available to ComReg. In that regard, ComReg notes that it has various statutory, objectives, regulatory principles and duties which are relevant to the issue of competition.

3.33 Of themselves, the various RIA guidelines and the RIA Policy Direction[41] provide little guidance on how much weight should be given to the positions and views of each stakeholder group (Step 3), or the impact on competition (Step 4). Accordingly, ComReg has been guided by its statutory objectives which it is

[39] ComReg acknowledges that other stakeholders have an interest in the 3.6 GHz Band including the State (in respect of State services provided using spectrum in the Band), entities using the adjoining spectrum and equipment manufacturers. However, it does not appear to ComReg that these stakeholders would be significantly impacted by how the 3.6 GHz Band is assigned. Accordingly, they are not considered further in this chapter.

[40] While other ECS services can also be provided in the 3.6 GHz Band and the other bands discussed in Document 14/101, WBB is generally considered to be the most likely use. Indeed, the relevant EC harmonising decision (2008 3.6 GHz EC Decision), emphasises that "*the services provided in this frequency band should mainly target end-user access to broadband communications*". Accordingly, this RIA focuses the likely demand for this band and other bands in the context of WBB.

[41] See Policy Direction Number 6.

obliged to pursue when exercising its functions. ComReg's statutory objectives in managing the radio frequency spectrum, include:

- the promotion of competition;
- contributing to the development of the internal market; and
- promoting the interests of users within the Community.

3.34 In this document, ComReg has adopted the following structure in relation to Step 3 and Step 4 – the impact on industry stakeholders is considered first, followed by the impact on competition, followed by the impact on consumers. The order of this assessment does not reflect any assessment of the relative importance of these issues but rather reflects a logical progression. For example, a measure which safeguards and promotes competition should also, in turn, impact positively on consumers. In that regard, the assessment of the impact on consumers draws substantially upon the assessment carried out in respect of the impact on competition.

## 3.4 Final 'Spectrum for Award' RIA

### 3.4.1 Identify the policy issues and identify the objectives (Step 1)

3.35 All rights of use in the 3.6 GHz Band awarded under the FWALA licencing scheme are due to expire on or before 31 July 2017. In Document 14/101[42], ComReg began the process of consulting on the award of new rights of use in this band and proposed its release as part of a multi-band award process. However, there was limited support for this proposal amongst respondents to that consultation. In particular, there was broader support for releasing this band in a separate award process. As a result, ComReg has given further consideration as to how to approach releasing rights of use in this band. Accordingly, the 3.6 GHz Band is the focus of the policy issues to be considered below.

#### Policy Issues

3.36 ComReg is of the view that the primary policy issue in the Spectrum for Award RIA is to consider whether to release the 3.6 GHz Band in a multi-band award process, as proposed in Document 14/101, or in a separate award process (either on its own or with additional bands).

3.37 In relation to this policy issue, ComReg sets out below some relevant high level observations which inform the identification of valid regulatory options.

[42] Document 14/101 – "*Spectrum award - 2.6 GHz band with possible inclusion of 700 MHz, 1.4, 2.3 and 3.6 GHz Bands"*.

3.38 It is generally agreed that the 3.6 GHz Band is primarily suitable for the provision of WBB services. Indeed, as noted previously, this is emphasised in the 3.6 GHz EC Decision and WBB is the main use to which the band is put (i.e. FWALA licensees). Accordingly, this RIA focuses on the likely demand for this band and other bands in the context of WBB.

3.39 The 3.6 GHz Band has characteristics which somewhat set it apart from other bands which were considered for inclusion in Document 14/101. In particular:

- unlike other bands, this band can be considered "brownfield" in terms of the provision of wireless broadband services;
- compared to the other bands, this band has the most spectrum available for release, making it particularly suitable for the potential deployment of high speed broadband services by multiple wireless broadband providers;
- compared to most of the other bands considered in Document 14/101 (i.e. 2.3 GHz, 2.6 GHz and 700 MHz) the LTE device ecosystem for the 3.6 GHz Band is not well developed.[43] The status of the LTE device ecosystem is one of the factors that interested parties are likely to consider in assessing the attractiveness or suitability of a band for the deployment of LTE services. That said, a FWA provider will likely select all equipment (base stations and consumer premises equipment). Accordingly, a small range of equipment may be sufficient, while a mobile broadband provider is likely to require that a wide range of user terminals support a band (as users select their own terminals). ComReg recognises that other technologies compliant with the relevant EC Decisions (e.g. WiMAX) may also be deployed in these bands but notes that a number of responses to Document 14/101 and Document 15/70 identified LTE as the likely technology to be deployed in the 3.6 GHz Band in the coming years; and
- of all the bands considered in Document 14/101, this band has the least favourable propagation characteristics in terms of delivering coverage.

3.40 Of the other bands considered in Document 14/101, the timing of the availability of three of those bands is currently known (i.e. the 1.4 GHz, 2.3 GHz and 2.6 GHz bands). The 1.4 GHz and 2.3 GHz bands are "greenfield" bands and could be made available now, while the 2.6 GHz band became available recently when

[43] In April 2016, the Global mobile Suppliers Association (GSA) indicated that there were 64 LTE TDD devices in the 3.6 GHz Bands (Bands 42 and 43). For the other bands, the GSA indicated that there were 2,638 LTE FDD devices in the 2.6 GHz band, 1,435 LTE TDD devices in the 2.3 GHz band (Band 40), 1,207 LTE TDD devices in the 2.6 GHz band (Band 38) and 248 LTE FDD devices in the 700 MHz band. The 1.4 GHz band is not mentioned in the GSA report.
Source: Status of the LTE Ecosystem. 7 April 2016

MMDS licences expired in April 2016. Accordingly, all three bands will be available when the 3.6 GHz Band becomes available from 31 July 2017 and could therefore be considered for inclusion alongside the 3.6 GHz Band. On the other hand, further clarity on the timing availability of the 700 MHz band is required[44], and this weighs against releasing the 700 MHz band in the same award process as the 3.6 GHz Band, particularly given the impending FWALA licence expiry date of 31 July 2017 and the general desire amongst industry stakeholders (particularly existing licensees) to have this band re-assigned as soon as possible.

3.41 In addition, as observed by respondents to Document 14/101, given its favourable propagation characteristics and international harmonisation, the 700 MHz band could be considered a focal spectrum band in a future spectrum award. Therefore, in considering the potential inclusion of the other spectrum bands (1.4 GHz, 2.3 GHz and 2.6 GHz) in an award process with the 3.6 GHz Band, ComReg remains cognisant of what impact their inclusion/exclusion would have on a potential future award process which might have the 700 MHz band as the focal spectrum band.

3.42 Focusing firstly on the 1.4 GHz band, while this band has some characteristics which suggest that it might be appropriate to include it in an award process with the 3.6 GHz Band (e.g. both bands might be used for LTE in the future), on balance its characteristics would weigh against releasing it in a separate award process with the 3.6 GHz Band. For example:

- while there may be complementarity between paired 2.6 GHz frequencies and the 1.4 GHz band, this is less clear with the 3.6 GHz Band given the differences in propagation;
- while noting that the question was not specifically asked, there was little or no indication in the responses to Document 14/101 that the 1.4 GHz band should be included in an award with 3.6 GHz spectrum;
- the band is much closer in propagation characteristics to the sub-1 GHz (or coverage bands) than to the 3.6 GHz Band and is therefore potentially most beneficially used as for complementary downlink for FDD networks operating sub-1 GHz spectrum;
- further, the 2015 EC Decision on the 1.4 GHz band[45] allows Member States to set an increased in-block power limit such that the 1.4 GHz band could

[44] See Section 3.3.2 of Document 16/49.

[45] EC Decision (EU) 2015/750 of 8 May 2015 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015D0750&from=EN

be used in aggregation with spectrum in lower frequency bands. This possibility was also noted by one respondent to Document 14/101;

- as noted in Qualcomm's response to Document 14/101 (page 16), the joint award of the 1.4 GHz and 700 MHz bands would enable a potential new entrant or an MNO without spectrum in the 900 MHz or 800 MHz bands to fully benefit from the 1.4 GHz band;

- the ECC 1.4 GHz Decision[46] refers to this band specifically as a mobile broadband system and calls it "*a strategic tool to tackle the growing mobile data traffic asymmetry*". This supports the view that it should be included in an award where there is likely to be stronger demand from MNOs. This is more likely to be the case in an award of the 700 MHz band than a separate award of the 3.6 GHz Band; and

- as of April 2016, the Global Mobile Suppliers Association (GSA) indicated that there were no LTE devices available in the 1.4 GHz band[47].

3.43 For these reasons, the 1.4 GHz band is not, in ComReg's view, suitable for inclusion in a separate award of the 3.6 GHz Band (as distinct from the 700 MHz band) and is not therefore considered further in this RIA.

3.44 Focusing on the 2.3 and the 2.6 GHz bands, the characteristics of these bands are such that these bands could be considered substitutable with the 3.6 GHz Band as:

- all three bands are, or will be in the short term, harmonised for both mobile and fixed communications networks with a particular emphasis on the provision of WBB services[48]; and

- for mobile services these bands (i.e. the 2.3 GHz, 2.6 GHz and 3.6 GHz Bands) are also suitable for capacity purposes in areas where there is constant or periodic spikes in demand (e.g. in urban areas).

3.45 On the other hand, the somewhat more favourable propagation characteristics of the 2.3 GHz and 2.6 GHz bands and the considerably better LTE device ecosystem would, in ComReg's view, be better suited to a future award process which could have the 700 MHz band as the focal spectrum band.

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[46] ECC Decision (13)03 - Electronic Communications Committee decision to harmonise the use of the frequency band 1452-1492 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL).

[47] Source: Status of the LTE Ecosystem. 7 April 2016 http://gsacom.com/paper/status-of-the-lte-ecosystem-3745-lte-devices-announced-by-339-suppliers/

[48] See, the ECC 2.3 GHz Decision, the EC 2.6 GHz Decision and the 3.6GHz EC Decision.

3.46 Unlike the 700 MHz and 1.4 GHz bands, it is however less obvious that the 2.3 GHz and 2.6 GHz bands should be excluded from this RIA.

3.47 In light of the above, if the 3.6 GHz Band is considered suitable for release in a separate award process, it would appear appropriate to assess whether the 2.3 and/or the 2.6 GHz bands should be included in that award process. This is considered further below.

## Objectives

3.48 The focus of this RIA is to assess the impact of the proposed measure(s) (see regulatory options below) on stakeholders, competition and consumers. In that way, it allows ComReg to identify and implement the most appropriate and effective means to assign spectrum rights of use, while allowing ComReg to achieve its objectives of:

- assigning rights of use in the 3.6 GHz Band and, if appropriate, one or more other bands;
- assigning rights of use in the 3.6 GHz Band in line with the 3.6 GHz EC Decision and other relevant legislation;
- taking appropriate measures in advance of licence expiry in the 3.6 GHz Band;
- providing further clarity on the likely availability of spectrum for release in other relevant bands; and
- promoting the interests of the electronic communications sector and, in turn, the economic development of the State.

3.49 ComReg also aims to design and carry out this assignment process in accordance with its broader statutory objectives (set out in Annex 2), including, but not limited to, the promotion of competition in the electronic communications sector.

3.50 ComReg's other overarching objectives are to contribute to the development of the internal market and to promote the interests of users within the Community. ComReg also notes that, in achieving its objectives, its ultimate aim is to choose regulatory measures which maximise the benefits for consumers in terms of price, choice and quality.

3.51 Unlike other bands considered in this RIA, the 3.6 GHz Band is essentially "brownfield" in terms of the provision of wireless broadband services. There are

currently 21,655[49] existing customers receiving services which are provided using 3.6 GHz Band who may be at risk of losing their service on licence expiry[50] and ComReg has a general objective to take all reasonable measures aimed at promoting the interests of users. In this regard, ComReg observes that some respondents to this consultation process, referencing the above statutory objective, appear to suggest that ComReg's design of the proposed award process should be influenced by the impact on these existing customers above all else. While ComReg has considered these views, the objective of promoting the interests of users cannot however be read in isolation and must be balanced against other principal objectives including the promotion of competition which includes encouraging efficient use and ensuring the effective management of radio frequencies. ComReg will therefore promote the interests of users, but only to the extent that it is proportionate vis-à-vis its other statutory objectives.

3.52 Having identified the above policy issue and objectives, the following section identifies the regulatory options and compares those options in terms of their impact on stakeholders and competition.

### 3.4.2 Identify the Regulatory Options (Step 2):

- Option 1 – a single multi-band award process as proposed in Document 14/101;
- Option 2 – an award of the 3.6 GHz Band alone;
- Option 3 – an award of the 3.6 GHz Band with the 2.3 GHz and/or 2.6 GHz bands.

### 3.4.3 Impact on Stakeholders and Competition (Steps 3 and 4)

3.53 The focus of this section of the RIA is to assess the impact of the above regulatory options on:

- industry stakeholders (being existing operators and potential new entrants),
- competition, and

[49] This estimate is based on data from ComReg's latest Q1 2016 Quarterly Report. ComReg notes that it only collects information from FWALA providers that have annual turnover above €500,000 and thus accounts for 8 of the 13 3.6 GHz operators, hence the quoted figures may not accurately represent the total 3.6 GHz Band usage.

[50] ComReg would note that there are specific consumer circumstances relating to the 3.6 GHz Band where the existing WBB customers of 3.6 GHz licensees may not have an alternative comparable fixed broadband service in their area at the time of licence expiry. This could leave such customers without a fixed broadband service. In that regard, ComReg notes that a distinction can be drawn between this situation and the MMDS licence expiry in the 2.6 GHz band, where the MMDS customers are likely to have alternative comparable TV platform providers to turn to, such as Sky Ireland, Saorview, FreeSat, etc.

- consumers.

3.54 In section 3.3.2 (under the heading ‘Demand for Spectrum’) of Document 14/101, ComReg set out some useful background information concerning the characteristics of, and developments in, the demand for the spectrum bands (including the 3.6 GHz Band) that were under consideration. ComReg does not propose to repeat that information here except to note that such information remains relevant to the current process, at least to the extent that it assists ComReg in understanding the likely attitudes of industry stakeholders and consumers to the release of the 3.6 GHz Band.

3.55 ComReg sets out below a comparative analysis of the three spectrum band award options outlined above, in terms of their impact on stakeholders, competition and consumers.

## Impact on Industry Stakeholders

3.56 As noted above, industry stakeholders can be split between those operators that are currently active in the electronic communications sector and potential new entrants that may be considering entry into the electronic communications sector in the State.

### Option 1 (Multi-band award) versus Option 2 (3.6 GHz only)

3.57 In Chapter 3 of Document 15/140, ComReg summarised and assessed the submissions received on this issue in response to Document 15/70 and noted that there was broad support for holding a separate award process for the 3.6 GHz Band.

3.58 In light of these submissions, the responses to Document 15/140 and in the absence of information to the contrary, ComReg considers that industry stakeholders would, on balance, prefer for the 3.6 GHz Band to be released in a separate award process.

### Option 2 (3.6 GHz Band only) versus Option 3 (3.6 GHz Band and 2.3 and/or 2.6 GHz bands)

3.59 ComReg is not considering the possibility of releasing the 2.3 GHz and/or the 2.6 GHz bands in a standalone award process. Unlike for the 3.6 GHz Band, such a possibility was not generally raised by respondents to this consultation process. Instead, ComReg currently intends to release these bands either as part of a multi-band award process involving the 3.6 GHz Band, or a multi-band award process involving the 700 MHz band (depending on the preferred option identified). The appropriate point of reference for the assessment here is therefore whether these bands would be better released with the 3.6 GHz Band on the one hand, or with the 700 MHz band (and the 1.4 GHz band) on the other.

3.60 In Document 15/70, ComReg noted that it was at that time unclear whether industry stakeholders would, on balance, prefer the inclusion of one or both of these bands in an award of the 3.6 GHz Band. However, ComReg did note that stakeholders seemed to acknowledge the differences between this band and other bands and the benefits of including the 2.3 GHz and 2.6 GHz bands in any award of the 700 MHz band. As noted above, there was broad support amongst respondents to Document 15/70 for holding a separate award process for the 3.6 GHz Band. The responses received to Document 15/140 did not provide any reasons for ComReg to change this view.

3.61 Accordingly, it would appear that, on balance, stakeholders would prefer Option 2 over Option 3.

## Impact on Competition

3.62 Where the demand for spectrum in different bands is interdependent, this may give rise to strong economic efficiency reasons for combining bands into an integrated award process to reduce the risk for interested parties and to provide maximum opportunity for different types of interested parties (with potentially different intended uses and technologies) including potential new entrants.

3.63 Encouraging the efficient use and ensuring the effective management of available spectrum should, in turn, promote competition on the relevant downstream markets.

### Option 1 (Multi-band award) versus Option 2 (3.6 GHz only)

3.64 Including substitutable and/or complementary spectrum in the same award (i.e. a multi-band award) can be efficient and lead to greater competition in the award process and more efficient entry. On the other hand, having a separate award process for the 3.6 GHz Band poses potential risks around creating artificial scarcity in that award process and/or in a subsequent multi-band award. This also poses risks around creating common value uncertainty for parties interested in spectrum across both award processes.

3.65 The extent of these potential risks is linked to the difficulties which interested parties may have in bidding in consecutive award processes. However, given the large amounts of spectrum available in both the 3.6 GHz Band and the other bands considered in this document, and the broad support expressed by interested parties for a separate award of the 3.6 GHz Band given its different characteristics (as detailed earlier in this Chapter), the potential risks described above would appear to be minimal.

3.66 In addition, releasing the 3.6 GHz Band in a multi-band award including the 700 MHz band would likely delay the award of new rights of use in this band beyond the FWALA licence expiry date of 31 July 2017. Given the large amount of

spectrum available in this band (along with its harmonisation across Europe), such delay could have an adverse impact on competition by delaying the availability of suitable spectrum for advanced wireless broadband services to both existing competitors and potential new entrants.

3.67 In light of the above, ComReg is of the view that, on balance, Option 2 is preferred to Option 1 in terms of the impact on competition.

### Option 2 (3.6 GHz Band only) versus Option 3 (3.6 GHz Band and 2.3 and/or 2.6 GHz bands)

3.68 It is important to note that there are, on the face of it, a number of reasons to consider releasing one or both of the 2.3 and 2.6 GHz bands with the 3.6 GHz Band. For example, like the 3.6 GHz Band, both of these bands:

- are higher frequency bands (what might be viewed as 'performance' or 'capacity' bands, depending on the operator);
- are available for release within a short time period[51]; and
- are harmonised or are in the process of being harmonised, for ECS services including WBB at EU level[52].

3.69 In addition, both of these bands have equipment and technology roadmaps which suggest suitability for the deployment of fixed and mobile broadband services in the foreseeable future. Indeed, as discussed earlier, the LTE device ecosystem for the 2.3 GHz and 2.6 GHz bands is considerably more extensive than the LTE device ecosystem for the 3.6 GHz Band.

3.70 The above factors suggest some substitutability between these bands and the 3.6 GHz Band. There are general benefits to including substitutable (and complementary) spectrum in the same award process. For example, this increases the ability of award participants to express a full suite of preferences, thereby enhancing the efficiency of the award outcome which, in turn, has a positive impact on competition. This benefit is particularly pronounced given the exponential growth in consumer demand for wireless data services and the consequent increased demand for wireless broadband spectrum.

3.71 However, there are also a number of potential drawbacks of Option 3 over Option 2, including that this would preclude the inclusion of the 2.3 GHz and 2.6 GHz spectrum bands in a potential future award process where the 700 MHz band could be the focal spectrum band. The benefits of including large amounts

[51] The 2.3 GHz band is largely a 'greenfield' band and thus available for release. In respect of the 2.6 GHz band, all existing MMDS licences in this band expired on 18 April 2016 and this band is thus available for release.

[52] See the ECC 2.3 GHz Decision and the EC 2.6 GHz Decision.

of complementary ‘capacity’ type spectrum in a future award of the 700 MHz band were described in Document 14/101. In particular, this would increase the potential for efficient new entry. In respect of MNO demand, optimal network configuration also often involves a mix of both coverage and capacity bands and operators should be enabled, where possible, to obtain spectrum rights which allows them to configure an optimal network. This would support the inclusion of ‘capacity’ type bands in an award of sub-1 GHz spectrum where possible.

3.72 Furthermore, there is already a significant amount of spectrum (350 MHz) available for release in the 3.6 GHz Band, and the additional benefits of adding large amounts of other spectrum to a 3.6 GHz award appear questionable.

3.73 It would therefore appear that the benefits to competition of releasing the 2.3 GHz and 2.6 GHz bands in a potential future award of the (complementary) 700 MHz band would outweigh the benefits of an earlier combined award with the 3.6 GHz Band.

3.74 In light of the above, ComReg is of the view that, on balance, Option 2 is preferred to Option 3 in terms of the impact on competition.

## Impact on Consumers

3.75 As noted previously, for the purposes of this RIA, consumers include both business and residential end users of services provided over spectrum.

3.76 It can be assumed that what is good for competition, and what promotes efficient investment in infrastructure is, in general, good for consumers. This is because increased competition between wireless service providers brings benefits to their customers in terms of price, choice and quality of services. Consumer demand for wireless data services has grown considerably in recent years and is expected to grow exponentially, in data volume terms, over the coming years. This has and will increase the demand for spectrum suitable for WBB services. The spectrum bands under consideration in this RIA are all suitable for the provision of wireless broadband.

### Option 1 (Multi-band award) versus Option 2 (3.6 GHz only)

3.77 To the extent that holding a separate award for the 3.6 GHz Band provides greater certainty around the future use of the band to existing end-users in that band, ComReg considers that they are likely to prefer Option 2 over Option 1.

3.78 To the extent that holding a separate award process for the 3.6 GHz Band can be expected to provide earlier certainty on the 3.6 GHz spectrum rights of use post licence expiry, ComReg considers that consumers in general are likely to prefer Option 2 over Option 1.

3.79 Furthermore, as noted above, ComReg is of the view that Option 2 is, on balance, preferable over Option 1 in terms of its impact on competition. In turn, it can be expected that the benefits of competition will be experienced by consumers in terms of price, choice and quality.

3.80 Accordingly, ComReg is of the view that Option 2 is preferred to Option 1 in terms of the impact on consumers.

#### Option 2 (3.6 GHz Band only) versus Option 3 (3.6 GHz Band and 2.3 and/or 2.6 GHz bands)

3.81 ComReg has not identified any obvious efficiency gain from the inclusion of the 2.3 GHz and/or 2.6 GHz band in a separate award with the 3.6 GHz Band. Indeed, ComReg has identified drawbacks in relation to the exclusion of one or both of these bands from any future award which included the 700 MHz band.

3.82 As noted above, ComReg is of the view that Option 2 is, on balance, preferable over Option 3 in terms of its impact on competition. In turn, it can be expected that the benefits of competition will be experienced by consumers in terms of price, choice and quality.

3.83 In that light and to the extent that the inclusion of these bands is capable of undermining competition and the potential for effective entry arising from a subsequent 700 MHz band award process, consumers of mobile services are unlikely to have a preference for the exclusion of one or other of these bands from an award process with the 700 MHz band.

3.84 Accordingly, ComReg is of the view that Option 2 is preferred to Option 3 in terms of the impact on consumers.

### 3.4.4 The 'Spectrum for Award' RIA: Assessment and the Preferred Option (Step 5)

3.85 In light of the above, ComReg is of the view that, on balance, Option 2 (i.e. the release of the 3.6 GHz Band alone in a separate award process) is the preferred option in terms of its impact on stakeholders, competition and consumers.

## 3.5 Final Assignment Process RIA

3.86 ComReg refers to discussion on the general RIA framework as described in section 3.3 above.

### 3.5.1 Identify the policy issues and identify the objectives (Step 1)

#### Policy issue

3.87 ComReg is of the view that the primary policy issue to be considered in the Assignment Process RIA is how best to assign rights of use in the 3.6 GHz Band, bearing in mind the four award outcomes discussed in paragraph 3.37 of Document 15/140.

#### Objectives

3.88 The focus of this Assignment Process RIA is to assess the impact of the proposed measure(s) (see regulatory options below) on industry stakeholders, competition and consumers. ComReg can then identify and implement the most appropriate and effective means by which to assign 3.6 GHz spectrum rights of use, while achieving its objectives of:

- assigning rights of use in the 3.6 GHz Band in line with the 3.6 GHz EC Decision and other relevant legislation;
- selecting those to whom such rights may be granted on the basis of objective, transparent, non-discriminatory selection criteria;
- minimising potential negative effects on existing consumer services by ensuring the continued availability of fixed wireless services where spectrum rights of use are not assigned to incumbent providers; and
- promoting the interests of the economic development of the State and the electronic communications sector.

3.89 ComReg also aims to design and carry out this assignment process in accordance with its broader statutory objectives (set out in Annex 2) including, but not limited to, the promotion of competition in the electronic communications sector.

3.90 A further key objective in designing and carrying out this assignment process is to seek to encourage the efficient use and ensure the effective management of the radio frequency spectrum. ComReg's other overarching objectives are to contribute to the development of the internal market and to promote the interests of users within the Community. ComReg also notes that, in achieving its objectives, its ultimate aim is to choose regulatory measures which maximise the benefits for consumers in terms of price, choice and quality.

### 3.5.2 Identifying the regulatory options (Step 2)

3.91 First, it is ComReg's normal practice to only consider viable regulatory options in a RIA.

3.92 In that regard, ComReg recalls the concerns it expressed in relation to the administrative assignment proposals received in the context of both service- and technology-neutrality and non-discrimination.

3.93 Without prejudice to these concerns and conscious of the stated relative inexperience of certain industry stakeholders with spectrum assignment processes (including auction formats), in the present case ComReg is prepared to consider the two broad categories of administrative assignment proposals received in response to Consultation 15/70 in this Assignment Process RIA. This is for the purposes of further aiding such stakeholders' understanding of the relative merits of alternative assignment formats in the context of their potential impact upon industry stakeholders, competition and consumers.

3.94 The following options are therefore considered:

- **Option 1**: Regional assignment of all available spectrum in the 3.6 GHz Band using a combinatorial clock auction (CCA)[53];
- **Option 2**: Regional assignment of some (e.g. 150 MHz) or all available spectrum in the 3.6 GHz Band by way of administrative assignment to FWA providers; and
- **Option 3:** National assignment of 150 MHz (up to the proposed spectrum competition cap[54]) in the 3.6 GHz Band by way of administrative assignment to an FWA provider, and the remaining 200 MHz of spectrum to be assigned in line with Option 1.

### 3.5.3 Impact on Stakeholders and Competition (Steps 3 and 4)

3.95 The focus of this section of the RIA is to assess the impact of the above regulatory options on stakeholders and competition.

3.96 Stakeholders consist of two main groups:

- consumers (for the purposes of this RIA, consumers include both business and residential end users of spectrum); and
- industry stakeholders.

3.97 ComReg sets out below a comparative analysis of the three award options outlined above, in terms of their impact on industry stakeholders, competition and consumers.

[53] This Option refers to the proposal as set out in this document and for the avoidance of doubt allows a bidder to package its bid in order to provide services on a national basis

[54] See Chapter 5 of Document 15/140 and Chapter 5 of this Document for a discussion on spectrum competition caps.

## Impact on industry stakeholders

3.98 There are a number of key industry stakeholders in relation to the matters considered in this chapter:[55]

- existing FWA providers including:
  - licensees with spectrum rights of use in the 3.6 GHz Band (e.g. FWALA licensees);
  - parties who currently provide FWA services using other licensed (10.6 GHz) or unlicensed (5.8 GHz) spectrum;
- potential new entrants to the FWA sector; and
- non-FWA providers (e.g. MNOs).

3.99 It is recognised that, to the extent that a stakeholder has submitted an award proposal, they are likely to prefer an option that most closely reflects its proposal. Otherwise, stakeholders are likely to prefer an option which would offer the greatest amount of contestable spectrum (so as to provide the greatest chance of obtaining spectrum rights).

3.100 In that context, existing FWA providers[56] (with the exception of Imagine) and potential new entrant FWA operators may prefer Option 1 over Option 3 because:

- Option 3 is unlikely to be favoured by existing FWA providers and potential FWA new entrants for the following reasons:
  - all FWA providers expressed a clear preference for spectrum rights of use to be assigned on a regional basis. One can expect that those seeking to operate on a sub-national basis may not be in a position to effectively compete for a national licence and would, therefore, have less contestable spectrum to compete for on a regional basis; and
  - it would prevent other FWA providers seeking to provide services using less than 150 MHz of spectrum from participating in the administrative part of the award. This, in turn, would reduce the amount of contestable spectrum for such providers; and
- In contrast, under Option 1:

[55] ComReg acknowledges that other stakeholders have an interest in the 3.6 GHz Band including the State (in respect of State services provided using spectrum in the Band), entities using the adjoining spectrum and equipment manufacturers. However, it does not appear to ComReg that these stakeholders would be significantly impacted by how the 3.6 GHz Band is assigned. Accordingly, they are not considered further in this chapter.

[56] Viatel was the only FWA provider that expressed a preference for an auction format, citing its previous positive experience of a CCA in the UK and, as such, is likely to favour Option 1.

- all available spectrum is contestable and would not restrict providers from competing for all available spectrum;
- it would provide an opportunity for such providers to express their willingness to pay for spectrum that satisfies their demand on a sub-national basis; and
- block sizes of 5 MHz and package bidding would allow bidders to express their full valuation for packages of lots up to 150 MHz.

3.101 While a national FWA provider would clearly prefer Option 3, it would likely prefer Option 2 to Option 1 to the extent that this option would still reserve all or a large portion of spectrum for FWA use and could still allow for the possibility of the assignment of spectrum rights of use in all regions. However, under Option 2 there is no certainty that such a provider would be assigned its preferred quantum of spectrum or its use on a national basis.

3.102 ComReg is of the view that other interested parties, for example MNOs, would likely prefer Option 1[57] over Option 2 or 3 as this provides for the assignment of all available spectrum rights on a service- and technology-neutral basis and gives all operators an equal opportunity to acquire spectrum rights up to and including on a national basis. The administrative award of some, or all, of the band for fixed wireless would exclude other providers (e.g. MNOs) entirely or reduce the quantum of spectrum available to other providers and could cause the cost of any residual spectrum rights of use to artificially increase.

### Impact on competition

3.103 The impact on competition is assessed at two levels which are interconnected:

- Competition during the award process. This occurs where bidders/applicants compete with each other in order to be assigned spectrum rights; and
- Downstream retail competition between winning bidders and other market participants. The promotion of competition at this level is a primary goal of this proposed award process because competition at retail level is ultimately what will drive consumer benefits.

#### Competition within the award process

3.104 At a general level, the more intense the competition in the assignment process (the greater the level of participation), the higher the probability that the spectrum usage rights will be awarded to those operators that value it the most,

[57] Noting that MNOs may not agree with the specific auction format proposed by ComReg as set out in Chapter 5.

and who are incentivised to use the spectrum most efficiently and compete most vigorously in the downstream retail market.

3.105 Firstly, any form of assignment which excludes certain users from participating in the award process reduces the level of competition within the award process. The more extensive the restriction, in terms of the possible assignment outcomes which it precludes, then the more likely it is that competition is restricted and the actual optimal assignment is precluded from arising.

3.106 The level of competition within any of the administrative options outlined above is limited to the inclusion of other ECN/ECS providers. Indeed, the request for a reservation of the band for a particular use in the first place, suggests that more than one type of user would have participated in the award absent such reservation.

3.107 In that regard, ComReg notes that:

- Option 3 would likely result in the lowest level of competition in the administrative award since it restricts FWA providers who wish to provide services on a regional basis; and
- Option 2 would have a greater level of competition than Option 3 since it allows for a greater range of outcomes (i.e. assignment on a regional and national basis) but competition is still limited to the extent that certain ECN/ECS providers, particularly MNOs, are excluded.

3.108 Secondly, the lack of transparent procedures in an administrative award limits the extent of competition within the award. Specifically:

- applicants may be unable to respond to specific commitments made by competing applicants and, even where they can, the lack of objective selection criteria makes it difficult for competing applicants to determine the effectiveness of the applications (in terms of the outcome) they make; and
- applicants may be exposed to substitution risk and are unable to switch between regions in response to applications made by rivals, particularly where some applicants may be indifferent between one or more regions[58]. In this way competition between regions within the award would be restricted.

3.109 Thirdly, under Option 3 but also potentially Option 2 where the administrative award of spectrum does not satisfy a reserved bidder's demand entirely, the reserved bidder would hold a considerable advantage over alternative bidders who wished to compete on the same basis for residual spectrum. This would likely distort the nature of competition in the residual award as the spectrum fees

[58] Even where applicants can switch bids to alternative regions, applicants could hide demand by bidding on unwanted regions and then switching demand later in the award.

per MHz of spectrum would likely be less for the reserved bidder because a portion of its demand was satisfied through an administrative award rather than through an open competition.

3.110 Option 1 would, in ComReg's view and considering all of the above factors, provide the greatest level of competition during the award process for the following reasons:

- it takes a service- and technology-neutral approach and allows all credible bidders[59] to compete for the same spectrum rights;
- it encourages participation in the award from national and regional operators alike through the use of package bidding;
- it ensures that all bidders compete on an equal basis for all available spectrum rights and not artificially on the basis of any mechanism designed to favour incumbency; and
- a multi-round format is transparent as it assists in price discovery allowing bidders to select their preferred combination of lots on a regional basis in response to changes in the relative price of lots in different regions, increasing competition for regions and lots.

3.111 Therefore, and for all of the reasons stated in this section, Option 1 would, in ComReg's view, better promote competition within the award process.

### Competition at retail level

3.112 The 3.6 GHz EC Decision requires that Ireland apply a service- and technology-neutral approach where one of the stated intentions of the designation is to address the "**convergence** of the mobile, fixed and broadcasting sectors" (emphasis added). Under Options 2 and 3, the reservation of spectrum rights to one sector has the potential to distort competition between wireless broadband services. Importantly, over the duration of the right of use the basis for competition could change or shift from the data rates and prices offered through the different platforms towards converged services and content demanded by end-users. Additionally, in terms of technology both mobile and fixed WBB providers are converging in terms of transmission standards, with both sectors moving towards adoption of LTE technology.

3.113 As Option 3 favours specific commercial strategies (i.e. provision of national services) it may restrict the amount of contestable spectrum for FWA operators, likely distorting competition between FWA providers. Furthermore, Option 3 would substantially restrict the extent to which such a provider on a national basis would be subject to regional competition in localised areas or larger

[59] The minimum price is set high enough in order to ensure non-credible bidders are excluded.

regions. Under Option 3, it is likely that regional competition would only be possible through the assignment of the residual spectrum. However, the extent to which such competition would occur would be limited for reasons including that:

- only the residual spectrum would be available for assignment among all ECN/ECS providers;
- any regional operator would require at least 100 MHz to offer a NGA-type service in those regions (as indicated by the Plum report)[60]. Given the likely participation of other ECN/ECS providers, the assignment of 100 MHz or above to a single operator from the residual spectrum is less likely than would have been the case under Option 1 from all available spectrum;
- the residual spectrum would likely be at a higher price to reflect the opportunity cost of the spectrum in that award and to reflect the artificial reduction in supply caused by the reservation; and
- the likely higher price/MHz would probably result in a regional provider operating on a higher cost base than otherwise would be the case.

3.114 ComReg also observes that there is no reason to believe that regional FWA providers are less capable of providing FWA services in the areas in which they operate compared to a FWA provider having a national footprint.

3.115 More generally, an assignment of spectrum rights to less efficient operators under Option 2 or Option 3 could lead to reduced competition and, consequently, lower quality services being offered by less efficient operators and higher prices from more efficient operators offering improved services, than would have been the case in an open transparent auction.

3.116 Under Option 2 and 3, ComReg notes that if such an award process fails to deliver an efficient outcome this would likely result in a negative impact on downstream competition. Therefore, there is a risk that applicants seeking to provide a differentiated range of services to consumers may be awarded less spectrum than would be efficient, or none at all, while less efficient operators would be awarded spectrum rights.

3.117 In the long run, spectrum usage fees (SUFs) serve an important role in ensuring the efficient use of spectrum by incentivising and encouraging the return of unused or underutilised spectrum rights. In order for SUFs to be effective, they should be set at a level that reflects the opportunity cost of holding the spectrum rights. In terms of the SUF, this cannot be known prior to the award (as SUFs

[60] Update of Plum Report 3 Document 15/140d

are paid at a future date). However, in setting the SUF as a proportion of the minimum price, and ultimately the final price, which would reflect the opportunity cost of the spectrum, the SUF should encourage return of unused or underused spectrum to ComReg (Option 1).

3.118 In the case of an administrative assignment, it is difficult for ComReg to make an accurate assessment of the alternative assignment options thereby setting a price that reflects the opportunity cost of the spectrum. This is exacerbated to the extent that usage fees, if any, prescribed under Options 2 and to a lesser extent Option 3, are unlikely to encourage the licensee to return unused or underused spectrum if they do not reasonably reflect the opportunity cost of the reserved use. As such, under these options long-term competition could be restricted because there is less of an incentive to return the spectrum over the duration of the licence to allow alternative users provide services.

3.119 Alternatively, compared with Options 2 and 3, Option 1 would provide for the greatest level of competition in downstream markets for reasons including that it would:

- produce a more efficient outcome by assigning spectrum rights to operators who attach the highest value to it, which will generally be those operators that can generate the greatest benefits to society from the use of that spectrum;
- allow for consumer services to be provided through a combination of regional, multi-regional and national assignments through the use of package bidding;
- provide incentives for bidders to engage in a manner expected of normal competition, and not engage in strategic or collusive behaviour.[61]
- the use of binding bids, ensure that bidders are committed to the bids they make, and the delivery of services from the use of the assigned spectrum; and
- avoid outcomes where spectrum rights go unsold despite efficient demand existing for same.

3.120 Therefore, and for the reasons stated above, Option 1 would, in ComReg's view, better promote downstream competition.

### Impact on Consumers

3.121 Consumers are likely to prefer Option 1 to Options 2 or 3 because all available spectrum rights would be offered to all providers of all services, and non-FWA

[61] See Section 5.2.2 in Document 15/70;

service providers (e.g. mobile & backhaul) would not be restricted from participating in the award. In contrast, administratively assigning spectrum rights to certain stakeholders would automatically deny these spectrum rights to other potential providers of services and potentially more efficient providers of services. Consumers would be negatively impacted if the administrative assignment of spectrum restricted other service providers from providing services in the future.

3.122 Additionally, under Options 2 and 3, there could be a negative impact on consumers as it would create the risk that spectrum would be assigned to a less efficient operator. Even small losses to consumer welfare as a result of an administrative assignment could result in a substantial aggregate loss over the period of the rights of use. In particular, under Option 3, the assignment of all reserved spectrum to one operator on a national basis would create the risk that all reserved spectrum could be assigned to one operator who may not be the most efficient among competing alternatives.

3.123 For all administrative options, the negative impacts on downstream competition for FWA services as outlined above would in turn have a negative impact on consumers. In particular, Option 3 would provide a worse outcome for fixed wireless consumers than Option 2 because it would unduly restrict different forms of FWA competition in two ways:

(i) it would reduce regional competition; and

(ii) it would limit consumer choice for those customers who may prefer lower speeds at a better price[62].

3.124 In an administrative award, the potential for failure to deliver on commitments made in terms of coverage, rollout or investment ultimately affects the delivery of services to consumers. In an administrative award no effective ex-ante mechanism exists with which to restrain the extent to which some commitments are made. This could potentially have a significant impact on consumers if the winning application(s) fails to deliver on their commitments.[63] In contrast, under Option 1, the use of binding bids ensures that bidders are committed to the bids they make, incentivising the delivery of services from the use of the assigned spectrum.

3.125 ComReg notes, in respect of the potential disruption to current FWA services, that certain consumers (21,665 are provided services through existing use of

[62] ComReg notes that FWA services are currently offered in large urban areas where NGA access is already available.

[63] For example, Norway assigned four 3G Licences using a beauty contest. One of the winners (Enitel) became insolvent and another (Tele 2) returned its licence after being unable to meet the network deployment commitments it had given. Similarly in Sweden, the coverage obligations were only reached three years after the initial deadline, followed by remaining operators seven months later.

the 3.6 GHz Band, Q1, 2016) may prefer Options 2 or 3 because it could better ensure that those consumers would not face any disruption to existing services by removing the risk that an incumbent would not win sufficient spectrum in an open auction. In that regard, ComReg observes that the proposed auction design is such that there would not be an unmanageable risk to business continuity, and therefore disruption to existing services, absent a decision by an existing FWA provider not to pay a higher spectrum fee than another bidder in order to secure the spectrum. ComReg is also proposing transitional arrangements and rules with which to, among other things, mitigate against the potential for adverse effects on existing consumer services where a current FWA operator does not win sufficient spectrum rights in the proposed award.

3.126 Compared with Option 2 and 3, Option 1 would provide the most positive impact on consumers for reasons including that:

- it should have the most positive impact on downstream competition. Therefore, by extension, Option 1 would be better for consumers than either of the administrative options;
- it would ensure that spectrum is awarded to those operators who value it most and who are better placed to ensure that consumer welfare is maximised where spectrum rights of use are made available;
- it would provide for a range of outcomes and differentiated services by:
    - allowing for services to be provided to consumers on a regional and national basis;
    - allowing for various types of FWA services/technologies to be delivered depending on spectrum assigned to individual bidders, potentially increasing the choice for consumers; and
    - allowing for mobile operators to complement their existing spectrum holdings, thereby improving existing and future services to consumers;
- Option 1 is less likely to delay the ultimate delivery of services due to challenge, as the use of opportunity cost pricing ensures that there would not be dissatisfied losers in terms of the price paid[64];
- Option 1 would better incentivise holders of 3.6 GHz rights to return unused or underutilised spectrum to ComReg for reassignment to users that provide services to consumers; and

[64] The final prices paid are at a level at which winners are willing to be assigned the spectrum while losers are not willing to be assigned the same spectrum at this price level.

- the transition proposals associated with Option 1 would mitigate against the potential for adverse effects on existing consumer services.

3.127 In light of the above benefits to consumers from an open auction, in ComReg's view, consumers would likely prefer Option 1 if concerns about disruption to existing services could be sufficiently mitigated against.

### 3.5.4 The 'Assignment Process' RIA: Assessment and the Preferred Option (Step 5)

3.128 ComReg firstly notes its willingness, in this instance, to consider certain categories of administrative assignment. This assessment has considered the impact of the various options from the perspective of industry stakeholders, as well as the impact on competition and consumers, and should aid stakeholders' understanding of the relative merits of the alternative assignment formats.

3.129 In summary, it is likely that FWA providers would prefer Option 2 whereby spectrum is reserved for FWA use in the band. Imagine or any potential national FWA provider would prefer Option 3. However, based on the analysis above, it is clear that these options would be in the best interests of those particular stakeholders, and not in terms of competition and consumers. Furthermore, it seems likely that even some FWA stakeholders would prefer Option 1 over the assignment of spectrum under Option 3 to only one operator on a national basis.

3.130 Option 1, in this case, also appears to be the best means to promote competition for spectrum usage rights and, in turn, promote downstream retail competition. Option 1 would also best ensure an efficient award outcome thereby ensuring that downstream retail competition is maximised to the benefit of consumers. In contrast, such an outcome would not be assured under Option 2 or Option 3.

3.131 Therefore, and for the reasons outlined in this RIA, ComReg's preferred option under the 'Assignment Process' RIA is to make available the entire 3.6 GHz Band (i.e. that portion of the band which is available for assignment) using an auction format which is subject to certain rules and fees that reflect the value of retaining spectrum for potential future use. This approach would be more flexible, as it would allow for the full band to be utilised if there is strong demand for spectrum in the present award, while at the same time it would ensure that the spectrum is only assigned if its value to potential licensees is sufficiently high, relative to the value of retaining spectrum for future assignment. Finally, the potential for service continuity issues to arise can also be addressed by non-assignment measures, such as the proposed transition arrangements and rules.

## 3.6 Overall Preferred Option

3.132 In light of the preceding discussion on the preferred assignment process and the outcome of the 'Spectrum for Award' RIA, ComReg is of the final view that the 3.6 GHz Band should be assigned by way of auction with no other bands included in same.

3.133 In Document 15/140, ComReg considered a number of different types of competitive award formats suitable for the award of rights of use in the 3.6 GHz Band. Of the various auction formats considered, ComReg formed the preliminary view that a CCA would be the most appropriate format. Chapter 5 of this paper also addresses any remaining concerns expressed by respondents to Document 15/140 in relation to the appropriate award format.

3.134 The following section assesses the above Preferred Option against ComReg's other relevant functions, objectives and duties.

## 3.7 Assessment of Preferred Option against ComReg's other relevant functions, objectives and duties

3.135 The above RIAs considered a number of options potentially available to ComReg within the context of the RIA analytical framework as set out in ComReg's RIA Guidelines (i.e. impact on industry stakeholders, impact on competition and impact on consumers).

3.136 In this section, ComReg has undertaken an assessment of the Preferred Option with regard to other statutory provisions relevant to the management of Ireland's radio frequency spectrum (which are set out in Annex 2 of this document). It is not proposed to exhaustively reproduce those statutory provisions here. However, set out below is a summary of all statutory provisions which ComReg considers to be particularly relevant to the use and management of the radio frequency spectrum with an assessment (to the extent not already dealt with as part of the above RIAs) of whether, and to what extent, the Preferred Option accords with those provisions. In carrying out this assessment, ComReg has highlighted below some of the relative merits / drawbacks which would arise if it was to select some of the alternative options assessed under the RIAs above.

3.137 For the purposes of this assessment, the statutory provisions which ComReg considers to be particularly relevant to its management of the radio frequency spectrum in the State are grouped as follows:

- general provisions on competition;
- contributing to the development of the internal market;
- to promote the interest of users within the Community;

- efficient use and effective management of spectrum;
- regulatory principles;
- relevant Policy Directions and Policy Statements; and
- general guiding principles (in terms of spectrum management, setting of fees and licence conditions):
    - Objective justification;
    - Transparency;
    - Non-discrimination; and
    - Proportionality.

3.138 As will be seen below, the Preferred Option accords with those functions, objectives and duties which are relevant to ComReg's management of the radio frequency spectrum.

## General Provisions on Competition

3.139 As noted above, there is a natural overlap between the aims of the above RIAs and an assessment of ComReg's compliance with some of its statutory obligations and, in particular, one of its core statutory objectives under section 12 of the 2002 Act of promoting competition by, among other things:

- ensuring that users derive maximum benefit in terms of choice, price and quality;
- ensuring that there is no distortion or restriction of competition in the electronic communications sector;
- encouraging efficient use and ensuring effective management of radio frequencies;
- ensuring that elderly users and users with special social needs derive maximum benefit in terms of choice, price and quality; and
- ensuring that, in the transmission of content, there is no distortion or restriction of competition in the electronic communications sector.[65]

3.140 There are also other various statutory provisions requiring ComReg generally to promote and safeguard competition in the electronic communications sector including, amongst other things:

- Regulation 16(2) of the Framework Regulations which requires ComReg to apply objective, transparent, non-discriminatory and proportionate

[65] The final two statutory obligations were introduced by Regulation 16 of the Framework Regulations.

regulatory principles by safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure based competition;

- Regulation 9(11) of the Authorisation Regulations which requires ComReg to ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies;
- Article 4 of Directive 2002/77/EC (Competition Directive) which requires ComReg to refrain from granting exclusive or special rights of use of radio frequencies for the provision of electronic communications services; and
- the General Policy Direction on Competition (No. 1 of 2 April 2004) which requires ComReg to focus on the promotion of competition as a key objective, including the promotion of new entry.

3.141 Based on the RIAs set out above, ComReg's view is that the Preferred Option is the one that would best safeguard and promote competition to the benefit of consumers.

### Contributing to the development of the Internal Market

3.142 In achieving the objective of contributing to the development of the Internal Market, another of ComReg's core statutory objectives under Section 12 of the 2002 Act, ComReg considers that the following factors are of particular relevance in the context of this award process:

- the extent to which the Preferred Option would enable ComReg to ensure that harmonisation of the use of radio frequency spectrum across the EU is promoted, consistent with the need to ensure its effective and efficient use and in pursuit of benefits for the consumer such as economies of scale and interoperability of services, having regard to all decisions and measures adopted by the European Commission in accordance with the Radio Spectrum Decision[66] (Regulation 17 of the Framework Regulations);
- the extent to which the Preferred Option would encourage the establishment and development of trans-European networks and the interoperability of pan-European services, in particular by facilitating, or not distorting or restricting, entry to the Irish market by electronic communication services providers based or operating in other Member States; and
- in order to ensure the development of consistent regulatory practice and the consistent application of EU law, the extent to which ComReg has had due regard to the views of the European Commission, BEREC and other

[66] Decision No. 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the EU.

Member States in relevant matters, in selecting an option and considering any regulatory action required by ComReg in respect of such an option.

### Promoting harmonised use of radio frequency spectrum across the EU

3.143 In relation to the first factor identified above, for the reasons set out in the 'Spectrum for Award' RIA, it is ComReg's view that the Preferred Option would result in a more timely award of spectrum rights of use in the 3.6 GHz Band which are suitable for the provision of advanced WBB services. In this regard, the Preferred Option is consistent with and promotes the objectives of the relevant harmonisation decisions of the European Commission which emphasise the suitability of this band for WBB services.

### Encouraging the establishment and development of trans-European networks and the interoperability of pan-European Services

3.144 ComReg notes the overlap between this objective and the objective of promoting competition in the provision of ECN/ECS. Encouraging the establishment and development of trans-European networks requires that operators from other Member States seeking to develop such networks are given a fair and reasonable opportunity to obtain spectrum rights of use required for such networks and, particularly, access to critical spectrum rights of use. Accordingly, options which would restrict or distort competition or otherwise unfairly discriminate against potential entrants (such as through administrative assignment of rights of use to critical spectrum to incumbent operators) would not, in ComReg's view, satisfy the requirements of this objective.

3.145 In this regard, ComReg refers to the 'Spectrum for Award' RIA and its finding that the Preferred Option is likely to be preferred by operators which are not currently active in the 3.6 GHz Band. This is because the Preferred Option would not involve an administrative assignment of valuable spectrum rights that is more likely to favour incumbents simply by virtue of their incumbency, with the associated disincentives for potential participation by undertakings from other Member States in the proposed award process.

### Promoting the development of consistent regulatory practice and the consistent application of EU law

3.146 In relation to this aspect of contributing to the development of the internal market, ComReg continues to cooperate with other National Regulatory Authority's ('NRA's), including closely monitoring developments in other Member States to ensure the development of consistent regulatory practice and consistent implementation of the relevant EC harmonisation measures and relevant aspects of the Common Regulatory Framework.

3.147 For instance, ComReg has had clear regard to international developments in the context of:

- promoting the provision of WBB services;
- considering whether to include the 700 MHz, 1.4 GHz, 2.3 GHz and 2.6 GHz bands in the award process;
- harmonisation developments and equipment availability in relation to the 3.6 GHz and potential candidate bands;
- licence durations for spectrum rights in the 3.6 GHz Band; and
- licence fees (and benchmarking in particular).

3.148 Furthermore, ComReg will continue to have regard to international developments as appropriate.

3.149 In the present case, ComReg considers that the Preferred Option is consistent with the approaches taken by and being considered in other Member States.

### Promote the interest of users within the Community

3.150 The impact of the Preferred Option and other options on users from a more general perspective and in the context of ComReg's objective to promote competition has been considered in the context of the above RIAs and it is not proposed to consider this matter any further.

3.151 ComReg also observes that the majority of measures set out in Section 12(2)I(i) to (vii) of the 2002 Act, aimed at achieving this statutory objective, are more relevant to consumer protection, rather than to the management of the radio frequency spectrum.

### Efficient Use and Effective Management of Spectrum

3.152 Under section 10 of the 2002 Act, it is one of ComReg's functions to manage the radio frequency spectrum in accordance with a Policy Direction under section 13 of the 2002 Act. Policy Direction No. 11 of 21 February 2003 requires ComReg to ensure that, in managing spectrum, it takes account of the interests of all users of the radio frequency spectrum (including both commercial and non-commercial users) (see discussion on this policy direction below). Importantly, in pursuing its objective to promote competition under section 12(2)(a), ComReg must also take all reasonable measures to encourage efficient use and ensure effective management of radio frequencies. Section 12(3) of the 2002 Act also requires that measures taken with regard to encouraging the efficient use and ensuring the effective management of radio frequencies must be proportionate.

3.153 Regulation 9(11) of the Authorisation Regulations also provides that ComReg must ensure that radio frequencies are efficiently and effectively used having

regard to section 12(2)(a) of the 2002 Act and Regulations 16(1) and 17(1) of the Framework Regulations.

3.154 In relation to Policy Direction No. 11, the RIAs set out above take into account the interests of all users of the radio frequency spectrum (and assesses the extent to which such interests are consistent with ComReg's own statutory obligations), both commercial and non-commercial. ComReg is of the view that the Preferred Option is one that would safeguard and promote those interests. In that regard, see also the transition measures discussed in Chapter 7 of this document.

3.155 In addition, the preferred spectrum assignment process (an auction) should facilitate efficient new entry, and encourage an efficient use of spectrum by those successful in the proposed assignment process. This is because an auction would ensure that, subject to reasonable constraints inherent in the design of an auction e.g. spectrum competition caps, those who value the spectrum rights the most will win same and, because of these financial incentives, are the most likely to use the spectrum efficiently.

3.156 In that light, ComReg is of the view that the Preferred Option complies with the obligations contained in the above statutory provisions. ComReg is also of the view that the alternative spectrum and assignment options considered would fail to satisfy the above provisions to the same extent, if at all.

## Regulatory Principles

3.157 Under Regulation 16(2) of the Framework Regulations, ComReg must, in pursuit of its objectives under Regulation 16(1) and section 12 of the 2002 Act, apply objective, transparent, non-discriminatory and proportionate regulatory principles by, amongst other things:[67]

- promoting regulatory predictability by ensuring a consistent regulatory approach over appropriate review periods;
- promoting efficient investment and innovation in new and enhanced infrastructures, including by ensuring that any access obligation takes appropriate account of the risk incurred by the investing undertakings and by permitting various cooperative arrangements between investors and parties seeking access to diversify the risk of investment, whilst ensuring that competition in the market and the principle of non-discrimination are preserved; and

[67] Some of those principles listed in 16(2) are not listed here because they are either dealt with elsewhere in this chapter or were considered by ComReg as not being relevant to this award process.

- taking due account of the variety of conditions relating to competition and consumers that exist in the various geographic areas within a Member State.

### Regulatory Predictability

3.158 ComReg notes that it places importance generally on promoting regulatory predictability and, as illustrated below, has complied with this principle in carrying out the current process.

3.159 In the present context, ComReg considers the following objectives to be of particular importance to achieving the aims of this regulatory principle:

- promoting regulatory predictability in relation to availability of spectrum rights to other users of spectrum by applying an open, transparent, and non-discriminatory approach to spectrum release; and
- promoting regulatory predictability by, to the extent appropriate, taking a consistent approach to the award of spectrum in this award process as that taken in other recent spectrum awards.

3.160 In relation to the first objective, ComReg notes that the Preferred Option ensures that the future assignment of rights of use in the 3.6 GHz Band is known as soon as possible. This would give the market the utmost transparency and predictability in terms of the availability of spectrum rights in this band. The alternative of potentially delaying the award of rights of use in this band would not, in ComReg's view, contribute to the promotion of regulatory predictability.

3.161 In relation to the second objective, ComReg considers that the alternative options would not promote regulatory predictability due to the inherent uncertainties attached to administratively determining key parameters such as spectrum assignments and fees, particularly in the context of competing demands from stakeholders, imperfect information and the lengthy duration of the spectrum rights at issue. Rather, relying on a full market based mechanism (with objective, transparent, non-discriminatory and proportionate rules) to assign rights of use in a large amount of valuable spectrum across a range of bands better promotes regulatory predictability. In that regard, current mobile network operators in Ireland (post-MBSA) and further afield are becoming increasingly familiar with competitive auction processes and the use of such processes should contribute to regulatory predictability. With respect to other potential award participants, such as existing FWA licensees, who may not have previous auction experience, ComReg notes that it is putting in place safeguards to assist their participation and reduce award complexity (see, for example, Chapter 5 and Annex 8 of Document 15/140).

3.162 In addition, ComReg considers that the Preferred Option – which, amongst other things, facilitates potentially significant variations in demand characteristics

through regional licensing and would incorporate appropriate spectrum caps informed by this consultation to facilitate advanced WBB service provision while avoiding extreme outcomes – would better minimise the risk of award participants failing to win their desired spectrum assignments for reasons other than competitive tension within the award.

3.163 In light of the above, ComReg is of the view that the Preferred Option complies with the regulatory principle of promoting regulatory predictability.

### Promoting Efficient Investment and Innovation in New and Enhanced Infrastructures

3.164 ComReg considers that the Preferred Option is consistent with the aims of this regulatory principle because it:

- has the capacity to facilitate a fully competitive release of the 3.6 GHz Band at the earliest possible opportunity. Providing clarity around the availability of this band as soon as possible ensures that winners of rights of use are appropriately incentivised to efficiently invest in new and enhanced infrastructures, to deploy new technologies and to provide advanced WBB services to end users, while avoiding the potential costs, uncertainties and inefficiencies associated with a delayed release of such rights; and
- would give participants the scope to bid according to their own valuation of the spectrum rights, based on their own business plans and market and financial positions, and thus to invest efficiently.

### Conditions of Competition in Various Geographic Areas

3.165 ComReg observes that the application of this regulatory principle is primarily relevant in the context of (a) the nature and extent of coverage conditions which may be attached to new 3.6 GHz rights of use and (b) existing local area FWA services being provided in the 3.6 GHz Band. ComReg has addressed geographic considerations in detail in Chapters 4, 5, 6 and 7 of Document 15/140 and this document, and is of the view that the proposed release of sub-national rights of use, appropriately designed coverage obligations and proposed transition measures would satisfy this regulatory principle.

### Relevant Policy Directions and Policy Statements

3.166 ComReg has taken due account of the Spectrum Policy Statement issued by DCENR in September 2010 and its Consultation on Spectrum Policy Priorities issued in July 2014. ComReg notes that the core policy objectives, principles and priorities set out therein are broadly in line with those set out in the 2002

Act and in the Common Regulatory Framework and, in turn, with those followed by ComReg in identifying the Preferred Option.

3.167 Section 12(4) of the 2002 Act requires ComReg, in carrying out its functions, to have regard to policy statements, published by or on behalf of the Government or a Minister of the Government and notified to it, in relation to the economic and social development of the State. Section 13 of the 2002 Act requires ComReg to comply with any policy direction given to ComReg by the Minister as he or she considers appropriate to be followed by ComReg in the exercise of its functions.

3.168 ComReg considers below those Policy Directions which are most relevant in this regard (and which have not been considered elsewhere in this chapter).

### Policy Direction No.3 of 21 February 2003 on Broadband Electronic Communication Networks

3.169 This Policy Direction provides that:

> *"ComReg shall, in the exercise of its functions, take into account the national objective regarding broadband rollout, viz, the Government wishes to ensure the widespread availability of open-access, affordable, always-on broadband infrastructure and services for businesses and citizens on a balanced regional basis within three years, on the basis of utilisation of a range of existing and emerging technologies and broadband speeds appropriate to specific categories of service and customers."*

3.170 The purpose of this Policy Direction was to ensure that the regulatory framework for electronic communications plays its part in contributing to the achievement of the Government's objectives regarding the rollout of broadband networks.

3.171 ComReg is cognisant of the fact that the three year objective described in this policy direction has now expired. In any case, ComReg is of the view that the Preferred Option is aligned with this Government objective and the Progamme for Government objective to help facilitate the local rollout of commercial and National Broadband Plan infrastructure in each county area, insofar as it is the option most likely to maximise utilisation of the available radio frequency spectrum for WBB services. For example, it would promote the introduction of advanced WBB services in the 3.6 GHz Band at the earliest possible date and it complements other schemes aimed at ensuring the widespread availability of affordable, always-on broadband infrastructure and services for businesses and citizens on a balanced regional basis.

3.172 In addition, the proposed auction process should result in a greater competitive tension than in the case of an administrative assignment, and it can be expected

to positively impact on downstream retail competition in the deployment, or augmented deployment, of enhanced services in terms of bandwidth.

3.173 Furthermore, ComReg considers it unlikely that some form of administrative assignment of spectrum in the place of a competitive award procedure would incentivise the roll out of broadband infrastructure by recipients to the same extent as the Preferred Option, if at all.

## Policy Direction No.4 of 21 February 2003 on Industry Sustainability

3.174 This Policy Direction provides that:

> "*ComReg shall ensure that in making regulatory decisions in relation to the electronic communications market, it takes account of the state of the industry and in particular the industry's position in the business cycle and the impact of such decisions on the sustainability of the business of undertakings affected*."

3.175 The purpose of this policy direction is to ensure that any regulatory decisions take due account of the potential impact on the sustainability of industry players, in particular in light of the business cycle at the time such decisions are taken[68].

3.176 ComReg observes that this policy direction concerns the sustainability of the industry as a whole rather than just the position of individual players. Notwithstanding, in its RIAs above, ComReg has considered the impact of its award proposals in the context of all industry stakeholders, including different types of industry stakeholders. ComReg considers that an open auction which facilitates greater participation on a non-discriminatory basis facilitates the sustainability of the industry as a whole.

3.177 This Policy Direction is clearly relevant in terms of those costs that industry must bear which are, to some extent, within the control of ComReg, for example, the nature and extent of any minimum prices in the proposed award process and the related issue of the duration of spectrum rights of use. ComReg has regard to this policy direction in devising its proposals in relation to licence duration and minimum prices.

## Policy Direction No.11 of 21 February 2003 on the Management of the Radio Frequency Spectrum

3.178 This Policy Direction provides that:

[68] In the context of this award process, the business cycle for services in the 3.6 GHz Band is more than likely entering a new phase where the existing services and technologies are likely to be surpassed by the introduction of advanced services via new technologies (e.g. via LTE) due to the increasing consumer demand for more WBB capacity. Transition measures are proposed in this award process to facilitate the existing licensees in transitioning to these new services and technologies (see Chapter 7 in this regard).

"*ComReg shall ensure that, in its management of the radio frequency spectrum, it takes account of the interests of all users of the radio frequency spectrum*."

3.179 The purpose of this policy direction is to ensure that ComReg achieves an appropriate balance between the interests of various users of the radio frequency spectrum, in particular, the respective interests of commercial and non-commercial users.

3.180 In carrying out the above RIAs, ComReg has considered the Preferred Option in light of the interests of various categories of industry stakeholders and consumers.

3.181 ComReg is of the view, therefore, that it has complied with this requirement in carrying out the above RIAs and that the Preferred Option is the one that best serves the interests of all users of the radio frequency spectrum and strikes an appropriate balance where those interests may conflict.

## General guiding principles (in terms of spectrum management, licence conditions and setting of licence fees)

3.182 ComReg notes that it is required to comply with the guiding principles of objectivity, transparency, non-discrimination and proportionality in carrying out its functions under the 2002 Act and the Common Regulatory Framework. In relation to the current process, ComReg considers that these principles are most relevant in terms of its functions concerning spectrum use and management, attaching conditions to rights of use and the setting of licence fees.

3.183 In relation to spectrum management and use, ComReg notes that:

- Regulation 11(2) of the Authorisation Regulations requires that ComReg grants rights of use for radio frequencies on the basis of selection criteria which are objective, transparent, non-discriminatory and proportionate; and
- the regulatory principle set out in Regulation 16(2) of the Framework Regulations requires ComReg in pursuing its objectives to apply objective, transparent, non-discriminatory and proportionate regulatory principles by, amongst other things, ensuring that, in similar circumstances, there is no discrimination in the treatment of undertakings providing electronic communications networks and services.

3.184 ComReg notes that the above guiding principles are Irish and EU law principles that ComReg abides by generally in carrying out its day to day regulatory functions.

3.185 ComReg is of the view, having regard to the applicable legislation and legal principles, its RIAs and other analyses, its expert advice and reports, and the

material to which it has had regard, that its Preferred Option is objectively justified, transparent, proportionate and non-discriminatory.

Chapter 4

# 4 Key aspects of award spectrum

## 4.1 Introduction

4.1 This chapter sets out ComReg's final position on several aspects of the rights of use to be awarded under the Award Process. Specifically:

- the grant of individual rights of use for radio frequencies in the 3.6 GHz Band;
- the band plan and frequency arrangements for the 3.6 GHz Band;
- the geographic scope of rights of use to be awarded under the Award Process; and
- the duration of the rights of use to be awarded under the Award Process.

4.2 While these matters will ultimately determine some of the licence conditions that ComReg has, following consultation, decided to attach to the rights of use to be awarded (see Chapter 6 below), they are discussed here as ComReg's position on same is necessary for the subsequent discussion of the appropriate award type and format (Chapter 5).

## 4.2 Grant of individual rights of use in the 3.6 GHz Band

### Summary of ComReg's view in Document 15/140

4.3 At paragraph 4.1 of Document 15/140, ComReg proposed, in accordance with Regulation 9(2) of the Authorisation Regulations, to grant individual rights of use for radio frequencies under the proposed Award Process as this is necessary to:

- avoid harmful interference;
- ensure technical quality of service; and
- safeguard the efficient use of the spectrum rights to be awarded under the Award Process.

4.4 ComReg reflected this proposal in its Draft Decision as follows:

> *"3.5 under section 5 of the Wireless Telegraphy Act 1926, and pursuant to the 3.6 GHz Band Licence Regulations, to grant a limited number of individual rights of use for radio frequencies, by way of 3.6 GHz Band Liberalised Use Licences, in respect of the Award Spectrum;".*

#### Views of respondents / additional information

4.5 ComReg notes that it did not receive any submissions from respondents in relation to this proposal. Nor is ComReg aware of any information which would warrant an amendment to this proposal.

#### ComReg's final position

4.6 Accordingly, ComReg's final position is that it will grant a limited number of individual rights of use for radio frequencies, by way of 3.6 GHz Band Liberalised Use Licences, in respect of the Award Spectrum.

## 4.3 Band Plan

4.7 In determining the appropriate band plan to be used for the Award Process, ComReg previously identified, discussed and consulted upon the following three matters:

- the requirement for a guard band from 3 400 – 3 410 MHz;
- the existing use by State Services of a portion of the 3.6 GHz Band between 3 435 – 3 475 MHz; and
- the duplex arrangement for the sub-band 3 400 – 3 600 MHz.

### 4.3.1 Guard Band (3 400 – 3 410 MHz)

#### Summary of ComReg's view in Document 15/140

4.8 In section 4.2.1 of Document 15/140, ComReg recalled its views from Document 15/70 that:

- the existing band plan for the FWALA licensing scheme, as detailed in ComReg Document 06/17R7, has a 10 MHz guard band from 3 400 – 3 410 MHz;
- this guard band is identified in the ComReg Radio frequency Plan for Ireland (Document 13/118R) as the upper limit for airborne radars; and
- this guard band is likely to be required going forward and should therefore be incorporated into the 3.6 GHz Band plan.

4.9 ComReg also stated that, notwithstanding the above, it would keep this item under review in line with its objective of encouraging the efficient use of spectrum.

4.10 ComReg reflected its guard band proposal in its Draft Decision as follows:

*"to implement a guard band between 3400 MHz and 3410 MHz to give appropriate protection to systems in adjoining bands, as provided for by Article 2(2) of the 3.6 GHz EC Decision[69]"*.

4.11 Finally, ComReg in Document 16/22 reflected this position in its Draft IM and Draft Regulations where it defined the "3.6 GHz Band" as the radio frequency spectrum in the range 3 400 – 3 800 MHz but excluding the Guard Band Spectrum (3 400 – 3 410 MHz)[70].

### Views of respondents / additional information

4.12 ComReg received one response on this issue (from 3IHL) who agreed with ComReg's proposal for a 10 MHz guard band. In addition, ComReg is not aware of any other information which would warrant a recalibration of its guard band proposals.

### ComReg's final position

4.13 Accordingly, ComReg's final position is that it will implement a 10 MHz guard band between 3 400 MHz and 3 410 MHz to give appropriate protection to systems in adjoining bands, as provided for by Article 2(2) of the 3.6 GHz EC Decision.

## 4.3.2 State Services (3 435 – 3 475 MHz)

### Summary of ComReg's view in Document 15/140

4.14 In section 4.2.1 of Document 15/140, ComReg stated that it remained of the view that the 40 MHz of spectrum assigned to State Services in the 3.6 GHz Band[71] should not be considered for release as part of the Award Process.

4.15 In summary, reasons informing this view included that:

- in excluding the spectrum currently used by State Services, there remains a sizeable amount of spectrum available in the band and that the release of 350 MHz of internationally harmonised spectrum in a single award is unprecedented in Ireland;

[69] Article 2(2) of the 3.6 GHz EC Decision provides that "Member states shall ensure that networks referred to in paragraph 1 give appropriate protection to systems in adjacent bands."

[70] This definition of the "3.6 GHz Band" also excluded the State Services Spectrum (3 435 – 3 475 MHz)

[71] Which ComReg clarified as relating to airborne communications systems in the frequencies 3 435 – 3 475 MHz consisting of microwave links from aircraft to fixed and mobile receiving stations located around Ireland and that the operation of these airborne transmissions are generally transitory in nature.

- the proposed release of 350MHz of spectrum in the Award Process would result in an increase of circa 86% in the total amount of harmonised spectrum available in Ireland for fixed, nomadic and mobile wireless broadband services.[72] This means that there is ample spectrum being made available; and

- revisiting the use of the 3.6 GHz Band by State Services at this point in time, including the undertaking of a detailed cost/benefit analysis as suggested by one interested party, would likely lead to a significant delay in the release of the 3.6 GHz Band.[73]

4.16 ComReg also referred to the detailed adjacent channel coexistence study commissioned by it (and carried out by its expert advisors Plum), which modelled potentially critical interference scenarios between potential mobile/fixed communications networks (MFCN) and existing State Services in the 3.6 GHz Band.[74] In that regard, ComReg noted the following:

- the Plum study concluded that coexistence is possible in most scenarios for both the restricted and permissive block edge masks;

- the study also recommended that in the unlikely event of interference from State Services into MFCN base station receivers, additional filtering at the MFCN base station would be a potential solution to mitigate such issues; and

- co-existence between State Services and current FWA operators in the 3.6 GHz Band occurs in practice under the current licensing scheme[75].

4.17 ComReg stated that it will, however, continue to keep State Services use under review.

4.18 ComReg reflected its position on State Services in its Draft Decision as follows:

[72] 405 MHz has been released since the MBSA (this includes spectrum released as part of the MBSA).

[73] Noting the expiry of existing 3.6 GHz licences on 31 July 2017 and, further, that a majority of respondents to Document 15/70 expressed a strong desire to obtain further certainty in relation to the future of the 3.6 GHz Band as soon as possible in advance of licence expiry (which was one of the reasons for ComReg subsequently taking forward the 3.6 GHz Band in a separate award process to the multi-band award originally proposed in Document 14/101).

[74] Noting that the MFCN modelling parameters were based on the 2014 3.6 GHz EC Decision 2014/276/EU and ECC Report 203, while the State Services modelling parameters were based on confidential data provided by the responsible State body.

[75] Noting that the current scheme has been in operation since 2003 (roughly 12 years) with no adverse interference reported

*"3.1 to continue to licence the operation of the State Services, which constitute an existing use, within the meaning of Article 1 of the 3.6 GHz EC Decision;"*

4.19 Finally, ComReg in Document 16/22 reflected this position in its Draft IM and Draft Regulations where it defined the "3.6 GHz Band" as the radio frequency spectrum in the range 3 400 – 3 800 MHz but excluding the State Services Spectrum (3 435 – 3 475 MHz)[76].

## Views of respondents to 15/140

4.20 ComReg received one response on this issue from 3IHL.

4.21 In summary, the relevant issues raised by 3IHL include:

i. that ComReg has not clarified its position regarding 3IHL's proposal, as set out in its response to Document 15/70, that the State Services should be re-tuned to the bottom of the band and, further, that ComReg has not stated whether this proposal has been investigated;

ii. that ComReg should respond to this suggestion, noting that its proposal would have the following advantages:

- there would be only one "interface" between the airborne State Service use and commercial use, which would reduce the likelihood of inter-service interference and the requirement for guard bands or additional filtering; and
- it would eliminate the stranded lot of 25 MHz, giving more flexibility which should lead to a more efficient auction outcome;

iii. 3IHL also requested that in the interest of transparency, ComReg should clarify if the State Service using this spectrum has been issued with a licence under the Wireless Telegraphy Act; the expiry date of that licence; and the licence fees applicable. In that regard, 3IHL further submits:

- it is important that all users of the spectrum are treated equally, and given an equal incentive to use spectrum efficiently;
- there is an opportunity cost to the use of the spectrum by State Services (as otherwise it would be available for commercial licensing in the auction); and
- the auction should help to quantify this opportunity cost.

[76] This definition of the "3.6 GHz Band" also excluded the Guard Band Spectrum (3 400 – 3 410 MHz)

## ComReg's Assessment

4.22 By way of background, ComReg recalls that the 3.6 GHz EC Decision, which ComReg is seeking to implement by way of this Award Process, is without prejudice to the protection and continued operation of other existing uses in this band. See, in particular, Articles 1 and 2 of same.

4.23 ComReg confirms that it has conducted inquiries, both with the State body responsible for the State Services and independently, concerning whether it would be possible to relocate the State Services. In that regard, ComReg understands that:

- the equipment being used by the State Services is not "tuneable";
- new equipment would therefore be required by the State body if a relocation was required; and
- given the airborne element to the State Services, this change of equipment and the certification that is required before the airborne asset could be utilised would take a significant amount of time, and could be in the order of years rather than months.

4.24 While ComReg recognises the potential advantages of relocating State Services to the lower end of the 3.6 GHz Band or indeed outside the band altogether, ComReg is satisfied that its award proposals in relation to the 25 MHz frequency specific lot at the bottom of the 3.6 GHz Band should nevertheless result in an efficient award outcome given that the matter has been carefully considered in determining the proposed auction approach.

4.25 Seeking to achieve these potential advantages identified by 3IHL would not, however, be without associated costs and disadvantages which, in ComReg's view, would be disproportionate. In particular, and as ComReg identified in Document 15/140, revisiting the existing use of the 3.6 GHz Band by State Services, including the conduct and conclusion of the appropriate regulatory processes (e.g. consultation including potentially a detailed cost/benefit analysis as suggested by Eircom in its response to Document 15/70) would likely lead to a significant delay in the release of the 3.6 GHz Band and corresponding delays to the operator and consumer benefits that would otherwise result from a timely award process.[77] However, 3IHL does not consider how such costs / disadvantages could be mitigated in its proposal to include the spectrum for the State Services as part of the Award Spectrum.

[77] Again noting that a majority of respondents to Document 15/70 expressed a strong desire to obtain further certainty in relation to the future of the 3.6 GHz Band as soon as possible in advance of licence expiry and, further, that this was one of the reasons for ComReg subsequently taking forward the 3.6 GHz Band separately from the multi-band award originally proposed in Document 14/101.

4.26 Given these factors, ComReg considers that, on balance, its statutory functions, objectives and duties would be better achieved by proceeding with the award spectrum in the frequency range 3 410 – 3 800 MHz excluding the portion currently licenced to State Services.

4.27 Finally, in relation to the specific question raised in **point (iii)** above, ComReg can confirm that the relevant State body holds a licence issued pursuant to the Wireless Telegraphy (Radio Link Licence) Regulations 2009. In addition, ComReg would highlight its recent observations on this issue generally in section 4.6 of Document 16/49 including that:

- the appropriate spectrum fee to ensure the optimal use of a particular right of use will, clearly, depend on the specifics of that right of use; and
- that no evidence has been provided, and nor is ComReg aware of any credible material indicating, that different spectrum fees for different rights of use are either discriminatory (recalling that the factual position may well be materially different across different spectrum bands/classes of spectrum users) or likely to result in less than optimal use of the relevant spectrum rights.

#### ComReg's final position

4.28 In light of the above, ComReg's final position is to proceed with the proposed release of 350 MHz of spectrum excluding the 40 MHz assigned to State Services.

### 4.3.3 Duplex configuration for the sub-band 3 400 – 3 600 MHz

#### Summary of ComReg's view in Document 15/140

4.29 In section 4.2.2 of Document 15/140, ComReg noted that the 3.6 GHz EC Decision requires the implementation of a TDD mode of operation in the upper part of the band (i.e. 3 600 – 3 800 MHz) and, as such, observed that it does not have discretion in this regard.

4.30 Accordingly, the matter to be considered relates to the duplex configuration for the sub-band 3 400 – 3 600 MHz only.

4.31 In this regard, ComReg noted that, on balance, TDD would be the optimum configuration for the sub-band 3 400 – 3 600 MHz, as it would be in the interests of the various stakeholder groups and would best meet ComReg's statutory functions, objectives and duties, having regard to, among other things:

- the responses received to Document 14/101;
- the importance of harmonisation of the 3.6 GHz Band;

- the strong support for TDD expressed by industry;
- that operators are generally dependent on industry in determining the equipment they use;
- allowing both FDD and TDD in the band would create technical inefficiencies with respect to the requirements for guard bands[78]; and
- that because uplink traffic is expected to be much higher than downlink traffic, the uplink spectrum may consequently be inefficiently utilised in an FDD configuration.[79]

4.32 ComReg, after further consideration of this matter including the recommendations of its independent economic[80] and technical advisors[81], was of the preliminary view that the entire 3.6 GHz Band should be released in a TDD configuration as per Figure 1 below.

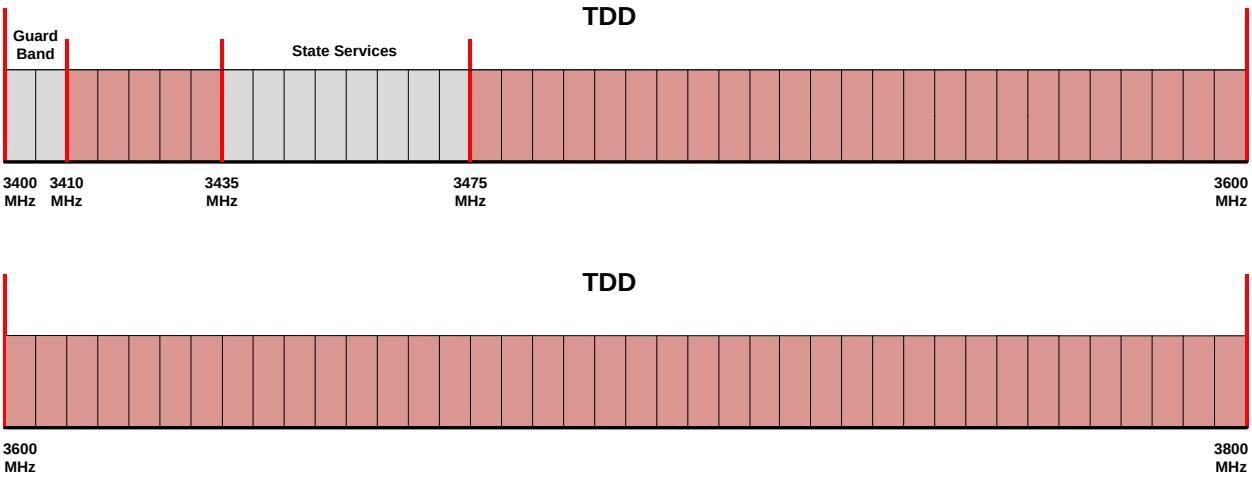


**Figure 1. TDD band plan**

[78] In Chapter 6 of Document 15/140 (paragraph 6.155), ComReg noted that frame structure configurations other than the default frame structure configuration would be permitted, provided its implementation complies with the restrictive Block Edge Mask (BEM) and would not cause interference to those networks that use the default frame structure (or equivalent).

[79] As indicated by Plum in Section 2.2.3 of Document 15/73.

[80] In summary DotEcon identified that allowing a flexible band plan to allow FDD or TDD would inevitably introduce significant additional complexity to the auction (Document 15/140a).

[81] In summary, Plum

- identified that there is a general trend to operators implementing TDD networks (Document 15/74) and
- if ComReg decided to implement FDD in the sub-band 3 400 – 3 600 MHz the spectrum available would be limited to 2 paired blocks one of 25 MHz and the other of 15 MHz due to the State Services (Document 15/72).

4.33 ComReg reflected its position on the optimum duplex configuration (i.e. band plan) for the 3 400 – 3 600 MHz sub-band in its Draft Decision as follows:

> *"3.3 to specify a time division duplex mode of operation (i.e. band plan) in the frequency range 3400 MHz to 3600 MHz*[82]*, without prejudice to the continued operation of the State Services*[83]*"*

4.34 Further, ComReg reflected its proposals with regard to the duplex configuration in Section 2B of Part 4 (Licence conditions) to Schedule 1 of the Draft Regulations published in Annex 2 of Document 16/22.

## Views of respondents to 15/140

4.35 Two respondents (Eircom and Permanet) provided submissions that relate to the duplex configuration for the 3.6 GHz Band.

4.36 Eircom requests that ComReg clarify its intentions in the draft decision on this matter. In particular, Eircom states that it is not clear whether the intention is that TDD is the specified mode of operation provided it does not prejudice the operation of the State Services, how potential bidders can factor in the operation of the State Services or whether ComReg is intending that State Services will be exempt from operating on a TDD basis.

4.37 Permanet, requests the following clarification.

> *"Comreg has mentioned in numerous places in the document that it is abiding by the principal of technology neutrality. Understanding that the duplex arrangement is designed to facilitate TDD equipment we would like to clarify that an operator would be permitted to operate FDD equipment provided they have acquired the necessary spectrum to do so and under the technical conditions applicable."*

## ComReg's assessment

4.38 In relation to Eircom's query, ComReg can clarify that the matter being considered is the duplex configuration for the Award Spectrum, so it will not apply to the State Services, as the 3.6 GHz EC Decision is *"without prejudice to the protection and continued operation of other existing use in this band."* Further, measures under the Article 1.4 of the Radio Spectrum Decision[84] are without prejudice to the rights of Member States to pursue general interest

[82] Footnote 235 of Document 15/140 is reproduced here: "*This is the 'preferred' duplex mode of operation identified in paragraph A.1 of the Annex to the 3.6 GHz EC Decision."*

[83] Footnote 236 of Document 15/140 is reproduced here: *"In respect of spectrum in the range 3 600 MHz to 3 800 MHz, the 3.6 GHz EC Decision specifies time division duplex mode of operation so ComReg has no discretion in this regard."*

[84] Decision 676/2002/EC of the European Parliament and of the Council on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision).

objectives, relating to content regulation and audio-visual policy, to the provisions of Directive 1999/5/EC and, in particular, to the right of Member States to organise and use spectrum for public order and public security purposes and defence purposes.

4.39 In relation to Eircom's query about the coexistence of any new licences issued in the 3.6 GHz Band with the State Services, ComReg notes that this matter has been addressed in Document 15/140 (see paragraph 4.14) as summarised in section 4.3.2 above.

4.40 In relation to Permanet's view, and as noted previously by ComReg, the 3.6 GHz EC Decision does not afford the possibility to work and use the FDD mode of operation in the sub-band 3 600 – 3 800 MHz.

4.41 However, the 3.6 GHz EC Decision states that the *preferred* duplex mode of operation for the sub-band 3 400 – 3 600 MHz is TDD and hence some discretion is afforded to Member States for this sub-band.

4.42 ComReg has considered this matter in detail in section 4.1 of Document 15/70 and section 4.2.2 of Document 15/140. In Document 15/140, after considering views of respondents and the information available to it, ComReg was of the preliminary view that the entire 3.6 GHz Band[85] should be released in a TDD configuration.

4.43 As discussed in Document 15/140 (see paragraph 6.155), ComReg notes that an operator could implement other frame structure configurations, one of which conceivably could be a FDD configuration, in the sub-band 3 400 – 3 600 MHz. For this to occur, however, an operator would need to acquire sufficient and appropriate spectrum rights of use, abide by all applicable technical parameters as set out in the 3.6 GHz EC Decision and all conditions attached to any licence issued on foot of this Award process.[86]

4.44 Considering the above requests for clarification from both Eircom and Permanet, and ComReg's response to same, ComReg observes that there is merit in clarifying that ComReg's position on the 3 400 – 3 600 MHz sub-band relates to the specifying a TDD band plan, as opposed to a TDD mode of operation as outlined in the Draft Decision.

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[85] As illustrated previously ComReg only has discretion in the sub-band 3 400 – 3 600 MHz.

[86] These would include but not be limited to

(i) the internalising of guard bands,

(ii) respecting the restrictive BEM and committing to not interfering with adjacent services, and

(iii) implementing a duplex spacing of 100 MHz with terminal station transmission (FDD uplink) located in the lower part of the band between 3 410 MHz and 3 490 MHz and base station transmission (FDD downlink) located in the upper part of the band between 3 510 MHz and 3 590 MHz.

### ComReg's final position

4.45 In light of the above, ComReg's final position is to specify a time division duplex (TDD) band plan for the Award Spectrum of the sub-band 3 400 – 3 600 as set out in Figure 1.[87]

## 4.4 National / Regional Licences

### 4.4.1 Summary of ComReg's view from Documents 15/140 and 15/70

4.46 In Document 15/70 ComReg first considered in detail the potential to make rights of use available in the 3.6 GHz Band on a regional basis. ComReg, in Document 15/140 considered a number of further submissions in this regard and, as a result, made adjustments to its initial proposals[88]. In the remainder of this section ComReg summarises the key items considered in developing its regional proposals.

4.47 In section 4.2.2 of Document 15/70 and section 4.3 of Document 15/140, ComReg discussed the potential for facilitating national and regional licences in the 3.6 GHz Band. As part of this discussion, ComReg considered a number of issues, including the justification for national / regional licences, the appropriate number of regional areas, how to define region boundaries and the other principles upon which the regions should be established.

4.48 ComReg came to the preliminary view that:

- regional areas should be established and that it is appropriate to define both urban and rural regions to take account of the potentially different uses in these areas; and
- the main urban areas should be the five main cities and suburbs (Dublin, Cork, Limerick, Galway and Waterford) and the boundaries for these should be established using their respective CSO boundaries.

4.49 In defining the regional boundaries and, in particular, the larger more rural regional areas, ComReg proposed that it should be guided by the following five objective principles:

[87] ComReg has no discretion with regard to the band plan for the sub-band 3 600 – 3 800 MHz. The 3.6 GHz EC Decision specifies that the duplex mode of operation in the 3 600 – 3 800 MHz sub-band shall be time division duplex.

[88] These adjustments related to a change to the regions to facilitate alignment with the lots to be awarded through the National Broadband Plan being developed by the Department of Communications, Climate Change and Natural Resources.

a) there should a small number of regions (i.e. between circa five to nine regions) including the major cities to provide a balance between allowing bidders flexibility to obtain licences in an appropriately-sized area and limiting auction complexity;

b) established boundaries should be used for the identification of borders between regions e.g. County boundaries and/or County council boundaries;

c) the instances of tri-lateral agreements occurring between operators at boundaries between regions should be minimised;

d) the instances where a city region is adjacent to two other regions should, as far as practicable, be eliminated; and

e) by extension, the potential for each regional operator to acquire both a city and surrounding rural region should be facilitated.

4.50 These objective principles were developed by ComReg having regard to its statutory functions, objectives and duties in respect of the management of the radio frequency spectrum.

4.51 Considering the above and the submissions received from interested parties, ComReg set out its position on the regions to be used for the Award Process in its draft decision as follows:

*"3.7 to make rights of use in respect of the Award Spectrum available on a regional basis as set out in Figure 1 [of the Draft Decision] below:*

- **Borders, Midlands and West:** Counties Donegal, Leitrim, Sligo, Mayo, Roscommon, Cavan, Monaghan, Louth, Longford, Westmeath, Offaly, Laois, Galway excluding the Galway CSO City and Suburb region.
- **East:** Counties, Meath, Kildare, Wicklow and Dublin excluding Dublin CSO City and Suburb region.
- **South East:** Counties Kilkenny, Carlow, Wexford, the legal boundary of South Tipperary and Waterford, excluding Waterford City and Suburbs.
- **South West:** Counties, Clare, Limerick excluding Limerick CSO City and Suburbs, Kerry and Cork excluding Cork CSO city and Suburbs and the legal boundary for North Tipperary.
- **Dublin CSO boundary** for City and Suburbs
- **Cork CSO boundary** for City and Suburbs
- **Limerick CSO boundary** for City and Suburbs
- **Galway CSO boundary** for City and Suburbs
- **Waterford CSO boundary** for City and Suburbs

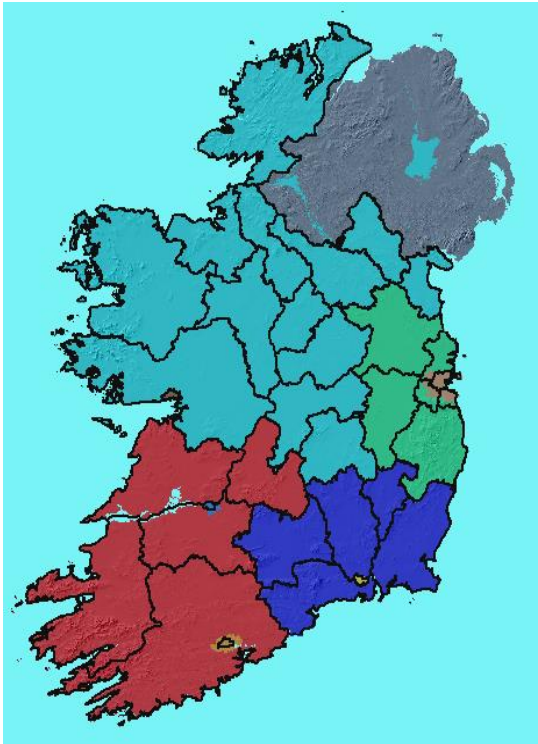

**Figure 2: "Figure 1 of the Draft Decision: Regions"**

4.52 ComReg also, subsequently, reflected these proposals[89] in section 2.2 of the draft Information Memorandum.

### 4.4.2 Views of respondents to Document 15/140

4.53 ComReg received one response (from Vodafone) relating to its proposed approach to regional licences.

4.54 In summary, Vodafone submits that it does not agree that the fifth principle (i.e. the potential for each regional operator to acquire spectrum rights of use for both a city and surrounding rural region) should be used in defining the regional areas of the award. The reasons provided by Vodafone were:

[89] Which provided additional clarity in the text description of the regions and an alternative illustration

- it does not believe that this is a likely scenario and, in its view, it does not appear from the submissions made that there is demand for an individual city and surrounding area; and

- facilitating this in the auction creates, in its view, a significant number of additional lots and hence more combinations of bids adding to auction complexity.

4.55 Instead, Vodafone favours the removal of principle 5 and proposes that the cities should all be included as a single Lot.

### 4.4.3 ComReg's assessment

4.56 ComReg notes that there are some similarities between Vodafone's position and that raised by 3IHL at an earlier stage in the process[90]. ComReg refers Vodafone to section 4.3.3 (paragraphs 4.61 to 4.64) of Document 15/140 where 3IHL's earlier view on this matter is considered.

4.57 In considering the specifics of the matter raised by Vodafone, ComReg considers the following also to be relevant:

- there are existing 3.6 GHz FWALA licensees that hold licences in areas that include a city and surrounding rural area, and it is conceivable that these regional operators may wish to acquire spectrum rights of use into the future that may have a similar or comparable footprint[91];

- such operators may not be interested in all urban regions and to bundle all together might act as a barrier to such operators bidding; and

- one of the reasons provided by Vodafone is that having the cities in individual lots adds to complexity. However, the degree of complexity added by this is, at best, marginal and any such complexity that arises resides with the auctioneer rather than the bidders in any event.[92]

4.58 On balance, ComReg considers that the benefits claimed by Vodafone in respect of its' proposal would not outweigh the likely disadvantages of same

[90] In its submission to Document 15/140, 3IHL notes ComReg's position and explanation for keeping the 9 different geographic areas, and states that 3IHL can accept the reasoning behind this position also.

[91] Including LightNet, Permanet, Airspeed and Imagine

[92] In this regard ComReg also references DotEcon's view on this matter summarised in paragraph 4.63 of Document 15/140.

"*Further, DotEcon, in considering this proposal, observes that there is no material advantage in combining the cities into a single region and that doing so could, in fact, disadvantage some bidders and have a detrimental impact on the efficiency of the award. DotEcon notes that a CCA award format allows for package bidding and, by keeping the cities in separate regions, offers flexibility for bidders to express their demand for individual or any combination of the five cities and suburbs without aggregation risks. Accordingly, DotEcon recommends that the cities are kept as separate regions and bidders be allowed to choose their preferred combination.*

and, further, would not be consistent with the aims of a regional award of spectrum rights and may well preclude regional bidders from participating.

### 4.4.4 ComReg's Final position

4.59 Accordingly, ComReg's final position is to make rights of use in respect of the Award Spectrum available on a regional basis as set out in Figure 3 below:

- **Borders, Midlands and West:** That area of the State comprising counties Donegal, Leitrim, Sligo, Mayo, Roscommon, Cavan, Monaghan, Louth, Longford, Westmeath, Offaly, Laois and Galway, but excluding the CSO Boundary for Galway City and Suburbs Region.

- **South West:** That area of the State comprising counties Clare, Limerick, Kerry, Cork and the former local authority area of North Tipperary (as originally referred to as Tipperary North Riding in the Local Government Act 1898) but excluding the respective parts of these counties contained in the CSO Boundary for Cork City and Suburbs region and the CSO Boundary for Limerick City and Suburbs Region.

- **East:** That area of the State comprising counties Meath, Kildare, Wicklow and Dublin, but excluding the respective parts of these counties contained in the CSO Boundary for Dublin City and Suburbs Region.

- **South East:** That area of the State comprising counties Carlow, Wexford, the former local authority area of South Tipperary (as originally referred to as Tipperary South Riding in the Local Government Act 1898), Kilkenny and Waterford, but excluding the respective parts of these counties contained in the CSO Boundary of Waterford City and Suburbs Region.

- **CSO Boundary for Dublin City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Dublin City and Suburbs.

- **CSO Boundary for Cork City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Cork City and Suburbs.

- **CSO Boundary for Limerick City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Limerick City and Suburbs.

- **CSO Boundary for Galway City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Galway City and Suburbs.

- **CSO Boundary for Waterford City and Suburbs:** That area of the State as defined by the CSO as per the Census 2011 Boundary Files for Waterford City and Suburbs.

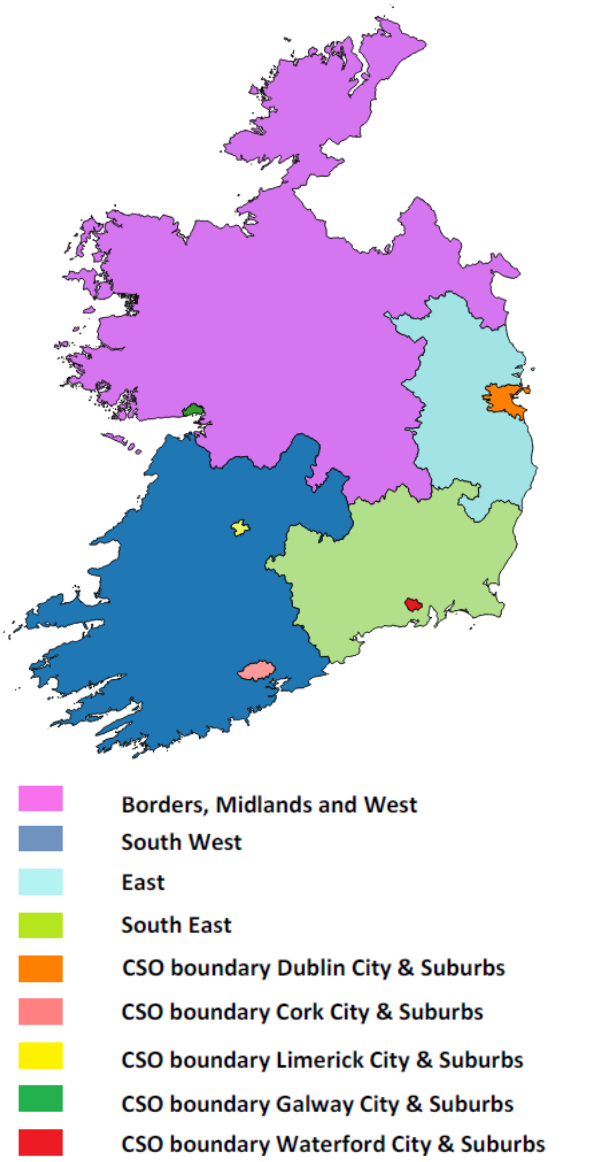




**Figure 3: "Regions"**

## 4.5 Licence duration

### 4.5.1 Summary of ComReg's view in Document 15/140

4.60 In section 4.4 of Document 15/140, ComReg set out its proposals on the duration for rights of use with regard to the proposed 3.6 GHz Band award.

4.61 ComReg considered its proposals along with submissions received in respect of same, particularly with regard to the following three matters:

- whether rights of use awarded under the proposed award process should be of finite or infinite duration;
- if rights of use are to be of finite duration, what would be the appropriate duration for such rights of use, having regard to the nature of the spectrum involved and ComReg's obligations under the regulatory framework; and
- in considering the latter, whether it is desirable that rights of use should co-terminate with other rights of use, be they existing or future rights of use.

4.62 ComReg was of the preliminary view that new 3.6 GHz rights:

- should be of finite duration;
- should be for a duration of somewhere between 15 and 20 years; and
- need not co-terminate with spectrum rights of use awarded under the MBSA process.

4.63 Further, ComReg was of the preliminary view that a duration of 15 years would be appropriate.

4.64 ComReg reflected its position on the appropriate duration of the rights of use for the 3.6 GHz award in its Draft Decision as follows:

*"3.10.3 3.6 GHz Band Liberalised Use Licences in respect of the Award Spectrum being granted for a maximum term of 15 years and where all rights of use of spectrum granted shall expire absolutely on 31 July 2032[93]".*

### 4.5.2 View of respondents to 15/140

4.65 ComReg received four responses on the matter (from 3IHL, Imagine, Permanet and Vodafone) and the responses can be grouped into the following categories:

[93] Footnote 237 of Document 15/140 states that *"Any delay to the commencement of 3.6 GHz Band Liberalised Use Licences due to Transitional Licences shall not affect this expiry date."*

i. Support for perpetual or rolling licences (3IHL and Vodafone). The reasons submitted in support of this are summarised as follows:

   a) 3IHL's view that the benefits cited by ComReg in support of licences of finite duration are also applicable to "rolling licences". In support of this view 3IHL refers to its submission in response to Document 15/131[94];

   b) 3IHL view that rolling licences are superior because such an approach would provide security for on-going investment by the licensee;

   c) Vodafone's submission that the Radio Spectrum Policy Group's (RSPG) is of the view that licence terms should be lengthened and consideration given to creating perpetual licences in order to promote ongoing investment and upgrades in mobile broadband networks.

ii. That the licence duration should be for 25 years as it will align with the contract term of the NBP (3IHL, Imagine, Vodafone[95]). The reasons provided by respondents are summarised as follows:

   a) a shorter licence duration of 15 years would impede the use of the wireless NGA services or the 3.6 GHz Band by a bidder in the National Broadband Plan (NBP) (3IHL, Imagine);

   b) the lack of clarity on the potential renewal of licences until a time in the future is disadvantaging bidders in the NBP that wish to use wireless NGA services (3IHL, Imagine); and

   c) it seems inconsistent that ComReg would modify the geographic lots to match the NBP areas, however is proposing a licence term that is significantly shorter than the NBP contract duration (3IHL).

iii. Permanet in its submission also make the following statement in respect of ComReg's discussion on indefinite licences:

   *"In relation to sections 4.97 to 4.99 we would take this opportunity to acknowledge that clearly there is demand from end-users for higher speed services. In now making larger amounts of contiguous 3.6Ghz spectrum available for the provision of high speed services this may also create an opportunity to attract investment.*

[94] Consultation on Radio Spectrum Management Strategy 2016 to 2018.

[95] In support of its view, Vodafone also referenced its submission as per item i c) above.

*However we would point out that it is quite apparent to many WISPs that Comreg decision 10/29 has been the single most significant factor effecting investment in 3.6Ghz FWA in the period 2010 to 2015."*

### 4.5.3 ComReg's Assessment

4.66 In relation to items **I (a), (b) and (c)**, ComReg notes that these submissions are in essence the same as those submitted by these respondents in response to ComReg Document 15/131[96]. ComReg has addressed these submissions in section 4.3 of Document 16/49[97], and does not propose to address those issues again here save to clarify that the RSPG, in its final report on Efficient Awards and Efficient Use of Spectrum (RSP16-004 FINAL)[98] does not, in fact, express the views claimed by Vodafone.[99] In summary, ComReg does not consider these arguments to be persuasive generally or in the context of the 3.6 GHz Band award.

4.67 In relation to items **ii (a) and (b)**, ComReg has considered these points in detail in section 4.4.2 of Document 15/140 and does not propose to address these issues again here.

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[96] Consultation on Radio Spectrum Management Strategy 2016 to 2018 http://www.comreg.ie/publications/consultation_on_radio_spectrum_management_strategy_2016_to_2018.583.105008.p.html

[97] Response to Consultation 15/131 on ComReg's radio spectrum management strategy 2016 – 2018 - http://www.comreg.ie/publications/response_to_consultation_15_131_on_comreg_s_radio_spectrum_management_strategy_2016_-_2018.583.105136.p.html

[98] http://rspg-spectrum.eu/2016/03/39th-rspg-meeting-24-february-2016/

[99] In section 6.1 (entitled "Licence Duration") of its report the RSPG states:

*"Licence duration is important in that it provides licensees with the certainty that they require in order to have confidence to invest in the development and deployment of their network, and needs to be carefully assessed when defining the licence duration. Several respondents to the consultation agreed that licenses need to be of sufficient duration to promote long term investment. In most Member States licences are awarded for a specific duration, usually around 15-20 years. While in some Member States this is a policy decision, in others, there are statutory requirements that limit the duration of usage.*

*In a few cases, the licence duration is not specified and a revocation notice may be issued after a set period of time. For example, in the UK, Ofcom generally grants indefinite licences with a minimum period of notice for revocation (such as five years) for spectrum management reasons. In order to give the licensee certainty following the award that they will have at least a minimum period to recover their investment, Ofcom will offer assurances during the award that no such revocation notice will be issued for a certain period (e.g. not in the first 15 years).*

*The nature of investment in mobile networks has evolved and changed over time as a result of the different characteristics of 2G, 3G and 4G networks. The RSPG considers it essential that licences are of sufficient duration, taking into account national circumstances, to provide legal certainty and the promotion of investment. Equally, however, care must be taken to ensure that spectrum is not sterilised; for example if the use for which the band has been harmonised does not materialise as expected, or changes over time or as a result of technical innovation or changes in consumer demand (such as 1900-1920MHz where rights have been granted 15 years ago)."* (emphasis added).

4.68 In relation to item **ii (c)**, ComReg has already fully set out its reasoning for its proposals on geographic lots and licence duration in sections 4.3.3 and 4.4.2 of Document 15/140 respectively and does not propose to repeat that assessment here. In particular, at paragraphs 4.133 to 4.148 of Document 15/140, ComReg set out in detail its reasoning as to why it would not be appropriate to simply align licence duration with the NBP contract duration. However, 3IHL does not address that reasoning in its submission.

4.69 In relation to item **iii,** ComReg notes that the FWALA licence term as set out in Document 06/17 (as amended) is for a maximum term of 7 years and that ComReg clearly set out in its information notice, Document 10/29, to set an end-date for FWALA licensing which was over 7 years into the future. This gave all existing 3.6 GHz FWALA licensees the certainty that their licences would run for the full 7-year duration (subject of course to annual renewal and compliance with all licence conditions), and it clearly informed prospective licensees significantly in advance that 31 July 2017 is the absolute end-date for the current 3.6 GHz FWALA licensing scheme. Further, ComReg also notes that the number of licences in force annually has increased[100] since the publication of Document 10/29 and while the statement by Permanet may be relevant for certain operators it has not manifested itself in the number of live FWALA licences in force generally.

4.70 In light of the above, ComReg notes that the submissions received to Document 15/140 are in general the same as those previously received and fully considered by ComReg in the formulation of its Draft Decision. Further, ComReg is not aware of any other information which would warrant an amendment to its proposals on licence duration.

### 4.5.4 ComReg's final position

4.71 Accordingly, ComReg's final position is that 3.6 GHz Band Liberalised Use Licences in respect of the Award Spectrum be granted for a maximum term of 15 years and where all rights of use of spectrum granted shall expire absolutely on 31 July 2032[101].

[100] In April 2010 there were 163 licences in force, November 2015 - 208 licences and June 2016 230 licences.

[101] Any delay to the commencement of 3.6 GHz Band Liberalised Use Licences due to Transition Activities shall not affect this expiry date.

Chapter 5

# 5 Award Type and Format

## 5.1 Introduction

5.1 This chapter sets out ComReg's final position on several aspects of the Award Type and Format. Specifically the:

- award format;
- packaging of spectrum;
- competition caps;
- unsold lots; and
- fees.

5.2 ComReg notes that these matters have also been considered separately by ComReg's economic advisors, DotEcon, in Document 16/57a, and ComReg has had regard to these views in reaching its final position.

## 5.2 Award Format

### 5.2.1 Summary of ComReg's view in Document 15/70 and 15/140

5.3 In Chapter 5 of Document 15/70, ComReg identified and examined a number of suitable auction formats for awarding rights to the Award Spectrum. These formats included:

- simultaneous multiple-round ascending auction (SMRA);
- simple clock auction (SCA);
- combinatorial clock auction (CCA); and
- sealed bid combinatorial clock auction (SBCA).

5.4 In order to assess which auction format was best suited to the proposed Award Process, a number of risks which could arise from a stand-alone 3.6 GHz award process were identified and considered.[102]

[102] The main risks associated with this award process are aggregation risks, gaming opportunities, substitution risks, common value uncertainty and complexity. Each risk was discussed in detail in Chapter 5 of Document 15/70.

5.5 In summary, ComReg considered that a CCA format would best mitigate those risks while ensuring spectrum rights would be awarded to those users who value it the most. In particular, the CCA format would:

- avoid the aggregation risks associated with the SMRA[103] by allowing bidders the opportunity to bid for packages of lots and ensuring that any package is assigned to the bidder that values it the most, provided bidders bid truthfully according to their valuations;
- allow for the ability to switch across regions, thereby reducing substitution risk, without creating an unacceptable risk of gaming or strategic behaviour that could weaken competition;
- mitigate the risk of inefficiently unsold lots by providing for a supplementary bids stage;
- allow for limited transparency so as to reduce the likelihood of tacit collusion and strategic demand reduction; and
- be very flexible and could be adapted to cope with situations where bidders are competing for different amounts of spectrum and may wish to deploy different services and technologies.

5.6 Having considered the responses received to Document 15/70, ComReg reaffirmed its view, in Document 15/140, that a CCA was the appropriate award format for assigning rights of use in the 3.6 GHz Band.

5.7 ComReg reflected its position on the award format in its Draft Decision as follows[104]:

*3.10 to incorporate into the competitive selection procedure, inter alia, the following elements:*

*3.10.1 a number of stages including an application stage, a qualification stage, a main stage and an assignment stage, with the outcome of the qualification stage determining whether the procedure moves directly to the assignment stage due to demand not exceeding supply, or whether the main stage is necessary, due to demand exceeding supply;*

*3.10.2 the main stage, if it occurs, comprising of a combinatorial clock auction;*

*…*

[103] Including other auction formats that do not allow for package bidding.

[104] Para 3.10 of Draft Decision.

*3.10.4 in the event of the main stage of the auction proceeding, multiple clock primary rounds, with the auctioneer setting the price in each round for each lot category specified in the Information Memorandum, with Qualified Bidders entitled to bid, subject to detailed rules to be set out in the Information Memorandum, for packages of lots at those prices, until supply equals or exceeds demand across all lot categories at the round prices or for such other reason as may be set out in the Information Memorandum;*

*3.10.5 following any such primary rounds, a single, sealed-bid, supplementary round, entitling Qualified Bidders to submit a number of bids for packages of lots for which such Qualified Bidders are eligible to bid, at bid prices of their choosing, all of which will be subject to detailed rules set out in the Information Memorandum. Winning bids will be determined by selecting at most one bid from amongst the entirety of bids made by each Qualified Bidder in order to maximise the total value of winning bids subject to not allocating more Lots than available. A price calculation methodology as set out in the Information Memorandum, will then be applied to calculate the Base Price on the basis of the opportunity cost of awarding Lots to each Winning Bidder;*

*3.10.6 an assignment stage, in which Winning Bidders will be required to participate (other than in respect of the Fixed Frequency Lot) in which such parties are eligible to bid for their preferred locations in the Award Spectrum;*

*3.10.7 a constraint in the assignment stage whereby (except in respect of the Fixed Frequency Lot) all Winning Bidders will be assigned contiguous lots in each Region;*

*3.10.8 winning bids and prices in the assignment stage being determined in accordance with the winner and price determination methodology set out in the Draft Information Memorandum.*

5.8 Finally, in Document 16/22 ComReg reflected this position in its Draft IM and Draft Regulations where, among other things, it defined the "Award" as *"the competitive award procedure used by the Commission for the purpose of granting individual rights of use for radio frequencies in the 3.6 GHz Band, as detailed in the Information Memorandum"*.

### 5.2.2 Views of respondents / additional information

5.9 ComReg received two responses (3IHL and Vodafone) in relation to the award format.

5.10 3IHL accepts that there are advantages and disadvantages to each auction type, and that the final detailed rules will have an impact on how the auction

progresses. In that regard, 3IHL reserved further comment on the award format until publication of the draft Information Memorandum.[105]

5.11 Vodafone repeats its concerns that:

- price setting is becoming more of a risk as operators become more experienced with a CCA;
- a CCA needs to keep to a more standard design in order to avoid complexity; and
- ARPUs are not, in its view, increasing in line with increasing usage and as spectrum volumes increase, the value of additional spectrum should be reduced. [106]

### 5.2.3 ComReg's Assessment

5.12 ComReg notes that the views expressed by Vodafone have been addressed in previous consultations [107] and ComReg does not propose to repeat that assessment here.

### 5.2.4 ComReg's final position

5.13 Accordingly, ComReg's final position is that a CCA is the auction format most appropriate for the award of 3.6 GHz spectrum rights of use.

## 5.3 Packaging of spectrum

### 5.3.1 Summary of ComReg's view in Documents 15/70 and 15/140

5.14 In Chapter 5 of Document 15/70, ComReg set out that between 3 475 MHz and 3 800 MHz, generic lots should be offered across all regions using lot sizes of 5 MHz for the following reasons:

- 5 MHz lots offer more options and provides greater flexibility for bidders to bid for spectrum rights that suits their individual needs;
- some bidders may want to acquire spectrum rights of use for an additional 5 MHz to use as a guard band;

[105] 3IHL did not make any further submissions with regard to the CCA format in its response to the Draft Information Memorandum.

[106] In relation to the value of additional spectrum, Vodafone observes that ComReg has not commented on how the creation of a spectrum shortage can affect prices. ComReg discusses this in Section 5.6 below.

[107] See, in particular, Section 5.2 of Document 15/140.

- the use of larger lot sizes could result in bidders acquiring spectrum above their demand, possibly leading to an inefficient use of spectrum;

- in an award with a large range of bidders seeking different bandwidths, a larger block size could lead to spectrum being inefficiently distributed or remaining unsold; and

- a CCA, in any case, allows for ready aggregation of lots by bidders into packages of spectrum that would constitute larger blocks.

5.15 ComReg further considered that between 3 410 and 3 435 MHz a frequency-specific lot of 25 MHz should be offered across all regions because the existing use of the 3.6 GHz Band by State Services fragments the 3.6 GHz Band and creates non-contiguous spectrum at the point above and below the 3 435 – 3 475 MHz portion of the band.

5.16 This packaging of spectrum would allow bidders certainty that all bids placed on any frequency generic lots could be made available on a contiguous basis in the assignment phase. [108]

5.17 Having considered the responses to Document 15/70, ComReg reaffirmed its view, in Document 15/140, to make rights of use available in frequency generic (of 5 MHz size) and frequency-specific lots (of 25 MHz size).

5.18 ComReg reflected its position on the packaging of spectrum in its Draft Decision as follows:

"3.8 *to make rights of use available in the form of Frequency Generic Lots per Region*[109]

*3.9 to make rights of use available in the form of a Fixed Frequency Lot per Region*[110]

5.19 Finally, in Document 16/22 ComReg reflected this position in its Draft IM and Draft Regulations where:

- a "Type A Spectrum Block" means *"a 25 MHz unpaired block of radio frequency spectrum in the range 3410 MHz – 3435 MHz";* and

[108] Bidders may still win non-contiguous spectrum if they win both frequency-generic and frequency specific lots. Bidders, however will be aware of this if they bid for both types of lots.

[109] Where a Frequency Generic Lot means "*a right of use in respect of 1 x 5 MHz block of spectrum in the range 3475 MHz to 3800 MHz, which bidders can bid for in the main stage of the competitive award process, with the specific frequencies being allocated to such lots in the assignment stage"*

[110] Where a Fixed Frequency Lot means "*a right of use in respect of spectrum in the range 3410 MHz to 3435 MHz which will be made available as a single frequency-specific lot per Region*"

- a “Type B Spectrum Block” means *“a 5 MHz unpaired block of radio frequency spectrum in the range 3475 MHz – 3800 MHz”.*

### 5.3.2 Views of respondents / additional information

5.20 Vodafone broadly agrees with the proposed packaging of available spectrum. However, it submits that the assignment process should provide for the possibility that bidders may want part of their spectrum assigned in the 3 400 – 3 600 MHz and the 3 600 – 3 800 MHz parts of the band.

### 5.3.3 ComReg’s final position

5.21 In relation to Vodafone’s request ComReg observes that the detailed rules associated with the assignment round is a matter more appropriate for consideration when finalising the Information Memorandum. ComReg will therefore address this proposal in its entirety in its forthcoming response to submissions provided to Document 16/22, noting that Vodafone provided further detail on this suggestion in its response to Document 16/22.

5.22 ComReg notes that it did not receive any other submissions from respondents in relation to the packaging of spectrum. Nor is ComReg aware of any other information which would warrant an amendment to these proposals.

5.23 Accordingly, ComReg’s final position is to make the Award Spectrum available in the form of sixty five 5 MHz unpaired Frequency Generic Lots (between 3 475 and 3 800 MHz) and one 25 MHz unpaired Fixed Frequency Lot (between 3 410 and 3 435 MHz) per Region.

## 5.4 Unsold Lots

### 5.4.1 Summary of ComReg’s view in Document 15/140

5.24 In section 5.2.4 of Document 15/140, ComReg stated that it should retain discretion regarding how it might treat any unsold lots, depending on the factual circumstances arising from the award, save that unsold lots should not be considered for assignment for a reasonable period after the process (and, in any event, would not be considered for a minimum of two years.)

5.25 Retaining discretion in this way would avoid providing a negative incentive to bidders to strategically withhold demand during the auction in the hope of being assigned this spectrum on the same or more preferable terms in any follow up process.

5.26 ComReg reflected its position on the unsold lots in its Draft Decision as follows

"3.14 *to retain its discretion regarding how it might treat any unsold Lots depending on the factual circumstances arising from the award process, save for the decision that unsold Lots will not be considered for assignment for a reasonable period after the process, and, in any event, will not be considered for a period of at least 2 years*."

### 5.4.2 Views of respondents / additional information

5.27 Vodafone agrees that unsold spectrum should not be assigned for a period of two years and then only after a consultation process. Vodafone also submits that any operators taking part in the auction would be allowed to compete for spectrum in any new process.

### 5.4.3 ComReg's Assessment

5.28 ComReg acknowledges Vodafone's agreement that unsold lots should not be assigned for a period of two years.

5.29 Any views in respect of a potential future award process will be addressed, as appropriate, at the time of any future consultation process.

### 5.4.4 ComReg's final position

5.30 ComReg's final position is that it will retain its discretion regarding how it might treat any unsold Lots depending on the factual circumstances arising from the award process, save for the decision that unsold lots will not be considered for assignment for a reasonable period after the process, and, in any event, will not be considered for a period of at least 2 years.

## *5.5* Competition Caps

### 5.5.1 Summary of ComReg's view in Documents 15/140

5.31 In section 5.2.2 of Document 15/140, ComReg assessed the views of interested parties on the use of competition caps. In summary, ComReg considered that a spectrum competition cap of 150 MHz would be a more proportionate and balanced measure having regard to ComReg's functions, objectives and duties, and to the matters raised by respondents, because:

- compared to a cap of 100 MHz, it would better allow bidders to obtain sufficiently large contiguous blocks of spectrum to meet likely future

requirements[111] and would not unduly restrict the range of demand that could be expressed in the proposed award;

- compared to a cap of 160 MHz and 170 MHz, it would ensure a minimum of three winners who win at least 50 MHz each; and

- compared to a cap of 160 MHz, it would better ensure the efficient use of spectrum by minimising the potential for an undesirable (and potentially unassigned) residual 5 MHz lot above State Services.

5.32 ComReg reflected its position on competition caps in its Draft Decision as follows

"3.10.9 *a spectrum cap, which will apply to each Qualified Bidder in the competitive selection procedure, and only for the duration of that procedure, of 150 MHz of Award Spectrum per Region*"

5.33 Finally, in Document 16/22 ComReg reflected this position in its Draft IM where it is defined as the "*Explicit maximum limits set on the amount of spectrum that any one Bidder can be awarded in the Award Process. All Bids are subject to a Competition Cap of 150 MHz in each Region. The Competition Cap only applies for the duration of the Award Process*[112]."

### 5.5.2 Views of respondents to 15/140

*5.34* Vodafone agrees with the proposed cap of 150 MHz for this award. It also submits that a possible future cap on 2.6 GHz spectrum would be a serious disincentive to operators bidding for 3.6 GHz spectrum.

5.35 Imagine submits that:

- a cap of 150 MHz is likely to lead to an inefficient outcome given that the agreed optimal channel bandwidth for NGA type services is 20 MHz and 150 MHz is not a multiple of 20 MHz;

- there is nothing to prevent existing fixed NGA infrastructure operators bidding to acquire substantially all of the spectrum; and

- ComReg should provide clarity on the extent to which 3.6 GHz spectrum rights of use acquired in this award would be considered in determining any further 2.6 GHz award caps.

[111] In that regard, ComReg recalls, among other things, Plum's estimate that with 100 MHz in total and an infrastructure density comparable to one of today's mobile cellular networks, LTE-A could serve up to 30% of all broadband subscribers in a typical suburban area and up to 50% of all subscribers in more rural areas.

[112] Document 16/22, p149.

5.36 Permanet submits that the cap of 150 MHz reduces the probability that smaller rural ISPs will be able to acquire 3.6 GHz spectrum rights.

### 5.5.3 ComReg's Assessment

5.37 In relation to the optimal channel bandwidth and suggestions for a lower cap, ComReg notes that such views have been addressed in previous consultations[113]. Notwithstanding, DotEcon provides further observations on this issue and notes that:

- whether the competition cap is a multiple of 20 MHz is irrelevant in determining whether the spectrum available will be assigned in a way that each bidder receives a multiple of 20 MHz. In this regard, DotEcon observes that:
    - the competition cap is only an upper limit on the maximum it may bid for;
    - bidders who wish to acquire a total bandwidth in multiples of 20 MHz are free to do so at levels below 150 MHz;
    - the spectrum in the upper sub-band between 3 475 to 3 800 MHz band does not divide neatly into 20 MHz blocks. Unless some spectrum remains unassigned at least one of the winners will win bandwidth that is not a multiple of 20 MHz;
- the proposed cap ensures that a third bidder should still be able to acquire a minimum bandwidth of 20 MHz in the upper sub-band whereas a cap of 160 MHz would not guarantee this;
- bidders may wish to acquire additional spectrum for internalised guard bands and, therefore, may wish to acquire spectrum that is not a whole multiple of 20 MHz; and
- a lower cap could potentially limit the scope for future services that require a larger bandwidth and may impact on the range of demand that could be expressed in the auction.

5.38 In relation to Vodafone's and Imagine's concerns regarding the spectrum competition cap for the 2.6 GHz band, ComReg notes DotEcon's view in Document 16/57a that "*it is not clear at present what other spectrum bands, if any, will be offered as part of the 2.6 GHz award, when the award may take place, or what the structure of the relevant market(s) will be at that*

[113] Section 5.2.2 of Document 15/140.

*time…Therefore, a competition assessment and any decisions on caps related to the 2.6 GHz award would need to be made at a later stage.*"

5.39 ComReg agrees with this analysis and considers that the extent to which 3.6 GHz spectrum holdings should form part of future competition caps is a matter for future spectrum awards (such as 2.6 GHz).

5.40 ComReg further notes that any future decision on competition caps would be taken following consultation with interested parties. In that regard, and among other things, the degree of substitutability between bands for award (such as 2.6 GHz) and existing spectrum holdings (such as 3.6 GHz) would be assessed. However, it would be inappropriate to assess competition caps for future awards at this time, as the extent to which relevant factors may change up to the time of any award is not known.

5.41 In relation to claims that certain bidders could acquire substantially all of the spectrum (Imagine), or certain bidders would be unable to acquire sufficient spectrum (Permanet), ComReg notes that a competition cap of 150 MHz would ensure a minimum of three bidders would have the opportunity to win at least 50 MHz each. ComReg further notes that it has previously addressed these concerns in section 5.2.2 of Document 15/140 and does not propose to repeat those arguments again here.

### 5.5.4 ComReg's final position

5.42 Accordingly, ComReg's final position is that a spectrum cap of 150 MHz of Award Spectrum per Region will apply to each Bidder in the Award Process, but only for the purposes of the Award Process itself.

## 5.6 Fees

### 5.6.1 Summary of ComReg's view in Document 15/140

#### Benchmarking and the level of minimum prices

5.43 In section 5.2.5 of Document 15/140, ComReg outlined its views in relation to fees. In relation to benchmarking and the level of minimum prices, ComReg was of the view that:

- benchmarking was an appropriate approach to determine a minimum price in a stand-alone 3.6 GHz award process;
- DotEcon's recommended approach to excluding outliers (i.e. using standard definitions of outliers rather than excluding data points in an ad-hoc manner) was appropriate;

- there appeared to be sufficient uncertainty surrounding the value of the 3.6 GHz spectrum to warrant a lower minimum price compared to that set out in Document 15/70. Minimum prices should therefore be lowered on a price per MHz per capita basis from €0.015 to €0.01 in rural regions and €0.025 to €0.015 in urban regions; and

- the benchmarking analysis would be updated in light of later available data and minimum prices should be kept under review.

### Adjustment to minimum price for urban and rural regions

5.44 In Document 15/72, DotEcon noted that experience from international auctions[114] suggested that urban regions command a higher spectrum price than less populated regions. Two reasons were outlined for this being, in summary:

- urban areas have a population inflow due to commuting patterns; and
- population density is higher in urban areas reducing the unit costs of providing capacity.

5.45 Accordingly, setting the same minimum price across urban and rural regions would not adequately reflect the additional value in urban areas and render the benchmark relatively more conservative in those areas.

5.46 Further, to account for these differences:

- the population of each region is adjusted to take account of the commuter flows between the five urban regions and the other non-urban regions; and
- as highlighted above, a price per MHz per capita basis of €0.015 should apply for urban regions to account for the higher population density, and €0.01 should apply to the rural regions.

### Minimum price structure and split

*5.47* Having considered the views of respondents to Document 15/70 and the recommendations of DotEcon, ComReg considered it appropriate to revise its position on the split between the minimum Spectrum Access Fee ("SAF") (the "Reserve Price") and Spectrum Usage Fees (SUFs) from 50/50 to 40/60 so as to better encourage participation by smaller bidders without creating a significant additional risk of speculative entry.

5.48 ComReg reflected its position on Minimum Prices in its Draft Decision as follows:

"3.10.10 *reserve prices and spectrum usage fees (SUFs) for the 3.6 GHz Band Liberalised Use licences described herein, to be determined in accordance with*

[114] See Annex B of Document 15/72

*the methodology set out in Chapter XX of Document 16/YY [document to which the final decision will be attached], and with the Benchmarking Report prepared by DotEcon and which accompanies Document 16/YY [document to which the final decision will be attached], where the final prices will be set out in the Information Memorandum, taking account of any additional relevant data at that time*"

5.49 Finally, ComReg in Document 16/22 reflected this position in its Draft IM and Regulation 8 of the Draft Regulations where it stated that the fee for a 3.6 GHz Band Liberalised Use Licence consists of an Upfront Fee which is paid at the end of the Award Process and Spectrum Usage Fees ("SUFs") which are paid prior to the first grant of a 3.6 GHz Band Liberalised Use Licence and then over its duration, and where the Reserve Price per Lot per Region is set out in Table 4 of Document 16/22[115] and Schedule 6 to the Draft Regulations.

## 5.6.2 Views of respondents to 15/140

### Benchmarking and the level of minimum prices

5.50 ComReg received two responses (3IHL and Vodafone) in relation to its proposals on benchmarking and the level of minimum prices which are summarised below.

5.51 3IHL does not favour the use of benchmarking to derive minimum prices and disagrees with the level of minimum prices as described in Document 15/140 because:

- the current approach does not, in its view, avoid the risk of choking-off demand.
- it claims that the use of minimum prices to prevent strategic demand reduction is overstated and submits that no evidence has been produced to show that strategic demand reduction has occurred in any auction in Ireland or anywhere else; and
- in its view, it is unclear what "*real economic value*" means and the role it plays in the assignment of spectrum. 3IHL further submits that:
    - ComReg's approach is to set reserve prices at or above real economic value; and

[115] Document 16/22, p30.

- it should be explained how varying the minimum price at the auction could result in a user with a higher economic value obtaining the spectrum.

5.52 Vodafone submits that ComReg has not justified the setting of minimum prices and that a properly designed auction will reveal the real value of the spectrum being offered. In particular, Vodafone states that:

- the newly reduced minimum prices are not adequately conservative and believes that a further reduction is justified;
- ComReg has tended to set auction reserve prices based on results of auctions in other countries whereas, in its view, the auction should reveal the value of the spectrum;
- the spectrum assigned for ECS in Ireland is lower than in other European countries which could place an artificially high value on spectrum by creating a spectrum shortage;
- ComReg has not offered any evidence as to why "*normal competitive conditions"* do not exist in Ireland;
- some judgement is required on whether the market structures in the countries used in the benchmark are reasonably similar to Ireland before including them;
- prices for 2.6 GHz spectrum should not be used as part of the benchmarking process; and
- the proposed criterion to identify outliers is inappropriate as the sample size is too small to use a purely statistical process.

### Adjustment to minimum price for urban and rural areas

5.53 There was one response, from 3IHL, in relation to the adjustment of the minimum price for urban and rural regions.

5.54 3IHL asserts that the assumptions underpinning the Urban/Rural split are incorrect and should be removed. To support this view, 3IHL uses a traffic profile from its network which it claims illustrates that the traffic volume grows steadily from about 16:00 and peaks between 18:00 and midnight with the busy hour occurring between 22:00 and 23:00.

### Minimum price structure and split

5.55 Two responses were received (3IHL and Vodafone) in relation to the SAF/SUF split.

5.56 Vodafone simply noted that it has no issue with the proposed split.

5.57 3IHL welcomes the SAF/SUF adjustment and believes that this can be applied on this occasion without adversely affecting the bidder incentives.

5.58 3IHL, however, does not believe it is appropriate to link annual spectrum fees to the Consumer Price Index (CPI).

## 5.6.3 ComReg's Assessment

### Benchmarking and the level of minimum prices

5.59 ComReg addresses the concerns raised in relation to benchmarking and the level of minimum prices under the following headings:

- risk of choking-off demand;
- strategic demand reduction;
- real economic value;
- the use of outliers; and
- the use of 2.6 GHz data points.

#### Risk of choking-off demand

5.60 ComReg is satisfied that the risks of choking-off demand have been adequately addressed and notes, in particular, the following:

- obtaining nationwide coverage for the whole country on the basis of current FWALA use corresponds to a licence price per MHz per capita ranging between €0.007 and €0.020 depending on the FWALA licence fee which applies to the licensed bandwidth;
- the value of 3.6 GHz spectrum offered in this award is likely to be higher than that of spectrum rights for current FWALA use due to harmonisation of the band (in particular, allowing for the deployment of LTE technologies and also noting its potential future use for 5G services) and increased equipment availability;
- minimum prices have been lowered on a price per MHz per capita basis from €0.015 to €0.01 in rural areas and €0.025 to €0.015 in urban areas; a reduction of 33% and 40 % respectively; and

- the SAF/SUF split has been revised to a 40/60 ratio to encourage smaller bidders without creating significant additional risk of speculative entry.

5.61 ComReg also notes DotEcon's view in Document 16/57a that "*In our original benchmarking report we highlighted our belief that the recommended minimum prices were unlikely to choke off demand. We continue to hold this view, especially in light of the lowering of minimum prices in acknowledgment of the uncertainty over market value*."

5.62 In relation to Vodafone's suggestion in respect of spectrum shortage, ComReg notes that this issue was addressed by ComReg in section 2.3.3 of Document 16/49 and, in this regard, ComReg is satisfied that an artificially high value is not likely to arise in this award as a result of the spectrum shortage suggested.

5.63 For the reasons set out above, ComReg is satisfied that any potential risks of choking-off demand have been adequately addressed.

### Strategic Demand Reduction

5.64 In relation to 3IHL's concerns relating to strategic demand reduction, DotEcon notes that identifying clear instances of strategic demand reduction in practice would be extremely difficult without knowledge of a bidder's true valuation.

5.65 Notwithstanding, DotEcon refers to a number of sources that present evidence of strategic demand reduction including:

- evidence from the FCC Nationwide Narrowband Auction[116];
- evidence from the German GSM Auction[117];
- evidence from the Austrian 3G Auction[118];
- lab experiments;[119] and

[116] Ausubel, Lawrence M., and Peter Cramton. "Demand reduction and inefficiency in multi-unit auctions." (2002).

Cramton, Peter C. "Money out of thin air: The nationwide narrowband PCS auction." Journal of Economics & Management Strategy 4.2 (1995): 267-343

[117] Grimm, Veronika and Riedel, Frank and Wolfstetter, Elmar, Low Price Equilibrium in Multi-Unit Auctions: The GSM Spectrum Auction in Germany (June 2001). CESifo Working Paper Series No. 506.

Klemperer, Paul. "Auctions: theory and practice." Available at SSRN 491563(2004).

Ausubel, Lawrence M., and Peter Cramton. "Demand reduction and inefficiency in multi-unit auctions." (2002).

[118] Klemperer, Paul. "How (Not) to Run Auctions: the European 3G Telecom Auctions." European Economic Review (2002).

[119] Goeree, Jacob K., Theo Offerman, and Randolph Sloof. "Demand reduction and preemptive bidding in multi-unit license auctions." Experimental Economics 16.1 (2013): 52-87.

Kagel, John H., and Dan Levin. "The winner's curse and public information in common value auctions." The American economic review (1986): 894-920.

- controlled field experiments[120].

5.66 DotEcon also considers that:

- an effective auction design should minimise the scope for all types of gaming/collusive behaviour; and
- the lack of evidence of observed strategic demand reduction in Ireland is consistent with effective auction design and ComReg actively setting out to mitigate the risks of strategic behaviour in its award processes .

5.67 ComReg agrees with the above observations and analysis, and is of the view that the scope for strategic demand reduction is an important consideration for this award. Therefore, ComReg considers that the level of minimum prices is an important factor in mitigating the risks of strategic demand reduction occurring in this award.

### Real Economic Value

5.68 3IHL's concerns in relation to "real economic value" have been previously addressed in Documents 15/70 and 15/140. Notwithstanding, ComReg observes that 3IHL appears to continue to misinterpret the term and attribute views to ComReg that are incorrect.

*5.69* For example, 3IHL claims that "*In Document 14/101 and 15/70, ComReg sets out its approach to setting reserve prices for spectrum at or above what it terms real economic value"*. For the avoidance of doubt, this is not ComReg's approach to setting reserve prices and the documents referred to by 3IHL make no such claims. On the contrary, Document 15/140[121] noted that the real economic value is not determined by ComReg but rather is determined by the interaction between bidders in an award. This remains ComReg's position.

5.70 In response to 3IHL's request for further clarity on the explanation provided by ComReg in Document 15/140, DotEcon, in Document 16/57a, states the following:

- *"ComReg has used this term to simply describe the opportunity cost of assigning spectrum to winning bidders i.e. the value of the spectrum to the losing bidders who could have been assigned the spectrum instead*;

Engelmann, Dirk, and Veronika Grimm. "Bidding Behaviour in Multi‐Unit Auctions−An Experimental Investigation*." The Economic Journal 119.537 (2009): 855-882.

[120] Engelbrecht-Wiggans, Richard and List, John A. and Reiley, David, Demand Reduction in Multi-Unit Auctions with Varying Numbers of Bidders: Theory and Evidence from a Field Experiment.

[121] Para 5.105

- *Pricing based on opportunity cost (i.e. achieving the real economic value) is a standard feature of a combinatorial clock auctions*

- *Concerns over achieving real economic value arise when there is scope for bidders to keep prices artificially low through collusive/ gaming behaviour.*

- *ComReg was simply providing a real-world example of what real economic value represents (i.e. the price that would be achieved if a licensee were to sell its spectrum to one or more operators via standard market mechanisms)*."

5.71 In addition to the above, ComReg provides the following observations by way of additional clarification:

- the minimum price approach aims to mitigate the incentives for bidders to seek to keep the price artificially low and should, therefore, help to prevent spectrum rights being released at below or less than real economic value;

- in an auction, opportunity cost pricing ensures that the real economic value reflects the highest value that spectrum has to potential alternative acquirers, if it were not assigned to the user actually acquiring it;

- if an alternative user with a higher alternative value emerges after the auction then this value can be realised through the spectrum transfer framework[122]. If a higher alternative user does not exist, the spectrum rights will presumably remain with the licensee as the user who values it the most; and

- spectrum transfer is a market-based mechanism and any higher alternative value is a matter for the licensee and the alternative user, and is not affected by the minimum price in an earlier award.

5.72 In relation to Vodafone's claim about setting auction reserve prices based on results of auctions in other countries, ComReg notes that it had already recently addressed this issue in section 4.6 of Document 16/49 and does not propose to address it again here.

## Use of Outliers

5.73 In relation to Vodafone's views on the lack of country-specific analysis in the benchmarking exercise, DotEcon, in Document 16/57a states that:

[122] See S.I 34 of 2014 and, ComReg Documents 14/10 and 14/11.

- obtaining any objective measure of spectrum scarcity for each country would be difficult as it would depend on the spectrum available but also demand for spectrum and the market context;
- the benchmark distinguishes between European and non-European observations with European observations since 2010 treated as more relevant;
- the use of PPP exchange rates provides some correction for local economic conditions (in terms of income and consumer spending differences) across countries; and
- to the extent that differences between certain observations and Ireland might result in a high minimum price, this has been taken into account by the reduction of the minimum price to account for additional uncertainty as described above.

5.74 In relation to Vodafone's concerns regarding DotEcon's approach for removing outliers, ComReg observes that:

- Vodafone has not identified any specific awards that it believes should be excluded;
- the objective and transparent rule developed by DotEcon to identify outliers has already excluded high price observations[123]; and
- the minimum prices determined by the benchmarking approach will be kept under review until the publication of the final Information Memorandum.

5.75 Finally, in relation to Vodafone's concerns surrounding "*normal competitive conditions*". ComReg observes that it was not referring to conditions currently present in the relevant market/s for services, but the "*normal competitive conditions*" that should occur in an auction if all bidders compete for their full demand and bid truthfully based on their actual valuations.

### Use of 2.6 GHz data points

5.76 In relation to Vodafone's concern around the use of 2.6 GHz data points, DotEcon notes that:

- the value of the 2.3 GHz and 2.6 GHz spectrum is higher than 3.6 GHz spectrum;

[123] For example, India was identified by DotEcon as having a spectrum shortage and was captured, as such, by the outlier rule.

- however, the number of 3.6 GHz data points is rather limited and many of the awards are not recent; and

- there is a degree of substitutability between these spectrum rights, which is implicitly recognised by Vodafone in its suggestion that a lack of 2.6 GHz spectrum in Ireland may inflate the value of 3.6 GHz spectrum.

5.77 For these reasons, and the reasons as stated in Document 15/72, DotEcon considers that awards for unpaired 2.3 GHz and 2.6 GHz spectrum could be used in the benchmarking analysis provided that the differences in the expected values were considered and accounted for in the proposed Minimum Price.

5.78 ComReg agrees with DotEcon's analysis and approach and observes that such considerations, including the propagation characteristics of different bands, have already been addressed in section 5.8 of Document 15/70. In particular, and as noted in section 5.8.2 of Document 15/70, ComReg agreed that the 2.3 GHz and 2.6 GHz bands are likely to have a higher value compared to the 3.6 GHz Band, in that these bands have greater equipment availability and superior propagation. For this reason, ComReg noted that the 2.3 GHz and 2.6 GHz spectrum benchmarks would need to be adjusted downwards to reflect the likely value difference between these bands.

### Adjustment to minimum price for urban and rural areas

5.79 ComReg notes the material provided by 3IHL but does not agree with the conclusion 3IHL reaches in relation to the adjustment made to account for population flows. In particular, ComReg notes and agrees with DotEcon's assessment that:

- the adjustment considers the flow of consumers between rural and urban areas over a full 24 hour period and reflects that spectrum rights are likely to be more valuable in urban areas than in rural areas;

- the daily traffic profile provided by 3IHL shows a data traffic profile across all regions (i.e. the State) and, in that regard:

    - only demonstrates usage across all regions at different times of the day; and

    - is not reflective of any differences between regions or the relative values placed by consumers on having coverage in urban/rural areas;

- 3IHL's traffic data shows current mobile usage only, so any conclusions drawn purely on the basis of this data may not be reflective of usage for other services, such as existing fixed services or new future services; and

- while minimum prices increase by 14% in urban areas, there is a corresponding drop of 9% in rural areas (which accounts for 66% of population) to account for the net flows. As a result, the minimum price for all regions increases by just 1.5% and should not, therefore, have a material impact on final auction prices which would be determined by the interaction of bidders in the award.

5.80 In light of the above, ComReg considers that the adjustment to minimum prices to account for commuter flows remains appropriate.

### Minimum price structure and split

5.81 In relation to 3IHLs submission that the use of the Consumer Price Index is inappropriate, ComReg notes that this issue is addressed in section 4.6 (paragraphs 4.52 to 4.54) of Document 16/59.

5.82 ComReg notes that it did not receive any other submissions from respondents suggesting a change to this proposal. Nor is ComReg aware of any information which would warrant an amendment to this proposal.

## 5.6.4 ComReg's final position

5.83 Having carefully considered the views of respondents and DotEcon, ComReg does not propose to amend its proposals on fees as set out in Chapter 5 of Document 15/140 and summarised above.

5.84 Accordingly, ComReg's final position is that:

- minimum prices will be determined in accordance with the methodology set out in the Benchmarking Report prepared by DotEcon (Document 15/140b); and

- reserve prices and spectrum-usage fees (SUFs) for the Liberalised Use Licences described herein will be determined in accordance with the methodology set out in Chapter 5 of Document 15/140.The final prices for same will be set out in the final Information Memorandum, taking due account of any additional relevant data at that time.

Chapter 6

# 6 Licence Conditions

## 6.1 Introduction

6.1 This chapter sets out ComReg's final position on the licence conditions that should be attached to the rights of use that are intended to be awarded on foot of the Award Process. These licence conditions are guided and informed by, among other things:

- ComReg's statutory functions, objectives and duties including, in particular, its powers and obligations under the Authorisation Regulations;
- the licence conditions, and rationale for same, proposed in Documents 14/101, 15/70, 15/140 and the submissions received to these consultations; and
- other relevant information (e.g. the 3.6 GHz EC Decision, the Plum Reports, international best practice, etc.)

6.2 The following licence conditions were proposed in Chapter 6 of Document 15/140:

- technology and service neutrality;
- non-exclusive assignment of spectrum;
- notification of the termination of a technology;
- coverage and rollout;
- quality of service; and
- technical conditions.

## 6.2 Technology and Service Neutrality

### Summary of ComReg's view in Document 15/140

6.3 In section 6.2 of Document 15/140, ComReg considered that a service- and technology-neutral[124] approach should be applied to the licensing of the 3.6 GHz Band. The principle of service- and technology-neutrality is promoted throughout the Common Regulatory Framework and is reflected in the 3.6 GHz EC Decision. In particular, any technologies that comply with the technical

[124] Technology- and service-neutrality is the principle that spectrum rights of use, and the conditions applied thereto, should not preclude the provision of any specific service and/or the use of any technology.

conditions as set out in the Annex to the 3.6 GHz EC Decision can be deployed in the band to provide electronic communications services. ComReg also noted that:

- Article 3 requires Member States to *"allow the use of the 3 400-3 800 MHz band in accordance with Article 2 for fixed, nomadic and mobile electronic communications networks."*; and
- Recital 2 of the 2008 3.6 GHz EC Decision states that *"[T]he designation of the 3 400-3800 MHz band for fixed, nomadic and mobile applications is an important element addressing the convergence of the mobile, fixed and broadcasting sectors and reflecting technical innovation. The services provided in this frequency band should mainly target end-user access to broadband communication"*.

6.4 ComReg subsequently reflected this proposed condition in the Draft Regulations published in Annex 2 of Document 16/22 (see Regulation 6(2) and section 2B (Technical Conditions") of Part 4 ("Licence Conditions") to Schedule 1 ("3.6 GHz Band Liberalised Use Licence").

### Views of respondents/additional information

6.5 ComReg received one response on this issue from Permanet who requested clarification on whether an operator would be permitted to operate FDD equipment provided it acquired the necessary spectrum rights to do so and under the technical conditions applicable.

### ComReg's assessment

6.6 ComReg notes that it has addressed the above matter in section 4.3.3 on the duplex configuration for the sub-band 3 400 – 3 600 MHz. Accordingly, ComReg does not propose to again address this matter here. ComReg also notes that it did not receive any further submissions from respondents on this issue, nor is it aware of any other information which would warrant reconsideration of this proposal.

### ComReg's final position

6.7 Accordingly, and in line with the Common Regulatory Framework and the 3.6 GHz EC Decision, ComReg's final position is that the Award Spectrum will be awarded on a service- and technology-neutrality basis, such that the deployment and provision of all technologies and services that comply with the 3.6 GHz EC Decision will be permitted.

## 6.3 Non-exclusive assignment of 3.6 GHz rights

### Summary of ComReg's view in Document 15/140

6.8 In section 6.3 of Document 15/140, ComReg stated that it remained of the view that 3.6 GHz rights of use issued on foot of the proposed award would be assigned on a non-exclusive basis, observing that Article 2(1) of the 3.6 GHz EC Decision obliges Member States to make available the 3.6 GHz Band on a non-exclusive basis and that this decision is binding on Member States.

6.9 ComReg also stated that it remained of the view that it would permit spectrum in the 3.6 GHz Band to be used for other uses on a non-interference and non-protected basis. In this regard, and in the interests of appropriate regulatory consistency, ComReg proposed that the non-exclusivity provision that would be attached to 3.6 GHz Band Liberalised Use licences would be substantively the same as the non-exclusive provision attached to Liberalised Use Licences issued under S.I. 251 of 2012[125].

6.10 ComReg subsequently reflected this proposed condition in the Draft Regulations published in Annex 2 of Document 16/22 (see definitions of "Non-Interference and Non-Protected Basis", Non-exclusive" and "Licence" in Regulation 2).

### Views of respondents/additional information

6.11 ComReg notes that it did not receive any submissions from respondents on this proposal, nor is ComReg aware of any other information which would warrant reconsideration of this proposal.

### ComReg's final position

6.12 Accordingly, ComReg's final position is that 3.6 GHz rights of use issued on foot of the Award Process will be granted on a non-exclusive basis, and that the non-exclusivity provision would be substantively the same as that attached to Liberalised Use Licences issued under S.I. 251 of 2012[125].

[125] The following definitions are included in S.I 251 of 2012

*"Non-exclusive", in relation to a Licence, means that the Commission is not precluded from authorising the keeping and possession by other persons of other apparatus for wireless telegraphy on a Non-Interference and Non-Protected Basis in one or more of the 800 MHz, the 900 MHz and the 1800 MHz bands;*

*"Non-Interference and Non-Protected Basis" means that the use is subject to no harmful interference being caused to any Radiocommunication Service, and on which no claim may be made for the protection of apparatus used on this basis against harmful interference originating from Radiocommunication Services;*

## 6.4 The notification of the termination of a technology

### Summary of ComReg's view in Document 15/140

6.13 In section 6.4 of Document 15/140, ComReg proposed that a licence condition requiring the prior notification of the termination of a technology should be attached to 3.6 GHz Band Liberalised Use Licences. This licence condition would require a licensee to give six months' notice to ComReg of its intention to terminate the provision of services using one technology in favour of another technology.

6.14 In addition, ComReg, after further consideration of this matter in Document 15/140, remained of the view that should a licensee notify ComReg that it would cease using one technology in favour of another in a time period of less than 6 months, ComReg would assess the proposal at that time, in light of its statutory functions, objectives and duties, considering, among other things, how disruption to consumer services would be minimised.

6.15 In summary, the reasons informing this view included:

- minimising the potential for significant disruption to consumer services;
- ensuring appropriate regulatory consistency given that this proposal is substantively similar to the licence condition attached to the Liberalised Use Licences issued under S.I. 251 of 2012; and
- a notification to ComReg would not seem to place an onerous burden on licensees.

6.16 ComReg subsequently reflected this proposed condition in Regulation 12(a) and (b) of the Draft Regulations published in Annex 2 of Document 16/22.

### Views of respondents/additional information

6.17 ComReg notes that it did not receive any submissions from respondents on this proposal, nor is ComReg aware of any other information which would warrant reconsideration of this proposal.

### ComReg's final position

6.18 Accordingly, ComReg's final position is that:

- a licence condition requiring a 6 month prior notification to ComReg of the termination of a technology will be attached to 3.6GHz Band Liberalised Use Licences;

- this condition will be substantively the same as that imposed on Liberalised Use Licences issued under S.I 251 of 2012[126]; and

- should a licensee notify ComReg that it could cease using one technology in favour of another in a time period of less than 6 months, then such a proposal will be assessed by ComReg at the relevant time in light of its statutory functions, objectives and duties, considering, among other things, how disruption to consumer services will be minimised.

## 6.5 Coverage and rollout conditions

### Summary of ComReg's View in Document 15/70

6.19 In section 6.4.3 of Document 15/70, ComReg considered that it would be more appropriate to design a rollout metric based on the number of base stations deployed rather than using the more typical population- or geographic-based coverage measures. Reasons informing this view included:

- the recent adoption of "use-it" or rollout-type obligations in other Member States[127]; and
- that the deployment of base stations at cell sites (be that at a high site, a small cell or other cell site type) is likely to be common to both likely potential uses for this band (i.e. mobile and fixed).

6.20 ComReg noted that its rollout proposal consisted of the following two elements which are discussed in more detail below:

- the extent of any rollout obligation; and
- minimum base station capability requirements.

#### *The extent of any rollout obligation*

6.21 Given ComReg's preference to set obligations at the minimum necessary to ensure the timely and efficient use of radio spectrum (bearing in mind the potential adverse effects on competition and spectrum use inherent in setting

[126] The following licence condition is included in S.I 251 of 2012

*6. It shall be a condition of any Licence to which these Regulations apply, that the Licensee shall:*

*(12) (a) notify the Commission, not less than 6 months prior to the proposed cessation of use of any terrestrial system listed in Schedule 1 to which the Liberalised Use Licence relates and;*

*(b) use all reasonable endeavours, to ensure that any adverse effects on users from the cessation of use of a terrestrial system are minimised;*

[127] See for example Romania - https://www.telegeography.com/products/commsupdate/articles/2015/05/18/ancom-consults-on-upcoming-3-4ghz-3-8ghz-auction/

too high an obligation), and having considered existing infrastructure deployment in the 3.6 GHz Band[128], in Document 15/70, ComReg considered that it would seem appropriate to set a similar lower-level range rollout obligation for:

- the non-urban regions; and
- the urban areas with the exception of Dublin.

6.22 Furthermore, and in the interests of encouraging the efficient use of spectrum across the various parts of a licensed area (i.e. a licence region identified by ComReg) and having regard to the infrastructure deployment across a number of different locations[129], ComReg outlined that it may be appropriate to add a geographic element to any base station rollout obligation.

6.23 In light of the above, and in order to provide a proposal which interested parties could comment upon, ComReg proposed the following rollout obligations:

- for each of the non-urban regions: the deployment of network-controlled base stations[130] at 15 to 25 sites and that these sites should be located in 3 to 5 different counties within the region;
- for the Dublin region: the deployment of network-controlled base stations at 15-25 sites; and
- for all other urban regions: the deployment of network-controlled base stations at 2-4 sites.

### *The minimum base station capability requirements*

6.24 To encourage licensees to employ more spectrally-efficient equipment and technologies, ComReg also proposed to set a minimum base station capability requirement. Observing that the potential uses of the band are migrating towards the use of equipment with similar technologies, ComReg proposed to set this obligation on the capabilities of a LTE base station and, further, using Plum's observation in Document 15/75 that the deployment of LTE-A equipment

[128] Region (No of BS in region): North East (43 – 49), South West (33 – 40), North West (28 – 54), South East (16 – 27), Dublin CSO boundary (59 – 63), Waterford CSO boundary (3 – 5), Galway CSO (2 – 8), Limerick CSO (2 – 4), Cork CSO (2 – 4). Source: Table 2 of Document 15/70.

[129] See Figure 5 in Document 15/70.

[130] Footnote 163 of Document 15/70: *"Network controlled base stations are those under the ownership of the operator and which have backhaul capability over a network connection under the control of the operator. Therefore plug and play type base stations (such as femto cells) or repeaters will not count toward this obligation."*

could result in an overall "technical spectrum efficient rate" of 4 bps/Hz per sector[131] as the basis for determining a base station's capability criteria.

6.25 ComReg observed that the technical capability of a base station would also depend on the quantum of spectrum assigned to it. Given this, ComReg considered that it would seem appropriate to vary the base station capability requirements applicable to a licensee according to:

(a) the amount of spectrum assigned to the licensee; or

(b) the amount of spectrum deployed by the licensee at each base station.

6.26 Paragraphs 6.62 and 6.63 of Document 15/70 provided an example of how this proposed base station capability obligation could vary.

### *The timing of any rollout obligation*

6.27 Noting that the proposed rollout obligation is linked to the provision of services based on the capability of a LTE base station (or a technology of a similar capability), and that the timeframe for the widespread availability of LTE equipment in this band is currently expected to be somewhere around 2020[132], ComReg was of the preliminary view that a roll-out period of between 3 to 5 years appeared appropriate.

### *The application of the above rollout obligations to a national licence*

6.28 As the rollout obligations above were presented in terms of the obligations in each licence area, ComReg proposed that where a bidder obtains a national licence (or a multi-region licence) the rollout obligation should comprise the aggregate of the individual rollout obligations within each specific licence area.

## Summary of ComReg's View in Document 15/140

6.29 After further consideration of respondents' views to Document 15/70 on its rollout proposals and its assessment of these views in section 6.6 of Document 15/140, ComReg modified its rollout proposals as summarised below:

- network-controlled small cells (e.g. microcells or picocells) should count towards rollout targets. In addition, ComReg re-clarified its proposal that femto cells would not count towards the rollout obligation given that a femto cell would not be a network-controlled base station (see footnote 173 of Document 15/70);

[131] Footnote 164 of Document 15/70: *"4 bps/Hz is achievable with LTE-A using 16QAM modulation (See section 3.2.1 of Plum Report 3 Document 15/75). Other technologies could achieve this throughput rate utilising 64QAM."*

[132] See Plum Report 2 Document 15/74

- infrastructure for backhaul would count towards the rollout obligation. In that regard, a point-to-point link forming part of the network infrastructure[133], even if it comprises multiple hops to the network, would be counted as one base station. ComReg further stated that if a licensee proposed to deploy apparatus not explicitly discussed under the base station proposal above, ComReg would consider, on a case-by-case basis, whether such apparatus should count towards the base station rollout condition in the context of its statutory functions, objectives and duties and, in particular, in the context of its obligation to ensure that spectrum is efficiently used;
- a higher rollout obligation would be imposed on licensees holding more than 100 MHz of spectrum rights compared to those holding up to 100 MHz. In addition, ComReg proposed to reduce the minimum number of base stations required in the Dublin region slightly from those proposed in Document 15/70. Noting these amendments, ComReg proposed the rollout obligations set out in the tables below:

| Region Type* | Licensee holding up to and including 100 MHz in the 3.6 GHz Band | Licensee holding over 100 MHz in the 3.6 GHz Band |
|---|---|---|
| Non-urban | 15 | 25 |
| Urban (other than Dublin) | 2 | 4 |
| Dublin | 10 | 15 |
| *See Table 3 of Document 15/140 – Regions below | | |

**Table 1: "Table 2 of Document 15/140 – Proposed base station rollout obligation by region"**

[133] Footnote 194 of Document 15/140: "*Defined to be links, such as backhaul links, which carry data originating from, or destined for multiple customer premises. This excludes links forming the final connection to individual customer premises equipment as, the level of rollout obligation proposed would not, in ComReg's view, be sufficient to ensure the timely and efficient use of spectrum, if such links counted towards the obligation."*

| Reference Number of Region | Region Type | Name of Region | Description of Region |
|---|---|---|---|
| 1 | Non-urban | Borders, Midlands and West | Counties Donegal, Leitrim, Sligo, Mayo, Roscommon, Cavan, Monaghan, Louth, Longford, Westmeath, Offaly, Laois, Galway excluding Region 8 |
| 2 | Non-urban | East: | Counties Meath, Kildare, Wicklow and Dublin excluding Region 5 |
| 3 | Non-urban | South East: | Counties Kilkenny, Carlow, Wexford, Waterford, excluding Region 9, and the boundary of South Tipperary |
| 4 | Non-urban | South West | Counties Clare, Limerick excluding Region 7, Kerry, Cork excluding Region, and the boundary for North Tipperary |
| 5 | Dublin | Dublin city and suburbs | Dublin CSO boundary for City and Suburbs |
| 6 | Urban | Cork city and suburbs | Cork CSO boundary for City and Suburbs |
| 7 | Urban | Limerick city and suburbs | Limerick CSO boundary for City and Suburbs |
| 8 | Urban | Galway city and suburbs | Galway CSO boundary for City and Suburbs |
| 9 | Urban | Waterford city and suburbs | Waterford CSO boundary for City and Suburbs. |

**Table 2: "Table 3 of Document 15/140 – The details of each Region (as per the regions proposed in Chapter 4)"**

- base stations should be required to be deployed in at least 4 counties in each non-urban region;
- the deployment of base stations pursuant to a spectrum leasing arrangement would count towards the rollout obligation;
- the use of shared infrastructure, including shared base stations, may occur in practice. For the avoidance of doubt and subject to competition law, there is no prohibition on operators using shared base stations. However, for such base stations to count towards the rollout obligation of a licensee, the base station must be utilising the spectrum assigned to that licensee;
- if a licensee agrees an appropriate leasing arrangement with a licensee in an adjoining region to utilise a high site in that adjoining region, or utilises a high site in one of the counties in its region to serve a county in another region, the base station should be counted as being deployed in the county it serves, not the region where it is located, for the purpose of meeting rollout targets;

- the base station rollout obligations should be achieved and maintained within 3 years of the licence commencement date, and that it would not be appropriate in present circumstances to propose interim milestones given this proposed duration;
- it is appropriate to maintain a base station capability requirement in relation to the base stations that count towards the rollout obligation. For the avoidance of doubt, the proposed obligation does not prevent equipment which does not meet the minimum capability requirement from being used in the 3.6 GHz Band[134]. However, such equipment would not count towards the rollout obligation or the maintenance of this obligation over the duration of the licence; and
- where a bidder obtains a national licence (or a multi-region licence), the rollout obligation applicable to that bidder should comprise the sum of the individual rollout obligations within each specific licensed region.

6.30 ComReg subsequently reflected its proposals in section 4 ("Rollout Requirements") of Part 4 to Schedule 1 of the Draft Regulations published in Annex 2 of Document 16/22[135].

### Views of respondents to Document 15/140

6.31 ComReg received one response from Imagine on rollout in the context of spectrum hoarding which is addressed in section 6.8.3 below. ComReg notes that it did not receive any further submissions from respondents on this issue nor is aware of any other information which would warrant reconsideration of this proposal.

### ComReg's final position

6.32 In light of the above, and having regard to its final RIA as set out in Annex 5, ComReg's final position is to impose coverage and rollout obligations as detailed in Document 15/140, summarised above and as will be further particularised in the 3.6 GHz Band Regulations

[134] Footnote 199 of Document 15/140: *"Subject to compliance with all other conditions, including without limitation, BEMs".*

[135] Given that the term "deploy" is not used in relevant legislation (e.g. the Wireless Telegraphy Act 1926 (as amended)), the term "worked and used" is used in the Draft Regulations in relation to the rollout obligation.

## 6.6 Quality of Service ("QoS")

### Summary of ComReg's view in Document 15/140

6.33 In section 6.7 of Document 15/140, ComReg stated that it remained of the view that it would be appropriate to impose a minimum QoS licence obligation consisting of a network availability obligation and voice call standard obligation.

#### *Network Availability*

6.34 In relation to the network availability obligation, ComReg proposed that:

- each licensee would keep a log of network availability, which would be made available for inspection by ComReg;
- each licensee would ensure that network unavailability is less than 35 minutes per six month period; and
- the calculation of network unavailability would be subject to weighting factors that take account of traffic load variations.

6.35 ComReg further proposed that all relevant services provided to licensee's customers and provided to third party customers by a licensee (e.g. in the case of mobile virtual network operator (MVNO) or other forms of wholesale arrangements) would be captured under this QoS obligation. ComReg also proposed that its assessment of this obligation would be made against the aggregate total[136].

6.36 Reasons informing these proposals included:

- the need to protect end users against unreasonable levels of disruption to their service and safeguard the interests of consumers against operators who might otherwise have unacceptably high levels of network unavailability;
- ComReg's draft RIA on the proposed imposition of an 'availability of the network' QoS obligation (as set out in annex 9 of Document 15/140);
- ComReg's assessment of respondents' views on the proposed network availability obligation (as set out in section 6.7 of Document 15/140); and
- the desirability of promoting regulatory consistency, noting that this proposal is substantively similar to the licence condition currently attached to the Liberalised Use licences for the 800 MHz 900 MHz and 1800 MHz spectrum bands.

[136] The aggregate total refers to the network availability in respect of both services provided to the licensee's customers and services provided to any third party (via contractual or other arrangements) customers by the licensee.

### *Voice Call Standard*

6.37 In relation to the voice call standard obligation, ComReg proposed that for each six month period:

- the maximum Permissible Blocking Rates[137] must not be exceeded;
- the maximum Permissible Dropped Call Rates[138] must not be exceeded; and
- the speech transmission quality must meet or exceed the appropriate standard.

6.38 ComReg proposed that all relevant non-VoIP[139] 'voice call' services provided to a licensee's customers and to third party customers by a licensee would be captured under this voice call obligation.

6.39 ComReg further proposed that managed VOIP call services would also be captured under this QoS obligation because such services are considered to be substitutable with traditional voice call services[140] and are increasingly used by consumers.

6.40 Finally, ComReg also proposed that any assessment of this obligation would be made against the aggregate total[141].

6.41 Reasons informing these proposals included:

- safeguarding the interests of consumers against operators who might not otherwise maintain acceptable quality levels for voice calls in line with current expectations;
- ComReg's assessment of respondents' views on the proposed voice call obligation (as set out in section 6.7 of Document 15/140);

[137] This is a measure of the proportion of unsuccessful call attempts to successful calls, when a subscriber tries to make a call. The rate of blocked calls is measured using a 'Time consistent busy hour'. The time consistent busy hour is determined from the operator's voice traffic. It is the one-hour period during which there is the highest level of traffic. The blocked call rates are measured for the same one-hour period during each review period (e.g. 6 months). The one-hour period is determined by the operator and is subject to ComReg's approval.

[138] This is a measure of the proportion of calls which are ended before the caller/receiver ends the call. This measure is based on a three minute call duration.

[139] Voice over Internet Protocol.

[140] See, for example, paragraph 2.6 of Market Review: Retail Access to the Public Telephone Network at a Fixed Location for Residential and Non Residential Customers – Document 14/89 in relation to fixed voice calls.

[141] The aggregate total refers to the voice call standard in respect of both services provided to the licensee's customers and services provided to any third party (via contractual or other arrangements) customers by the licensee.

- ComReg's draft RIA on the proposed imposition of an 'voice call' obligation (as set out in annex 9 of Document 15/140); and
- the desirability of promoting regulatory consistency, noting that this proposal is substantively similar to the licence condition currently attached to the Liberalised Use licences for the 800 MHz 900 MHz and 1800 MHz spectrum bands.

6.42 ComReg subsequently reflected the proposed conditions in Section 5 ("Quality of Service (QoS) Obligations") of Part 4 to Schedule 1 of the Draft Regulations published in Annex 2 of Document 16/22.

## Views of respondents to 15/140 and 16/22

### *Network Availability*

6.43 No views were submitted in relation to the network availability obligation proposal.

### *Voice Call Standard*

6.44 One respondent, 3IHL, submitted views on the voice call obligation proposal in its response to Document 15/140 and Document 16/22[142]. In summary, 3IHL submits that the proposed obligation should be removed and that existing regulatory requirements for transparency should be sufficient to ensure that customers are aware of the factors that affect their service.

6.45 3IHL submits that:

(i) the proposal must be applied in a non-discriminatory way. Noting ComReg text which stated that "*such an obligation would only apply to operators providing voice services and would therefore only likely apply to MNOs. It would not apply to voice services provided using IP over FWA links",* 3IHL suggests that this would represent fundamentally discriminatory treatment of some services or service providers, and would be contrary to the requirement of service neutrality;

(ii) it is unclear what would happen if a licensee provided a voice service using 3.6 GHz spectrum and chose to call it a "non-managed" voice service. Whether this was fixed, nomadic, or mobile then it seems to 3IHL that the quality of service condition would not apply in this case; and

(iii) ComReg should clarify what calls would be covered under this obligation, as at present it seems that the single most significant factor that distinguishes the calls that would be covered by this obligation from the

[142] 3IHL's submission to Document 16/22 is considered relevant to this discussion.

calls that would not is the use of E.164 numbers from the National Numbering Scheme. Further, 3IHL notes that the definition of a voice call is not static, but is whatever ComReg considers to be a substitute for traditional voice calls at any point in time.

## ComReg's Assessment

### *Network Availability*

6.46 ComReg did not receive any submissions from respondents on its network availability proposals and is not aware of any other information which would warrant reconsideration of this proposal.

### *Voice Call Standard*

6.47 In relation to 3IHL's submission at point (i) above, ComReg agrees that this obligation should be applied in a non-discriminatory manner. Observing that the text cited by 3IHL is from the draft RIA on Rollout and QoS Licence Conditions (see in particular paragraph A9.63 in Annex 9 of Document 15/140), ComReg notes that this statement was included in error and, as such, the statement has been removed from the final RIA on Rollout and QoS Licence Conditions as set out in Annex 5.

6.48 In relation to point (ii), ComReg notes that such a scenario would be a licence compliance matter and, as such, would be dealt with on a case-by-case basis. Should ComReg become aware that a licensee is potentially not complying with the licence conditions, ComReg would investigate and take any appropriate action in line with its statutory functions, objectives and duties.

6.49 In relation to point (iii), ComReg firstly observes that the method by which operators provide voice call services can change over time[143]. With this in mind the definition of a voice call in this proposed obligation ought, in ComReg's view, to be forward-looking in order to remain relevant and effective as a measure by which to safeguard the interests of consumers. Noting the increasing use of managed VOIP services in relation to the fixed line access (see for example ComReg Documents 12/117[144] and 14/89[145]), and its potential use in relation to mobile services, ComReg considers that the inclusion of managed VoIP call services alongside the traditional voice call (i.e. non-VOIP) services remains appropriate.

[143] For example, voice call services may be provided over VoLTE in the future.

[144] ComReg Document 12/117 – Market Review – Retail Access to the Public Telephone Network at a Fixed Location for Residential and Non Residential Customers – 26th Oct 2012.

[145] ComReg Document 14/89 – Market Review-Retail Access to the Public Telephone Network at a Fixed Location for Residential and Non Residential Customers – 28th August 2014.

6.50 In relation to 3IHL's request for clarity on what calls would be covered under this obligation, ComReg again observes that it cannot know the manner in which operators may provide voice call services to consumers over the lifetime of a licence. Given this, it is not possible at this stage to categorically identify the calls that would be included under this proposed licence condition, and the voice call definition needs to remain somewhat dynamic.

6.51 Cognisant that some guidance should be provided on how ComReg may assess the definition of managed VOIP calls for future 3.6 GHz Band licences, ComReg, as an example, noted the managed VOIP call definition for fixed-line access[146]. Noting that the specific voice call services provided by 3.6 GHz licensees may differ somewhat to those assessed in relation to fixed line access, and that these voice call services may evolve over time, ComReg observes that further clarification on the definition of a managed VOIP call, as it applies in the context of this QoS obligation, may need to be provided in light of the specific circumstances of the 3.6 GHz Band licences.

6.52 ComReg envisages that such clarification[147] could be provided closer to the commencement date of a 3.6 GHz Band licence and/or during the lifetime of the licence, noting that both ComReg and 3.6 GHz Band licensees are likely to have further information on the managed VOIP calls services that are provided or likely to be provided in the 3.6 GHz Band at that time.

6.53 Should such clarification require the amendment of this definition in the licence condition, then such amendment would be carried out in accordance with relevant legislation and, in particular, Regulation 15 of the Authorisation Regulations.

6.54 ComReg observes that 3IHL's comment on the use of E.164 numbers relates to the managed VoIP definition for fixed line access. In this regard, ComReg notes that the use of E.164 numbers is not what distinguishes the calls which would be covered by this obligation because non-managed VOIP service providers providing an ECS can also apply for and use E.164 numbers. Instead, the main

[146] The definition of "managed" and "non-managed" or "unmanaged" VOIP services as defined in Documents 12/117 and 14/89 is listed below:

- *"Managed VOIP means that the supplier also provides and maintains the customer's access path, either directly on its own network or indirectly by renting the access path from a third party. A managed VOIP supplier will also have its own switching platform, interconnect(s) and numbering allocations. Managed VOIP suppliers can manage their broadband network in such a way that prioritises quality of voice service requirements for the voice service."*
- *"Non-managed or Over the Top ("OTT") VOIP means that the supplier does not necessarily have a switching platform with interconnects and does not itself provide access paths to its customers."*

[147] Such clarification could result from a request from a 3.6 GHz Band licensee for clarification or from a ComReg initiative. Further such clarification could form part of ComReg's ongoing process for assessing the licence compliance of each 3.6 GHz Band licensee.

difference between managed and non-managed calls in relation to fixed services is the access path for its service.

#### ComReg's final position

6.55 In light of the above, and ComReg's final QoS RIA as set out in Annex 5, ComReg's final position is that minimum QoS licence conditions covering both network availability and voice call standards will be attached to 3.6 GHz Liberalised Use Licences, as further particularised in the 3.6 GHz Band Regulations

## 6.7 Technical conditions

6.56 In section 6.8 of Document 15/140, ComReg proposed that the following technical conditions would apply to the Award Spectrum:

- the technical conditions set out in the 3.6 GHz EC Decision;
- conditions relating to TDD inter-network synchronisation; and
- technical conditions ensuring co-channel co-existence across regional borders.

### 6.7.1 Technical conditions set out in the 3.6 GHz EC Decision

#### Summary of ComReg's view in Document 15/140

6.57 In section 6.8.1 of Document 15/140, ComReg proposed that the technical parameters relating to a block edge mask (BEM) defined in part B and C of the Annex to the 3.6 GHz EC Decision should apply for any new rights of use in the 3.6 GHz Band. In particular, technical parameters relating to:

- in-block power limits;
- transitional region power limits;
- baseline power limits;
- guard band power limits;
- base station additional baseline power limits for country specific cases; and
- terminal station BEM in-block power limit.

6.58 ComReg subsequently reflected these proposed conditions in Section 2 ("Technical Conditions") of Part 4 to Schedule 1 of the Draft Regulations published in Annex 2 of Document 16/22.

### Views of respondents/additional information

6.59 ComReg did not receive any submissions from respondents on the above proposals and ComReg is not aware of any developments at this time to warrant a change to the proposals set out above.

6.60 However, as noted in Chapter 2 above, ComReg is aware that the suitability of the current harmonised technical conditions in the 3.6 GHz Band for the deployment of 5G is being assessed at a European level [148]. While this assessment is just beginning, ComReg notes that the outcome of this process could lead to the development of revised harmonised technical conditions for the 3.6 GHz Band in the future. Such developments will be considered and, if appropriate, implemented by ComReg at the appropriate time in accordance with relevant legislation.

### ComReg's final position

6.61 Accordingly, ComReg's final position is that licence conditions implementing the technical parameters as set out in Annex to the 3.6 GHz EC Decision (and re-iterated in paragraphs 6.119 to 6.124 of Document 15/140) will be attached to 3.6GHz Liberalised Use Licences as particularised in the 3.6 GHz Band Regulations

## 6.7.2 TDD inter-network synchronisation

### Summary of ComReg's view in Documents 15/70 and 15/140

6.62 In Section 6.6.1 of Document 15/70, ComReg proposed putting in place a framework to encourage inter-network synchronisation, which would facilitate the efficient use of spectrum, provide certainty to operators and allow a prompt rollout of services. In particular, ComReg proposed the following:

- not setting guard bands between assignments, meaning that unsynchronised networks would be required to internalise guard bands to meet the relevant technical conditions;
- setting a permissive BEM for synchronised networks and a restrictive BEM for unsynchronised networks, where the restrictive BEM would assume the internalising of guard bands; and
- setting a default frame structure.

[148] At the 42nd ECC Plenary meeting held in Stockholm ECC tasked ECC PT1 to assess the suitability of the current harmonised technical conditions in 3.4-3.8 GHz for 5G – For further information see http://cept.org/ecc/groups/ecc/news/42nd-ecc-plenary-meeting-14-17-june-2016-stockholm/ .

6.63 Having considered views expressed by respondents to Document 15/70, and ComReg's assessment in Section 6.8.2 of Document 15/140, ComReg updated its proposals as summarised below:

- TD-LTE configuration 2 (3:1) with special sub frame (SSF) option 6 is the optimal default frame structure for use with permissive masks. Alternative frame structures whose transmit and receive periods are aligned with this configuration would also be permitted to use the permissive mask;
- any other configuration that is not compatible with TD-LTE configuration 2 SSF option 6 would still be permitted. However, its implementation would be subject to the restrictive BEM and would be obliged to not cause interference to those networks that use the default frame structure (or equivalent);
- indoor small cells that operate with an EIRP of less than or equal to 24 dBm per carrier would be exempted from the requirement to synchronise, and may use the permissive mask. However, if these small cells cause interference to other users then the responsible operators would be required to rectify such interference issues, which may include ensuring synchronisation or EIRP reduction;
- an inter-operator synchronisation procedure as described in paragraphs 6.147 to 6.148 of Document 15/140 would form part of the conditions for all 3.6 GHz Band Liberalised Use Licences; and
- in the event that sufficient demand from operators exists to change any of the technical parameters as described in the inter-operator synchronisation procedure, operators should first agree on which parameters they wish to change, before notifying ComReg of their desire to make said changes. ComReg would then carry out a review of the proposed changes and, provided the proposed changes would not cause interference to other operators in particular, ComReg would revise the inter-operator synchronisation procedure and notify all licensees of the change. Any changes to this procedure would then be reflected in operators' licences for the 3.6 GHz Band.

6.64 ComReg subsequently reflected these proposed conditions in Section 2 ("Technical Conditions") and Section 3 ("Inter-Licensee Synchronisation Procedure") of Part 4 to Schedule 1 of the Draft Regulations published in Annex 2 of Document 16/22.

### Views of respondents/additional information

6.65 ComReg received one response from Vodafone who agrees that the use of synchronisation would improve the efficiency of spectrum usage by all

operators. Vodafone also submits that its research into configuration and special sub-frame option has identified configuration 2 and special sub-frame option 6 as the most used and most useful frame structures.

6.66 In addition, ComReg is not aware of any other information which would warrant reconsideration of this proposal.

### ComReg's final position

6.67 Accordingly, ComReg's final position is to put in place a framework to encourage inter-network synchronisation as described in detail in Section 6.8 of Document 15/140 and as summarised above, and that this will form part of the conditions attached to 3.6GHz Liberalised Use Licences as particularised in the 3.6 GHz Band Regulations.

## 6.7.3 Technical conditions required to ensure co-channel co-existence across regional borders

### Summary of ComReg's view in Document 15/140

6.68 In Section 6.8.3 of Document 15/140, ComReg proposed that the following technical conditions would apply at regional and national borders:

- all operators operating in the border regions would be subject to the coordination thresholds and corresponding procedures as set out in the Memorandum of Understanding (MOU) between ComReg and Ofcom on the 3.6 GHz Band[149];
- a co-ordination threshold of 32 dBµV/m/5 MHz for 90% of the time and 90% of the locations would be applied[150]; and
- coordination procedures to facilitate inter-operator coordination agreements are to be established to allow operators to operate with cross-border field strengths higher than the proposed threshold limit of 32 dBµV/m/5MHz. If, however, no coordination agreement can be reached between operators, the proposed co-ordination threshold remains a binding licence condition.

6.69 In summary, the reasons informing these proposals included:

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[149] Footnote 216 of Document 15/140: *"There is an existing MOU on frequency co-ordination between Republic of Ireland and the United Kingdom for wireless access services in the frequency band 3 400 - 3 800 MHz - See Annex 3 of ComReg Guidelines: http://www.comreg.ie/_fileupload/publications/ComReg0617R7.pdf "*

[150] Footnote 4 of the Draft 3.6 GHz Band Liberalised Use Licence as set out in Schedule 1 to the Draft Regulations published in Annex 2 of Document 16/22: *"The field prediction method shall be according to Recommendation ITU-R P.452-16, unless otherwise specified by ComReg."*

- ensuring co-channel co-existence at borders between licence regions and international borders with the UK;
- the relevant recommendations of ComReg's independent technical advisors, Plum Consulting[151];and
- broad support among respondents with ComReg's view as outlined in Document 15/70 and re-iterated in Document 15/140.

6.70 ComReg subsequently reflected these proposed conditions in Section 2(B)(6),(7),(8),(9) ("Technical Conditions") of Part 4 to Schedule 1 of the Draft Regulations published in Annex 2 of Document 16/22.

#### Views of respondents/additional information

6.71 ComReg notes that it did not receive any submissions from respondents on these proposals, nor is ComReg aware of any other information which would warrant reconsideration of these proposals.

#### ComReg's final position

6.72 Accordingly, ComReg's final position is that licence conditions requiring compliance with the technical conditions as described in section 6.8.3 of Document 15/140 and as summarised above will be attached to 3.6 GHz Liberalised Use Licences.

## 6.8 Spectrum transfers, spectrum leasing and spectrum hoarding

### 6.8.1 Spectrum transfers

#### Summary of ComReg's position in Document 15/140

6.73 In Section 6.5.1 of Document 15/140, ComReg stated that it remained of the view that the 3.6 GHz Band is a band to which the Spectrum Transfer Regulations (S.I. 34 of 2014) apply and, therefore, regulatory mechanisms already exist to facilitate any transfer of new 3.6 GHz rights of use.

6.74 ComReg subsequently reflected this proposed condition in Regulation 6(16) of the Draft Regulations published in Annex 2 of Document 16/22.

[151] Footnote 214 of Document 15/140*: "See ComReg Document 15/73 - Technical advice from Plum Consulting concerning potential rights of use in the 3.6 GHz Band, Report 1: Co-existence recommendations - http://www.comreg.ie/_fileupload/publications/ComReg1573.pdf "*

### Views of respondents

6.75 ComReg notes that it did not receive any submissions from respondents on this proposal, nor is ComReg aware of any other information which would warrant reconsideration of this proposal.

### ComReg's final position

6.76 ComReg's position on spectrum transfers as stated above therefore remains unchanged.

## 6.8.2 Spectrum leasing

### Summary of ComReg's position in Document 15/140

6.77 In Section 6.5.2 of Document 15/140, ComReg stated that *"spectrum leasing will be permitted in the 3.6 GHz Band subject to procedures that ComReg intends to put in place prior to the expiry of existing licences in July 2017. ComReg will consult on its spectrum leasing procedures in due course and would, of course, welcome the views of all interested parties on same."*

6.78 ComReg subsequently reflected this proposed condition in Regulation 6(18), (19) of the Draft Regulations published in Annex 2 of Document 16/22.

### Views of respondents

6.79 ComReg received one response (from Permanet) in relation to its assessment on spectrum leasing as set out in Document 15/140. Specifically, Permanet queried whether ComReg could compel holders of new 3.6 GHz rights of use to sublet spectrum in areas where it may otherwise go unused.

### ComReg's Assessment and Position

6.80 ComReg notes that it has already considered this proposal in detail in Section 6.5.2 of Document 15/140 and does not propose to repeat that assessment here.

6.81 Accordingly, ComReg's final position is that spectrum leasing will be permitted in the 3.6 GHz Band subject to procedures that ComReg intends to put in place prior to the expiry of existing licences in July 2017.

### 6.8.3 Spectrum hoarding

#### Summary of ComReg's position in Document 15/140

6.82 In paragraphs 6.44 to 6.46 of Document 15/140, ComReg considered it appropriate, in the context of ensuring the efficient use of liberalised 3.6 GHz rights, to impose an obligation on licensees to comply with any rules to prevent spectrum hoarding as may be laid down by ComReg under Regulation 17(10) of the Framework Regulations. ComReg further noted that while no such rules have been laid down by ComReg to date, it reserves the right to specify such rules in the future.

6.83 ComReg subsequently reflected this proposed condition in Regulation 6(5) of the Draft Regulations published in Annex 2 of Document 16/22.

#### Views of respondents

6.84 ComReg received one response (from Imagine) who stated that *"the proposed measures to curtail Spectrum Hoarding are insufficient in the context of the wider NGA market. An existing fixed operator could easily rollout sites to meet the criteria and provide minimal services. Clarity on the possible obligations on winners of liberalised 3.6 GHz rights to comply with any rules to prevent spectrum hoarding as may be laid down by ComReg under Regulation 17(10) of the Framework Regulations would be beneficial in terms of curtailing strategic bidding."*

#### ComReg's Assessment and position

6.85 ComReg notes that it has already considered this proposal in Section 6.6 of Document 15/140. In summary, to address such concerns ComReg:

- is proposing rollout obligations which reflect, at a minimum, the existing levels of base station rollout in the 3.6 GHz Band, including Imagine's own base station deployment levels in the 3.6 GHz Band;

- further notes that its award proposals contain a number of additional measures aimed at ensuring the efficient use of spectrum which should, in turn, minimise the potential for spectrum hoarding, including the requirement on winners to pay both upfront spectrum access fees and ongoing spectrum usage fees; and

- observes, at this stage, that it is too early to tell whether any spectrum hoarding[152] may occur and, if so, what may be the appropriate measures to address any such hoarding. That being said, ComReg recalls that Regulation 17(10) of the Framework Regulations refers, in particular, to the "setting out [of] strict deadlines for the effective exploitation of the rights of use by the holder of rights"[153] and, further, observes in this regard that its proposed rollout obligations would have substantively the same effect.

6.86 In light of the above, ComReg's position on spectrum hoarding as stated in paragraphs 6.4.2 to 6.46 of Document 15/140 above remains unchanged.

[152] Noting that the notion of "spectrum hoarding" is described in recital 71 of Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 as follows:

*"Competent national authorities should have the power to ensure effective use of spectrum and, where spectrum resources are left unused, to take action to prevent anti-competitive hoarding, which can hinder new entry".*

[153] And, further, "by withdrawing the rights of use in cases of non-compliance with the deadlines".

Chapter 7

# 7 Transitional issues and Preparatory Licences

## 7.1 Introduction

7.1 This chapter sets out ComReg's final position on its framework for addressing Transition issues likely to arise as an outcome of the 3.6 GHz Band Award Process.

7.2 ComReg's Transition framework is based on the consideration that some, or all, of the Existing Licensees in the 3.6 GHz Band may be required to make adjustments to their existing networks to comply with the outcome of the Award Process (both as regards geographical areas and frequency assignments) and align their use of spectrum with the rights of use that they obtain, if any, should they wish to continue to provide services following the cessation of the 3.6 GHz Band FWALA licensing scheme on 31 July 2017.

7.3 The Transition framework, as illustrated in Figure  below, consists of three tools:

- the setting of Transition Rules and the formulation and implementation of a Transition Plan;
- the Transition Protected Licence (TPL); and
- the Transition Unprotected Licence (TUL).

7.4 In addition, this chapter sets out ComReg's final position on Preparatory Licences.

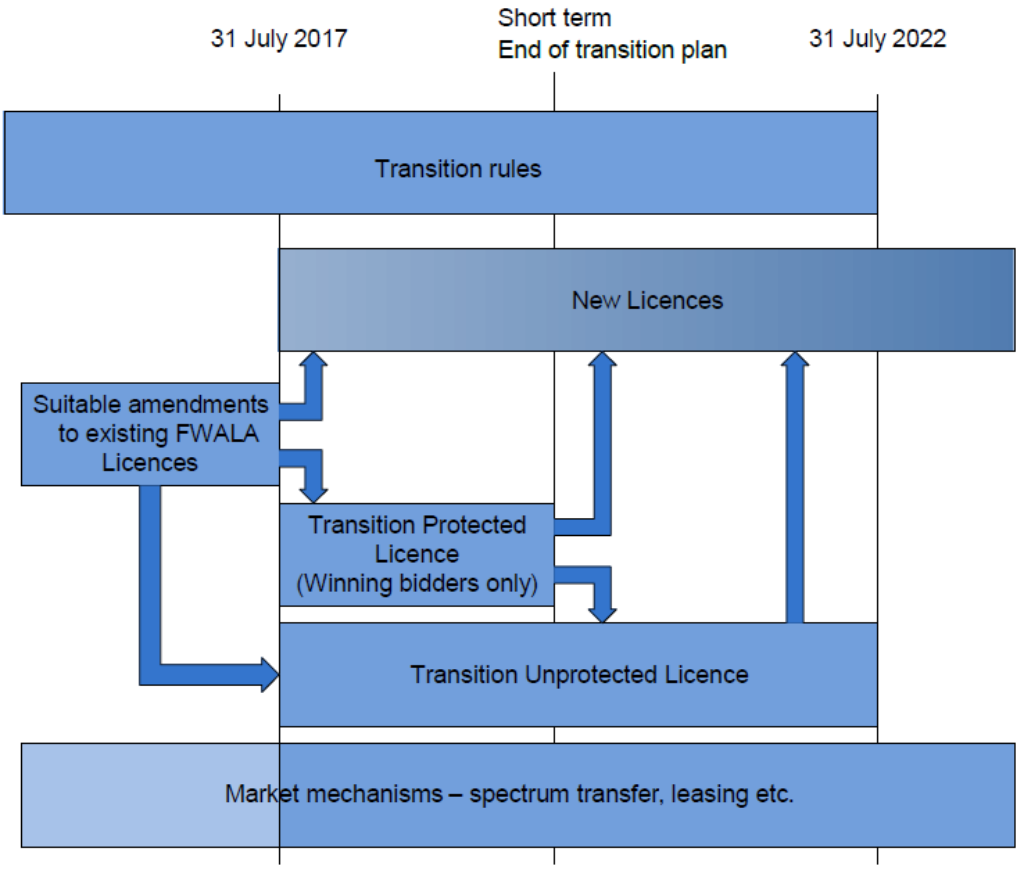


**Figure 4: ComReg's Transition framework and other key tools**

## 7.2 The setting of transition rules and the formulation and implementation of a transition plan

### Summary of ComReg's view in Document 15/140

7.5 In section 7.11 of Document 15/140, ComReg set out its proposals on the formulation of a Transition Plan, based on Transition Rules, to facilitate an orderly and timely Transition to the outcome of the Award Process.

7.6 ComReg reflected these proposals in its Draft Decision as follows:

*"3.10.11 to require all Winning Bidders and all parties applying for a Transition Unprotected License to abide by transition rules as set out in the Information Memorandum"* and

*"3.10.12 to develop and finalise a transition plan in consultation with interested parties".*

7.7 ComReg also, subsequently reflected these proposals in Section 3.8 of the draft Information Memorandum (Document 16/22).

### Views of respondents to Document 15/140

7.8 ComReg received one response on this issue (from Vodafone).

7.9 Notwithstanding Vodafone's view that it broadly agrees with ComReg's Transition proposals, it submits that:

*"Due regard will have to be given throughout the process to the 2008 3.6GHz EC decision and its statement that alternative parameters should not "prevent use of the band according to the Annex." Article2(1)".*

### ComReg's assessment

7.10 Vodafone does not elaborate on why it draws attention to this particular statement in Article 2(1) of the 3.6 GHz EC Decision. In any event, ComReg agrees with Vodafone's statement and, further, is satisfied that the Award Process is designed fully in accordance with the requirements of the 3.6 GHz EC Decision and that its Transition proposals aim to introduce liberalised licences as soon as possible and without undue delay to the delivery of future liberalised services.

### ComReg's final position

7.11 In light of the above, ComReg's final position[154] is to:

- require all Bidders and all parties applying for a Transition Unprotected Licence to abide by Transition Rules as set out in the Information Memorandum; and
- develop and finalise a Transition Plan in consultation with interested parties,

as set out in detail in Section 7.11 of Document 15/140.

## 7.2.1 Reimbursement of spectrum fees in the event of delayed commencement

7.12 In the context of its Transition proposals, ComReg proposed in paragraph 7.85 of Document 15/140 that, where the commencement date of any new spectrum rights of use won in the 3.6 GHz Award Process could be delayed due to the Transition Activities of Existing Licensees, it would make a pro-rata refund of licence fees to Winning Bidders for any such delayed commencement.

7.13 ComReg reflected this proposal in its Draft Decision as follows:

[154] In the Draft Decision, the term "Winning Bidders" was used in error. This should have been "Bidders". The text of ComReg's final position now aligns with the detail of section 7.11 (paragraph 7.80) of Document 15/140.

*"3.10.13 to provide reimbursement of a pro rata proportion of spectrum access fees (as described in the Information Memorandum) and SUFs to a Winning Bidder in the event that the commencement of its 3.6 GHz Band Liberalised Use Licence is delayed as a result of delayed availability of spectrum to it because of a Transitional Licence awarded for the completion of the transition plan;".*

7.14 ComReg notes that it did not receive any submissions from respondents in relation to this proposal. Nor is ComReg aware of any information which would warrant a revision of this proposal.

7.15 Accordingly, ComReg's final position is that it will provide reimbursement of a pro-rata proportion of Upfront Fees (as described in the Information Memorandum) and SUFs to a Winning Bidder in the event that the commencement of its 3.6 GHz Band Liberalised Use Licence is delayed as a result of delayed availability of spectrum to it due to circumstances outlined in the Information Memorandum, including the Transition Activities of Existing Licensees under the Transition Plan[155].

## 7.3 The Transition Protected Licence

### Summary of ComReg's view in Document 15/140

7.16 In section 7.12 of Document 15/140, ComReg set out its proposals for a Transition Protected Licence (TPL) in order to facilitate the timely and orderly completion of the Transition Plan activities of Existing Licensees some of which may occur following the end of the existing FWALA licensing scheme on 31 July 2017.

7.17 Under the TPL proposal, ComReg would allow an Existing Licensee to apply for a TPL where:

- such an Existing Licensee is a Winning Bidder of new rights of use in a region that contains the service area of its Existing Licence; and
- the Transition Activities associated with this Existing Licence are likely to occur after the end date of the FWALA licensing scheme on 31 July 2017.

7.18 ComReg also noted that such licences would be of a short-term nature in order to avoid unnecessary delay to the introduction of new licences.[156]

7.19 ComReg reflected this proposal in its Draft Decision as follows:

[155] To better align with ComReg position on this matter as particularised in the draft Information Memorandum, ComReg has changed some of the wording of its final position on this matter from that of the Draft Decision. However, the intended meaning of the final position remains unaltered from that of the Draft Decision.

[156] See, for example, paragraph 7.88 of Document 15/140.

*"3.11 upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, to consider granting a Transition Protected Licence in accordance with the transition plan".*

7.20 ComReg also subsequently reflected these proposals in sections 2.6 and 3.8 of the draft Information Memorandum.

### Views of respondents to Document 15/140

7.21 ComReg received one response on this issue (from Vodafone).

7.22 Vodafone submits that:

*"We would like more clarity around Comreg's thinking on what time limit there would be to short-term TPLs."*

### ComReg's assessment

7.23 As set out in paragraph 7.47 of Document 15/140, ComReg reiterates that, until the Award Process is complete, it is unable to fully quantify the duration of any Transition Plan. Notwithstanding, ComReg remains of the view that the duration should be the minimum necessary to facilitate the timely and orderly completion of the Transition Plan activities of Existing Licensees. Further ComReg notes that the Transition Plan is to be developed and finalised in consultation with interested parties, thus providing such interested parties an opportunity to submit proposals in respect of the Transition Plan.

7.24 ComReg also observes that the Transition Protected Licensees will have incentives to transition as soon as possible given that:

- TPL licensees will be required to pay liquidated damages in respect of any non-compliance by them with the Transition Plan[157]; and
- Winning Bidders who are also Existing Licensees applying for a TPL will most likely intend to transition as soon as possible to exercise their newly acquired 3.6 GHz rights of use for which they will have paid (1) an Upfront Fee at the end of the Award Process and (2) Spectrum Usage Fees prior to the first grant of a 3.6 GHz Band Liberalised Use Licence, and which are further payable over the licence duration.

### ComReg's final position

7.25 ComReg's final position is that, upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, it

[157] ComReg will monitor Transition Activities to assess compliance with the Transition Plan.

will consider granting a Transition Protected Licence in accordance with the Transition Plan, as set out in detail in section 7.12 of Document 15/140.

## 7.4 The Transition Unprotected Licence

### Summary of ComReg's view in Document 15/140

7.26 In section 7.13 of Document 15/140, ComReg set out its proposal for a Transition Unprotected Licence (TUL). Under this proposal, an Existing Licensee (whether or not it wins rights of use in the proposed Award Process) may, under certain pre-conditions, obtain a TUL on the same terms and conditions as its Existing Licence (with certain exceptions) for a period of no more than five years. The purpose of the TUL is to:

- facilitate the timely and orderly completion of the Existing Licensee's Transition Activities in accordance with the Transition Plan; and
- maximise the benefits to users and ensure the efficient use of spectrum during the transitional period.

7.27 ComReg reflected this proposal in its Draft Decision as follows:

*"3.12 upon application properly being made to it by Winning Bidders, Existing Licensees or holders of Transition Protected Licences within the terms of the 3.6 GHz Band Licence Regulations, to consider granting a Transition Unprotected Licence to such persons;".*

7.28 ComReg also subsequently reflected this proposal in sections 2.7 and 3.8 of the draft Information Memorandum.

### Views of respondents to Document 15/140

7.29 ComReg received one response on this issue (from Imagine) as follows.

*"Imagine note that ComReg propose "to develop and finalise a transition plan in consultation with interested parties" and reiterate its view that:*

- *the notice period should be sufficient to ensure that any existing contractual agreements related to the infrastructure used to support existing services (e.g. Backhaul contracts, site agreements, co-location agreements etc.) can be terminated without penalty*
- *the notice period should facilitate the ongoing provision of services to customers that have no alternative either due to a new operator not yet having service available or not providing an equivalent service.*

*In terms of the timing of the Award process and the transition arrangements existing operators of wireless services need to know this as far in advance of the termination of licences in July 2017 in order to understand the implications for their existing business and customers and to assess the exposure and risk in terms of their contractual obligations in relation to sites and backhaul infrastructure much of which is renewed on an annual basis."*

## ComReg's assessment

7.30 ComReg notes the practical matters suggested by Imagine as being potentially relevant for consideration in setting the duration of the Transition Plan and the notification period from a new licensee to a TUL licensee. ComReg observes, however, that until the outcome of the award process is known and the Transition Plan consultation commences, it will not be in a position to provide further information on duration, save as to highlight the information already detailed in Document 15/140, where ComReg:

- in paragraph 7.92, noted that the purpose of a TUL is to:
    - facilitate the timely and orderly completion of the Existing Licensee's Transition Activities in accordance with the Transition Plan; and
    - maximise the benefits to users and ensure the efficient use of spectrum during the transitional period;
- in paragraph 7.67, envisaged that the Transition Plan would provide a reasonable time period to the Existing Licensees (including TUL licensees) to transition to the outcome of the Award Process;
- in paragraph 7.68, took the view that any subsequent notification period from a new licensee to a TUL licensee would be of a short duration; and
- in paragraph 7.68, observed that a notification from a new licensee could be issued during the implementation of the Transition Plan, such that any TUL licensee would have to vacate the specific spectrum block and region once the Transition Activities for that spectrum block and region have been completed in line with the Transition Plan, and that this would facilitate the timely deployment of services by a new licensee.

7.31 Notwithstanding the above, ComReg reiterates its view as set out in paragraph 7.77 of Document 15/140 that all Existing Licensees consider and, where practicable, make preparations for the Transition Activities which might be

required of them, noting that there are a number of options[158] that an Existing Licensee can consider in seeking to mitigate the scale and time of any Transition Activity required. An Existing Licensee's consideration of transition activities could include making preparations to mitigate the practical matters as proposed by Imagine, for example, by ensuring that contractual agreements can be terminated at short notice without penalty.

7.32 With regard to Imagine's observations concerning the timing of the Award Process, ComReg notes that the final Information Memorandum on the 3.6 GHz Band Spectrum Award, scheduled for publication in August 2016, will clarify the timetable of the Award Process.

### ComReg's final position

7.33 In light of the above, ComReg's final position is that, upon application properly being made to it by Winning Bidders, Existing Licensees or holders of Transition Protected Licences within the terms of the 3.6 GHz Band Licence Regulations, it will consider granting a Transition Unprotected Licence to such persons, as set out in detail in section 7.13 of Document 15/140[159].

## 7.5 Preparatory Licences

7.34 In section 7.14 of Document 15/140, ComReg introduced its proposal for Preparatory Licences intended to facilitate Winning Bidders in carrying out preparations to their network by installing equipment.

7.35 ComReg reflected this proposal in its Draft Decision as follows:

*"3.13 upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, to consider granting a Preparatory Licence to such persons;".*

7.36 ComReg also subsequently reflected this proposal in section 2.5 of the draft Information Memorandum.

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[158] Footnote 226 of Document 15/140 stated: *"Aside from understanding the frequency agility and time potentially required to modify the existing technology, options available to Existing Licensees to minimise the impact on existing consumer services include providing such services using licence-exempt spectrum or alternative spectrum bands, and/or by concluding commercial agreements with other operators (including winners of new 3.6 GHz rights of use) such that the Existing Licensee could continue to provide a service (e.g. transfer or leasing arrangements)."*

[159] It should be noted that the CPI adjustment to the FWALA fees in order to determine TUL fees, as outlined in paragraph 7.95 of Document 15/140, currently stands at 18%. This CPI adjustment is based on the change in the overall CPI index between March 2003 and May 2016 using the December 2001 base reference data available on the Central Statistics Office (CSO) website. This adjustment value will be finalised in the Information Memorandum in line with the latest published CPI data.

7.37 ComReg notes that it did not receive any submissions from respondents in relation to this proposal. Nor is ComReg aware of any information which would warrant a revision of this proposal.

7.38 Accordingly, ComReg's final position is that it will, upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, consider granting a Preparatory Licence to such persons, as set out in detail in section 7.14 of Document 15/140.

Chapter 8

# 8 Decision

This chapter sets out a decision document based on the positions set out by ComReg in the preceding chapters and their supporting annexes.

## Decision

## 1. DEFINITIONS AND INTERPRETATION

1. In this Decision, save where the context otherwise admits or requires:

**"2008 3.6 GHz EC Decision"** means European Commission Decision 2008/411/EC;[160]

**"2014 3.6 GHz EC Decision"** means European Commission Decision 2014/276/EU;[161]

**"3.6 GHz Band"** means spectrum in the range 3 400 MHz to 3 800 MHz;

**"3.6 GHz Band Liberalised Use Licence"** means a licence of the type set out in draft form in Schedule 1 to the 3.6 GHz Band Licence Regulations;

**"3.6 GHz Band Licence Regulations"** means the Wireless Telegraphy (Licences in the 3.6 GHz Band) Regulations 2016, a draft form of which is set out in Annex 2 to ComReg Document 16/22;

**"3.6 GHz Band Preparatory Licence"** means a licence of the type set out in Schedule 3 to the 3.6 GHz Band Licence Regulations;

**"3.6 GHz Band Spectrum Lease Licence"** means a licence of the type set out in draft form in Schedule 2 to the 3.6 GHz Band Licence Regulations;

**"3.6 GHz Band Transition Protected Licence"** means a licence of the type set out in Schedule 4 to the 3.6 GHz Band Licence Regulations;

**"3.6 GHz Band Transition Unprotected Licence"** means a licence of the type set out in Schedule 5 to the 3.6 GHz Band Licence Regulations;

**"3.6 GHz EC Decision"** means the 2008 3.6 GHz EC Decision, as amended and supplemented by the 2014 3.6 GHz EC Decision;

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[160] The 2008 3.6 GHz EC Decision of 21 May 2008 on the harmonisation of the 3400-3800 MHz frequency and for terrestrial systems capable of providing electronic communications services in the Community. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:144:0077:0081:EN:PDF.

[161] The 2014 3.6 GHz EC Decision of 2 May 2014 on amending the 2008 3.6 GHz EC Decision 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0276&from=EN.

**"Authorisation Regulations"** means the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations, 2011 (S.I. No. 335 of 2011);

**"Award Spectrum"** means 350 MHz of spectrum in the 3.6 GHz Band excluding the Guard Band Spectrum and the State Services Spectrum;

**"Base Price"** means the price to be paid by a Winning Bidder for the package of Lots won by it in the main stage of the competitive selection procedure described herein;

**"Bidder"** means an interested party that has submitted an application and initial deposit to ComReg to participate in the competitive selection procedure described herein;

**"Communications Regulation Act 2002"** means the Communications Regulation Act, 2002, (No. 20 of 2002), as amended;

**"ComReg"** means the Commission for Communications Regulation, established under section 6 of the Communications Regulation Act 2002;

**"Existing Licensee"** means a person holding one, or more, licences issued pursuant to the Wireless Telegraphy (Fixed Wireless Access Local Area Licence) Regulations, 2003 (S.I. No. 79 of 2003), as amended by the Wireless Telegraphy (Fixed Wireless Access Local Area Licence) (Amendment) Regulations, 2003 (S.I. No. 530 of 2003), which will expire on 31 July 2017;[162]

**"Fixed Frequency Lot"** means a right of use in respect of a 1 x 25 MHz block of spectrum from 3410 MHz to 3435 MHz which will be made available per Region;

**"Frequency Generic Lot"** means a right of use in respect of a 1 x 5 MHz block of spectrum in the range 3 475 MHz to 3 800 MHz, which will be made available per Region, with the specific frequencies of such Lots being determined in the assignment stage of the competitive selection procedure described herein;

**"Framework Regulations"** means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011, (S.I. No. 333 of 2011);

**"Guard Band Spectrum"** means spectrum in the range 3 400 to 3 410 MHz;

**"Information Memorandum"** means the information memorandum which ComReg intends to publish in due course, and **"Draft Information Memorandum"** means the draft information memorandum published by ComReg on 16 March 2016 under ComReg Document Number 16/22;

**"Lot"** means a Frequency Generic Lot or a Fixed Frequency Lot;

**"Minister"** means the Minister for Communications, Climate Change and Natural Resources;

[162] See ComReg Document 10/29.

**"Qualified Bidder"** means an applicant who, following consideration of its application by ComReg, has been informed, in accordance with the requirements of the Information Memorandum that its application is compliant and that it is entitled to participate in the competitive selection procedure described herein;

**"Region"** means a region as identified in Figure 2 of this decision;

**"RIA"** means Regulatory Impact Assessment;

**"State Services"** means the existing use by State Services using the State Services Spectrum;

**"State Services Spectrum"** means spectrum in the range 3 435 to 3 475 MHz;

**"Transitional Licence"** means a 3.6 GHz Band Transition Protected Licence or a 3.6 GHz Band Transition Unprotected Licence;

**"Winning Bidder"** means a Qualified Bidder that wins at least one Lot in the competitive selection procedure described herein; and

**"Wireless Telegraphy Act 1926"** means the Wireless Telegraphy Act, 1926 (No. 45 of 1926), as amended.

# 2. DECISION-MAKING CONSIDERATIONS

2. In arriving at its decisions in this document, ComReg has had regard to:

i. the contents of, and the materials and reasoning referred to in, as well as the materials provided by respondents in connection with, the below-listed ComReg documents:
    a) 14/101 (insofar as relevant to the 3.6 GHz Band);
    b) 14/126 (insofar as relevant to the 3.6 GHz Band);
    c) 15/70;
    d) 15/140;
    e) 16/22; and
    f) 16/57;

ii. the consultants' reports commissioned, and the advice obtained by ComReg in relation to the subject-matter of the documents and materials listed above;

iii. the powers, functions, objectives and duties of ComReg, including, without limitation those under and by virtue of:
    a) the Communications Regulation Act 2002, and, in particular, sections 10, 12 and 13 thereof;

b) the Framework Regulations, and, in particular, Regulations 13, 16 and 17 thereof;

c) the Authorisation Regulations, and, in particular, Regulations 9, 10, 11, 12, 15, 16, 17, 18(1)I and 19 thereof;

d) the 3.6 GHz EC Decision;

e) Sections 5 and 6 of the Wireless Telegraphy Act, 1926; and

f) the applicable Policy Directions made by the Minister under section 13 of the Communications Regulation Act 2002,

and, noting that it has:

a) 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; and

b) evaluated the matters to be decided, in accordance with ComReg's RIA Guidelines (ComReg Document 07/56a) and the RIA Guidelines issued by the Department of An Taoiseach in June, 2009,

as set out in the various chapters of Document 16/57 and their supporting annexes, ComReg has decided:

# 3. DECISIONS

3.1 to proceed with the proposed release of the Award Spectrum;

3.2 to implement a 10 MHz guard band between 3 400 MHz and 3 410 MHz to give appropriate protection to systems in adjoining bands, as provided for by Article 2(2) of the 3.6 GHz EC Decision;

3.3 to specify a time division duplex (TDD) band plan for the 3 400 – 3 600 sub-band portion of the Award Spectrum as illustrated in Figure 1[163];

[163] Noting that ComReg has no discretion with regard to the band plan for the sub-band 3 600 – 3 800 MHz portion of the Award Spectrum. In particular, the 3.6 GHz EC Decision specifies that the duplex mode of operation in the 3 600 – 3 800 MHz sub-band shall be time division duplex.

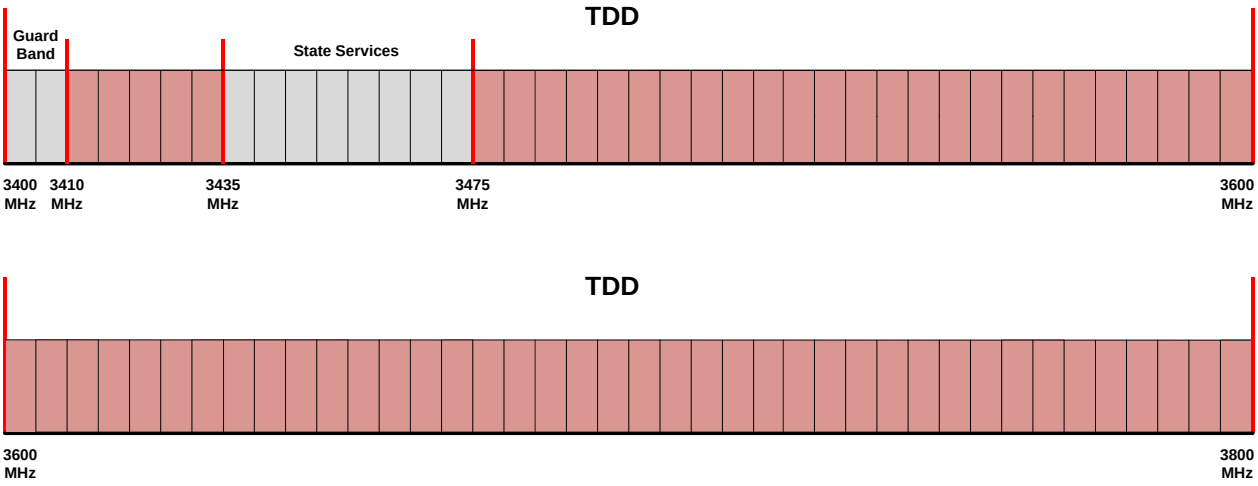


**Figure 1. TDD band plan**

3.4 subject to obtaining the consent of the Minister, to the making by it of the 3.6 GHz Band Licence Regulations, to make those regulations under section 6 of the Wireless Telegraphy Act 1926, prescribing relevant matters in relation to 3.6 GHz Band Liberalised Use Licences, 3.6 GHz Band Spectrum Lease Licences, 3.6 GHz Band Preparatory Licences, 3.6 GHz Band Transition Protected Licences and 3.6 GHz Band Transition Unprotected Licences, including prescribing the form of the licences concerned, their duration and the conditions and restrictions subject to which they are granted;

3.5 under section 5 of the Wireless Telegraphy Act 1926, and pursuant to the 3.6 GHz Band Licence Regulations, to grant a limited number of individual rights of use for radio frequencies, by way of 3.6 GHz Band Liberalised Use Licences, in respect of the Award Spectrum;

3.6 to attach conditions to rights of use to the Award Spectrum as generally described in Chapter 6 of Document 16/57 and which will be further particularised in the 3.6 GHz Band Licence Regulations;

3.7 to select those parties who will be eligible to be granted 3.6 GHz Band Liberalised Use Licence(s) by means of a competitive selection procedure which is more particularly described in Chapter 5 of Document 16/57 and which will be further particularised in the Information Memorandum;

3.8 to make rights of use in respect of the Award Spectrum, as they may be held under 3.6 GHz Band Liberalised Use Licences, 3.6 GHz Band Spectrum Lease Licences and 3.6 GHz Band Preparatory Licences, available on a regional basis as set out in Figure 2 below;

- **Borders, Midlands and West:** That area of the State comprising counties Donegal, Leitrim, Sligo, Mayo, Roscommon, Cavan, Monaghan, Louth, Longford, Westmeath, Offaly, Laois and Galway, but excluding the CSO Boundary for Galway City and Suburbs Region.

- **South West:** That area of the State comprising counties Clare, Limerick, Kerry, Cork and the former local authority area of North Tipperary (as originally referred to as Tipperary North Riding in the Local Government Act 1898) but excluding the respective parts of these counties contained in the CSO Boundary for Cork City and Suburbs region and the CSO Boundary for Limerick City and Suburbs Region.

- **East:** That area of the State comprising counties Meath, Kildare, Wicklow and Dublin, but excluding the respective parts of these counties contained in the CSO Boundary for Dublin City and Suburbs Region.

- **South East:** That area of the State comprising counties Carlow, Wexford, the former local authority area of South Tipperary (as originally referred to as Tipperary South Riding in the Local Government Act 1898), Kilkenny and Waterford, but excluding the respective parts of these counties contained in the CSO Boundary of Waterford City and Suburbs Region.

- **CSO Boundary for Dublin City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Dublin City and Suburbs.

- **CSO Boundary for Cork City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Cork City and Suburbs.

- **CSO Boundary for Limerick City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Limerick City and Suburbs.

- **CSO Boundary for Galway City and Suburbs:** That area of the State as defined by the CSO in the Census 2011 Boundary Files for Galway City and Suburbs.

- **CSO Boundary for Waterford City and Suburbs:** That area of the State as defined by the CSO as per the Census 2011 Boundary Files for Waterford City and Suburbs.

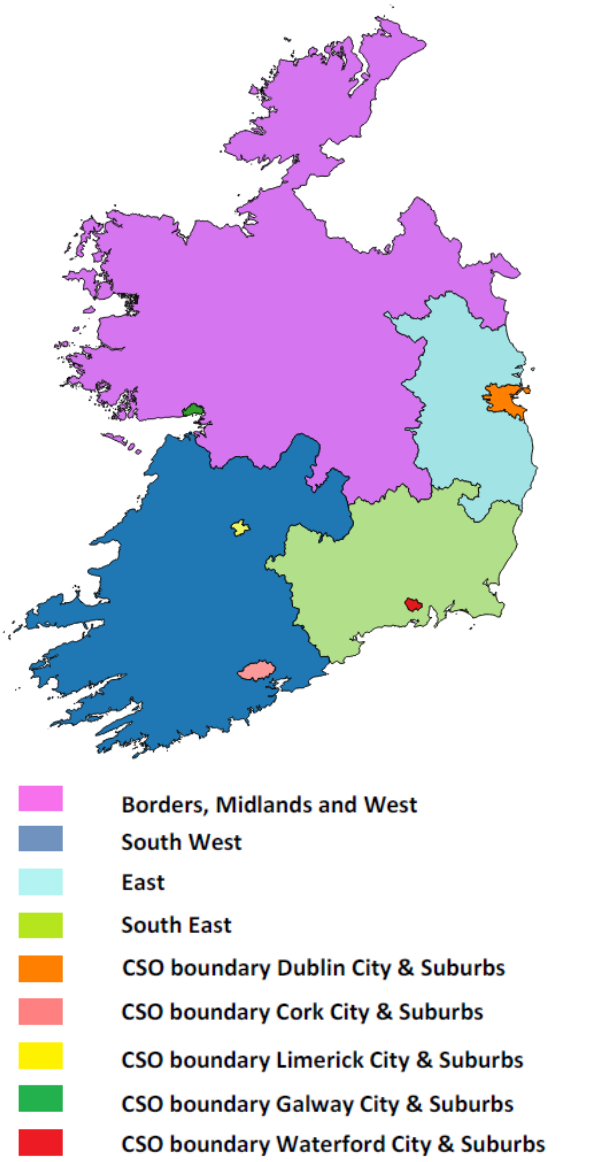




**Figure 2: Regions**

3.9 to make rights of use available in respect of the Award Spectrum in the form of Frequency Generic Lots per Region;

3.10 to make rights of use available in respect of the Award Spectrum in the form of a Fixed Frequency Lot per Region;

3.11 to incorporate into the competitive selection procedure, *inter alia,* the following elements:

3.11.1 a number of stages including an application stage, a qualification stage, a main stage and an assignment stage, with the outcome of the qualification stage determining whether the procedure moves directly to the assignment stage due to demand not exceeding supply, or whether the main stage is necessary, due to demand exceeding supply;

3.11.2 the main stage, if it occurs, comprising of a combinatorial clock auction;

3.11.3 3.6 GHz Band Liberalised Use Licences in respect of the Award Spectrum being granted for a maximum term of 15 years and where all rights of use of spectrum granted shall expire absolutely on 31 July 2032[164];

3.11.4 in the event of the main stage of the auction proceeding, multiple clock primary rounds, with the auctioneer setting the price in each round for each lot category specified in the Information Memorandum, with Qualified Bidders entitled to bid, subject to detailed rules to be set out in the Information Memorandum, for packages of Lots at those prices, until supply equals or exceeds demand across all lot categories at the round prices or for such other reason as may be set out in the Information Memorandum;

3.11.5 following any such primary rounds, a single, sealed-bid, supplementary round, entitling Qualified Bidders to submit a number of bids for packages of Lots for which such Qualified Bidders are eligible to bid, at bid prices of their choosing, all of which will be subject to detailed rules set out in the Information Memorandum. Winning bids will be determined by selecting at most one bid from amongst the entirety of bids made by each Qualified Bidder in order to maximise the total value of winning bids subject to not allocating more Lots than available. A price calculation methodology as set out in the Information Memorandum, will then be applied to calculate the Base Price on the basis of the opportunity cost of awarding Lots to each Winning Bidder;

[164] Any delay to the commencement of 3.6 GHz Band Liberalised Use Licences due to Transitional Licences shall not affect this expiry date.

3.11.6 an assignment stage, in which Winning Bidders will be required to participate (other than in respect of the Fixed Frequency Lot) in which such parties are eligible to bid for their preferred assignment option/s as determined by the detailed rules to be set out in the Information Memorandum;

3.11.7 winning bids and prices in the assignment stage being determined in accordance with the winner and price determination methodology set out in the Information Memorandum;

3.11.8 a spectrum cap, which will apply to each Qualified Bidder in the competitive selection procedure, and only for the duration of that procedure, of 150 MHz of Award Spectrum per Region;

3.11.9 reserve prices and spectrum usage fees (SUFs) for the 3.6 GHz Band Liberalised Use Licences described herein, to be determined in accordance with the methodology referred to in Chapter 5 of Document 15/70 and with the Benchmarking Report prepared by DotEcon in Document 15/140b, where the final prices will be set out in the Information Memorandum, taking account of any additional relevant data at that time;

3.11.10 to require all Bidders and all parties applying for a 3.6 GHz Band Transition Unprotected Licence to abide by the transition rules as set out in the Information Memorandum;

3.11.11 to develop and finalise a transition plan in consultation with interested parties;

3.11.12 to provide reimbursement of a pro rata proportion of the upfront fee (as determined by the competitive selection process in accordance with the rules set out in the Information Memorandum) and SUFs to a Winning Bidder in the event that the commencement of its 3.6 GHz Band Liberalised Use Licence is delayed as a result of delayed availability of spectrum to it due to circumstances described in the Information Memorandum, including the transition activities of Existing Licensees under the transition plan;

3.11.13 upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, as made following the obtaining of Ministerial consent, and on payment of the fees prescribed thereby, to grant 3.6 GHz Band Liberalised Use Licences to Winning Bidders, under section 5 of the Wireless Telegraphy Act 1926 for the period, and subject to the conditions and restrictions (including conditions as to revocation), prescribed in the 3.6 GHz Band Licence Regulations, including, as appropriate, the schedules to the 3.6 GHz Band Liberalised Use Licences as currently set out in Annex 2 of Document 16/22;

3.12 upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, to consider granting a 3.6 GHz Band Transition Protected Licence to such persons in accordance with the positions as set out in Chapter 7 of Document 16/57, the Information Memorandum and the transition plan;

3.13 upon application properly being made to it by Winning Bidders, Existing Licensees or holders of Transition Protected Licences within the terms of the 3.6 GHz Band Licence Regulations, to consider granting a 3.6 GHz Band Transition Unprotected Licence to such persons in accordance with the positions as set out in Chapter 7 of Document 16/57, the Information Memorandum and the transition plan;

3.14 upon application properly being made to it by Winning Bidders within the terms of the 3.6 GHz Band Licence Regulations, to consider granting a Preparatory Licence to such persons;

3.15 upon application properly being made to it in accordance with any such procedures as may be specified by ComReg under Regulation 19 of the Framework Regulations, to consider granting a 3.6 GHz Band Spectrum Lease Licence; and

3.16 to retain its discretion regarding how it might treat any unsold Lots depending on the factual circumstances arising from the award process, save for the decision that unsold Lots will not be considered for assignment for a reasonable period after the process, and, in any event, will not be considered for a period of at least 2 years.

# 4. STATUTORY POWERS NOT AFFECTED

4.1 Nothing in this document shall operate to limit ComReg in the exercise of its discretions or powers, or the performance of its functions or duties, or the attainment of objectives under any laws applicable to ComReg from time to time.

**Gerry Fahy**

**COMMISSIONER**

**THE COMMISSION FOR COMMUNICATIONS REGULATION**

**THE 11 DAY OF JULY 2016**

Chapter 9

# 9 Next Steps

## 9.1 Next Steps

9.1 Insofar as it might receive e correspondence on matters relating to this document, ComReg hereby gives notice that it will publish any material correspondence received in this regard. Such information will be subject to the provisions of ComReg's guidelines on the treatment of confidential information (Document 05/24).

9.2 ComReg will, in due course, publish a final information memorandum setting out the rules and procedures associated with the competitive selection procedure decided upon in the Decision herein. Subject to obtaining the required ministerial consent, ComReg will then make regulations under the Wireless Telegraphy Acts prescribing relevant matters in relation to the licences to be granted to eligible persons following that award process. ComReg also intends to hold workshops with interested parties was well as running mock auctions to familiarise bidders with the auction software.

## 9.2 Envisaged next publications and actions in the Award Process

9.3 The start date of the Award Process will be announced in the final Information Memorandum or by notice following the publication of the final Information Memorandum.

9.4 While ComReg is unable to give specific dates for each step detailed below, ComReg envisages that the next steps in this process will be the following publications and actions[165]:

- Publication of final Information Memorandum;
- The holding of a presentation to allow interested parties to further develop their understanding of the relevant award procedures, processes and tools;
- Publication of the licensing regulations under Wireless Telegraphy Acts (following obtaining the required consent of the Minister);

[165] Note that the publications and actions set out here are not necessarily exhaustive, nor are they necessarily set out in the order in which they may need to be carried out.

- The holding of a question and answer phase;
- If not announced in the final Information Memorandum, then the publication of an Information Notice announcing the start date of the Award Process.
- The submission of applications by interested parties;
- The determination by ComReg of qualified bidders; and
- Where there is a need to hold a main stage (i.e. an auction):
    - the holding of mock auction(s) with qualified bidders;
    - notice to qualified bidders on the start date of the main stage; and
    - the start of the main stage.

# Annex 1: Glossary

## A1.1 Definitions

A 1.1 The definitions in this glossary shall apply to this document as a whole save that they shall not apply to the Decision set out in Chapter 8

A 1.2 Where a term in this glossary is defined by reference to a definition in a section or paragraph and an explanation of that term is provided in this glossary, the latter explanation is for convenience only and reference should be made to the appropriate part of the document for the definitive meaning of that term in its appropriate context.

A 1.3 Any reference to any provision of any legislation shall include any modification re-enactment or extension thereof.

A 1.4 Terms defined in this consultation paper shall, unless the context otherwise requires or admits, have the meaning set out below:

| | |
|---|---|
| 3.6 GHz Band | The radio frequency spectrum in the range 3 400 MHz to 3 800 MHz. |
| 2.6 GHz EC Decision | Refers to EC Decision 2008/477/EC. See section A1.3 below for further details |
| 3.6 GHz EC Decision | Refers to EC Decision 2008/411/EC as amended in EC decision 2014/276/EU. See section A1.3 below for further details |
| 2008 3.6 GHz EC Decision | European Commission ("EC") Decision 2008/411/EC. |
| 2014 3.6 GHz EC Decision | European Commission ("EC") Decision 2014/276/EU |
| 3.6 GHz Band Transition Protected Licence (TPL) | A Licence issued under Schedule 4 of the Regulations (as may be amended prior to enactment) in the form set out in Annex 2 of Document 16/22 which entitles the holder to keep and have possession of Apparatus for the provision of FWA services in one or more than one FWALA Service Area, subject to the terms and conditions set out therein. |
| 3.6 GHz Band Transition | A Licence issued under Schedule 5 of the Regulations (as may be amended prior to enactment) in the form set out in Annex 2 of Document 16/22 which entitles the holder to keep and have |

| | |
|---|---|
| Unprotected Licence (TUL) | possession of Apparatus for the provision of FWA services in one or more than one FWALA Service Area on a Non-Interference and Non-Protected Basis, subject to the terms and conditions set out therein. |
| 700 MHz band | The frequency range 694 – 790 MHz |
| 800 MHz band | The frequency range 790 – 862 MHz |
| 900 MHz band | The frequency range 880 – 915 MHz paired with 925 – 960 MHz |
| 1.4 GHz band | The frequency range 1 452 – 1 492 MHz |
| 1 800 MHz band | The frequency range 1 710 – 1 785 MHz paired with 1 805 – 1 880 MHz |
| 2.1 GHz band | The frequency range 1 900 – 1 980 and 2 110 – 2 170 MHz |
| 2.3 GHz band | The frequency range 2 300 – 2 400 MHz |
| 2.6 GHz band | The frequency range 2 500 – 2 690 MHz |
| Award Process | The overall process through which it is intended that rights of use of the Award Spectrum will be granted in the event that at least one Applicant submits a valid Application, which by definition must include a valid Bid. |
| Award Spectrum | The radio frequency spectrum in the range 3 410 – 3 435 MHz and 3 475 – 3 800 MHz |
| CPI | Consumer Price Index published by the Central Statistics Office. |
| Capacity band | A spectrum band whose propagation characteristics when used for mobile and similar services where user equipment is fitted with low gain antennas, render it unsuitable for its use to serve wide geographical areas, and may be more suitable for urban deployment as hot spots or high capacity infill. |
| Complementarity | The term can be taken as referring to spectrum bands where the value attributed by an interested party to spectrum in one band is enhanced |

| | |
|---|---|
| | by having or winning rights of use of spectrum in another band in relation to the proposed award process. |
| Coverage band | A spectrum band whose propagation characteristics when used with low gain antennas, render it suitable to serve wide geographical areas, such as the deployment of macro cells for wide area services. |
| General Authorisation | An authorisation for an undertaking to provide an electronic communications network or service under and in accordance with Regulation 4 of the Authorisation Regulations. |
| Information Memorandum (IM) | The document to be published for the purposes of outlining in detail the processes and procedures the ComReg would follow in running the Award process, currently in draft form in Document 16/22 |
| Lot | A 5 MHz or 25 MHz block of spectrum in the 3.6 GHz Band. |
| MBSA Process | MBSA or the MBSA Process refers to the Multi-Band Spectrum Award process whose final results were announced in ComReg Document 12/131 on 5 December 2012 |
| Minimum Price | The price per Lot in a Lot Category at the beginning of the Award Process. This price is the combination of the Reserve Price and SUF. |
| NGA | Next Generation Access |
| NRA | National Regulatory Authority |
| RIA | Regulatory Impact Assessment, an analysis of the likely effect of, and necessity of, a proposed new regulation or regulatory change. Such assessments are carried out in accordance with Document 07/56a - Guidelines on ComReg‘s approach to Regulatory Impact Assessment - August 2007. |
| Reserve Price | The minimum Bid for a Lot for such a Lot to be assigned. |
| Spectrum right of use | Authorisation to use certain radio frequencies subject to such conditions and restrictions as may be prescribed in a licence or by any Regulations made by ComReg under section 6 of the Act of 1926. |

| | |
|---|---|
| Spectrum Usage Fees (SUFs) | Fees, typically annual, which a Licensee must pay in respect of spectrum rights of use assigned in the Award Process. |
| Substitutability | The term can be taken as referring to spectrum bands which can serve the same purpose for interested parties and so those parties are relatively indifferent to switching between those bands in relation to the proposed award process. |
| The Minister | Minister for Communications, Climate Change and Natural Resources |
| Winning Bidder | A Bidder that wins at least one Lot in an Award Process. |
| WBB | Wireless broadband |

## A1.2 European and Governmental Bodies, Regulatory and Standardisation Organisations

| | |
|---|---|
| 3GPP | The 3rd Generation Partnership Project |
| ComReg | Commission for Communications Regulation |
| CEPT | Conférence européenne des Administration des postes et des télécommunications. In English, European Conference of Postal and Telecommunications Administrations |
| DCENR | Department of Communications, Energy and Natural Resources |
| EC | European Commission |
| ECC | Electronic Communications Committee (of CEPT) |
| ECO | European Communications Office |
| EU | European Union |
| ITU | International Telecommunication Union |
| RSPG | Radio Spectrum Policy Group |

## A1.3 Primary and Secondary Legislation

| S.I. | Statutory Instrument |
|---|---|
| 2002 Act | The Communications Regulation Act 2002 (No. 20 of 2002), as amended[166] |
| Authorisation Regulations | European Communities (Electronic Communication Networks and Services) (Authorisation) Regulations 2011 (S.I. No 335 of 2011) |
| Broadcasting Act 2009 | Broadcasting Act 2009 (No. 18 of 2009). |
| Directive 2002/77/EC | A European Commission Directive on competition in the markets for electronic communications networks and services |
| EC Decision 2008/477/EC | European Commission Decision on the harmonisation of the 2500-2690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community |
| EC Decision 2009/766/EC | European Commission Decision on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community |
| EC Decision 2011/251/EU | European Commission Decision, amending Decision 2009/766/EC, on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community. |
| EC Decision 2014/276/EU | European Commission Decision on amending Decision 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community. |

[166] Includes the Communications Regulation (Amendment) Act 2007 and the Communications Regulation (Premium Rate Services and Electronic Communications Infrastructure) Act 2010.

| | |
|---|---|
| European Parliament and Council Decision 243/2012/EU | European Parliament and Council Decision establishing a multi-annual radio spectrum policy programme. |
| ECC Decision (13)03 | Electronic Communications Committee decision to harmonise the use of the frequency band 1452-1492 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL). |
| ECC Decision ECC/DEC(14)02 | Electronic Communications Committee decision to harmonised technical and regulatory conditions for the use of the band 2300-2400 MHz for Mobile/Fixed Communications Networks (MFCN). |
| Framework Regulations | European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No 333 of 2011) |
| Specific Regulations | Specific Regulations has the same meaning as set out in Regulation 2 of the Framework Regulations |

## A1.4 Glossary of Technical Terms

| | |
|---|---|
| 3G | Third Generation Mobile System (e.g. UMTS) |
| BEM | Block Edge Mask |
| CCA | Combinatorial clock auction |
| CPI | Consumer Price Index |
| DTT | Digital Terrestrial Television |
| ECN | Electronic Communications Networks |
| ECS | Electronic Communications Service as defined under the Framework Regulations |
| EIRP | Equivalent isotropic radiated Power |
| EMC | Electro Magnetic Compatibility |
| E-UTRA | Evolved Universal Terrestrial Radio Access - the air interface of LTE |
| FDD | Frequency Division Duplex |
| FWA | Fixed Wireless Access |
| FWALA | Fixed Wireless Access Local Area |
| GHz | Gigahertz (1 000 000 000 Hertz) |
| Guard-band | An unused spectrum bandwidth separating channels to prevent interference |
| GSA | The Global mobile Suppliers Association - an organisation which represents suppliers of equipment and services to the mobile industry |
| GSM | Global System for Mobile Communications |

| | |
|---|---|
| GSMA | GSM Association - – an organisation which represents mobile operators |
| Hertz | Unit of Frequency |
| kHz | Kilohertz (1 000 Hertz) |
| LTE | Long Term Evolution of 3G |
| LTE Advanced / LTE+ | An evolution of LTE, having the capability to provide 4G services. |
| MFCN | Mobile/fixed communications networks |
| MHz | Megahertz (1 000 000 Hertz) |
| MNO | Mobile Network Operator |
| MVNO | Mobile Virtual Network Operator (a licensed mobile operator with no spectrum assignment and with or without network infrastructure) |
| MoU | Memorandum / Memoranda of Understanding |
| NPV | Net Present Value |
| QoS | Quality of Service |
| Restricted block | A spectrum block to which restricted conditions apply. |
| SAF | Spectrum Access Fee |
| SBC | Sealed-bid combinatorial (auction) |
| SCA | Simple clock auction |
| SDL | Supplementary Downlink |

| | |
|---|---|
| SMRA | Standard simultaneous multiple-round ascending (auction) |
| SSF | Special Sub Frame |
| SUF | Spectrum Usage Fee |
| TDD | Time Division Duplex |
| TD-LTE | Time Division – Long Term Evolution |
| TPL | Transition Protected Licence |
| TUL | Transition Unprotected Licence |
| UE | User Equipment |
| UMTS | Universal Mobile Telecommunications System. |
| UTRA | Universal Terrestrial Radio Access |
| WDMDS | Wideband Digital Mobile Data Services |
| WiMAX | Worldwide Interoperability for Microwave Access |
| WRC | World Radiocommunications Conference |

## A1.5 Glossary of respondents[167]

| | |
|---|---|
| 3IHL | Three Ireland Hutchison Ltd. |
| Eircom | Eircom Limited |
| Imagine | Imagine Telecommunications Business Ltd |
| Permanet | Permanet Ltd |
| Ripplecom | Ripplecom Communications Ltd |
| Vodafone | Vodafone Ireland Limited |

[167] This list provides the reference used in this document and further details for the entity(s) where known. Not all respondents provided full details of its company name in its response. ComReg has aimed to update the table based on the information available to it, but would appreciate clarifications on same.

# Annex 2: Legal Framework and Statutory Objectives

A 2.1 The Communications Regulation Acts 2002-2011[168] (the "2002 Act"), the Common Regulatory Framework (including the Framework and Authorisation Directives[169] as transposed into Irish law by the corresponding Framework and Authorisation Regulations[170]), and the Wireless Telegraphy Acts1926 to 2009[171] set out, amongst other things, powers, functions, duties and objectives of ComReg that are relevant to the management of the radio frequency spectrum in Ireland and to this preliminary consultation.

A 2.2 Apart from licensing and making regulations in relation to licences, ComReg's functions include the management of Ireland's radio frequency spectrum in accordance with ministerial Policy Directions under section 13 of the 2002 Act, having regard to its objectives under section 12 of the 2002 Act, Regulation 16 of the Framework Regulations and the provisions of Article 8a of the Framework Directive. ComReg is to carry out its functions effectively, and in a manner serving to ensure that the allocation and assignment of radio frequencies is based on objective, transparent, non-discriminatory and proportionate criteria.

A 2.3 This annex is intended as a general guide as to ComReg's role in this area, and not as a definitive or exhaustive legal exposition of that role. Further, this annex restricts itself to consideration of those powers, functions, duties and objectives of ComReg that appear most relevant to the matters at hand and generally excludes those not considered relevant (for example, in relation to postal services, premium rate services or market analysis). For the avoidance of doubt, however, the inclusion of particular material in this

[168] The Communications Regulation Act 2002, the Communications Regulation (Amendment) Act 2007, the Communications Regulation (Premium Rate Services and Electronic Communications Infrastructure) Act 2010 and the Communications Regulation (Postal Services) Act 2011.

[169] Directive No. 2002/21/EC of the European Parliament and of the Council of 7 March 2002 (as amended by Regulation (EC) No. 717/2007 of 27 June 2007, Regulation (EC) No. 544/2009 of 18 June 2009 and Directive 2009/140/EC of the European Parliament and Council of 25 November 2009) (the "Framework Directive") and Directive No. 2002/20/EC of the European Parliament and of the Council of 7 March 2002 (as amended by Directive 2009/140/EC) (the "Authorisation Directive").

[170] The European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011) and the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011) respectively.

[171] The Wireless Telegraphy Acts 1926 to 1988 and Sections 181 (1) to (7) and (9) and Section 182 of the Broadcasting Act 2009.

annex does not necessarily mean that ComReg considers same to be of specific relevance to the matters at hand.

A 2.4 All references in this annex to enactments are to the enactment as amended at the date hereof, unless the context otherwise requires.

## A2.1 Primary Objectives and Regulatory Principles under the 2002 Act and Common Regulatory Framework

A 2.5 ComReg's primary objectives in carrying out its statutory functions in the context of electronic communications are to:

- promote competition[172];
- contribute to the development of the internal market[173];
- promote the interests of users within the Community[174];
- ensure the efficient management and use of the radio frequency spectrum in Ireland in accordance with a direction under section 13 of the 2002 Act[175]; and
- unless otherwise provided for in Regulation 17 of the Framework Regulations, take the utmost account of the desirability of technological neutrality in complying with the requirements of the Specific Regulations [176] in particular those designed to ensure effective competition [177].

### A2.1.1 Promotion of Competition

A 2.6 Section 12(2)(a) of the 2002 Act requires ComReg to take all reasonable measures which are aimed at the promotion of competition, including:

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[172] Section 12 (1)(a)(i) of the 2002 Act.

[173] Section 12 (1)(a)(ii) of the 2002 Act.

[174] Section 12(1)(a)(iii) of the 2002 Act.

[175] Section 12(1)(b) of the 2002 Act. Whilst this objective would appear to be a separate and distinct objective in the 2002 Act, it is noted that, for the purposes of ComReg's activities in relation to electronic communications networks and services ("ECN" and "ECS"), Article 8 of the Framework Directive identifies "*encouraging efficient use and ensuring the effective management of radio frequencies (and numbering resources*)" as a sub-objective of the broader objective of the promotion of competition.

[176] The 'Specific Regulations' comprise collectively the Framework Regulations, the Authorisation Regulations, the European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No. 334 of 2011), the European Communities (Electronic Communications Networks and Services) (Universal Service and Users' Rights) Regulations 2011 (S.I. 337 of 2011) and the European Communities (Electronic Communications Networks and Services) (Privacy and Electronic Communications) Regulations 2011 (S.I. No. 336 of 2011).

[177] Regulation 16(1)(a) of the Framework Regulations.

- ensuring that users, including disabled users, derive maximum benefit in terms of choice, price and quality;
- ensuring that there is no distortion or restriction of competition in the electronic communications sector; and
- encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources.

A 2.7 In so far as the promotion of competition is concerned, Regulation 16(1)(b) of the Framework Regulations also requires ComReg to:

- ensure that elderly users and users with special social needs derive maximum benefit in terms of choice, price and quality, and
- ensure that, in the transmission of content, there is no distortion or restriction of competition in the electronic communications sector.

A 2.8 Regulation 9(11) of the Authorisation Regulations also provides that ComReg must ensure that radio frequencies are efficiently and effectively used having regard to section 12(2)(a) of the 2002 Act and Regulations 16(1) and 17(1) of the Framework Regulations. Regulation 9(11) further provides that ComReg must ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies, and, for this purpose, ComReg may take appropriate measures such as mandating the sale or the lease of rights of use for radio frequencies.

### A2.1.2 Contributing to the Development of the Internal Market

A 2.9 Section 12(2)(b) of the 2002 Act requires ComReg to take all reasonable measures which are aimed at contributing to the development of the internal market, including:

- removing remaining obstacles to the provision of ECN ECS and associated facilities at Community level;
- encouraging the establishment and development of trans-European networks and the interoperability of transnational services and end-to-end connectivity; and
- co-operating with electronic communications national regulatory authorities in other Member States of the Community and with the Commission of the Community in a transparent manner to ensure the development of

consistent regulatory practice and the consistent application of Community law in this field.

A 2.10 In so far as contributing to the development of the internal market is concerned, Regulation 16(1)(c) of the Framework Regulations also requires ComReg to co-operate with the Body of European Regulators for Electronic Communications ("BEREC") in a transparent manner to ensure the development of consistent regulatory practice and the consistent application of EU law in the field of electronic communications.

### A2.1.3 Promotion of Interests of Users

A 2.11 Section 12(2)(c) of the 2002 Act requires ComReg, when exercising its functions in relation to the provision of electronic communications networks and services, to take all reasonable measures which are aimed at the promotion of the interests of users within the Community, including:

- ensuring that all users have access to a universal service;
- ensuring a high level of protection for consumers in their dealings with suppliers, in particular by ensuring the availability of simple and inexpensive dispute resolution procedures carried out by a body that is independent of the parties involved;
- contributing to ensuring a high level of protection of personal data and privacy;
- promoting the provision of clear information, in particular requiring transparency of tariffs and conditions for using publicly available ECS;
- encouraging access to the internet at reasonable cost to users;
- addressing the needs of specific social groups, in particular disabled users; and
- ensuring that the integrity and security of public communications networks are maintained.

A 2.12 In so far as promotion of the interests of users within the EU is concerned, Regulation 16(1)(d) of the Framework Regulations also requires ComReg to:

- address the needs of specific social groups, in particular, elderly users and users with special social needs, and

- promote the ability of end-users to access and distribute information or use applications and services of their choice.

### A2.1.4 Regulatory Principles

A 2.13 In pursuit of its objectives under Regulation 16(1) of the Framework Regulations and section 12 of the 2002 Act, ComReg must apply objective, transparent, non-discriminatory and proportionate regulatory principles by, amongst other things:

- promoting regulatory predictability by ensuring a consistent regulatory approach over appropriate review periods;
- ensuring that, in similar circumstances, there is no discrimination in the treatment of undertakings providing ECN and ECS;
- safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition;
- promoting efficient investment and innovation in new and enhanced infrastructures, including by ensuring that any access obligation takes appropriate account of the risk incurred by the investing undertakings and by permitting various cooperative arrangements between investors and parties seeking access to diversify the risk of investment, while ensuring that competition in the market and the principle of non-discrimination are preserved;
- taking due account of the variety of conditions relating to competition and consumers that exist in the various geographic areas within the State; and
- imposing ex-ante regulatory obligations only where there is no effective and sustainable competition and relaxing or lifting such obligations as soon as that condition is fulfilled.

### A2.1.5 BEREC

A 2.14 Under Regulation 16(1)(3) of the Framework Regulations, ComReg must:

- having regard to its objectives under section 12 of the 2002 Act and its functions under the Specific Regulations, actively support the goals of BEREC of promoting greater regulatory co-ordination and coherence; and
- take the utmost account of opinions and common positions adopted by BEREC when adopting decisions for the national market.

### A2.1.6 Other Obligations under the 2002 Act

A 2.15 In carrying out its functions, ComReg is required, amongst other things, to:

- seek to ensure that any measures taken by it are proportionate having regard to the objectives set out in section 12 of the 2002 Act;[178]
- have regard to international developments with regard to ECN and ECS, associated facilities, postal services, the radio frequency spectrum and numbering[179]; and
- take the utmost account of the desirability that the exercise of its functions aimed at achieving its radio frequency management objectives does not result in discrimination in favour of or against particular types of technology for the provision of ECS.[180]

## A2.1.7 Policy Directions[181]

A 2.16 Section 12(4) of the 2002 Act provides that, in carrying out its functions, ComReg must have appropriate regard to policy statements, published by or on behalf of the Government or a Minister of the Government and notified to the Commission, in relation to the economic and social development of the State. Section 13(1) of the 2002 Act requires ComReg to comply with any policy direction given to ComReg by the Minister for Communications, Energy and Natural Resources ("the Minister") as he or she considers appropriate, in the interests of the proper and effective regulation of the electronic communications market, the management of the radio frequency spectrum in the State and the formulation of policy applicable to such proper and effective regulation and management, to be followed by ComReg in the exercise of its functions. Section 10(1)(b) of the 2002 Act also requires ComReg, in managing the radio frequency spectrum, to do so in accordance with a direction of the Minister under section 13 of the 2002 Act, while Section 12(1)(b) requires ComReg to ensure the efficient management and use of the radio frequency spectrum in accordance with a direction under Section 13.

A 2.17 The Policy Directions which are most relevant in this regard include the following:

### Policy Direction No.3 on Broadband Electronic Communication Networks

[178] Section 12(3) of the 2002 Act.

[179] Section 12(5) of the 2002 Act.

[180] Section 12(6) of the 2002 Act.

[181] ComReg also notes, and takes due account of, the Spectrum Policy Statement issued by the Department of Communications Energy and Natural Resources in September 2010.

A 2.18 ComReg shall in the exercise of its functions, take into account the national objective regarding broadband rollout, viz, the Government wishes to ensure the widespread availability of open-access, affordable, always-on broadband infrastructure and services for businesses and citizens on a balanced regional basis within three years, on the basis of utilisation of a range of existing and emerging technologies and broadband speeds appropriate to specific categories of service and customers.

### Policy Direction No.4 on Industry Sustainability

A 2.19 ComReg shall ensure that in making regulatory decisions in relation to the electronic communications market, it takes account of the state of the industry and in particular the industry's position in the business cycle and the impact of such decisions on the sustainability of the business of undertakings affected.

### Policy Direction No.5 on Regulation only where Necessary

A 2.20 Where ComReg has discretion as to whether to impose regulatory obligations, it shall, before deciding to impose such regulatory obligations on undertakings, examine whether the objectives of such regulatory obligations would be better achieved by forbearance from imposition of such obligations and reliance instead on market forces.

### Policy Direction No.6 on Regulatory Impact Assessment

A 2.21 ComReg, before deciding to impose regulatory obligations on undertakings in the market for electronic communications or for the purposes of the management and use of the radio frequency spectrum or for the purposes of the regulation of the postal sector, shall conduct a Regulatory Impact Assessment in accordance with European and International best practice and otherwise in accordance with measures that may be adopted under the Government's Better Regulation programme.

### Policy Direction No.7 on Consistency with other Member States

A 2.22 ComReg shall ensure that, where market circumstances are equivalent, the regulatory obligations imposed on undertakings in the electronic communications market in Ireland should be equivalent to those imposed on undertakings in equivalent positions in other Member States of the European Community.

### Policy Direction No.11 on the Management of the Radio Frequency Spectrum

A 2.23 ComReg shall ensure that, in its management of the radio frequency spectrum, it takes account of the interests of all users of the radio frequency spectrum.

### General Policy Direction No.1 on Competition (2004)

A 2.24 ComReg shall focus on the promotion of competition as a key objective. Where necessary, ComReg shall implement remedies which counteract or remove barriers to market entry and shall support entry by new players to the market and entry into new sectors by existing players. ComReg shall have a particular focus on:

- market share of new entrants;
- ensuring that the applicable margin attributable to a product at the wholesale level is sufficient to promote and sustain competition;
- price level to the end user;
- competition in the fixed and mobile markets; and
- the potential of alternative technology delivery platforms to support competition

## A2.2 Other Relevant Obligations under the Framework and Authorisation Regulations

### A2.2.1 Framework Regulations

A 2.25 Regulation 17 of the Framework Regulations governs the management of radio frequencies for ECS. Regulation 17(1) requires that ComReg, subject to any directions issued by the Minister pursuant to Section 13 of the 2002 Act and having regard to its objectives under Section 12 of the 2002 Act and Regulation 16 of the Framework Regulations and the provisions of Article 8a of the Framework Directive, ensure:

- the effective management of radio frequencies for ECS;
- that spectrum allocation used for ECS and issuing of general authorisations or individual rights of use for such radio frequencies are based on objective, transparent, non-discriminatory and proportionate criteria; and
- ensure that harmonisation of the use of radio frequency spectrum across the EU is promoted, consistent with the need to ensure its effective and efficient use and in pursuit of benefits for the consumer such as economies of scale and interoperability of services, having regard to all decisions and measures adopted by the European Commission in accordance with Decision No. 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the EU.

A 2.26 Regulation 17(2) provides that, unless otherwise provided in Regulation 17(3), ComReg must ensure that all types of technology used for ECS may be used in the radio frequency bands that are declared available for ECS in the Radio Frequency Plan published under Section 35 of the 2002 Act in accordance with EU law.

A 2.27 Regulation 17(3) provides that, notwithstanding Regulation 17(2), ComReg may, through licence conditions or otherwise, provide for proportionate and non-discriminatory restrictions to the types of radio network or wireless access technology used for ECS where this is necessary to—

- avoid harmful interference;
- protect public health against electromagnetic fields;
- ensure technical quality of service;
- ensure maximisation of radio frequency sharing;
- safeguard the efficient use of spectrum; or
- ensure the fulfilment of a general interest objective as defined by or on behalf of the Government or a Minister of the Government in accordance with Regulation 17(6).

A 2.28 Regulation 17(4) requires that, unless otherwise provided in Regulation 17(5), ComReg must ensure that all types of ECS may be provided in the radio frequency bands, declared available for ECS in the Radio Frequency Plan published under Section 35 of the Act of 2002 in accordance with EU law.

A 2.29 Regulation 17(5) provides that, notwithstanding Regulation 17(4), ComReg may provide for proportionate and non-discriminatory restrictions to the types of ECS to be provided, including where necessary, to fulfil a requirement under the International Telecommunication Union Radio Regulations (“ITU-RR”).

A 2.30 Regulation 17(6) requires that measures that require an ECS to be provided in a specific band available for ECS must be justified in order to ensure the fulfilment of a general interest objective as defined by or on behalf of the Government or a Minister of the Government in conformity with EU law such as, but not limited to—

- safety of life;
- the promotion of social, regional or territorial cohesion;

- the avoidance of inefficient use of radio frequencies; or
- the promotion of cultural and linguistic diversity and media pluralism, for example, by the provision of radio and television broadcasting services.

A 2.31 Regulation 17(7) provides that ComReg may only prohibit the provision of any other ECS in a specific radio spectrum frequency band where such a prohibition is justified by the need to protect safety of life services. ComReg may, on an exceptional basis, extend such a measure in order to fulfil other general interest objectives as defined by or on behalf of the Government or a Minister of the Government.

A 2.32 Regulation 17(8) provides that ComReg must, in accordance with Regulation 18, regularly review the necessity of the restrictions referred to in Regulations 17(3) and 17(5) and must make the results of such reviews publicly available.

A 2.33 Regulation 17(9) provides that Regulations 17(2) to (7) only apply to spectrum allocated to be used for ECS, general authorisations issued and individual rights of use for radio frequencies granted after 1 July 2011. Spectrum allocations, general authorisations and individual rights of use which already existed on 1 July 2011 are subject to Regulation 18 of the Framework Regulations.

A 2.34 Regulation 17(10) provides that ComReg may, having regard to its objectives under Section 12 of the 2002 Act and Regulation 16 and its functions under the Specific Regulations, lay down rules in order to prevent spectrum hoarding, in particular by setting out strict deadlines for the effective exploitation of the rights of use by the holder of rights and by withdrawing the rights of use in cases of non-compliance with the deadlines. Any rules laid down under this Regulation must be applied in a proportionate, non-discriminatory and transparent manner.

A 2.35 Regulation 17(11) requires ComReg to, in the fulfilment of its obligations under that Regulation, respect relevant international agreements, including the ITU-RR and any public policy considerations brought to its attention by the Minister.

## A2.2.2 Authorisation Regulations

### Decision to limit rights of use for radio frequencies

A 2.36 Regulation 9(2) of the Authorisation Regulations provides that ComReg may grant individual rights of use for radio frequencies by way of a licence where it considers that one or more of the following criteria are applicable:

- it is necessary to avoid harmful interference;

- it is necessary to ensure technical quality of service;
- it is necessary to safeguard the efficient use of spectrum; or
- it is necessary to fulfil other objectives of general interest as defined by or on behalf of the Government or a Minister of the Government in conformity with EU law.

A 2.37 Regulation 9(10) of the Authorisation Regulations provides that ComReg must not limit the number of rights of use for radio frequencies to be granted except where this is necessary to ensure the efficient use of radio frequencies in accordance with Regulation 11.

A 2.38 Regulation 9(7) also provides that:

- where individual rights of use for radio frequencies are granted for a period of 10 years or more and such rights may not be transferred or leased between undertakings in accordance with Regulation 19 of the Framework Regulations, ComReg must ensure that criteria set out in Regulation 9(2) apply for the duration of the rights of use, in particular upon a justified request from the holder of the right.
- where ComReg determines that the criteria referred to in Regulation 9(2) are no longer applicable to a right of use for radio frequencies, ComReg must, after a reasonable period and having notified the holder of the individual rights of use, change the individual rights of use into a general authorisation or must ensure that the individual rights of use are made transferable or leasable between undertakings in accordance with Regulation 19 of the Framework Regulations.

## Publication of procedures

A 2.39 Regulation 9(4)(a) of the Authorisation Regulations requires that ComReg, having regard to the provisions of Regulation 17 of the Framework Regulations, establish open, objective, transparent, non-discriminatory and proportionate procedures for the granting of rights of use for radio frequencies and cause any such procedures to be made publicly available.

## Duration of rights of use for radio frequencies

A 2.40 Regulation 9(6) of the Authorisation Regulations provides that rights of use for radio frequencies must be in force for such period as ComReg considers appropriate having regard to the network or service concerned in view of

the objective pursued taking due account of the need to allow for an appropriate period for investment amortisation.

## Conditions attached to rights of use for radio frequencies

A 2.41 Regulation 9(5) of the Authorisation Regulations provides that, when granting rights of use for radio frequencies, ComReg must, having regard to the provisions of Regulations 17 and 19 of the Framework Regulations, specify whether such rights may be transferred by the holder of the rights and under what conditions such a transfer may take place.

A 2.42 Regulation 10(1) of the Authorisation Regulations provides that, notwithstanding Section 5 of the Wireless Telegraphy Act,1926, but subject to any regulations under Section 6 of that Act, ComReg may only attach those conditions listed in Part B of the Schedule to the Authorisation Regulations. Part B lists the following conditions which may be attached to rights of use:

- Obligation to provide a service or to use a type of technology for which the rights of use for the frequency has been granted including, where appropriate, coverage and quality requirements.
- Effective and efficient use of frequencies in conformity with the Framework Directive and Framework Regulations.
- Technical and operational conditions necessary for the avoidance of harmful interference and for the limitation of exposure of the general public to electromagnetic fields, where such conditions are different from those included in the general authorisation.
- Maximum duration in conformity with Regulation 9, subject to any changes in the national frequency plan.
- Transfer of rights at the initiative of the rights holder and conditions of such transfer in conformity with the Framework Directive.
- Usage fees in accordance with Regulation 19.
- Any commitments which the undertaking obtaining the usage right has made in the course of a competitive or comparative selection procedure.
- Obligations under relevant international agreements relating to the use of frequencies.
- Obligations specific to an experimental use of radio frequencies.

A 2.43 Regulation 10(2) also requires that any attachment of conditions under Regulation 10(1) to rights of use for radio frequencies must be non-discriminatory, proportionate and transparent and in accordance with Regulation 17 of the Framework Regulations.

## Procedures for limiting the number of rights of use to be granted for radio frequencies

A 2.44 Regulation 11(1) of the Authorisation Regulations provides that, where ComReg considers that the number of rights of use to be granted for radio frequencies should be limited it must, without prejudice to Sections 13 and 37 of the 2002 Act:

- give due weight to the need to maximise benefits for users and to facilitate the development of competition, and
- give all interested parties, including users and consumers, the opportunity to express their views in accordance with Regulation 12 of the Framework Regulations.

A 2.45 Regulation 11(2) of the Authorisation Regulations requires that, when granting the limited number of rights of use for radio frequencies it has decided upon, ComReg does so *"…on the basis of selection criteria which are objective, transparent, non-discriminatory and proportionate and which give due weight to the achievement of the objectives set out in Section 12 of the 2002 Act and Regulations 16 and 17 of the Framework Regulations."*

A 2.46 Regulation 11(4) provides that where it decides to use competitive or comparative selection procedures, ComReg must, inter alia, ensure that such procedures are fair, reasonable, open and transparent to all interested parties.

## Fees for spectrum rights of use

A 2.47 Regulation 19 of the Authorisation Regulations permits ComReg to impose fees for rights of use which reflect the need to ensure the optimal use of the radio frequency spectrum.

A 2.48 ComReg is required to ensure that any such fees are objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose and take into account the objectives of ComReg as set out in Section 12 of the 2002 Act and Regulation 16 of the Framework Regulations.

## Amendment of rights and obligations

A 2.49 Regulation 15 of the Authorisation Regulations permits ComReg to amend rights and conditions concerning rights of use, provided that any such

amendments may only be made in objectively justified cases and in a proportionate manner, following the process set down in Regulation 15(4).

## A2.3 Other Relevant Provisions

### Wireless Telegraphy Act, 1926 (the "1926 Act")

A 2.50 Under Section 5(1) of the 1926 Act, ComReg may, subject to that Act, and on payment of the prescribed fees (if any), grant to any person a licence to keep and have possession of apparatus for wireless telegraphy in any specified place in the State.

A 2.51 Section 5(2) provides that, such a licence shall be in such form, continue in force for such period and be subject to such conditions and restrictions (including conditions as to suspension and revocation) as may be prescribed in regard to it by regulations made by ComReg under Section 6.

A 2.52 Section 5(3) also provides that, where it appears appropriate to ComReg, it may, in the interests of the efficient and orderly use of wireless telegraphy, limit the number of licences for any particular class or classes of apparatus for wireless telegraphy granted under Section 5.

A 2.53 Section 6 provides that ComReg may make regulations prescribing in relation to all licences granted by it under Section 5, or any particular class or classes of such licences, all or any of the following matters:

- the form of such licences;
- the period during which such licences continue in force;
- the manner in which, the terms on which, and the period or periods for which such licences may be renewed;
- the circumstances in which or the terms under which such licences are granted;
- the circumstances and manner in which such licences may be suspended or revoked by ComReg;
- the terms and conditions to be observed by the holders of such licences and subject to which such licences are deemed to be granted;
- the fees to be paid on the application, grant or renewal of such licences or classes of such licences, subject to such exceptions as ComReg may prescribe, and the time and manner at and in which such fees are to be paid; and

- matters which such licences do not entitle or authorise the holder to do.

A 2.54 Section 6(2) provides that Regulations made by ComReg under Regulation 6 may authorise and provide for the granting of a licence under Section 5 subject to special terms, conditions, and restrictions to persons who satisfy it that they require the licences solely for the purpose of conducting experiments in wireless telegraphy.

## Broadcasting Act 2009 (the "2009 Act")

A 2.55 Section 132 of the 2009 Act relates to the duties of ComReg in respect of the licensing of spectrum for use in establishing digital terrestrial television multiplexes and places an obligation on ComReg to issue:

- two DTT multiplex licences to RTÉ by request (see Sections 132 (1) and (2) of the 2009 Act); and

- a minimum of four DTT multiplex licences to the BAI by request (see Sections 132 (3) and (4) of the 2009 Act) for the provision of commercial TV content.

## Article 4 of Directive 2002/77/EC (Competition Directive)

A 2.56 Article 4 of the Competition Directive provides that:

*"Without prejudice to specific criteria and procedures adopted by Member States to grant rights of use of radio frequencies to providers of radio or television broadcast content services with a view to pursuing general interest objectives in conformity with Community law:*

- *Member States shall not grant exclusive or special rights of use of radio frequencies for the provision of electronic communications services.*

- *The assignment of radio frequencies for electronic communication services shall be based on objective, transparent, non-discriminatory and proportionate criteria."*

## Radio Spectrum Policy Programme

A 2.57 On 15 February 2012, the European Parliament adopted the five-year Radio Spectrum Policy Programme ("RSPP") which establishes a multi-annual radio spectrum policy programme for the strategic planning and harmonisation of the use of spectrum. The objective is to ensure the functioning of the internal market in the Union policy areas involving the use of spectrum, such as electronic communications, research, technological development and space, transport, energy and audiovisual policies.

A 2.58 Among the activities being undertaken in the context of the RSPP is a comprehensive inventory of spectrum use in the range 400 MHz to 6 GHz in order to identify developing and potentially significant uses of that spectrum.

# Annex 3: Relevant EC/CEPT Decisions and technical documents

A 3.1 This Annex sets out, in the following table, key documentation, at an EC and CEPT level, relating to the bands referenced in this consultation:

| Spectrum Band | Document Title | Description and link |
|---|---|---|
| 3.6 GHz Band | EC Decision 2008/411/EC | Commission Decision of 21 May 2008 on the harmonisation of the 3 400 – 3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32008D0411 |
| | EC Decision 2014/276/EU | Amends EC Decision 2008/411/EC on the harmonisation of the 3 400 - 3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services. The decision includes the setting of preferred frequency arrangements and technical conditions for the band: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.139.01.0018.01.ENG |
| | ECC Decision (11)06 | Harmonises the frequency arrangements and technical conditions for mobile/fixed communications networks (MFCN) operating in the bands 3400-3600 MHz and 3600-3800 MHz: http://www.erodocdb.dk/docs/doc98/official/pdf/ECCDec1106.pdf |
| | ECC Report 203 | Derives modified BEM to facilitate the deployment of broadband fixed, mobile and nomadic communications systems in the band: http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP203.PDF |
| 2.6 GHz band | EC Decision 2008/477/EC ('the EC 2.6 GHz Decision') | The EC Decision sets out the harmonisation of the band for ECS including frequency arrangements and technical conditions: http://eur-lex.europa.eu/legal-content/EN/ALL/;ELX_SESSIONID=FVBRTYsPmkGjHrBJPN7YtpGn59B1tdKm9mJhZVVQZV4BJpnnQGGQ!-462921947?uri=CELEX:32008D0477 |

| Spectrum Band | Document Title | Description and link |
|---|---|---|
| | ECC Decision (05)05 | Harmonises the utilisation of spectrum for IMT-2000/UMTS systems operating within the band http://www.erodocdb.dk/docs/doc98/official/pdf/ECCDec0505.pdf |
| | ECC Report 131 | Derivation of a block edge mask (BEM) for terminal stations in the 2.6 GHz frequency band (2 500- 2690 MHz): http://www.erodocdb.dk/docs/doc98/official/pdf/ECCRep131.pdf |
| 2.3 GHz band | EC Mandate to CEPT - | EC Mandate to CEPT to develop harmonised technical conditions for the 2 300 – 2 400 MHz ('2.3 GHz') frequency band in the EU for the provision of wireless broadband electronic communications services; http://www.cept.org/Documents/fm-52/17474/FM52(14)17_Mandate-to-CEPT-on-2300-2400-MHz |
| | ECC Decision (14)02 ('the ECC 2.3 GHz Decision') | This ECC Decision harmonises the band for the for Mobile/Fixed Communications Networks (MFCN) including frequency arrangements and technical conditions; http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC1402.PDF |
| | ECC Report 172 | Derives technical conditions and frequency arrangements for Broadband Wireless Systems Usage in the band: http://www.erodocdb.dk/docs/doc98/official/pdf/ECCRep172.pdf |
| | ECC Report 205 | Sets out an approach to licenced shared access ('LSA') particularly in relation to the 2.3 GHz band: http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP205.PDF |
| 1.4 GHz band | EU Decision 2015/750 | Commission Implementing Decision of 8 May 2015 (EU) 2015/750 on the harmonisation of the 1452-1492 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Union |
| | ECC Decision (13)03 | Harmonises the use of the band for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL) including frequency arrangements and technical conditions: |

| Spectrum Band | Document Title | Description and link |
|---|---|---|
| | | http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC1303.PDF |
| | ECC Report 202 | Derives the out of band emission limits for Mobile/Fixed Communication Networks (MFCN) Supplemental Downlink (SDL) operating in the band: http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP202.PDF |
| | ECC Report 188 | Presents an analysis of the most suitable use for the band in Europe: http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP188.PDF |
| 700 MHz | EU Decision 2016/687 | Commission Implementing Decision of the 28 April 2016 - (EU) 2016/687 on the harmonisation of the 694-790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union. |
| | ECC Decision /(15)/01 | Harmonised technical conditions for MFCN in the band 694-790 MHz<br>ECC Decision of 6 March 2015 on Harmonised technical conditions for mobile/fixed communications networks (MFCN) in the band 694-790 MHz including a paired frequency arrangement (Frequency Division Duplex 2x30 MHz) and an optional unpaired frequency arrangement (Supplemental Downlink) |

# Annex 4: Update on international developments regarding the 3.6 GHz Band

## Regulation of the 3 400 –3 600 and 3 600 – 3 800 MHz sub bands

Last update: June 2016

This table below shows the current licensing situation and member states' preparations to implement the newly harmonised conditions, in particular whether member states:

- have already amended the frequency plan to implement the new conditions (in particular the block sizes of 5 MHz and the block edge masks);
- plan to refarm existing licences (e.g. by changing the block sizes to multiples of 5 MHz, re-arranging the position within the band, switching from FDD to TDD, and/or changing power limits to harmonised BEMs); and
- plan to award new licences in unused parts of the sub-bands, based on the newly harmonised conditions.

More detailed information is available in Cullen International's Radio Spectrum Service.

| Country | Regulation of the 3 400 – 3 600 MHz sub band | | | Regulation of the 3 600 – 3 800 MHz sub band | | |
|---|---|---|---|---|---|---|
| | Current licences (summarised) Expiry dates | Frequency plan amended to implement decision 2014/276/EU? | Preparations for refarming or award of new licences? | Current licences (summarised) | Frequency plan amended to implement decision 2014/276/EU? | Preparations for refarming or award of new licences? |
| **AT** | Regional licences<br>2019 | No | Yes<br>RTR consulted until May 20, 2016 on possible future frequency awards in several bands.<br>One of the possible options would be an | Mostly unused | No | Yes<br>RTR consulted until May 20, 2016 on possible future frequency awards in several bands.<br>One of the possible options would be to |

| Country | Regulation of the 3 400 – 3 600 MHz sub band | | | Regulation of the 3 600 – 3 800 MHz sub band | | |
|---|---|---|---|---|---|---|
| | **Current licences (summarised) Expiry dates** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** | **Current licences (summarised)** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** |
| | | | auction of the 700 MHz, 2 GHz and 3.4–3.6 GHz Bands in 2018/19. | | | auction 3.7–3.8 GHz for regional wireless broadband in 2017/18. |
| **BE** | Regional and local licences<br>2019, 2021, 2025 | Yes | No | Land stations for fixed satellite service | Yes | No |
| **CH** | Unused | Not applicable<br>(no EU member state) | No | Unused | Not applicable<br>(no EU member state) | No |
| **CZ** | 417 local licences<br>2020 / unlimited | Yes | No | Unused, to be auctioned in 2H 2016 | Yes | Yes<br>See below |
| | | | | CTO consulted in March 2016 on the tender conditions. According to CTO's consultation:<br>• The whole 200 MHz would be offered in five abstract lots of 40 MHz, all for TDD under the newly harmonised conditions.<br>• CTO proposed to conduct a simultaneous multiple round auction SMRA.<br>• Licensees would be obliged to cover certain numbers of municipalities and districts, depending on the amount of spectrum they will win. For details, see the tables in chapter 7.4 of the proposed tender conditions.<br>• Licence would expire on Dec. 31, 2030 (after about 15 years) | | |
| **DE** | Regional licences<br>2021 | No | No | Point-to-point links and satellite ground stations | No | No |
| **ES** | Three national licences<br>2020<br>One national licence (auctioned in March 2016)<br>2030 | Yes | No | Radio links (scheduled to end in 2018) and a limited number of satellite station services.<br>Use of the band for ECS is foreseen in the national frequency plan (note UN107) but no licences yet awarded. | Yes<br>In April 2015 the Ministry of Industry (spectrum NRA) reviewed the national frequency plan to allow for the use of the band for ECS in accordance with decision 2014/276/EU. Existing licences in the band must | Yes<br>The Ministry of Industry (spectrum NRA) consulted until June 21, 2015 on the future award of the band for ECS in accordance with Commission decisions |

| Country | Regulation of the 3 400 – 3 600 MHz sub band | | | Regulation of the 3 600 – 3 800 MHz sub band | | |
|---|---|---|---|---|---|---|
| | **Current licences (summarised)**<br>**Expiry dates** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** | **Current licences (summarised)** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** |
| | | | | | migrate to other bands, and no new licences for radio links will be granted. | |
| **FI** | Several local licences<br>Dec. 2016 | No | No | Radio links for the transport of TV signals<br>(detailed information not available) | No | No published plans, but the frequency allocation table says that the band is under review |
| **FR** | Two national and several regional licences<br>2018/2026 | No | No | Unused | No | No |
| **HU** | Five national licences expiring in July 2016<br>One new licence (2016–2034) | Yes | Yes<br>In May/June 2016 NMHH auctioned the entire sub-band (2x80 MHz for FDD), but only 2x30 MHz found a bidder. | One new licence (2016–2034)<br>Previously unused | Yes | Yes<br>In May/June 2016 NMHH auctioned the entire sub-band (200 MHz for TDD), but only 20 MHz found a bidder. |
| **IE** | Many regional licences<br>July 2017 | No | Yes<br>ComReg is preparing a new award of the entire band and issued a draft information memorandum in March 2016. | Many regional licences<br>July 2017 | No | Yes<br>ComReg is preparing a new award of the entire band and issued a draft information memorandum in March 2016. |
| **IT** | 14 ‘macro regional’ and 21 regional licences<br>2023<br>Band partly used by ministry of defence | Yes | No | Fixed radio links<br>Fixes satellite systems (FSS)<br>Ministry of defence<br>(detailed information not available)<br>(para. 16 of AGCOM decision 659/15/CONS) | Yes | Yes<br>The Ministry of Economic Development will issue a call for tender at an as yet unspecified date on the basis of a framework set out by AGCOM decision 659/15/CONS.<br>Existing fixed-wireless services and fixed satellite systems must be protected under a sharing framework, as well as |

| Country | Regulation of the 3 400 – 3 600 MHz sub band | | | Regulation of the 3 600 – 3 800 MHz sub band | | |
|---|---|---|---|---|---|---|
| | **Current licences (summarised) Expiry dates** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** | **Current licences (summarised)** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** |
| | | | | | | existing services in adjacent bands. The NRA decision sets out general principles but the detailed LSA model would be issued by the Ministry of Economic Development (MISE).<br>(Update) |
| **NL** | Ministry of defence | No | No | Unused | No | Yes<br>No new licences issued in preparation to include mobile broadband in this band |
| **PL** | 17 regional licences<br>2020 to 2026 | No | No | 3 national and 70 regional licences<br>2016 to 2022 | No | No |
| **PT** | Regional licences<br>2024/2025 | No | Yes<br>ANACOM adopted a decision on January 28th, 2016 on a public consultation on availability of spectrum. | Regional licences<br>2025 | No | Yes<br>ANACOM adopted a decision on January 28th, 2016 on a public consultation on availability of spectrum. |
| **RO** | 3 national licences<br>(2x55 MHz in total)<br>Jan. 1, 2026 | No | Yes<br>New licences awarded in Oct. 2015 (see below) | 3 national licences<br>(145 MHz in total)<br>Jan. 1, 2026 | No | Yes<br>New licences awarded in Oct. 2015 (see below) |
| | On Oct. 27, 2015 ANCOM announced the results of an auction of 16 paired blocks of 2x5 MHz in the 3.4–3.6 GHz Band (reserve price: €370,000) and 36 unpaired 5 MHz blocks in the 3.6–3.8 GHz band (reserve price: €185,000). 16 paired 2x5 MHz blocks allocated at the national level in the 3.4–3.6 GHz Band were auctioned out, 11 of which were awarded in the selection procedure. Furthermore, 36 unpaired 5 MHz blocks allocated at the national level in the 3.6–3.8 GHz band went under the hammer, 29 of which were awarded. The winning bidders are 2K Telecom S.R.L., Orange Romania S.A., RCS&RDS S.A., The National Radiocommunications Company and Vodafone Romania S.A.<br>The total licence fees collected are €10,124,101 and the new rights of use of the radio spectrum came into force on Jan. 1, 2016 for a period of ten years. Licence conditions are based on decision 2014/276/EU. Licensees have to establish 25 base stations within one year, 50 within two years and 100 within four years. | | | | | |
| **SE** | 2 national licences | No | No | 1159 local licences | No | No |

| Country | Regulation of the 3 400 – 3 600 MHz sub band | | | Regulation of the 3 600 – 3 800 MHz sub band | | |
|---|---|---|---|---|---|---|
| | **Current licences (summarised) Expiry dates** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** | **Current licences (summarised)** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** |
| | 2017<br>10 regional licences<br>2023 | | On Dec. 11, 2014 PTS issued a statement that refarming and award of new licences in the 3.5 GHz band in line with decision 2014/276/EU can be carried out only after expiry of all current local and regional licences in this band in 2023. | 2022 | | The remaining local/regional licences in the 3.5 GHz band would be awarded based on first-come-first-served principle until expiry of the existing licences |
| **SI** | 4 regional licences<br>2021 | No | No | 1 regional licence<br>2022 | No | No |
| **SK** | Three national licences (100 MHz in total) auctioned in 2015<br>Another 2 national licences of 2x14 MHz issued before and extended to 2x20 + 2x15 MHz in 2016<br>All licences expire in 2025 | Yes | Yes<br>New licences awarded in 2015 (Flash) | Three national licences of 40 MHz | Yes | Yes<br>New licences awarded in 2015 (Flash)<br>Remainder of the band to be awarded later |
| | RU published a call for tender in February 2015, then cancelled the tender for lack of demand. RA published a new call for tender in June 2015, with reduced reserve prices.<br>RA offered three national licences, two with 2x20 MHz (that can be used as 2x20 MHz FDD or 40 MHz TDD) and one with 20 MHz (TDD).<br>The three lots were awarded by a simultaneous multiple round auction (SMRA) in July 2015. O2 acquired 2x40 MHz (FDD or TDD) and Swan 20 MHz (TDD).<br>Winners have to offer at least one access point in each of the 79 districts within 24 months, and will have to cover at least three administrative units with less than 3000 inhabitants within 36 months. Special obligations apply for Bratislava and Kosice.<br>Licences will expire on August 31, 2025 (after about ten years) | | | RU auctioned three national licences of 40 MHz in January 2015.<br>The auction design differed from typical multiple round spectrum auctions. The auction had one round of 120 minutes, with possible extensions. If a bidder increased his bid within 10 minutes before the scheduled end of the auction, the time was extended by 10 minutes. However, only 60 such extensions were possible and the auction therefore was to end after 12 hours at the latest.<br>Winners have to offer at least one access point in each of the 79 districts within 24 months, and have to cover at least three administrative units with less than 3000 inhabitants within 36 months. Special obligations apply for Bratislava and Kosice.<br>Licences will expire on December 31, 2024 (after about ten years). | | |

| Country | Regulation of the 3 400 – 3 600 MHz sub band | | | Regulation of the 3 600 – 3 800 MHz sub band | | |
|---|---|---|---|---|---|---|
| | **Current licences (summarised)**<br>**Expiry dates** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** | **Current licences (summarised)** | **Frequency plan amended to implement decision 2014/276/EU?** | **Preparations for refarming or award of new licences?** |
| **UK** | UK Broadband holds a national licence of 2x20 MHz with indefinite duration. | Proposed<br>UK Broadband already uses its licence for LTE-TDD. | Yes<br>See below | UK Broadband holds a national licence with indefinite duration: 3605–3689 / 3925–4009 MHz.<br>With regard to 3605–3689 MHz the licence was amended in 2009.<br>The band is also used for satellite ground stations and fixed links. | Proposed<br>UK Broadband already uses the 3605–3689 MHz of its licence for LTE-TDD. | No |
| | Ofcom plans to auction the available spectrum in the 3.4–3.6 GHz Band (150 MHz) as lots of 5 MHz for TDD in a simultaneous multiple round auction together with 40 MHz in the 2.3–2.4 GHz band. (Flash)<br>Licences will be non-exclusive for an indefinite period with a 20 year initial term and free from coverage obligations. | | | | | |

# Annex 5: Final RIA on Rollout and QoS Licence Conditions

## A 5.1 Introduction

A 5.1 This annex sets out the Regulatory Impact Assessments (RIAs) on the proposed rollout and quality of service obligations as discussed in Chapter 6.

## A 5.2 General RIA Framework

### RIA Framework

A 5.2 In general terms, a RIA is an analysis of the likely effect of a proposed new regulation or regulatory change, and, indeed, of whether regulation is necessary at all. A RIA should help identify the most effective and least burdensome regulatory option and should seek to establish whether a proposed regulation or regulatory change is likely to achieve the desired objectives, having considered relevant alternatives and the impacts on stakeholders. In conducting a RIA, the aim is to ensure that all proposed measures are appropriate, effective, proportionate and justified.

### Structure of a RIA

A 5.3 As set out in ComReg's RIA Guidelines[182], there are five steps in a RIA. These are:

Step 1: Identify the policy issues and identify the objectives.

Step 2: Identify and describe the regulatory options.

Step 3: Determine the impacts on stakeholders.

Step 4: Determine the impact on competition.

Step 5: Assess the impacts and choose the best option.

A 5.4 One of the focuses of the RIA is to assess the impact of the proposed regulatory options available to ComReg on stakeholders (Step 3). A precursor to the subsequent steps in the RIA, therefore, is to identify the relevant stakeholders.

### Identification of stakeholders

[182] See Document 07/56a - Guidelines on ComReg's approach to Regulatory Impact Assessment - August 2007.

A 5.5 Stakeholders consist of two main groups:

- consumers (for the purposes of this RIA, consumers include both business and residential end users of spectrum); and
- industry stakeholders.

A 5.6 There are a number of key industry stakeholders in relation to the matters considered in this chapter:

- existing service providers;
- licensees with spectrum rights of use in the 3.6 GHz Band (e.g. FWALA licensees);
- parties who currently provide services using other spectrum (licensed or license exempt) for whom the spectrum being considered for inclusion in the award may be of particular interest to satisfy existing and potential demand (e.g. mobile network operators or other wireless broadband providers); and
- potential new entrants who do not currently provide any services using spectrum in the State. ComReg is of the view that such potential entrants would most likely wish to deploy wireless broadband (WBB)[183].

A 5.7 The focus of Step 4 is to assess the impact on competition of the proposed regulatory options available to ComReg. In that regard, ComReg notes that it has various statutory, objectives, regulatory principles and duties which are relevant to the issue of competition.

A 5.8 Of themselves, the various RIA guidelines and the RIA Policy Direction[184] provide little guidance on how much weight should be given to the positions and views of each stakeholder group (Step 3), or the impact on competition (Step 4). Accordingly, ComReg has been guided by its statutory objectives which it is obliged to pursue when exercising its functions. ComReg's statutory objectives in managing the radio frequency spectrum, include:

- the promotion of competition;

[183] While other ECS services can also be provided in the 3.6 GHz Band and the other bands discussed in Document 14/101, WBB is generally considered to be the most likely use. Indeed, the relevant EC harmonising decision (2008 3.6 GHz EC Decision), emphasises that "*the services provided in this frequency band should mainly target end-user access to broadband communications*".

[184] See Policy Direction Number 6.

- contributing to the development of the internal market; and
- promoting the interests of users within the Community.

A 5.9 In this document, ComReg has adopted the following structure in relation to Step 3 and Step 4 – the impact on industry stakeholders is considered first, followed by the impact on competition, followed by the impact on consumers. The order of this assessment does not reflect any assessment of the relative importance of these issues but rather reflects a logical progression. For example, a measure which safeguards and promotes competition should also, in turn, impact positively on consumers. In that regard, the assessment of the impact on consumers draws substantially upon the assessment carried out in respect of the impact on competition.

# A 5.3 Final 'Rollout' RIA

## Introduction

A 5.10 This section sets out the RIA on rollout which assesses the level of regulatory impact of various approaches that ComReg could take and determines the appropriate minimum rollout obligation that should be set as part of the rollout licence condition for the 3.6 GHz Band.

## Identify the policy issues and identify the objectives (Step 1)

### Policy issue

A 5.11 The primary policy issue to be addressed is a concern that operators issued with new 3.6 GHz licences could potentially not use those licences to roll out services across an acceptable geographic area, in a timely manner, and that this may not be in the interests of consumers or make efficient use of the radio spectrum.

A 5.12 As against this, the imposition of overly onerous rollout obligations could discourage participation in the award process by parties who want to deploy services.

A 5.13 Accordingly, the policy issue for ComReg is to determine an appropriate rollout obligation which would ensure a reasonable level of rollout without significantly discouraging participation in the award process.

### Objectives

A 5.14 ComReg's overall objectives in relation to this spectrum release process are set out in Annex 2

A 5.15 ComReg's most relevant objectives, insofar as rollout is concerned are as follows:

- to encourage the efficient use and effective management of spectrum;
- to ensure that all end users, including disabled users, derive maximum benefit in terms of choice, price and quality;
- to encourage efficient investment in infrastructure and promote innovation; and
- to ensure there is no distortion or restriction of competition in markets for the provision of electronic communications services.

## Identifying the Regulatory options (Step 2)

A 5.16 ComReg has undertaken a RIA to consider whether a rollout condition is necessary or appropriate for the 3.6 GHz Band. In Document 15/70, ComReg considered that it would be appropriate to move away from the traditional population or geographic based coverage measure for the 3.6 GHz Band and use a rollout type obligation based on the deployment of bases stations.

A 5.17 ComReg considers that the four regulatory options available to it are:

- **Option 1:** Impose no rollout obligation on the award spectrum.

  This would mean that each new Licensee would have full flexibility to choose how extensive their rollout would be regardless of the spectrum rights of use it was assigned in the band. An operator could choose to provide no services, only to provide services in high density areas, or choose to differentiate itself as a provider with an extensive network footprint.

- **Option 2:** Impose a rollout obligation, with a rollout period of 3-5 years, as set out in Document 15/70, as follows:
  - for each of the non-urban regions: the deployment of network controlled base stations at 15 to 25 sites and that these sites should be located in 3 to 5 different counties within each region;
  - for the Dublin region: the deployment of network controlled base stations at 15-25 sites; and
  - for all other urban regions: the deployment of network controlled base stations at 2-4 sites

- **Option 3**: Impose a rollout obligation, with a rollout period of 3 years, as follows:

1. For an operator holding **up to 100 MHz**, as follows:
    - for each of the non-urban regions: the deployment of network controlled base stations at 15 sites and that these sites should be located in 4 different counties within the region;
    - for the Dublin region: the deployment of network controlled base stations at 10 sites; and
    - for all other urban regions: the deployment of network controlled base stations at 2 sites.
    - Allow leasing to count towards rollout.
2. For an operator holding **over 100 MHz**, as follows:
    - for each of the non-urban regions: the deployment of network controlled base stations at 25 sites and that these sites should be located in 4 different counties within the region;
    - for the Dublin region: the deployment of network controlled base stations at 15 sites; and
    - for all other urban regions: the deployment of network controlled base stations at 4 sites.
    - Allow leasing count towards rollout.

- **Option 4:** Impose a high rollout obligation, with a rollout period of 3 years, as follows:
    1. For an operator holding **up to 100 MHz**, as follows:
        - for each of the non-urban regions: the deployment of network controlled base stations at 30 sites and that these sites should be located in 4 different counties within the region;
        - for the Dublin region: the deployment of network controlled base stations at 20 sites; and
        - all other urban regions: the deployment of network controlled base stations at 4 sites.
        - Allow leasing count towards rollout.
    2. For an operator holding **over 100 MHz**, as follows:
        - for each of the non-urban regions: the deployment of network controlled base stations at 50 sites and that these sites should be located in 4 different counties within the region;

- for the Dublin region: the deployment of network controlled base stations at 30 sites; and
- for all other urban regions: the deployment of network controlled base stations at 8 sites.
- Allow leasing count towards rollout.

## Impact on Stakeholders and Competition (Steps 3 and 4)

A 5.18 The focus of this section of the RIA is to assess the impact of the above regulatory options on:

i. industry stakeholders (being existing operators and potential new entrants),

ii. competition, and

iii. consumers.

## Impact on industry stakeholders

A 5.19 Industry stakeholders would prefer the rollout obligation that has the least impact on their commercial strategy, particularly if such obligations significantly differ from what they would choose to do independently of any obligation.

### Option 1

A 5.20 Existing providers of FWA services would be unlikely to prefer Option 1 because this option would make it more likely for strategic bidders, who may not use the spectrum, especially in the short term, to compete in the award process. In that regard, some respondents to Document 15/70 and 15/140 expressed concern that certain operators might hoard spectrum damaging the FWA sector. In particular, Imagine expressed concern that Eircom might seek to acquire spectrum rights of use with the purpose of foreclosing opportunities for FWA providers, rather than using the spectrum to deliver services.

A 5.21 For existing FWA providers, a rollout obligation may already be met[185] given their current network, particularly within certain regions, and any residual obligations in respect of rollout would only arise in respect of any regions those operators would need to expand into. As such, any rollout obligations set as a minimum requirement would not likely impose a significant obligation on these providers, and as a result, existing FWA providers may be indifferent as to whether Option 1 is chosen.

[185] Noting that base station equipment will likely need to be replaced in due course to align with the band plan and provide an acceptable level of spectrum efficiency.

A 5.22 Potential new entrants are likely to prefer an option with as low a rollout obligation as possible, and therefore Option 1 could be their preferred option. However, given that such entrants would rollout a network to some degree, regardless of any obligation, a new entrant might well be indifferent between Option 1 and, Options 2 and 3 to the extent that it restricts strategic bidding.

A 5.23 All MNOs (3IHL, Eircom and Vodafone) agree that some form of obligation should be imposed to ensure that the spectrum is being used by any winning bidder(s). MNOs are therefore unlikely to prefer Option 1 where a rival has the opportunity to be assigned spectrum with the purpose of denying it to alternative users. In particular, Eircom suggested that a more substantial rollout obligation is required to guard against hoarding of spectrum.

A 5.24 In summary, it is likely that industry stakeholders would, on balance, prefer either Options 2, 3 or 4 over Option 1.

### Option 4

A 5.25 With the exception of Imagine, which expressed a preference for more aggressive rollout commitments than those suggested under Option 2, Option 4 is unlikely to be favoured by most FWA providers as, given the differentiated and geographic nature of FWA providers, they would likely prefer to have more control over when and how they roll out their networks. If the obligation required reaching a rollout that was too high or that had to be reached in an overly ambitious timeframe, this could lead to an unnecessary burden for certain FWA providers.

A 5.26 An existing FWA provider's possible preference for a rollout obligation to prevent strategic bidding needs to be balanced against the desire to have flexibility in providing services to certain regions in line with its commercial strategy. For FWA providers, the rollout obligations for certain regions under Option 4 are in excess of the number of base stations currently in place in those regions (as illustrated in Chapter 6 of Document 15/70). Therefore, it is likely that Option 4 would require existing FWA operators to rollout additional base stations in certain regions where they may not necessarily have additional demand. This could also potentially result in operators having to make inefficient investments in their network.

A 5.27 Similarly, the high rollout obligation could act as a significant barrier to entry for a new entrant. While any new entrant would require the rollout of a network to some degree, such an obligation may not correspond to a new entrant's likely initial low market share and might therefore not be aligned with its business needs. Accordingly, the higher rollout obligation would

negatively impact on the willingness of potential new entrants to participate in an award and ultimately provide services.

A 5.28 Under Option 4, MNOs would be required to rollout and maintain a more extensive network than the other options when it could be more efficient to spread their investment across other spectrum bands in their portfolio, particularly in non-urban regions where sub 1 GHz bands are more conducive to providing wide area coverage. For this reason, MNOs would be unlikely to favour the rollout obligations of Option 4, as it could also result in inefficient infrastructure investment.

A 5.29 In summary, it is likely that industry stakeholders would, on balance, prefer either Option 2 or 3 over Option 4.

### Option 2 v Option 3

A 5.30 Certain FWA respondents agreed with Option 2 (i.e. the rollout proposals set out by Document 15/70) without any substantive justification in support of their view. However, ComReg notes that these respondents[186] have licences in non-urban regions and do not offer fixed wireless services in Dublin. Therefore, the extent to which these respondents agreed with Option 2 is likely to apply to non-urban regions only.

A 5.31 In respect of urban regions, however, Viatel in response to Document 15/70 suggests that it has been able to maintain a large customer base in Dublin with just a fraction of the minimum base stations suggested by ComReg, perhaps indicating that the rollout obligation for the Dublin region may have been set too high thereby excluding certain class of services. Furthermore, ComReg notes that operators who are assigned spectrum rights of use to Dublin and the new Eastern region may wish to locate base stations in the Eastern Region to serve Dublin in line with their current network configuration in which case the higher obligation would have a negative impact upon them. Therefore, in consideration of this and the concerns expressed by Viatel, ComReg considers that for Option 2 the rollout obligation for Dublin may be too high.

A 5.32 Option 3, keeps the base station obligations within the levels set out in Option 2 for non-urban regions but reduces the Dublin obligation by 33% and 40% at the lower and higher end of the range respectively. Option 3, when compared with Option 2, does not impact operators whose footprint is in non-urban regions and sets the rollout obligation at the lower end of that range. It should also ensure that operators interested in urban areas

[186] KerNet, Net1, Premier BB, Digital Forge and FWA 4

are not set too high an obligation. In that regard, most FWA operators would likely prefer Option 3 over Option 2.

A 5.33 Notwithstanding its likely preference for Option 4, Imagine also indicated an interest in rolling out high speed services through the use of more than 100 MHz (160 MHz). Therefore, Imagine is also likely to prefer Option 3 over 2 which increases the rollout obligation for assignments of spectrum above 100 MHz

A 5.34 In response to Document 15/70, Eircom and Vodafone both agree that a base station rollout obligation is appropriate, while 3IHL believes it inappropriate to specify the number of base stations per region, as this may eliminate, in its view, some valid but unspecified types of use.

A 5.35 Given the nature of the 3.6 GHz Band, and its use primarily as a capacity band for mobile, the rollout obligations for urban regions are likely to be of relevance for MNOs. In that regard, MNOs are likely to prefer Option 3, as the lower rollout obligation in Dublin is less likely to eliminate any valid uses (as claimed by 3IHL) for the spectrum in that region and may be sufficiently high to prevent the non-use of spectrum across all uses. Furthermore, and in comparison with Option 2, it does not impact any operator wishing to use spectrum rights of use in non-urban regions. In this regard, ComReg notes Vodafone's agreement with ComReg's rollout conditions (Option 3).

A 5.36 Noting the above, the business plans and investment decisions of operators should not be affected because equally efficient providers arguing for a higher obligation will be able to express that willingness in the retail market.

A 5.37 Finally, all interested parties are likely to prefer Option 3 over Option 2 to the extent that leasing provides more scope to meet the rollout obligation.

A 5.38 In light of the above, ComReg is of the view that industry stakeholders would, on balance, prefer Option 3 over Options 1, 2 and 4.

### Impact on competition

A 5.39 Competition for mobile services would not likely be affected to any great degree by any of the regulatory options, as competition for mobile services (unlike FWA) is informed by multiple differentiated spectrum bands of varying importance. Furthermore, unlike FWA providers where there is a large asymmetry between various regional, subnational and national operators, all three MNOs operate on a national basis and the rollout obligation is unlikely to be too burdensome for one MNO but not the others.

A 5.40 The remainder of this section considers the impact of competition for fixed wireless services.

### Option 1

A 5.41 Option 1, all other things being equal, would not deter any interested parties from participation in the auction, thereby arguably promoting competition within the auction. Winning bidders would also have a high degree of flexibility and could choose their own rollout levels allowing customers to make a choice of provider based on the services provided over relevant region(s). Such flexibility could have a positive impact on competition at the retail level.

A 5.42 Option 1, however, may harm competition to the extent that it could result in strategic bidders gaining spectrum rights of use for purposes other than providing services to consumers, or to enable them to make inefficient use of spectrum. If this occurred, interested parties wishing to provide services might not be able to compete in the award.

A 5.43 Further, a suitably designed rollout obligation (i.e. under Options 2, 3 or 4) could have an additional positive impact on competition not available under Option 1, as, in ComReg's experience, it can serve as a useful reference point and encourage winning bidders to move ahead with the rollout of services at a speed and level greater than that set by the obligations.

A 5.44 In summary, it is likely that either Option 2, 3 or 4 would, on balance, have a more positive impact on competition than Option 1.

### Option 4

A 5.45 On the one hand, Option 4 reduces the prospect of spectrum going unused and could lead to a more comprehensive roll-out of advanced innovative services which, as noted under the previous heading, can act as a useful reference point and have a positive impact on competition.

A 5.46 However, by imposing a high roll-out obligation, Option 4 is more likely than other options to discourage participation and dampen competition within the award process. Setting a roll-out obligation which is too high could also negatively impact on competition at the retail level by increasing the likelihood that winning bidders must make inefficient investment in infrastructure.

A 5.47 In addition, Option 4 could also reduce competition between FWA providers to the extent that the obligations may be too high, excluding certain smaller FWA providers from competing for spectrum rights of use. This could reduce competition in the retail market in two ways:

- It could prevent certain providers from providing FWA services altogether; or

- It would require certain FWA providers to provide services using other licenced (10.5 GHz) or license exempt (5.8 GHz) spectrum. This however could also reduce competition to the extent that:
    - those providers may need additional or new equipment to operate in these bands in order to provide the same service to the same number of users; and
    - for license exempt spectrum there is less certainty regarding network reliability.

A 5.48 In summary, it is likely that either Option 2 or 3 would have a more positive impact on competition than Option 4.

### Option 2 v Option 3

A 5.49 By setting a minimum rollout obligation sufficiently high, Option 2 could mitigate the risk of spectrum not being used, or used inefficiently, and allow existing FWA providers and new entrants[187] to increase competition for fixed wireless services.

A 5.50 However, while it appears that the rollout obligation may be set at an appropriate level for non-urban regions under Option 2, the proposed requirement in Dublin might impact certain FWA providers reducing the level of competition in that region. In this regard, Option 2 could prevent operators from offering differentiated services and could therefore lead to a reduced choice for consumers.

A 5.51 Furthermore, because the assignment of spectrum rights of use above 100 MHz provides an opportunity for FWA providers to provide high speed services, an insufficient rollout obligation at these levels does not incentivise the efficient use of spectrum. This could restrict the extent to which high speed services are provided, reducing competition between FWA providers and broadband services more generally.

A 5.52 The business plans of all potential licensees, including new entrants, are likely to plan for a certain level of network investment and coverage. Option 3 is likely to be the best option for competition because it would set the rollout obligation at a sufficiently high level to restrict the non-use of spectrum and also would encourage the provision of services across all regions. Furthermore, there are good reasons to expect market forces to be reasonably effective in providing incentives for rollout greater than those set by the regulator.

[187] Given its intention to enter, any new entrant would require some level of investment to provide an initial level of service regardless of any obligation.

A 5.53 In addition, Option 3 is likely to prove more effective for competition because it uses a higher rollout obligation for spectrum assignments above 100 MHz. In terms of competition for FWA services, the higher obligation should provide the right incentives for operators to provide better services above certain assignment levels rather than use spectrum inefficiently. It also constrains operators from holding large amounts of spectrum to prevent the rollout of high speed services for broadband services more generally.

A 5.54 In light of the above, ComReg is of the view that, on balance, Option 3 would have a more positive impact on competition than Options 1, 2 and 4.

## Impact on Consumers

### Option 1

A 5.55 From the perspective of consumers, whilst Option 1 is likely to make entry more attractive compared to the other options, it leaves the risk that spectrum will not be used or used inefficiently.

A 5.56 FWA customers could prefer Options 2, 3 and 4 over Option 1 since any rollout obligation could act as a safeguard to protect existing services levels, and provide for an initial service level where an operator expands into a new territory.

A 5.57 Finally, there would also be no obligation to rollout services on a geographic basis across any of the regions (i.e. 4 counties within a non-urban region) and no timeframe under which any rollout would take place (i.e. 3 years under Options 2, 3 & 4), as a result the rollout of services could be delayed.

A 5.58 As a result, it is likely that either Option 2, 3 or 4 would, on balance, have a more positive impact on consumers than Option 1.

### Option 4

A 5.59 Consumers may therefore, prefer Option 4 as this provides for a high rollout obligation across the widest possible area. However, a high rollout obligation could restrict the extent to which existing providers including new entrants would be willing to participate in the award process and therefore provide services at all. Therefore, consumers would likely prefer a less onerous rollout obligation that maximised the extent to which operators provide services and rollout is provided across the widest possible area.

### Option 2 v Option 3

A 5.60 Competition for broadband services is likely to be influenced by the introduction of high speed fixed wireless services. In particular, and as

indicated in the Plum Report[188], the assignment of 100 MHz or more, to a single operator, could allow for speeds greater than 30 Mbps to be provided. A uniform rollout obligation for all quantities of spectrum under Option 2 creates the possibility of inefficient operators acquiring more spectrum than necessary thereby denying the same spectrum rights of use to an alternative provider who could use the spectrum more efficiently to deliver high speed services to consumers.

A 5.61 Additionally, the positive impacts on competition for FWA services under Option 3, as outlined above, would in turn have a positive impact on consumers.

A 5.62 Therefore, consumers of FWA services may prefer Option 3 over Option 2 for the following reasons:

- The lower rollout obligation for lower quantities of spectrum in certain regions would likely result in more operators being willing to participate in the award process and, therefore, to provide services;
- It mitigates incentives for not using spectrum (denying services to consumers) and inefficient use of spectrum, by imposing:
    - a rollout obligation; and
    - a higher rollout obligation for spectrum assignments above 100 MHz.
- It increases the possibility of consumers being deliver high speed services.

A 5.63 Option 3 is also less likely than Options 2 and 4, to prevent MNOs from providing services where demand exists. At the same time, the rollout obligation under Option 3 is also likely to be sufficiently high to prevent strategic bidding causing harm to other consumers.

A 5.64 Finally, to the extent that the rollout obligation would be 4 or 5 years within the 3-5 year range, consumers would prefer Option 3 as services would likely be rolled out quicker. [189]

A 5.65 ComReg is of the view that Option 3 strikes the right balance between ensuring that spectrum is used efficiently and competition in the award process and downstream is not dampened.

[188] A report examining likely rollout considerations and timelines for the deployment of the technologies and potential services likely to be put into use for regional assignments in the 3.6 GHz Band including equipment and rollout considerations from its technical consultants, Plum Consulting London

[189] ComReg observes that the timing of any rollout is the same across Options 3 and 4 therefore the extent to which there is an impact on competition and consumers is only relevant to Option 1 (no obligation) and was discussed above.

### The 'Rollout' RIA: Assessment and the Preferred Option (Step 5)

A 5.66 In light of the preceding discussion, ComReg is of the preliminary view that Option 3 is the preferred option in terms of the imposition of a roll-out obligation on new licensees.

## A 5.4 Final 'Quality of Service' (Voice Services) RIA

A 5.67 This section sets out the RIA on Quality of Service (Voice Services) which assesses the appropriate minimum QoS that should be set as part of a QoS licence condition for the 3.6 GHz Band.

A 5.68 ComReg refers to the discussion on the general RIA framework as described in Section A1.2 above.

### Identify the policy issues and identify the objectives (Step 1)

#### Policy Issue

A 5.69 The policy issue to be addressed is whether it is appropriate to impose QoS obligations to ensure that users are offered a minimum service level by operators who are granted licences for 3.6 GHz spectrum.

#### Objectives

A 5.70 ComReg's overall objectives in relation to this spectrum release process are set out in Annex 2. The most relevant objective in terms of QoS is to ensure that all users derive maximum benefit in terms of price, choice and quality from the spectrum to be made available in the release process.

### Identifying the regulatory options (Step 2)

A 5.71 ComReg has identified the following options:

- **Option 1**: Do not impose QoS licence conditions on voice services, provided using 3.6 GHz spectrum.
- **Option 2**: Impose QoS conditions on voice services, provided using 3.6 GHz spectrum in line with Liberalised Use Licences with variations for VOIP services.

### Impact on Stakeholders and Competition (Steps 3 and 4)

A 5.72 The focus of this section of the RIA is to assess the impact of the above regulatory options on:

i. industry stakeholders;

ii. competition, and

iii. consumers.

## Impact on industry stakeholders

A 5.73 An operator can guarantee a quality level for calls made between subscribers on its own network. However, it cannot guarantee call quality when its subscribers make/receive calls to/from a different network. As a voice call to or from a network can originate or terminate on a different network (either fixed or mobile), this makes it very difficult for operators to prove that the quality of voice calls it offers on its network is superior to the quality of voice calls provided by other networks, in the absence of minimum quality standards for calls across all operators.

A 5.74 As a result of this feature of the market, non-imposition of a minimum standard for a voice call could create an incentive for a licensee (or other third party providers such as an MVNO) to engage in behaviour which resulted in the quality of its voice calls falling below the current standards (e.g. through lack of investment or poor network planning). In addition, other operators with higher quality standards would not be able to isolate the higher quality standards applied to voice calls on their own network from the lower quality standards applied on other networks. Such high quality operators might then have less incentive to maintain this higher QoS and may allow the quality of their voice calls to fall. Such an overall reduction in quality for voice calls could result in lower consumer demand for voice calls, which in turn would negatively impact all providers of voice call services, though no individual provider would have an incentive to unilaterally increase quality back to previous levels

A 5.75 The imposition of minimum QoS conditions for voice calls would prevent such a situation from arising, and ensure that all operators would be subject to the same minimum standard and, as such, each would be assured that no other operator could avoid meeting these minimum standards.

A 5.76 ComReg acknowledges that Option 2 may involve compliance costs for licensees, which would not arise under Option 1. However, investments made by Licensees in voice call QoS on their own networks would not be jeopardised by the possibility of competing operators offering low quality voice call services. Furthermore, ComReg does not consider that the compliance costs involved for Licensees would be disproportionate in terms of the consumer protection objective to be achieved.

A 5.77 With minimum QoS standards, licensees would be assured that no other licensee could avoid meeting these minimum standards.

A 5.78 In light of the above, ComReg is of the view that, on balance, stakeholders would prefer Option 2 over Option 1.

### Impact on competition

A 5.79 Neither option is likely to materially impact on the level of competition between licensees or between licensees and third party competitors such as MVNOs, provided that all licensees are subject to similar obligations.

A 5.80 Option 1 could, however, result in less competitive intensity in terms of voice call quality than would occur under Option 2, for the reasons described above. QoS standards for voice calls is likely to improve competition, given:

- the inability for individual operators to isolate the higher quality standards applied to voice calls on their own network from the lower quality standards applied on other networks; and
- that a consumer who experiences poor voice call quality cannot determine whether the problem relates to his/her own network or to the network of the person on the other end of the line.

A 5.81 Therefore ComReg is of the view that Option 2 would have the most positive impact on competition.

### Impact on consumers

A 5.82 Consumers will likely prefer any option which ensures that they receive a minimum quality of service (Option 2) over an option which relies solely on market forces or the goodwill of individual operators (Option 1), as long as the preferred option does not otherwise result in reduced benefits in terms of price, choice and quality. In this regard, ComReg does not see any downside to Option 2 with respect to consumer welfare.

A 5.83 Consumers would be unlikely to prefer Option 1. While operators are likely to aim to prevent any disruption to service in order to retain and attract consumers there are situations where, due to information asymmetries, the setting of minimum QoS standards may be necessary in order to protect consumers. Without a minimum quality of service obligation determined by ComReg, consumers would be subject to a range of different quality of service assurances which would vary from operator to operator. Some consumers could enjoy a greater or lesser minimum QoS as a result. Additionally, assurance provided by operators offers consumers no recourse in the event of an unreasonable level of disruption.

A 5.84 Consumers would likely prefer Option 2 as the ability to make or receive telephone calls remains a highly utilised service and a key priority for consumers. In Q1, 2016, mobile minutes remained at levels just over 3

billion minutes for that quarter with mobile minutes for 2015 reaching peak levels. As voice calls can originate and terminate on different networks, a consumer who experiences poor voice call quality cannot determine whether the problem relates to his/her own network or to the network of the person on the other end of the line. Setting minimum QoS standards for voice calls can safeguard the interests of consumers in these circumstances.

A 5.85 Option 1 could result in consumers receiving lower voice call QoS than that to which they are currently accustomed, by reducing incentives for operators to maintain certain QoS standards. For these reasons, consumers would prefer Option 2 as this would ensure that the standards under current Liberalised Use Licences[190] are maintained for future licences for 3.6 GHz spectrum.

A 5.86 Finally, Option 2 would ensure that consumers would be protected against an unreasonable level of disruption and increases the likelihood that ComReg becomes that their service provider did not meet its obligations.

### The Final 'Quality of Service' RIA: Assessment and the Preferred Option (Step 5)

A 5.87 In light of the preceding discussion, ComReg is of the view that Option 2 is the preferred option in terms of its impact on stakeholders, competition and consumers.

## A 5.5 RIA on the Imposition of QoS on Network Availability

A 5.88 This section sets out the RIA on the imposition of QoS on Network availability which assesses the QoS conditions in respect of the availability of the network for the 3.6 GHz Band.

A 5.89 ComReg refers to discussion on the general RIA framework as described in Section A1.2 above.

### Identify the policy issues and identify the objectives (Step 1)

#### Policy Issues

A 5.90 The policy issue to be addressed in this RIA is whether a network availability condition should be imposed on holders of liberalised licences in the 3.6 GHz Band, in order to ensure that any periods during which a licensee's network is unavailable do not exceed a specified level.

[190] The Liberalised Use Licences in the 800 MHz, 900 MHz and 1800 MHz Frequency bands.

### Objectives

A 5.91 ComReg's overall objectives in relation to this spectrum release process are set out in Annex 2. The most relevant objective in terms of the imposition of QoS on network availability is to ensure that all users derive maximum benefit in terms of price, choice and quality from the spectrum to be made available in the release process.

## Identifying the regulatory options (Step 2)

A 5.92 ComReg has identified the following options:

- **Option 1**: Do not impose minimum QoS conditions in respect of the availability of the network

- **Option 2**: Set minimum QoS conditions in respect of the availability of the network, based on current liberalised use license conditions, such that each licensee shall ensure that service unavailability shall be less than 35 minutes (based on weighting factors) per six month period.

## Impact on Stakeholders and Competition (Steps 3 and 4)

A 5.93 The focus of this section of the RIA is to assess the impact of the above regulatory options on:

iv. industry stakeholders;

v. competition, and

vi. consumers.

### Impact on industry stakeholders

A 5.94 Option 1 would allow operators full discretion over how often and how long their networks may be unavailable (e.g. for the purposes of systems upgrades etc.).

A 5.95 Option 2 may require operators to incur additional expenditure in their network to ensure compliance with obligations (e.g. back-up systems) over and above the level which they would choose to incur, absent the licence condition.

A 5.96 Six of the seven responses to Document 15/70 agreed that a QoS obligation as set out under Option 2 was necessary. Therefore operators may be of the view that Option 2 provides good incentives for all operators to minimise service unavailability. Operators may be of the view that such conditions improve the perception of the network and such benefits are likely to exceed any compliance costs.

A 5.97 3IHL was of the view that this type of obligation is not appropriate for the 3.6 GHz Band, therefore to the extent that, 3IHL does provide services using the 3.6 GHz Band, it may have a preference for the greater flexibility and avoidance of compliance costs associated with Option 1.

A 5.98 Notwithstanding, most operators are likely to have a preference for Option 2.

## Impact on Competition

A 5.99 Neither option is likely to impact materially on competition as any conditions imposed would apply equally to all licensees. Option 1 could, however, result in less competitive intensity in terms of network availability than would occur under Option 2, for the reason described in the above Voice Call RIA.

## Impact on Consumers

A 5.100 Network availability is of fundamental importance to consumers. If any network is unavailable, subscribers on that network cannot use services. Consumers face serious disruption if the network to which they are subscribed is unavailable. The longer the period of unavailability, the greater the level of disruption. Setting a licence condition relating to network performance would safeguard the interests of consumers against operators who might otherwise have an unacceptably high level of network unavailability;

A 5.101 Option 2 would ensure that consumers would be protected against an unreasonable level of disruption to services. Under Option 2, customers could refer the matter to ComReg if their service provider did not meet its obligations. ComReg would act as a watchdog for consumers by ensuring that the overall duration of network unavailability is within the specified range.

A 5.102 Under Option 1, operators may, amongst other things, have an incentive to undertake lower levels of investment in their networks in terms of operability than would otherwise be the case, or to impose unreasonable levels of disruption on their customers when undertaking systems upgrades, etc.

A 5.103 The QoS obligation imposed under Option 2 would apply to licensees which means, in turn, that licensees would need to ensure that third parties using their network assist it in achieving compliance as appropriate. As a result, all consumers regardless of the provider would benefit from the obligation.

A 5.104 For these reasons, consumers would most likely prefer Option 2 whereby all Licensees are required to ensure that the overall duration of network unavailability does not exceed a specified level.

## The Final RIA on the imposition of QoS for network availability: Assessment and the Preferred Option (Step 5)

A 5.105 Having considered the impacts on stakeholders, competition and consumers, ComReg considers Option 2 to be the better option by which to achieve its objectives.