An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulat

Response to Consultation and Draft Decision on the proposed 26 GHz Spectrum Award 2018

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An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
1 Lárcheantar na nDugaí, Sráid na nGildeanna, BÁC 1, Éire, D01 E4X0.
One Dockland Central, Guild Street, Dublin 1, Ireland, D01 E4X0.
Teil | Tel +353 1 804 9600 Suíomh | Web www.comreg.ie

Content

1 Introduction

1.1 In its Radio Spectrum Management Strategy 2016 to 2018 (Doc 16/50), the Commission for Communications Regulation (ComReg) stated that it would consult on the proposed granting of new rights of use for radio frequencies in the 26 GHz band by granting such rights of use, under new National Block Licences.

1.2 ComReg commenced that public consultation in October 2017 by publishing Consultation 17/85 in which ComReg considered the 26 GHz band, the type of award mechanism that might be used, the approach to setting fees for new licences, and appropriate conditions to attach to such licences.

1.3 Eight interested parties responded to Consultation 17/85 (non-confidential versions of those responses are published alongside this paper:

(i). Cambridge Broadband Networks ("CBNL")
(ii). Eir Group ("eir")
(iii). L.M. Ericsson Ltd ("Ericsson")
(iv). Global Mobile Suppliers Association ("GSA")
(v). Imagine Communications Group Ltd ("Imagine")
(vi). Three Ireland (Hutchison) Ltd ("Three")
(vii). Qualcomm Europe Inc. ("Qualcomm")
(viii). Vodafone Ireland Ltd ("Vodafone")

1.4 ComReg is publishing, alongside this response to consultation and decision:

- Document 18/12b - Non confidential submissions to ComReg document 17/85;
- Document 18/12a - An analysis prepared by ComReg's economic and award design expert, DotEcon Ltd ("DotEcon"), of the submissions received in response to Document 17/85 relating to the award design and format; and
- A draft Information Memorandum which will be published approximately one week after the date of publication of this Response to Consultation. There will be a maximum four week period in which to submit all responses on the draft Information Memorandum and that four week period will not be extended. The deadline for submitting responses on the draft Decision is **17.00 hrs on Friday 30 March 2018**.

1.5 ComReg's statutory functions, objectives and duties relevant to its management of the radio frequency spectrum are set out in Annex 1.

1.1 Outline of document

1.6 The remainder of this document contains the following:

- Chapter 2 deals with background and rights of use in the 26 GHz band;
- Chapter 3 is the response to draft RIA, and Final RIA.
- Chapter 4 deals with spectrum award details;
- Chapter 5 sets out the licence conditions;
- Chapter 6 details the transition plan that may be required;
- Chapter 7 sets out ComReg's draft Decision; and
- Annex 1 ComReg's statutory functions and objectives

2 Background and rights of use

2.1 This chapter sets out:

- the background to the 26 GHz band in Ireland;
- potential future uses of the 26 GHz band;
- proposals to grant a number of limited rights of use; and
- proposal to make rights of use available for fixed links only.

2.1 Background

2.2 The 26 GHz band constitutes a total of 3 300 MHz spanning 24.250– 27.550 GHz. In 2008, ComReg allocated a portion of the 26 GHz band (2 × 504 MHz in the frequency ranges 24.773 – 25.277 GHz paired with 25.781 – 26.285 GHz) for national block use.

2.3 ComReg also held an auction in 2008 in which the 2 x 504 MHz portion of the 26 GHz band was divided into 18 equal-sized blocks of 2 × 28 MHz. Parties could bid for such blocks and the obtained rights of use were assigned under licences granted by ComReg pursuant to the Wireless Telegraphy Act 1926.

2.4 Those licences permitted the holders of same to possess and use apparatus for wireless telegraphy for the purposes of Point-to-Point ("P2P") and Point-to-Multipoint ("PMP") applications, on a national basis. All licences were of ten years duration, they all came into effect concurrently on 6 June 2008 and will all expire concurrently on 5 June 2018, together with all rights of use for radio frequencies assigned thereunder.

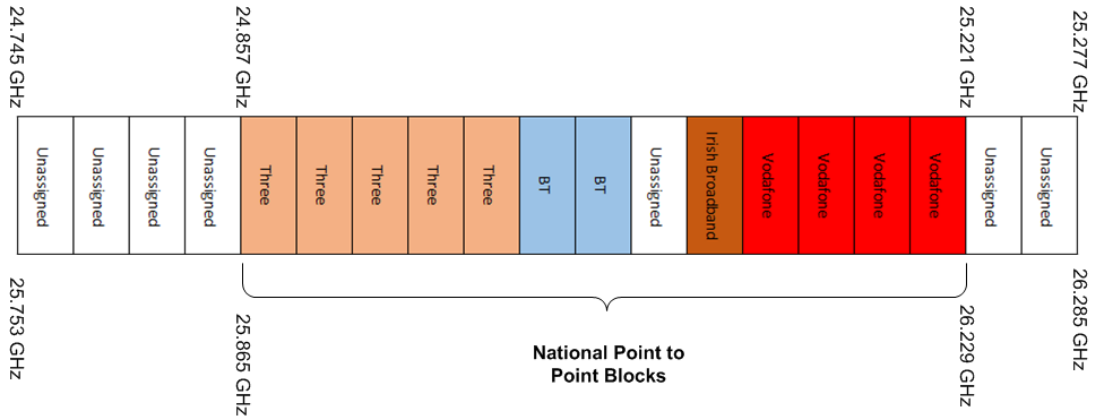

Figure 1: Existing 26 GHz National Block Assignment Channel Plan

2.5 ComReg now proposes to make a 2 × 532 MHz portion of the 26 GHz band available for new National Block Licences. This is the same portion as auctioned in 2008 but with one extra 2 x 28 MHz block – i.e. this time there would be 19 blocks instead of 18.

2.6 The "**Award Spectrum**" would therefore comprise 19 blocks of 2 × 28 MHz in the range 24.745 – 25.277 GHz paired with 25.753 GHz – 26.285 GHz.

Current Fixed Link Use

2.7 Fixed links are wireless devices or systems that connect two fixed locations in an electronic communications networks. Fixed links form a major part of the infrastructure of such networks and are the main category of licensed "*apparatus for wireless telegraphy*" that utilise the 26 GHz band in the State. ComReg currently licenses two types of fixed links in the 26 GHz band:

- 6 blocks of 2 × 28 MHz channels for deployment of fixed Individual P2P links (25.277 – 26.453 GHz); and
- Fixed National P2P and PMP Links (24.745 – 26.285 GHz).

2.8 Individual P2P links operate at the upper end of the 26 GHz band across six 2 × 28 MHz blocks and are licensed under the Wireless Telegraphy (Radio Link Licence) Regulations 2009.[1]

Fixed Wireless Access Local Area (FWALA) use

2.9 5 blocks of 2 × 28 MHz in the lower part of the 26 GHz band are allocated for FWALA, in the ranges 24.594 – 24.745 GHz paired with 25.557 – 25.753 GHz. 3 of those 5 blocks are currently assigned, one to Imagine in Dublin, one to Airspeed in Dublin, and one to Titan in Limerick.

[1] S.I. 370/2009

2.2 Potential future use of the 26 GHz band

2.10 In addition to the requirement for fixed links, respondents to Document 17/85 raised the potential future use of the 26 GHz band for 5G. ComReg has set out a detailed assessment of the future use of the 26 GHz band under the following headings:

(a) 5G spectrum; and

(b) Fixed links spectrum.

5G Spectrum

2.11 5G Spectrum needs will likely encompass a range of existing and new bands, which potentially span a wide section of radio spectrum including the sub-6 GHz bands and the mmWave bands above 6 GHz. European Commission ("EC") in its mandate to CEPT notes: "*5G terrestrial wireless systems are likely to operate both in existing EU harmonised frequency bands below 6 GHz and in pioneer frequency bands above 6 GHz (mmWave).*"[2]

2.12 Therefore, 5G will likely require spectrum in bands below 6 GHz bands (Sub-6GHz bands) and in the mmWave bands above 6GHz.

Sub-6 GHz bands

2.13 The mmWave bands (above 6 GHz) are not suitable for providing the wide area coverage[3] which will be essential for certain envisaged 5G services such as the Internet of Things ("IoT"). It is expected that the sub-6 GHz bands will provide such coverage. 5G services are likely to be provided in the sub-6 GHz bands before such services are provided in the mmWave bands.

2.14 For example, the RSPG expects the first major 5G commercial deployments to be in lower frequencies, in order to provide sufficient coverage for enhanced broadband communications which may require ubiquity, low latency and low complexity.[4] CEPT, in its draft Report B[5], notes that "*there is no expectation that the bands above 24 GHz will be used for contiguous nationwide coverage of MFCN networks*."

2.15 This eventual roll out of 5G will likely include existing sub-6 GHz bands such as 800 MHz, 1800 MHz, and 2.1 GHz which may be necessary to deliver coverage

[2] Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union, p2.
[3] The RSPG Second Opinion: "*Because of its characteristics, the 26 GHz band will not be used to create wide area coverage.*"
[4] European Commission Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union.
[5] Report B from CEPT to the European Commission in response to the Mandate

for 5G applications such as IoT[6]. As noted by the RSPG, the 700 MHz, 800MHz, 900MHz, 1.8 GHz[7], 2.1 GHz and 2.6 GHz harmonised bands are already potentially available for 5G as the harmonised technical conditions for those bands are based on the concept of block edge masks, in order to facilitate a technologically neutral approach and least restrictive conditions, which allows for the use of any technology that complies with the block edge mask.[8][9]

2.16 In addition, lower bands already licensed for mobile use (e.g. 700 MHz, 800 MHz, 900 MHz, 1800 MHz and 2100 MHz) could be used in combination with bands in the range 3300 - 3800 MHz. This may allow operators to benefit from faster and more cost-efficient deployment, delivering enhanced capacity without incurring network densification costs. The 3.6 GHz band has already been identified by the RSPG as a primary band suitable for the introduction of 5G in Europe and ComReg assigned all 350 MHz of available spectrum in the 3.6 GHz band in 2017, by auction.[10]

2.17 Further, the European Commission supports the 700 MHz band being used to support 5G – see Recital 10 of the associated Decision[11]. The Commission has also mandated CEPT to develop harmonised technical conditions for the 1427-1452 MHz and 1492-1518 MHz bands for downlink-only wireless broadband (WBB) electronic communications services, including next-generation (5G) terrestrial wireless systems.[12]

2.18 As set out in its Spectrum Strategy Statement 2016-18, ComReg plans to progress its award proposals for the 700 MHz, 1.4 GHz, 2.3 GHz and 2.6 GHz bands within the timeframe of the spectrum management strategy and this could increase the availability of harmonised spectrum for electronic communications by a further 390 MHz.[13]

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[6] https://gsacom.com/5g-spectrum-bands/

[7] For the 900 MHz and 1800 MHz frequency bands, the Commission "*is monitoring standardisation and market developments related to 5G and will assess in due time the need to amend the technical conditions in both bands, based on a follow-up mandate to CEPT, in order to ensure these are '5G-ready*". (Mandate to CEPT to review the harmonised technical conditions for use of the 900 MHz and 1800 MHz frequency bands for terrestrial wireless broadband electronic communications services in support of the Internet of Things in the Union.)

[8] RSPG (2016) - Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union

[9] RSPG also refer to this possibility in its Second Opinion noting that "*In due course, the mobile operators could perform transition of lower frequency mobile spectrum (800, 900, 1800, 2100, 2600 MHz) to 5G, but some studies suggest that 4G LTE and its evolutions will continue to develop in parallel to 5G deployments (as 3G continues to be used today in parallel to 4G)*"

[10] https://www.comreg.ie/five-winning-bidders-comregs-3-6-ghz-band-spectrum-award/

[11] Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union

[12] Mandate to CEPT to develop harmonised technical conditions in additional frequency bands in the 1.5 GHz range for their use for terrestrial wireless broadband electronic communications services in the Union

[13] https://www.comreg.ie/media/2016/03/Radio-Spectrum-Management-Strategy-2016-2018.pdf

2.19 The situation as of February 2018 is that:

- the band below 6 GHz (i.e. 3.6 GHz), recently identified as "*the primary band suitable for the introduction of 5G services in Europe*"[14], has already been assigned by ComReg;
- further sub-6 GHz spectrum will be made available in the period up to 2020; and
- the 700 MHz band (and other sub 1 GHz bands) will be part of the 5G New Radio (NR) bands in the 3GPP release 15 for 5G NR (mid-2018) with, notably for the 700 MHz band, the possibility for carrier aggregation (CA) with the 3.6 GHz band[15].

2.20 The above factors may further delay interest in, and demand for, the 26 GHz band.

mmWave bands

2.21 mmWave bands (above 6 GHz) have relatively high frequencies and so they have historically been considered unsuitable for mobile services because of high propagation losses and the inability of mmWave signals to penetrate buildings and propagate around obstacles. However mmWave bands, including the 26 GHz band, have been proposed as suitable for certain 5G services. It has been advanced that such bands could support very high capacity 5G networks in areas that require capacity, as such these bands have the advantage of providing large amounts of contiguous spectrum which is necessary for larger channel bandwidths and extremely high data rates.

2.22 The RSPG Second Opinion[16] notes that different bands will be used to suit different coverage areas: "*The 700 MHz band can be used to provide wide area coverage, the 3.6 GHz band can be used to provide high capacity and coverage, using both existing macro cells and small cells. The 26 GHz band is likely to be deployed in areas with very high demand, for example transport hubs, entertainment venues, industrial or retail sites and similar.*"

2.23 The RSPG opinion on a 5G roadmap (RSPG16-032) identifies 24.25 to 27.5 GHz (i.e. the 26 GHz Band) as a "*pioneer band*" and recommends that Member States make a portion of this frequency band available for 5G in response to market demand, taking into account that 5G deployment in this frequency range is likely to remain geographically limited by 2020. The RSPG also notes that mobile network operators are the main users of this band for fixed services and this may

[14] http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf
[15] Considering the limited bandwidth available in the bands below 1 GHz, it is expected that carrier aggregation between these bands and upper bands will be implemented so as to provide sufficient capacity and improved user experience.
[16] RSPG Second Opinion on 5G networks (2018)

reduce the need for extensive clearance of fixed links from the band.

2.24 The RSPG Second Opinion also observes that the 26 GHz band will be the pioneer band in Europe above 24 GHz, providing ultra-high capacity for innovative new services and enabling new business models and sectors of the economy to benefit from 5G. Amongst other things, the RSPG considers that:

- Member States should make a ***sufficiently large portion*** of the 26 GHz band (e.g. 1 GHz) available for 5G by 2020, in response to market demand, taking into account that 5G deployment in this frequency range is expected to be used for local coverage; and
- Regulatory flexibility for the progressive release of the 26 GHz band will facilitate an efficient introduction of 5G ***without having an unnecessary negative impact on the current users of the band***. [Emphasis added]

2.25 ComReg observes the following:

- the entire 26 GHz band as referred to by the RSPG spans 24.25 – 27.5 GHz;
- the draft CEPT ECC Decision on harmonised conditions for MFCN in the range 24.25 – 27.5 GHz notes that initial MFCN deployments in many CEPT countries is expected to be in the range 26.5 – 27.5 GHz;
- The Award Spectrum is in the range 24.745 – 26.285 GHz which is currently used for Fixed National P2P links.

2.26 As indicated in Figure 2, one quarter of the entire 26 GHz band could potentially be assigned under the proposed award process and used to operate fixed links. In addition, 1 207 MHz of contiguous spectrum in the upper part of the 26 GHz band is currently unassigned and unused and another 345 MHz of contiguous spectrum is available in the lower part of the band.

2.27 ComReg considers that this available spectrum should more than satisfy any requirement to make 1 GHz of the entire 26 GHz band available for 5G by 2020. As noted by DotEcon, the proposed granting of new rights of use in the duplex range 24.745 - 25.277 GHz with 25.753 - 26.285 GHz would not preclude 5G TDD use in the upper part of the 26 GHz band (26.5-27.5 GHz), in line with the RSPG roadmap.[17] Further, similar proposals are being made in other jurisdictions.[18] In their responses to Consultation 17/85, Qualcomm and the GSA identify the 26.5 - 27.5 GHz sub-band as being most relevant for deployment of 5G.

[17] DotEcon Report, p9.
[18] https://www.ofcom.org.uk/consultations-and-statements/category-2/5g-access-at-26-ghz

2.28 There is still considerable uncertainty as to when 5G networks will roll-out and as to what their spectrum requirements will be.[19] Estimates of future spectrum requirements range from 100 - 500 MHz per operator[20] to the more speculative 1 GHz per operator.[21] [22] Further, the more speculative spectrum requirements per operator are unlikely to be required in Ireland in the short term, given its particular demographics (e.g. urban and rural population densities).

2.29 ComReg is of the overall view that for the proposed 10-year period in question there should be more than enough mmWave spectrum available to meet any demand for 5G as may arise. In particular, it should be possible to meet any demand for 5G spectrum in the 26 GHz band, as may arise, using that portion of the 26 GHz band that is currently unassigned and unused and that would not be the subject of the proposed Spectrum Award.

2.30 ComReg is further of the view that to clear the portion of the 26 GHz band that would comprise the Spectrum Award at this time, in order to provide for its potential future use for 5G, would not be a reasonable or proportionate action in the circumstances and would not accord with ComReg's statutory objectives. There is a current identifiable, and to large degree quantifiable demand, for that portion of the 26 GHz band for national fixed links. As against that, there may be future demand for 26 GHz spectrum for 5G but it has yet to manifest.

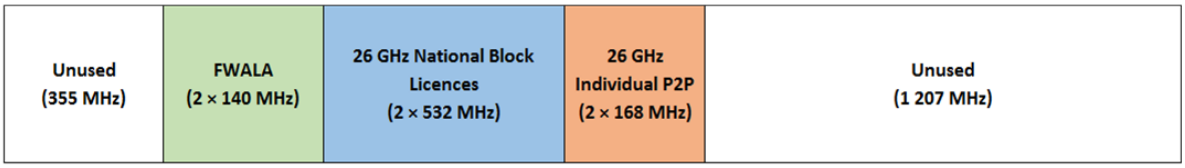

Figure 2: 24.25- 27.5 GHz

2.31 In addition, consideration of the spectrum requirements of future 5G networks is not limited to the 26 GHz band. WRC-19 will consider the following potential 5G bands as specified in Resolution 238 (WRC-15): 24.25 - 27.5 GHz, 31.8 - 33.4 GHz, 37 - 40.5 GHz, 40.5 - 42.5 GHz, 42.5 - 43.5 GHz, 45.5 - 47 GHz, 47 - 47.2 GHz, 47.2 - 50.2 GHz, 50.4 - 52.6 GHz, 66 - 76 GHz and 81 - 86 GHz.

2.32 ComReg will set out its position in respect of all of mmWave bands being considered for 5G, at an appropriate time and in light of any considerations and/or decisions as arise from WRC-19. However ComReg observes that, other than

[19] The RSPG Second Opinion on 5G networks notes that "*The RSPG is of the opinion that Member States will need flexibility in the way they authorise access to spectrum, for example: appropriate geographical areas (e.g. national, regional, city or hyper-local, e.g. for use in a factory), individual licencing or under a general authorisation framework".*

[20] The 5G-PPP IA has provided a position paper to the Radio Spectrum Policy Group (RSPG) 6 , which sets out the following for 24.25- 27.5 GHz or 31.8-33.4 GHz (for double digit Gb/s eMBB and a channel bandwidth of at least 500 MHz).

[21] ITU (2017) Minimum requirements related to technical performance for IMT-2020 radio interface(s).

[22] The 5G-PPP IA recommends a channel bandwidth of at least 1 GHz for 5G spectrum **above** 33 GHz

the 26 GHz band, the current main focus is on the 32 GHz band (31.8 - 33.2 GHz) and the 42 GHz band (40.5 - 43.5 GHz) as the 5G candidate bands most likely for a common agreement.[23] In that regard, the 32 GHz band is currently unassigned in Ireland and a small number of fixed links are assigned in the 42 GHz band. ComReg will continue to monitor WRC 19 and all developments with regard to demand for, and/or designation of, spectrum for 5G.

Fixed Links spectrum

2.33 The above discussion on 5G, whose use case is currently unclear, occurs against the backdrop of an important established use case for fixed links. P2P links in the 26 GHz band have increased from 1,300 National Block Links in 2011 to 2,800 National Block Links in 2017 (driven mainly by the two MNOs with National Block Licences, Vodafone and Three). Further, the potential for continued use of this portion of the 26 GHz band for fixed links in the future is supported by incumbent licensees who have all requested extensions to their existing licences for periods between 4 – 15 years.

2.34 Three submits:

- "*The use of 26 GHz links has also proven to be an economical means to provide backhaul from mobile sites in many cases, in particular for many locations where fibre is not an option*"; and
- "*Three has an ongoing requirement to provide backhaul that is currently carried in the 26 GHz band, and this will continue beyond 2018.*"

2.35 Vodafone submits:

- "*ComReg's documents recognises that the 26 GHz band is now used extensively by Vodafone for Radio Links to support services to customers nationwide and is a key ingredient of our network supporting mobile services and customers*"; and
- "*Fibre services are still not available at most of the radio sites operated by Vodafone and services to customers rely heavily on these links. The situation is unlikely to change significantly in the next 5 years.*"

2.36 Vodafone and Three have requested licence extensions ranging from 4 – 7 years. This indicates that, regardless of 5G, mobile operators will require 26 GHz spectrum for fixed links for at least 4 – 7 years beyond June 2018. Further, eir in its response agrees that new licences of ten years duration are appropriate, given the potential change in use of the radio spectrum and the need to allow for a sufficient return on investment.

[23] CEPT, June 2017, Spectrum Regulatory Challenges for 5G Session 4 –spectrum policies in the new digital 5G ecosystem.

2.37 In addition, draft Report B of the CEPT mandate supports the view that there is a requirement for co-existence of fixed links and clearing the entire 26 GHz band for 5G is not necessary given Member States individual circumstances:

- "*There is no need to define a common date for managing a migration to an alternative band or to clear the 26 GHz band from fixed services*."
- "*EU member States are able to manage this coexistence issue at national level according to market demands. Even if there may be a national target to clear the 26 GHz band, this could take time to clear the band and the EU Framework should leave possibility to EU member States to manage this fixed services/ 5G coexistence*." and
- "*Flexibility in timescales for release of the 26 GHz band, in response to the need of the different market players, is important to minimize the overall costs associated with 5G deployment and ensure a balance of the burden between both services*" and

2.38 None of the respondents who currently make extensive use of block licences provided any details as to how they would (i) overcome their requirement for fixed links in the next 5 – 7 years, or (ii) migrate around 2800 links out of the 26 GHz band in order to make the band available for 5G.

2.39 ComReg considers that moving around 2800 links into any of the current fixed-link bands would be challenging – similar challenges were overcome by the introduction of block-licences in the 26 GHz band in 2008.

2.40 Taking into account the profound uncertainties as detailed above and the consequential lack of regulatory certainty, ComReg considers that it could not, at this time, justify a decision to clear fixed links out of the portion of the 26 GHz band at issue.

2.41 ComReg is of the view that there is an established case for fixed links in the 26 GHz band, now and for the foreseeable future. In that regard, as noted by DotEcon, the extent of any future co-existence within the band is a matter for future consideration based on relevant technical studies.

2.42 In relation to submissions concerning 5G spectrum awards more generally and the future of FWALA[24] licensing, ComReg notes that such matters are not considered in this consultation and will be considered as part of the Spectrum Strategy Statement consultation in Q2 2018.

[24] One Respondent - CBNL - made a submission on the limited amount of spectrum available for FWALA and that it restricts service possibilities.

2.3 Proposal to grant a number of limited rights of use

2.43 In accordance with Regulation 9(2) of the Authorisation Regulations, ComReg proposes to grant individual rights of use for radio frequencies under the proposed award process as this is necessary to, amongst other things:

- avoid harmful interference;
- ensure technical quality of service; and
- safeguard the efficient use of the spectrum proposed for inclusion in the award process.

2.44 Regulation 11 of the Authorisation Regulations sets out the procedure by which it may limit the number of rights of use to be granted for radio frequencies. In the present case, ComReg observes that the most efficient block size of 2 × 28 MHz and a total of 2 × 532 MHz in the award spectrum naturally results in a limit of nineteen.

2.45 At the same time, ComReg recalls that, in limiting the number of rights of use, ComReg shall:

- give due weight to the need to maximise benefits for users and to facilitate the development of competition;
- give all interested parties, including users and consumers, the opportunity to comment on its proposal;
- grant such rights on the basis of selection criteria which are objective, transparent, non-discriminatory and proportionate[25]; and
- on foot of open, objective, transparent, non-discriminatory and proportionate procedures, which are required to be made publicly available[26].

2.46 ComReg considers the above factors (in particular the first three) in the following sections of this paper (including, in particular, Chapter 3).

[25] Regulation 17 of the Framework Regulations.
[26] Regulation 9 of the Authorisation Regulations.

2.4 Proposed service and technology restriction of award spectrum to P2P fixed links

2.46 A key principle to the management of radio frequencies under the Regulatory Framework is service and technology-neutrality.[27] This principle is reflected in ComReg's obligations under the Framework Regulations[28], the RSPP Decision[29] and the 2002 Act[30].

2.47 Despite this overarching principle, restrictions may be imposed on the types of services and/or technologies that may be provided or deployed in a specific band though any such restrictions must be justified, proportionate, transparent, and non-discriminatory in order to fulfil certain relevant objectives including to safeguard the efficient use of spectrum.[31]

2.48 ComReg considers it justified and proportionate to restrict new 26 GHz National Block Licences to P2P links, for the following reasons:

- Fixed links currently form and will continue to form a major part of the backhaul infrastructure of electronic communications networks for a variety of electronic communications services, including mobile voice and data services and fixed wireless broadband;

- The use of the award spectrum for purposes other than fixed links would be likely to result in the severe impairment of the provision of mobile and fixed services;[32]

- Suitable and sufficient alternative spectrum is not readily available in other bands and migrating to alternative spectrum would require costly and lengthy transition activities for existing licensees[33]. In that regard, ComReg notes that:

    - The 26 GHz band is the only spectrum band currently available for fixed links on a national basis. This provides operators deploying a large number of links access to national block assignments. Such

[27] Recitals 32 and 34 of the 2009 Amending Directive.
[28] Regulations 16(1)(a), 17(2) and 17(4) of the Framework Regulations
[29] Articles 2(1)(e), 2(2)(a), 3(f) and 6(3) of the RSPP Decision
[30] Section 12(6) of 2002 Act
[31] Regulation 17(5) of Framework Regulations; Articles 2(1)(e) of the RSPP Decision; Recital 38 of the 2009 Amending Directive; and Recitals 34 and 35 of the 2009 Amending Directive;
[32] See Impact on consumers below.
[33] [redacted]

assignments provide greater flexibility and assignment at a lower cost[34] than alternative individual link licences in other bands;[35]

- Transition costs[36] and the higher costs associated with a large number of individual links would require additional investment which would not appear to be required for any other reason, and as such would unlikely result in efficient infrastructure investment;
- P2P fixed links are currently used in all blocks assigned in the 2008 award, and demand for 26 GHz rights of use is likely to increase in the future. See Section '*Fixed links Spectrum'* and Section '*Demand for 26 GHz rights of use*'.
- Alternative higher links frequencies are less effective and could create unnecessary technical inefficiencies and network disruption e.g. shorter propagation and are likely to be affected by atmospheric conditions; and
- ComReg's expert advisors DotEcon are of the view that a deviation from a service and technology neutral approach is justified due to the special circumstances, with it being likely that part of the band will be mandated for 5G, but the timescales and other details being uncertain.

- It would better ensure the efficient use of the radio spectrum by preventing speculative acquisition on the expectation of such rights being useable for 5G applications in the future;

- The proposed restriction would only relate to a portion of the 26 GHz band (i.e. the award spectrum) and is based on continuation of existing use, noting that the remaining 1.2 GHz would, based on current information, likely be made available on a service-and technology neutral basis;

- New rights of use are proposed to be assigned through a competitive award process open to all interested bidders participating on an equal basis (See '*Impact on Competition'*);

- There do not appear to be any less onerous means to address the above factors;

[34] See Annex A, DotEcon Report (17/85a).
[35] The 21 other spectrum bands used for P2P links are: VHF-UHF, 1.3-1.4 GHz, 1.3-1.5 GHz, 2.0-2.3 GHz, L6, 6 GHz, U6, L7, 7 GHz, L8, U8, 11 GHz, 13 GHz, 15 GHz, 18 GHz, 20 GHz, 23 GHZ, 28 GHz, 38 GHz, 42 GHz, and 80 GHz
[36] Incumbent operators pointed to transition periods of 2 – 3 years and migration costs of up to [redacted]

- The proposed restriction of fixed links technology to P2P only is justified, proportionate and non-discriminatory for the reasons set out in Section 4.9; and

- ComReg consulted on its proposals in Document 17/85 and received widespread support for the proposed restrictions and, further, did not receive material evidence from respondents or any other information which would warrant an alternative approach.

3 Response to Draft RIA and Final RIA

3.1 Introduction and background

3.1 In Chapter 3 of Document 17/85, ComReg set out its draft 'Assignment Process' Regulatory Impact Assessment ("RIA") having regard to, among other things, its statutory remit in managing spectrum (see Annex 2 of Document 17/85[37]) and its previously expressed views on different assignment methods for spectrum rights of use.

3.1.1 Background - draft 'Assignment Process' RIA in Document 17/85

3.2 In Document 17/85, ComReg noted that its draft 'Assignment Process' RIA was informed by, among other things:

- ComReg's consideration of administrative assignment proposals received in response to Document 17/85;
- ComReg's previous general observations regarding administrative assignment proposals and administrative assignment format[38]; and
- ComReg's general observations on an auction format[39].

3.3 ComReg then identified the following regulatory options for consideration:

- Option 1: Assign new 26 GHz rights of use by administrative assignment; and
- Option 2: Assign new 26 GHz rights of use by auction.

3.4 ComReg's draft RIA describes why an extension of existing licences/rights of use was not considered an appropriate mechanism for assigning rights of use in the award spectrum. In summary:

- granting new 26 GHz National Block Licences should give all new licensees sufficient certainty by providing 10 years in which to invest in 26 GHz fixed links infrastructure and recoup their investments ;
- extending current 26 GHz licences could delay any new entry as might otherwise occur, by any other undertaking seeking to deploy P2P links under a National Block Licence;
- there is still significant uncertainty as to whether the 26 GHz band will be harmonised for future mobile technologies, and, even if this does

[37] ComReg Doc 16/50 – "Radio Spectrum Management Strategy 2016 to 2018
[38] See Para 3.35 to 3.62 of Document 15/140.
[39] See Para 3.63 to 3.83 of Document 15/140.

eventually happen, there is still significant uncertainty as to when it will happen; and

- there is also likely to be considerable potential for co-existence of fixed links with these new mobile technologies.

3.5 In light of its assessment, ComReg stated that its 'Preferred Option' was Option 2 – to assign new 26 GHz rights of use by auction.

3.1.2 Background - Assessment against functions, objectives and duties in Document 17/85

3.6 ComReg then assessed its Preferred Option against the objectives, principles, and duties relevant to its spectrum management function and formed the preliminary view that the Preferred Option would best meet those objectives, principles and duties.

3.2 Views of respondents on draft Assignment Process RIA

3.7 ComReg received four responses relevant to the draft 'Assignment Process' RIA (Eir, Vodafone, Imagine and Three). In summary:

- Eir supports the use of an auction and in particular the use of a Sealed Bid Combinatorial Auction.
- Vodafone submits that:
  - it generally supports auctions as a method to assign spectrum rights of use;
  - this is not an appropriate time to auction 26 GHz rights of use as it alleges that supply exceeds demand and the 26 GHz rights of use currently assigned to Vodafone is being used efficiently;
  - an administrative assignment of the fixed links 26 GHz rights of use should be used to cover the time period until a future award of 26 GHz for 5G; and
  - the most efficient way forward is to extend current 26 GHz rights of use by administrative assignment for a fixed period up to 7 years.
- Imagine submits that:
  - the existing 26 GHz rights of use should be ring-fenced for incumbent usage for a number of years (i.e. 15 years) to allow for services to remain and network investments to be recouped; and
  - this award process could become distorted by bidders speculatively acquiring 26 GHz rights of use in the hope that they may be utilised for 5G in future

- Three submits that:
    - ComReg should extend current licences for 4 to 5 years, under the same terms and conditions except for fees which would require updating;
    - ComReg should run whatever process is needed for 5G services in the 26 GHz band in 2020, when it believes that the 5G band and standards in 26 GHz will be known;
    - ComReg should make the two currently unused channels in the 26 GHz band available to any new user who may wish to use them during the licence extension period; and
    - if the rollout of 5G services was delayed or impaired until after 2028, this would be damaging to the availability of mobile communications in Ireland and for the economy generally.

ComReg's Assessment

3.8 Eir agrees with conducting an auction, the Preferred Option in the draft RIA.

3.9 The preference of the incumbent licensees (Three, Vodafone and Imagine) is for an administrative assignment process, albeit with differences on the proposed duration of same and other particulars.

3.10 ComReg expressed its preliminary view in Document 17/85 that extending existing licences / rights of use was not an appropriate mechanism for assigning 26 GHz rights of use (as summarised above). In the following section, ComReg considers the additional material provided by respondents in support of licence / rights of use extensions / renewals by administrative assignment, in the context of (a) efficient use of the radio spectrum (b) requirement of non-discrimination and (c) spectrum for 5G and fixed links.

Efficient use of the radio spectrum

3.11 First, ComReg generally considers that auctioning spectrum rights of use, subject to appropriate rules[40] and fees, can often be the most suitable means by which to discharge its objective to ensure the efficient use of spectrum, for the following reasons:

- An appropriately-designed auction that incentivises bidding to valuation can help to achieve an outcome that is based on bidders' true valuations of the spectrum rights of use being auctioned, in that those rights of use should be awarded to those bidders who value it most. Subject to suitable provisions to protecting against anti-competitive outcomes, an auction should typically represent an economically efficient means of assigning spectrum rights of use in that the parties who place the highest value on the such rights of use, and so bid the most, should be expected to make

[40] E.g. appropriate competition caps to promote and safeguard competition.

the best use of the rights of use, once acquired. This may not happen with an administrative assignment process, either because any bidder may be incentivised to hide its true valuation or may not accurately assess what the spectrum is worth.

- Auctions support opportunity cost pricing which, if applied consistently) can assist users with efficient decision making about spectrum use and network investment. This can create incentives for operators to return unused spectrum to the regulator.
- By assigning spectrum rights of use using an appropriately-designed auction, prices are determined by the auction and are therefore at a level which winners are willing to be assigned spectrum. This should help avoid the risk of administratively set prices either being too high (choking off demand and resulting in an inefficient assignment) or too low (leading to excess demand that would somehow need to be resolved by the regulator making administrative decisions as to how the spectrum should be assigned).
- By assigning spectrum rights of use to those bidders who most value the spectrum, auctions should result in an efficient assignment outcome because, amongst other things:
    - final prices should be at the level which winning bidders were are willing to pay, in order to be assigned the rights of use, while losing bidders are not willing to those rights of use at that price level;
    - valuations of spectrum rights of use are more likely to be based on a thorough assessment of investment conditions, as bidders must be reasonably certain that they can deliver on their business plans so as to recoup the investment cost of the spectrum rights of use; and
    - those who most value the spectrum rights of use should win same and, because of these financial incentives, are most likely to use the spectrum efficiently.

3.12 Second, ComReg notes and agrees with the following limitations identified by DotEcon concerning the submissions that current 26 GHz licences / rights of use ought to be extended by administrative assignment, with administratively determined fees:

- it cannot be assumed that the current distribution of 26 GHz rights of use (which were determined in 2008) would represent the most efficient assignment outcome going forward. For instance, and in light of developments since 2008, it may be more efficient for existing licensees to obtain more or less 26 GHz rights of use than they currently hold;
- similarly, extending existing 26 GHz rights of use may deny access to new users who could have made more efficient use of those rights, noting also

that the fragmented nature of currently unassigned spectrum may further deny usable spectrum to potential new users; and

- administratively setting an appropriate charge for the extended existing 26 GHz rights of use (that reflects their likely market value and incentivises efficient spectrum use) would be challenging as the 26 GHz band was undersubscribed in 2008 and the outcome of the previous award reveals very little about likely market value now.

3.13 ComReg also observes that the risk of administratively assigning 26 GHz rights of use below opportunity cost could be unfair to potential new entrants of the 26 GHz band, who may place a higher value on those rights of use and consequently may make more efficient use of same, if given the opportunity to do so.

3.14 In light of the above, ComReg considers that an appropriately-designed auction would best achieve its objective to ensure the efficient use of spectrum.

Promotion of competition and non-discrimination

3.15 By way of background, and in light of ComReg's proposal to grant individual 26 GHz rights of use by auction and noting that such rights of use would be limited, ComReg is required by Regulation 11 of the Authorisation Regulations to:

- give due weight to the need to maximise benefits for users and to facilitate the development of competition; and
- grant limited individual rights of use for radio frequencies on the basis of selection criteria which are objective, transparent, non-discriminatory[41] and proportionate (and which give due weight to achieving the objectives set out in section 12 of the 2002 Act and Regulations 16 and 17 of the Framework Regulations).

3.16 In this section, ComReg considers the responses appropriateness of Options 1 (Auction) and 2 (Administrative Assignment) (including the administrative assignment proposals of existing licensees) in the context of the above obligations.

3.17 In relation to Option 1, it is apparent that an auction should:

- facilitate the development of competition by providing an opportunity for:

  (a) potential new entrants to the 26 GHz band to compete for the available rights of use (rather than just a subset which, indeed, is a fragmented subset), and

  (b) existing 26 GHz licensees to compete for more or less spectrum than they currently hold depending on their current and likely future needs (i.e.

[41] ComReg applies this non-discrimination criteria by, among other things, ensuring that, in similar circumstances, there is no discrimination in the treatment of undertakings providing electronic communications networks and services.

an auction also facilitates a market-based recalibration of spectrum holdings between existing holders of same);

- maximise potential benefits to users, as against an administrative assignment, as an auction should ensure the most efficient use of the rights of use being auctioned, as described in the previous section; and
- best meet the requirement to ensure that the available rights of use for radio frequencies are assigned on foot of objective, transparent, non-discriminatory and proportionate selection criteria in that all interested parties, including incumbent licensees and new entrants, may compete for the entirety of the available rights of use which should, as a consequence, be assigned to those who most value them the most (and who bid accordingly).

3.18 In contrast, an administrative assignment could adversely affect potential new entrants (to the band or otherwise) by, firstly, limiting them to a smaller supply of 26 GHz spectrum at fixed frequencies. For example, if ComReg was to extend current 26 GHz licences by 4-5 years and administratively assign 12 of the 19 available blocks to incumbents, this would leave only 7 blocks available for new entrants (as suggested by Three). Further, those 7 blocks would be fragmented across the band in three contiguous frequency ranges (four blocks, two blocks, and a single block). As noted by DotEcon, extending 26 GHz licences would insulate existing licensees from any growth in demand for fixed link 26 GHz spectrum since 2008 (such demand may come from potential new licensees and from current licensees who wish to acquire more 26 GHz spectrum than they currently hold).

3.19 An administrative assignment may have other adverse effects on new entrants:

- It could artificially restrict supply and increase the price for access to the 26 GHz rights of use[42] above the market clearing rate, compared to all 19 blocks being made available;
- A new entrant could not acquire five blocks (the proposed competition cap) as the maximum number of contiguous unassigned blocks currently available is four;
- The largest bandwidth on a single link that is useable with currently available equipment is 2 × 112 MHz (i.e. four blocks) and only one new entrant could be assigned four blocks. . Any additional new entrants would be limited to a single package of two lots (blocks 18 & 19) and three single lots (blocks 12, 18 & 19);

[42] Particularly where a new entrant places a higher value on the 26 GHz spectrum than an incumbent.

- As illustrated in Table 1 below, the maximum[43] number of assignment options (i.e. specific frequency positions in the band) for individual blocks and for packages of 2, 3 and 4 contiguous blocks would be substantially limited compared to ComReg's Preferred Option of 19 blocks. Further, no option would be available for bidders interested in a package of 5 lots;

Package of n lots	19 blocks (Contiguous)	7 blocks (Fragmented)
1	19	7
2	18	4
3	17	2
4	16	1
5	15	0

Table 1: Assignment options across different scenarios.

- A period of 4 – 7 years as suggested by some respondents may not be sufficient for a new entrant to earn a return on its investment, particularly if it had to invest in new equipment, acquire new high sites, or negotiate space on existing infrastructure.

3.20 Given the above, ComReg remains of the preliminary view that an administrative assignment process (including those proposed by existing licensees) would not be appropriate and an auction would be the most appropriate means by which to grant new 26 GHz rights of use so[44] as to maximise benefits for users, facilitate the development of competition, and meet the requirement that the granting of the individual 26 GHz rights of use for radio frequencies be based on objective, transparent, non-discriminatory and proportionate criteria.

3.21 In addition, ComReg considers that an administrative assignment would be likely to adversely impact the ability of current licensees to acquire different spectrum holdings than they currently hold, or to realign their frequency assignments, and such an outcome would not best meet the applicable statutory objectives and principles.

[43] This is the *maximum* number of assignment options that might be available, depending on how the remaining lots are allocated to other winners e.g. in the 7-block scenario, a winner of 1 block would only have one option if two other entrants won 4 blocks and 2 blocks (and hence could only put in one location in the band).

[44] ComReg notes that the administrative assignment of spectrum may be appropriate in certain limited situations even where new entry is possible. For example, ComReg has in the past issued interim licences where the factual position is materially different. Such instances are usually for a short-time period, and to protect services already being provided to consumers.

Spectrum requirements for 5G and fixed links

3.22 Certain respondents seek an administrative assignment of 26 GHz rights of use for (4 – 5 years (Three) and up to 7 years (Vodafone)) on the grounds that such an approach would avoid any delay in the roll-out of future 5G services.[45]

3.23 ComReg first refers to the discussion in Chapter 2 regarding 5G.

3.24 In light of this material, ComReg is not persuaded by the submissions to the effect that administrative assignment would avoid any delay in the roll-out of future 5G, for the following reasons, in summary:

- A considerable unassigned and unused portion of the 26 GHz band (26.5-27.5 GHz) would remain available for future 5G services;
- 5G is not limited to mmWave bands and is likely to be provided across a wide variety of bands above and below 6 GHz;
- 5G is likely to be provided in the sub 6 GHz bands first - the pioneer 3.6 GHz band has already been assigned;
- There is still considerable uncertainty regarding use of the 26 GHz band for 5G;[46]
- The efficient use of spectrum would not be adversely affected by allowing the proposed award spectrum to continue to be used for fixed links up until the point that it may be required for alternative or complimentary purposes (i.e. liberalised use / 5G); and
- There is already an established use case for fixed links in the 26 GHz band and demand for 26 GHz spectrum for such links is likely to continue for the foreseeable future.

3.25 Finally, DotEcon observes that it would remain an option for ComReg to curtail fixed link licences at some subsequent date, if it should became apparent that the demand for spectrum for 5G could not be met by spectrum in the 26.5-27.5 GHz range (or more broadly, above 26.285 GHz).[47]

3.26 By assigning new 10-year rights of use for fixed links, ComReg would be in a position to provide clarity on the future use of this portion of the 26 GHz band when further information becomes available. This would include giving notice to incumbent fixed links and/or FWALA users about future plans for the 26 GHz band and allowing for any managed migration to alternative bands, as may be deemed necessary. This would be similar to the approach taken in the 3.6 GHz

[45] If there are services which can be offered which have an adequate business case to drive take-up of the use of the 26 GHz a band.

[46] Including:

- the current absence of a 5G technical standard;
- the availability and cost of 5G-enabled equipment in the 26 GHz band;
- whether harmonisation will include some or all of the 26 GHz band; and
- the full range of bands that any future mobile technology standard would encapsulate.

[47] DotEcon Report, p10..

band where such information[48] was provided to licensees several years in advance, in order to give them sufficient notice and to maximise the efficient use of the spectrum in future.

Speculative Acquisition

3.27 In relation to Imagine's concern as to possible speculative acquisition of 26 GHz rights of use, ComReg stated in Document 17/85 that under its proposal "*new 26 GHz National Block Licences will be restricted to P2P links*" and ComReg remains of the view that this restriction should apply. DotEcon also considers that Imagine's concerns should be largely addressed by specifying such restricted use under the new licences. Further, Three submits that 5G will require TDD spectrum, rather than FDD spectrum and notes DotEcon's view that the need for a co-ordinated approach to future migration to alternative uses should reduce incentives for speculative acquisition (as it would likely be difficult for any licensee to re-purpose its spectrum for 5G when in a FDD configuration).

3.28 ComReg further notes DotEcon's recommendation that ComReg - subject to the need to consider future decisions on their merits in light of the information available at the time – should indicate that it does not expect to liberalise the proposed National Block Licences for 5G but instead expects to grant new licences (thus giving parties no incentive to value National Block Licences on the basis that the 26 GHz rights of use thereunder may be used for 5G, in future).

3.29 ComReg's draft RIA noted that ComReg may, in future and if necessary, provide for early liberalisation of the 26 GHz band. Having considered the matter further, including DotEcon's advice, ComReg wishes to clarify that it does not intend to provide for any early liberalisation of the proposed National Block Licences within their 10-year duration save where exceptional circumstances may require ComReg to do so (such as proper fulfilment of its statutory remit). ComReg intends that all new 26 GHz rights of use shall be restricted to P2P for their full 10-year duration.

ComReg's final position

3.30 ComReg considers that a competitive award format (i.e. auction) remains the most appropriate means by which to assign new rights of use in the portion of the 26 GHz band at issue.

3.31 Accordingly, ComReg's final 'Assignment Process' RIA, set out in section 3.3 below, is substantially the same as that set out in Document 17/85.

[48] ComReg 10/29 – Fixed Wireless Access Local Area Licensing: End date of the FWALA licensing scheme in the 3.6 GHz band – 8 April 2010.

3.2.1 Assessment of the Preferred Option against functions, objectives and duties

3.32 ComReg received no submissions on its assessment of the Preferred Option against its functions, objectives and duties, as set out in Chapter 3 of Document 17/85. Accordingly, ComReg's final assessment, in section 3.4 below, is substantially the same as that in Document 17/85.

3.33 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 Final Assignment RIA

3.34 All existing licences in the 26 GHz band will expire on 5 June 2018. This chapter sets out ComReg's Regulatory Impact Assessment (RIA) on how best to assign new rights of use in the portion of the 26 GHz band at issue, by granting new National Block Licences (the "Assignment Process RIA"). This chapter concludes with ComReg assessing its preferred option arising from the RIA ("Preferred Option") against its statutory remit in managing spectrum,[49] including its relevant functions and objectives and the regulatory principles to which it must have regard (see Annex 1).

RIA Framework

3.35 ComReg seeks to ensure that all of its regulatory measures are justified, proportionate, transparent, and non-discriminatory. A RIA is an analysis of the likely effect(s) of a proposed measure, including whether the measure is necessary at all. A RIA seeks to identify all possible measures and to then identify the most effective and least burdensome measure, in terms of achieving the desired objectives while minimising any regulatory burden.

3.36 There are five steps in a RIA and this chapter goes through all five:[50]

- Step 1: Describe 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 impacts on competition;
- Step 5: Assess the impacts and choose the best option.

Policy Issues and Objectives (RIA Step 1)

3.37 In the following sections, ComReg describes the specific policy issues to be addressed and the background to those issues, as well as the objectives to be

[49] Set out in Annex 1.
[50] ComReg RIA Guidelines (2007) www.comreg.ie/media/dlm_uploads/2015/12/ComReg0756a.pdf

achieved by assigning new rights of use in the portion of the 26 GHz band at issue, by granting new 26 GHz National Block Licences.

Policy Issues

3.38 As stated in its 2016-2018 Spectrum Strategy Statement,[51] ComReg does not favour any one process for awarding new spectrum rights of use but prefers to decide upon the most appropriate process in each individual case. In this regard, there are various processes by which to award new rights of use in the portion of the 26 GHz band at issue. For example, it could be done by administrative assignment following a comparative selection procedure or through a competitive market-based mechanism (i.e. an auction). Each process will typically have its particular advantages and disadvantages and one process may, on balance, be found to be the most suitable in light of the particular features of the spectrum to be assigned.

3.39 The primary policy issue, to be decided upon, is how best to assign new rights of use in the portion of the 26 GHz band at issue, by the granting of new National Block Licences.

Objectives

3.40 This RIA assesses the impact of the proposed measure(s) (see regulatory options below) on stakeholders, including consumers, and on competition. This should enable ComReg to identify and implement the most appropriate and effective means to assign the new 26 GHz rights of use, while also achieving the following objectives:

- To take appropriate measures in advance of the expiry of the current 26 GHz National Block Licences, in June 2018;
- To assign new 26 GHz rights of use on the basis of justified, objective, transparent, and non-discriminatory selection criteria; and
- To promote the interests of end-users and the economic development of the State and the electronic communications sector.

3.41 ComReg aims to design and conduct the process for assigning new 26 GHz rights of use in accordance with its statutory remit in managing spectrum which, in summary, is to encourage the efficient use and ensure the effective management of spectrum, to promote competition in the electronic communications sector, to contribute to the development of the internal market, and to promote the interests of users within the Community. ComReg's goal, ultimately, is to choose the regulatory measure(s) which are most likely to maximise the benefits for consumers, in terms of the price, choice, and quality of products and services.

[51] ComReg's Radio Spectrum Management Strategy Statement (2016-18) www.comreg.ie/publication/radio-spectrum-management-strategy-2016-2018/

3.42 The remainder of this chapter contains the "Assignment Process RIA" – this addresses the primary policy issue and the statutory objectives outlined above.

Considerations relevant to the Assignment RIA

3.43 This section sets out relevant considerations in identifying and assessing an appropriate process for assigning spectrum rights of use. Before setting out the specific options for assigning new 26 GHz rights of use, it is useful to present an overview of the two main processes by which such rights of use may be assigned:

1. **Administrative Assignment**: the regulator determines who obtains spectrum rights of use, how much they obtain, and the price paid; or

2. **Competitive market mechanism**: the process determines who wins the spectrum rights of use and the price paid, subject to objective and transparent rules set *ex ante* by the regulator (e.g. an auction).

3.44 ComReg considers that the above options warrant an assessment on a case-by-case basis, having regard to the particular features of the spectrum band(s) at issue and the market circumstances. ComReg has previously expressed views on the assignment of spectrum by auction or administrative award, including in these documents:

- Chapter 3, Document 14/101[52]
- Chapter 3, Document 15/70[53]
- Chapter 3, Document 15/140[54]

3.45 Document 15/140, in particular, notes the outcomes that ComReg seeks to achieve in any spectrum award, irrespective of the particular process adopted (i.e. auction or administrative assignment). These outcomes include:

1. Determining which undertakings should be assigned spectrum rights of use;

2. Determining the quantum of spectrum to assign to each undertaking, and;

3. Determining the frequency ranges for the assigned spectrum rights of use.

3.46 As stated in Chapter 1, the proposed new 26 GHz National Block Licences would not permit provision of mobile services or possession or operation of PMP links; the new licences would be for P2P links only. For this reason, the possible fourth

[52] ComReg (2014) 'Spectrum Award – 2.6GHz Band with possible inclusion of 700 MHz, 1.4, 2.3 and 3.6 GHz Band
[53] ComReg (2015) 'Consultation on Proposed 3.6 GHz Band Spectrum Award'
[54] ComReg (2015) 'Response to consultation and draft decision on proposed 3.6 GHz band spectrum award' (page 32)

award outcome identified in Document 15/140 is not considered in this RIA because it relates to determining "*which electronic communications networks/services using which technologies*". The proposed new 26 GHz National Block Licences would be restricted to P2P links and ComReg's justification for this proposed restriction is set out in Section 2.4 and 4.9.

3.47 ComReg sets out the remaining award outcomes relevant to the assignment of 26 GHz rights of use below, together with the differences between administrative assignments and auctions in providing for such assignments.

1. Determining which undertakings should be assigned the spectrum

Administrative assignment

3.48 An administrative assignment can take many forms depending on what it is intended to achieve. Administrative assignments are likely to be most appropriate where there is relatively limited demand for a relatively large amount of spectrum, such that all applicants can obtain the amount of spectrum they require, or where the duration of an assignment is for a short period and is required in order to satisfy certain statutory objectives (e.g. consumer protection). Where supply exceeds demand, there is less risk of the regulator assigning the spectrum in a manner which will result in its inefficient use, since all competing requirements could be assigned spectrum.[55] [56] However, ComReg is of the view that demand for new of use in the portion of the 26 GHz band at issue could be greater than in 2008.

3.49 It is not clear which criteria ComReg should use in an administrative award so as to determine which undertakings are assigned spectrum rights of use in a manner that should ensure its efficient use. For example, an administrative award could involve:

a) Granting spectrum rights of use to specific parties (such as incumbents);

b) Reserving spectrum rights of use for specific parties (such as new entrants);

[55] ComReg notes that even in scenarios where supply exceeds demand, it may apply certain obligations (e.g. fees) to ensure that assignment does not displace valuable future uses.

[56] ComReg notes that a competitive assignment mechanism (auction) would sit within a wider framework for awarding spectrum, where:

- an auction would be run in the event that there was competing demand for at least some of the spectrum available; or
- the spectrum could be directly assigned to interested parties if it were possible to satisfy the demand expressed on all applications with the available spectrum (subject to any necessary conditions being satisfied).

In this way, even where the likelihood of demand exceeding supply does not arise, this award mechanism provides flexibility for the spectrum to be assigned in line with demand at minimum price. Such flexibility is not provided by an administrative award.

c) Conducting a comparative award ("beauty contest") where there are particular objectives; and

d) Extending or renewing existing spectrum rights of use or assigning spectrum rights of use to particular undertakings for a particular period of time.

3.50 In relation to (a) - granting spectrum rights of use to specific parties such as incumbents, for an extended period of time, may be appropriate if it was sufficiently clear that supply exceeded demand. However, in the case of the 26 GHz band an administrative award would run the risk of the assigned spectrum being used inefficiently, for the following reasons:

- The 2008 award represented an efficient outcome at that point in time but at this point in time, a decade later, ComReg must be open to the possibility of new entrants to the band – i.e. there may be one or more undertakings who currently do not hold any 26 GHz rights of use but would seek to obtain same, if given the opportunity, and who may be the most efficient users of those rights of use;
- Demand for new rights of use in the portion of the 26 GHz band at issue is likely to be significantly higher in 2018 than in 2008 (see '*Demand for 26 GHz rights of use*' below);
- There may be one or more undertakings who currently hold 26 GHz Individual Links Licences but would rather obtain a new National Block Licence containing a certain number of blocks (because a National Block Licence can be more cost effective than multiple Individual Links Licences, beyond a certain level of use - see Annex A of the DotEcon Report (ComReg Doc. 17/85a));
- An administrative assignment of new 26 GHz rights of use to incumbents could fragment the band such that only one other contiguous block of four would be available; and
- An administrative assignment of new 26 GHz rights of use would not provide criteria as to how unassigned blocks from the 2008 award ought to be assigned.

3.51 In relation to (b), new entry concerns:

i. new entrants to the band who may be active in providing mobile or fixed wireless services or

ii. new entrants to the telecommunications market.

3.52 Firstly, reserving 26 GHz rights of use for potential new entrants would not be justified. Having national 26 GHz rights of use is not likely to be essential to the provision of mobile backhaul though it may be a cost effective option depending on the network.

3.53 Annex A of the DotEcon Report (17/85a) shows that as the number of links increases, there is likely to come a point where National Block Licences become more cost effective, and thus more attractive, than Individual Links Licences. This depends on the fee for a National Block Licence compared to the fees for multiple Individual Links Licences. For example, one National Block licence costs approximately the same amount as 33 - 39 Individual Links Licences. This means that someone with 20 Individual Link Licences is likely to be content with same and is unlikely to want a National Block Licence, as the latter would be more expensive but would convey little or no advantage. However someone with, say, 30 or more Individual Link Licences may have reached the point where a single National Block Licence may be a more cost effective, and hence preferable, option.

3.54 Any potential new entrant to the portion of the 26 GHz band at issue has options other than being assigned rights of use in that band through an open competitive award process. For example, alternative options for backhaul include:

- using individual fixed P2P links in the upper part of the 26 GHz band; and/or
- using alternative spectrum bands[57] of which there are 21 with the closest being the 23 GHz and 28 GHz bands[58].

3.55 Further, potential new entrants to the portion of the band at issues may include undertakings who are already active in the downstream retail market for the provision of mobile services to end users and an administrative assignment of 26 GHz spectrum rights of use to such undertakings could distort competition in that downstream market.

3.56 Secondly, given the likely use of the 26 GHz band, ComReg does not consider that the administrative assignment of new 26 GHz rights of use is likely to be sufficient, of itself, to result in new entry to the Irish communications market. In order for any new entrant to be viable, it would require rights of use in a number of spectrum bands – i.e. having rights of use in the 26 GHz band alone would not be sufficient, particularly when restricted to P2P. Therefore, reserving some of the 26 GHz band for new entrants (whether new entrants to the band or more generally) could result in one or more of the 19 available blocks going unassigned when they could otherwise have been assigned to, and efficiently used by, incumbents.

3.57 In relation to (c) - conducting a comparative award or “beauty contest” - ComReg would require all relevant information in order to assess how a given spectrum

[57] The 21 other spectrum bands used for P2P links are: VHF-UHF, 1.3-1.4 GHz, 1.3-1.5 GHz, 2.0-2.3 GHz, L6, 6 GHz, U6, L7, 7 GHz, L8, U8, 11 GHz, 13 GHz, 15 GHz, 18 GHz, 20 GHz, 23 GHZ, 28 GHz, 38 GHz, 42 GHz, and 80 GHz.

[58] Note - national block licences are only available in the 26 GHz band; all of the other 21 bands use individual P2P licencing only. The top 5 bands with P2P links deployed (as at May 2017) are: 26 GHz (3,200); 38 GHz (2,200); 15 GHz (1,900); 23 GHz (1,800) and 13 GHz (1,500).

band, or part thereof, should be distributed amongst a number of undertakings with a view to determining which of those undertakings would generate the greatest value from that band. If there were competing demands for spectrum then it would be difficult for ComReg to determine, to any degree of accuracy, the exact combination of applicants and spectrum assignments, individually or collectively, which should result in the most efficient use of the spectrum, thereby ensuring that its economic and societal benefit is maximised. As described in Document 15/140, a number of factors limit the extent to which a regulator can hope to accurately identify optimum licensees through a comparative award process:

- Applications are likely to be voluminous and the time required to review, analyse and compare applications is likely to be extensive;
- Considerable information asymmetries exist between the regulator and applicants such that it may be difficult for the regulator to make comparative evaluations that are sufficiently robust; and
- The risk of legal disputes arising over assignments made on foot of decisions which are, by their nature, somewhat subjective can result in uncertainty and delay. This can be detrimental to undertakings seeking to obtain the spectrum rights of use and to end users in any affected downstream markets.

3.58 In relation to (d) - involves extending or renewing existing spectrum rights of use or assigning spectrum rights of use to particular undertakings for a particular period of time. For example, respondents to Document 17/85 argued that ComReg ought to extend current rights of use in the 26 GHz band until such time as there is more certainty as to whether the band will be harmonised for future mobile technology. However, this RIA does not consider the extension of existing 26 GHz rights of use for the reasons set out in the Response to RIA (above).

Auction

3.59 Under an auction, all existing and potential providers of any ECN seeking to use P2P fixed links would be afforded the same opportunities to compete for, acquire, and use spectrum rights in the portion of the 26 GHz band being auctioned (subject to the proposed competition cap).

3.60 As such, an auction would, firstly, avoid issues around having to make an ex ante determination as to the most efficient users or service providers. It would also avoid risk of challenge from unsuccessful applicants as to the evaluation process and / or outcome of a beauty contest (as to insufficient transparency, objectivity, due diligence, etc.) and delays resulting with such challenges. An auction is less likely to delay the ultimate delivery of services due to legal challenge because the use of opportunity cost pricing should ensure that there are no dissatisfied losing bidders, in terms of prices paid.

3.61 Further, an auction is the award format considered most likely to put the spectrum rights of use in the hands of those who value them most and who should, as a consequence, utilise those rights of use most efficiently.

2. Determining how much of the 26 GHz band should be assigned to each undertaking

Administrative Assignment

3.62 The specific quanta of 26 GHz spectrum that participants in an award process will require [59] is likely to vary between those participants and will depend on a number of factors including channel spacing, modulation, traffic optimisation, and commercial offering[60] (now and in future). These factors are likely to vary between participants and ComReg is not likely to have all necessary information by which to determine how to best to apportion the available spectrum between in such manner as to achieve the most efficient assignment.

3.63 Incumbents are likely to favour retaining their existing quanta of spectrum. However, it would be difficult for ComReg to assess what combination of applicants and quantum of spectrum (individually or collectively) would generate the greatest value, particularly where potential new entrants could have similar spectrum requirements. As set out below, ComReg remains of the preliminary view that demand for 26 GHz rights of use is higher in 2018 that it was in 2008. Even where there are only a small number of possible outcomes, it would be difficult to accurately assess those outcomes and determine the most efficient package and doing so would likely require extensive modelling.

Auction

3.64 A spectrum award process that utilises a market mechanism (i.e. an auction) would mean that ComReg would not be required to make a determination (based on incomplete and imperfect information) on the complex question of how best to assign the available spectrum so as to ensure its efficient use. The auction itself would determine the quantum of spectrum to be assigned to each participant and the cost of same (the licence fee).

3.65 A well-designed auction that incentivises truthful bidding (according to valuation) can extract information about bidders' valuation structures that would otherwise not be available to the regulator. This can be used to ensure that the spectrum is awarded efficiently to those bidders that value it most (where valuations can be reasonably expected to provide a proxy for the social welfare that could be

[59] The throughput that can be delivered by a microwave point to point link is proportional to the spectrum bandwidth. For example, a microwave system using 28 MHz of bandwidth will deliver twice the throughput of a microwave system using 14 MHz, using the same technology.

[60] For example, does an operator offer large data packages. Operators also have to dimension their backhaul network in terms of peak throughput to ensure required speeds are achieved.

generated by the bidder using the spectrum) and to establish prices based on the market value of the spectrum implied through the bids received.

3. Determination of which part of the 26 GHz band the spectrum rights should be located

Administrative Assignment

3.66 An administrative award of new rights of use in the portion of the 26 GHz band at issue would require ComReg to decide where in the band to place each winning applicant.

3.67 ComReg would expect 26 GHz incumbents to prefer to remain in their current locations, so as to avoid any costs of having to retune and/or change equipment. However, to allow incumbents to remain in their current locations would create a bias in that it would favour those incumbents over potential new entrants, or indeed over any incumbents who wish to change their locations in the band. Further, it would not be possible for ComReg to accurately assess the value that specific applicants place on specific locations in the band the impact of incumbents having to move from their current locations (as such impacts could vary significantly depending on the specifics of such moves).

3.68 In addition, any remaining blocks would not be contiguous and may not be sufficient for other applicants, exposing them to aggregation risk or creating the risk that spectrum that otherwise would have been assigned and used would not be assigned or used, contrary to the objective of ensuring the efficient use of spectrum. This would also create difficulties for any incumbents seeking to increase their holdings as they might not be able to fit their requirement into a contiguous block if other incumbents are fixed to a particular location in the band.

Auction

3.69 Unlike administrative (or comparative) assignments, auctions allow the market to determine the specific frequency assignments for winning bidders. This promotes efficient assignment based on information about bidders' preferences that would otherwise not be available to the regulator.

3.70 An auction give bidders opportunity to express their value for specific frequencies within the band and removes the problems with determining specific frequency assignments which are present in an administrative assignment process.

Identifying the options (RIA step 2)

3.71 In light of the above, ComReg considers that two options are available:

- **Option 1**: Assign new 26 GHz rights of use by administrative assignment; or
- **Option 2**: Assign new 26 GHz rights of use by auction.

3.72 The following sections consider the likely impacts of the above options on industry stakeholders, competition and consumers.

3.73 Prior to assessing these impacts, this RIA sets out ComReg's views on current demand for rights of use in the portion of the 26 GHz band at issue, particularly in light of developments since the 2008 award.

Demand for 26 GHz rights of use

3.74 Since 2008, several market developments have changed the nature of backhaul significantly such that demand for 26 GHz rights of use is likely to have increased:

- Consumer demand has shifted from "voice and text" to mobile, nomadic and fixed wireless data (such as streaming of video content);
- Wireless data traffic has increased sharply and is forecast to increase further:
  - Mobile data usage increased by 500% between 2012 and 2016[61],
  - A 2015 report for ComReg by Frontier Economics conservatively estimated that there will be a 33-fold increase in user demand for mobile data between 2015 and 2035;[62]
- The faster data speeds enabled by 4G LTE networks[63], as compared with 2G and 3G networks, has put additional stress on backhaul infrastructure[64]. As data usage continues to increase and new technologies emerge, demand for ever more backhaul capacity can also be expected to increase;
- There has been a significant increase in the assignment of spectrum rights of use for the provision of electronic communications services - since 2008, an additional 500 MHz has been assigned for mobile, nomadic and fixed wireless broadband services and a further 390 MHz has potential to be assigned;[65]
- Irish MNOs have extended and continue to extend coverage into rural areas where existing fibre backhaul connections may not be available[66]; and

3.75 In order to meet the ever increasing demand amongst consumers for faster and more ubiquitous mobile data services, operators are already investing in

[61] ComReg's 'Radio Spectrum Management Strategy Statement 2016-18' (page 2)
[62] ComReg document 15/62a 'Cost benefit analysis of the change of use of the 700 MHz radio frequency band in Ireland' (page 2)
[63] This will continue to increase in line with improvements in throughput and spectral efficiency for the current and future LTE releases.
[64] Capacity requirements of 4G backhaul networks are significantly higher than for 3G networks
[65] See Section 5.2.2 of ComReg's Spectrum Strategy Statement, Document 16/50.
[66] Vodafone note that fibre are still not available at most sites operated by Vodafone and services to customers rely heavily on these links.

expanding their networks. This includes having to invest in backhaul infrastructure, including fixed P2P links. For example:

- P2P links in the 26 GHz band have more than doubled in between 2011 and 2017.
- An alternative to 26 GHz National Block Licences are Individual Link Licences, located in the upper part of the 26 GHz band.[67] Meteor, the only MNO without a 26 GHz National Block Licence, has maintained a broadly steady deployment of individual P2P links using Individual Link Licences (Meteor had 235 individual P2P links in 2011 and currently has 200);
- Vodafone and Three, the two MNOs with current 26 GHz National Block Licences, also utilise 26 GHz Individual Link Licences though their deployment of Individual Links has decreased over the past five years (perhaps because their use of 26 GHz National Blocks has increased); and,
- The total number of undertakings utilising 26 GHz Individual Link Licences increased from four in 2011 to eight[68] in 2017; in that same period, the total number of individual links decreased from 657 to 417.

3.76 Given the above, ComReg is of the view that demand for rights of use in the portion of the 26 GHz band at issue is likely to be higher today than in 2008.

Impact on stakeholders (RIA step 3)

3.77 There are essentially two stakeholder groups who will be affected by the regulatory decisions made on foot of this consultation:

(i). Industry stakeholders who include incumbent[69] 26 GHz National Block Licensees (12 blocks of 2 × 28 MHz) and potential new entrants[70] from within or outside the State; and

(ii). Consumers who are assessed in the Section "*Impact on Consumers*".

3.78 In this RIA, the likely impact on industry stakeholders is first considered, followed by the impact on competition, followed by the impact on consumers. The order of this assessment does not imply any order of relative importance but is a logical progression. For example, a measure which safeguards and promotes

[67] Individual links licence spectrum 25.277–25.445 GHz duplexed with 26.285–26.453 GHz
[68] The eight licensees, in order of number of individual links deployed (as at June 2017) are: Meteor, Three, Vodafone, Eircom, Virgin Media, Airfibre Ltd, and Dundrum Credit Union.
[69] Incumbent licences in the 26 GHz band include: two MNOs (Three and Vodafone) with five and four blocks of spectrum respectively; and two other authorised operators (British Telecom and Irish Broadband) with two and one blocks of spectrum respectively.
[70] ComReg considers new entry from three perspectives: (i) pure new entry where entrant is currently not assigned any rights of use in the state; (ii) new entry to the 26 GHz band; and (iii) new entry to national block assignments.

competition should in turn have a net benefit for consumers. In that regard, the assessment of the likely impact on consumers draws substantially on the assessment of the likely impact on competition.

3.79 As noted above, industry stakeholders can be split between incumbents (current 26 GHz National Block Licensees) and potential new entrants**.**

Option 1 vs Option 2

3.80 A stakeholder who has submitted an award proposal is likely to prefer the regulatory option that most closely reflects that proposal. Three incumbents - Vodafone, Three, and Imagine - all favour extending existing licences beyond their expiry dates, for periods ranging from 4 to 15 years. These incumbents are likely to prefer Option 1 as it would ensure that they would remain in the 26 GHz band for 10 years, beyond 5 June 2018.

3.81 However remaining incumbents may not prefer an administrative assignment if the terms of that assignment (i.e. the specific quantum of spectrum being offered and the location in the band) would not meet their current or future spectrum needs. Some incumbents may thus prefer Option 2, an auction, because it would offer the greatest amount of contestable spectrum. Rather than merely being able to retain their current holdings in the 26 GHz band, such incumbents would have an opportunity to increase their current holdings (subject to any competition caps that may be imposed).

3.82 Eir (a potential new entrant to the 26 GHz band) agrees with Option 2, the use of a Sealed Bid Combinatorial Auction (SBCA). Under Option 2, new entrants could all compete openly with one another for all 19 National Blocks being auctioned. Option 2 should also provide new entrants with greater opportunity to win spectrum because an auction format exposes incumbents to the opportunity cost of retaining their existing spectrum holdings (i.e. if they want it then they have to pay opportunity cost). An administrative award is potentially less likely to reveal such information; it would be left to the judgment of the regulator as to how to best assign the spectrum and it could be a big call to take spectrum away from an incumbent who argued its case for retaining same (even if the spectrum was not being used efficiently, which in any case may be difficult to determine).

3.83 ComReg is of the view that other interested parties such as new entrants could prefer Option 2 over Option 1 as this would provide for the assignment of all available spectrum 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 would 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 (RIA step 4)

3.84 The respective likely impact of Options 1 and 2 on competition is assessed at two interconnected levels:

1. Competition during the award process. This occurs where bidders compete with each other for blocks of spectrum and the final price paid reflects the relative value attached to each block; and

2. Downstream retail competition[71]. This refers to competition between winning bidders and other market participants active in affected downstream markets such as fixed and mobile telephone and fixed and mobile broadband services.

3.85 Any form of administrative assignment entails a limited range of possible outcomes. The more extensive the restriction in terms of the possible assignment outcomes it precludes, the greater the risk of precluding the true optimal assignment.

3.86 Ordinarily, assigned spectrum rights of use should be used efficiently if the assignees pay at least the opportunity cost for same.[72] Opportunity cost-based pricing creates incentives for bidders to reveal their willingness to pay for the spectrum, thus helping to ensure that the spectrum is awarded to those who value it most and thereby achieving an efficient assignment. Prices based on opportunity cost also have the advantage of ensuring that there are 'happy losers', - i.e. that there are no other bidders or groups of bidders who would have been willing to buy the spectrum assigned to a winning bidder at a higher price than the winner was required to pay.

Administrative Assignment

3.87 In the case of a direct administrative assignment of the 26 GHz rights of use at issue, of the type likely to be favoured by incumbents, ComReg has limited information as to :

- the economic and social value of the services that each applicant could provide, and

- the bandwidth and frequency range that would need to be assigned to each applicant.

3.88 There is a risk that one or more applicants could exaggerate their business cases in applying for new 26 GHz rights of use through an administrative award, causing the level of competition between applicants for the available rights of use

[71] ComReg notes that 26 GHz band rights of use apply to fixed links only and any impact at network/infrastructure level could ultimately be felt in the downstream market.
[72] The opportunity cost is what an alternative operator would have been prepared to pay for the spectrum, e.g. the next highest bidder in an auction award.

to be somewhat artificial. And as a consequence of any such absence of real competition amongst applicants, the actual effects on the market may be different than ComReg, based on its assessment of the evidence before it, had envisaged.

3.89 The probability of an applicant undertaking being assigned 26 GHz rights of use below opportunity cost may be higher in an administrative award than in an auction. This is because ComReg would have less information about the value that alternative undertakings would place on those rights of use. In this sense, an administrative award could cause alternative undertakings to be artificially excluded from the award process, which would mean that their intended uses of the 26 GHz band would never manifest.

3.90 It is therefore difficult for ComReg to accurately determine the criteria for an administrative assignment of 26 GHz rights of use and there is a risk that this could result in the inefficient use of the portion of the 26 GHz band at issue, in terms of selecting the winning applicants and in determining how much spectrum to award to each winning applicant.

Spectrum reservation

3.91 Similarly, reserving some amount of the 26 GHz band for potential new entrants could result in inefficient entry if any new entrant(s) should win 26 GHz rights of use because demand had been artificially restricted - e.g. there may have been some other incumbent bidder who placed a higher value on those rights of use but who failed to obtains same because they were reserved for new entrants only. Reserving spectrum for possible new entrants could therefore disadvantage incumbents, by reducing the amount of spectrum available to them, and could ultimately result in such reserved spectrum being used less efficiently than would have been the case had it not been reserved.

3.92 Furthermore, even if an administrative award of 26 GHz rights of use did not entirely satisfy a reserved applicant / bidder's spectrum demand, it is likely that the reserved applicant / bidder would still hold an advantage over other applicants / bidders who wished to compete for the available residual spectrum. This is because the reserved applicant / bidder would effectively have a head start on its competitors because a portion of its demand had already been satisfied through an administrative award, rather than entirely through open competition.

Auction

3.93 In contrast to an administrative assignment, an open, competitive auction for new 26 GHz rights of use should reveal information about the value that different undertakings place on those rights of use. Such information would not be available to ComReg if it was to assign such rights of use administratively. Also, where 26 GHz rights of use are auctioned, blocks can be combined and bidders can express the value they place on different amounts and on aggregations of spectrum.

3.94 An auction can also include measures to promote competition and ensure an efficient outcome:

- Prices paid by winning bidders are based on the opportunity cost of winning bids – the "second price" rule. This should encourage straightforward bidding behaviour and should result in prices that are determined by competition from other bidders;[73]
- The non-uniformity of prices should support competition by reducing incentives to artificially reduce demand to keep prices low.
- Minimum prices reduce incentives for bidders to engage in strategic behaviour during an auction, in an attempt to decrease the eventual price(s) paid[74]. This includes tacit collusion during an auction and arrangements entered into before an auction begins and which are aimed at reducing competition between bidders.[75] Other measures to reduce collusion include having a carefully designed information policy and imposing appropriate sanctions for collusive behaviour.

3.95 Where 26 GHz rights of use are assigned by an appropriately designed auction, final prices will be set by the auction and should reflect what winning bidders were willing to pay and losing bidders were unwilling to pay. In this way, and taking account of the auction's design and rules, the new 26 GHz rights of use should be assigned in a manner that will result in their efficient use.

3.96 For the reasons set out above, ComReg is of the view that Option 2 – to assign new 26 GHz rights of use by auction - should best promote competition within the award process and thereby best ensure that the rights of use are assigned in a manner that results in their efficient use.

Competition in the market

3.97 The previous section discusses regulatory Options 1 and 2 in terms of their impact on competition. This section considers the impacts on downstream retail competition.

Administrative assignment

3.98 The administrative assignment of new 26 GHz rights of use to a particular applicant or category of applicants (i.e. incumbents or new entrants) would reduce the amount of the 26 GHz band that could be made available to other applicants. This would create a risk that certain applicants, such as those who require significant backhaul infrastructure in order to provide high-value services to end users, may obtain less spectrum than they require, or indeed may not

[73] See Section 5.1.4 DotEcon Report 17/85a.
[74] Note also that minimum prices that are too high might have a negative impact on competition if smaller participant/new entrants are discouraged from participating, so there is a balance as discussed in Chapter 4 below.
[75] See Section 4.3 DotEcon Report 17/85a.

succeed in obtaining any spectrum. At the same time, other applicants could obtain the quantum of the 26 GHz band which they sought even though they will use it less efficiently than others would have (had they succeeded in acquiring same). An administrative assignment of 26 GHz rights of use, to undertakings who will use those rights inefficiently or less efficiently than others, could also result in a lower level of downstream competition than would have been the case had those same rights of use been assigned by auction. This in turn could have a detrimental impact on end users in terms of the price, choice, and quality of services.

3.99 In addition, and as noted above, an ex-ante administrative assignment of new 26 GHz rights of use to certain applicants would reduce the amount of the band available to other applicants. This could be a barrier to entry if any of those other applicants, who were excluded from applying for some reserved segment of the 26 GHz band, perceived the Irish market as favouring certain pre-determined applicants. Also, reduced competition in the auction could reduce or distort competition in downstream markets.

Spectrum Reservation

3.100 While attracting new entrants is normally desirable in terms of promoting competition, to reserve some of the 19 available blocks for new entrants (whether to the 26 GHz band or to electronic communications within the State generally) would favour new entrants over other applicants/bidders. Absent objective justification for such a measure, this could result in new entry but by a new entrant who would use its obtained spectrum rights of use inefficiently, or less efficiently than would be the case had another applicant/bidder obtained same. Further, new entrants are not entirely dependent on select treatment and may succeed in obtaining 26 GHz rights of use even if none of the band is reserved for new entrants. As noted above, a new entrant could be an undertaking already operating in the downstream market.

3.101 ComReg is of the view that there is no justification for reserving some of the 26 GHz band for new entrants. Doing so would likely reduce the competitiveness of the award process and could result in some of the 26 GHz band being used inefficiently, or less efficiently than would be the case had some alternative applicant/bidder obtained it.

Competitive Award - Auction

3.102 Spectrum auctions are designed to incentivise participating bidders to express their willingness to pay for spectrum, the key objective being to assign the spectrum to those who value it most. Bidders who place the highest value on the spectrum, and who bid accordingly and thus succeed in obtaining the spectrum, would generally be expected to use the spectrum efficiently. This in turn should promote competition in any affected downstream retail market, to the ultimate benefit of end users in terms of price, choice, and quality of services.

3.103 Awarding spectrum by auction carries some risk of one or more bidders trying to reduce or distort the competitiveness of the auction, in order to restrict the total number of winning bidders and so gain a competitive advantage (by preventing new entry or foreclosing access to spectrum required by incumbents to maintain or enhance existing services) and/or to reduce the amounts paid by winning bidders. This could restrict the number of undertakings capable of providing downstream retail services, which in turn could reduce competition in the provision of those services. As a result, end users could have less choice and some services may be of relatively low quality, because the service providers concerned lack sufficient spectrum for their backhaul infrastructure.

3.104 ComReg therefore proposes taking certain measures to ensure that the auction of 26 GHz rights of use is truly competitive. Such measures include having competition caps as described in Chapter 4. ComReg considers that competition caps are the best means to ensure that the auction is truly competitive, such that the 26 GHz rights of use are assigned efficiently, which in turn should safeguard and promote downstream retail competition.

3.105 An award process that fails to deliver an efficient outcome is likely to have a negative impact on downstream competition. As noted above, ComReg is of the view that Option 2 – to assign new 26 GHz rights of use by auction - is more likely to produce an efficient outcome because it is most likely to result in those rights of use being assigned to those who value them most and who should therefore use them efficiently. ComReg is also of the view that an auction would be strengthened by certain additional measures, specifically competition caps and certain conditions attached to eventual 26 GHz National Block Licences for the purpose of protecting consumers and downstream competition.

Impact on Consumers

3.106 ComReg considers that consumers should prefer the option which has the greatest potential to promote competition, thereby maximising the long term benefits to consumers in terms of choice, price, and quality of electronic communications service. Consumers are also likely to prefer the option which is most likely to avoid or minimise any significant disruption to existing services.

3.107 Given that the proposed new 26 GHz National Block Licence would only permit possession and operation of P2P links, it is useful to briefly set out why the efficient assignment of new 26 GHz rights of use for fixed links is an important issue for consumers, as it will affect the choice, price, and quality of the electronic communications service that ultimately are made available to consumers.

3.108 Providers of wireless mobile services use a combination of inputs to provide those services. This includes radio frequency spectrum, a national resource and an essential input for all wireless electronic communications. Spectrum is used to transmit signals between base stations and end users' devices and to operate key network infrastructure such as base stations and transmission towers.

Spectrum for wireless electronic communications is also a scarce resource and so it must be used efficiently.

3.109 The backhaul element of a mobile network is essential to the provision of wireless mobile services as it routes voice and data traffic from base stations to the core network. Providers of wireless mobile services must have access to sufficient backhaul, in terms of sufficient capacity and speed, in order to avoid communications bottlenecks and a reduced quality of service for their customers.

3.110 Most backhaul infrastructure in the State consists of microwave links. The new 26 GHz National Block Licences would be used to deploy P2P links which provide backhaul services for mobile, nomadic and fixed wireless networks. The need for improved backhaul infrastructure - in terms of higher capacity and faster speeds – has increased and will probably continue to increase in parallel with the roll-out of 4G LTE services and ever increasing consumer demand for data intensive mobile services such as mobile video streaming. ComReg observes that a 'feedback loop' exists in that increased consumer demand leads to better services, which further increases consumer demand, and so on. All of this puts pressure on backhaul infrastructure. Even if operators were to use more fibre backhaul in future, alongside wireless backhaul, it is highly likely that microwave links will still be essential for backhaul to the core network, especially in rural areas. Therefore, the manner in which new 26 GHz rights of use are assigned could have significant impacts on consumers and on downstream communications markets.

3.111 ComReg considers that consumers are unlikely to prefer an administrative assignment of 26 GHz rights of use to incumbents, for the following reasons:

- Some incumbents may require more 26 GHz rights of use than they currently hold in order to improve their wireless mobile networks and/or services;
- Incumbents who currently do not use their 26 GHz rights of use efficiently, or who intend to reduce their utilisation of the 26 GHz band, could nevertheless be re-assigned their 26 GHz rights of use where those rights might have been more efficiently utilised by another undertaking;
- The assignment of new 26 GHz rights of use based on incumbents' current frequency ranges would risk fragmenting the band in that residual lots would not be contiguous with each other[76]. This could reduce the potential for new entry, as potential new entrants may require a minimum amount of contiguous bandwidth, and that in turn

[76] Assignment based on current occupied frequencies would leave seven residual blocks for potential new entrants. Of these, four are contiguous at the lower end of the band, two are contiguous at the upper end, and one solitary block is located towards the middle of the band.

could increase the risk of some lots not being assigned and left unused; and

- Customers of service providers who currently do not have 26 GHz National Block Licences could be denied the benefits that would be likely to accrue if those service providers obtained 26 GHz National Block Licences.

3.112 More generally, an administrative award of the 26 GHz rights of use at issue would increase the risk of some lots being assigned to undertakings who would use them inefficiently, as described above. This could negatively impact on competition and delay the introduction of more advanced mobile data services in the State. Any net negative effect resulting from the administrative assignment of 26 GHz rights of use would ultimately fall on consumers[77] and even a relatively small negative effect could result in a substantial aggregate loss, over the 10-year term of new 26 GHz National Block Licence as proposed.

3.113 Consumers are likely to generally be in favour of new entry but only where it is likely to result in (a) the optimal number of service providers in all markets; and (b) the replacement of less efficient incumbents.

3.114 For the reasons stated above, ComReg considers that reserving some of the 26 GHz rights of use at issue for potential new entrants would be likely to place other auction participants (including, perhaps, one or more incumbents) at a competitive disadvantage. The information asymmetry described above is such that reserving some of 26 GHz rights of use for new entrants would not guarantee an efficient spectrum assignment and may result in an inefficient assignment.

3.115 ComReg thus considers that consumers are likely to prefer Option 2 – to assign new 26 GHz rights of use by auction - for the following reasons:

- All of the rights of use in the portion of the 26 GHz band at issue would be offered to all potential bidders (incumbents and non-incumbents) and no interested party would be excluded or restricted from participating in the auction (subject to complying with the auction application process and auction rules, as set out in the IM);
- Incumbents would have the opportunity to retain their existing 26 GHz rights of use and/or to obtain additional 26 GHz rights of use, up to the spectrum competition cap;
- An auction should have the most positive impact on downstream retail competition and should thereby promote the interests of consumers in terms of the choice, price, and quality of electronic communications services;

[77] Such effects could include higher prices and less choice than might otherwise have been available; and poorer quality services than might have been achieved with a more efficient spectrum assignment.

- An auction should ensure that 26 GHz rights of use are assigned to those bidders who most value same and who are therefore best placed to maximise consumer welfare (by using their assigned rights of use efficiently).
- An auction should ensure that none of the bidders are dissatisfied with the outcome, as this could delay roll-out of new backhaul services and have a negative impact on the maintenance of current backhaul.
- An auction should create a better incentive for winning bidders to return, to ComReg, any 26 GHz rights of use that are unused. This is because the prices paid for such rights of use (annual licence fees) would have been set by the market and, provided that those prices are not insignificant, holders of the rights of use should have an incentive to return any rights that they do not need.

3.116 In light of the above likely benefits to consumers, ComReg remains of the preliminary view that consumers would likely prefer Option 2, an auction, over Option 1, an administrative assignment.

Preferred Option (RIA step 5)

3.117 The above assessment considers the likely impact of Options 1 and 2 from the perspective of industry stakeholders and considering the likely impacts of both options on competition and consumers. In summary, ComReg considers that incumbents would likely prefer a version of Option 1 in which some of the 26 GHz band is reserved for incumbents, whilst new entrants would likely prefer a version of Option 1 in which some of the 26 GHz band is reserved for new entrants. ComReg considers that while both versions of Option 1 might be in the best interests of particular stakeholders, neither is likely to be in the best interests of competition and consumers.

3.118 Furthermore, it seems likely that all stakeholders would prefer Option 2, a competitive award, over Option 1, an administrative assignment to specified stakeholders other than themselves. Option 2 also appears to be the best form of award by which to promote competition amongst bidders for the available 26 GHz rights of use, which in turn should promote competition in the downstream retail market, all to the ultimate benefit of consumers.

3.119 ComReg therefore remains of the preliminary view, as expressed in Consultation 17/85, that the new rights of use in the portion of the 26 GHz band at issue should be assigned by auction – this is the “Preferred Option”.

3.4 Assessment of preferred option against ComReg's statutory functions, objectives and duties

3.120 This RIA identifies and considers 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). This RIA also analyses the extent to which those various options would facilitate ComReg to meet its statutory remit in managing the 26 GHz band. This includes, in particular, analysing the extent to which the various options would promote competition and ensure that there is no distortion or restriction of competition in the electronic communications sector, whilst also encouraging efficient investment in infrastructure, promoting innovation, and ensuring the efficient use and effective management of the 26 GHz band. Acting in accordance with these objectives should best enable ComReg to ensure that end users derive maximum benefit in terms of choice, price and quality.

3.121 In this section, ComReg assesses the Preferred Option against the statutory provisions relating to spectrum management (see Annex 1). Those provisions are not exhaustively set out herein. In summary, ComReg's statutory function is to manage the national radio spectrum resource and its objectives, in doing so, are to promote competition, to contribute to the development of the internal market, to promote the interests of users within the Community, and to ensure the efficient use and effective management of spectrum. ComReg is also required to take measures towards the achievement of its objectives but must also have regard to certain regulatory principles. Specifically, its measures must be justified, transparent, non-discrimination, and proportionate.

Promotion of Competition

3.122 One of ComReg's statutory objectives, set out in section 12 of the 2002 Act, is to promote competition by, amongst 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.[78]

3.123 Other statutory provisions also require ComReg to promote and safeguard competition in the electronic communications sector:

- Regulation 16(2) of the Framework Regulations requires ComReg to apply objective, transparent, non-discriminatory and proportionate regulatory principles by safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure based competition;
- Regulation 9(11) of the Authorisation Regulations 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) 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) requires ComReg to focus on the promotion of competition as a key objective, including the promotion of new entry.

3.124 ComReg remains of the preliminary view that the Preferred Option would best safeguard and promote competition. In particular, it should maximise competition during the assignment process and in downstream retail markets by facilitating the assignment of 26 GHz National Block Licences in line with the requirement for nationwide fixed P2P links. In identifying the Preferred Option, ComReg applied objective, transparent, non-discriminatory and proportionate criteria and principles. ComReg is also of the view that, in identifying the Preferred Option, it has complied with the obligations contained in the above statutory provisions and the General Policy Direction on Competition (No. 1 of 2 April 2004).

3.125 ComReg also considers that the alternative option – an administrative assignment of new 26 GHz rights of use - would not achieve its objectives concerning competition to the same extent as the Preferred Option. In particular, ComReg notes DotEcon's observations that an administrative assignment may fail to ensure an efficient outcome, should demand for the 26 GHz rights of use exceed supply.

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

Contributing to the development of the Internal Market

3.126 ComReg considers the following factors to be particularly relevant to its statutory objective to contribute to the development of the Internal Market, in the context of this award process:

- The Preferred Option should best promote harmonisation of the use of spectrum across the EU, consistent with the need to ensure its effective and efficient use and in pursuit of consumer benefits such as increased economies of scale and improved interoperability of services, having regard to relevant decisions and measures adopted by the European Commission in accordance with the Radio Spectrum Decision[79] (Regulation 17 of the Framework Regulations);
- The Preferred Option should best support the establishment and development of trans-European networks and the interoperability of pan-European services, in particular by facilitating, or at the very least by not distorting or restricting, entry into the Irish mobile market by undertakings from other EU Member States; and
- In selecting the Preferred Option, and in order to ensure the development of consistent regulatory practice and the consistent application of EU law, ComReg has had due regard to the views of the European Commission, BEREC and other EU Member States.

Promoting harmonised use of radio frequency spectrum across the EU

3.127 The 26 GHz band has not been harmonised at EU level[80] and therefore issues of promoting harmonisation do not currently arise. However, the broader 26 GHz band may become harmonised in future and ComReg has considered that possibility and its views on the same in Chapter 2.

3.128 ComReg thus remains of the preliminary view that the Preferred Option is based on current known facts and makes suitable allowance for future events as may occur. The Preferred Option should provide for the effective management of the 26 GHz band, now and for the foreseeable future, by assigning new 26 GHz rights of use for the provision of P2P links.

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

3.129 ComReg notes the overlap between this objective and the objective to promote competition. Encouraging the establishment and development of trans-European networks requires that operators from other Member States, who seek to develop such networks, are given a fair and reasonable opportunity to obtain and/or use

[79] 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.

[80] The 26 GHz Band is, however, harmonized at a CEPT level for both fixed and mobile services

all requisite spectrum. ComReg considers that any regulatory measure which failed to encourage (or which actively discourages) the establishment and development of trans-European networks, or which would otherwise unfairly discriminated against potential new entrants, would not meet the objective at issue. ComReg, in this regard, considers that an administrative assignment of 26 GHz rights of use to incumbents could fail to encourage, or could actively discourage, the establishment and development of trans-European networks.

3.130 ComReg also refers to its above reasoning as to why the Preferred Option, an auction, is likely to be preferred by potential new entrants, as opposed to an administrative assignment that is more likely to favour incumbents simply by virtue of their incumbency. The Preferred Option should not act as a disincentive for potential participation by undertakings from other Member States.

Promoting the development of consistent regulatory practice and the consistent application of EU Law

3.131 ComReg continues to cooperate with other National Regulatory Authorities ('NRAs) and to closely monitor developments in other Member States, to ensure that its regulatory practice and implementation of the EC of the Common Regulatory Framework is generally consistent with comparable jurisdictions.

3.132 For example, ComReg has had regard to international developments in the following areas: promoting the provision of wireless broadband (WBB) services; harmonising equipment standards for the 26 GHz and other candidate bands; durations of 26 GHz rights of use; and fees for 26 GHz rights of use.

3.133 ComReg will continue to note relevant international developments during this consultation. At present, ComReg considers that the Preferred Option is consistent with approaches taken in comparable jurisdictions.

Promote the interest of the users within the Community

3.134 The likely impact of the Preferred Option and of the other identified option (administrative assignment) on users, generally and in the context of ComReg's objective to promote competition, has been considered earlier in this RIA and is not considered in any further detail in this section.

3.135 ComReg also observes that most of the measures set out in section 12(2) (c) of the 2002 Act, aimed at promoting the interests of users, relate to consumer protection more than to spectrum management.

Efficient use and effective management of spectrum

3.136 Section 10 of the 2002 Act requires ComReg to manage spectrum in accordance with any Ministerial Policy Direction No. 11 of 21 February 2003, issued under section 13 of the 2002 Act. Policy Direction No.11 requires ComReg

to ensure that, in managing spectrum, it takes account of the interests of all users of spectrum, including commercial and non-commercial users. Also, in pursuing its objective to promote competition ComReg must take all reasonable measures to encourage efficient use and ensure effective management of spectrum.

3.137 Further, section 12(3) of the 2002 Act also requires that all measures by ComReg, including any measure related to managing spectrum, be proportionate, and regulation 9(11) of the Authorisation Regulations requires ComReg to ensure that spectrum is used efficiently and effectively having regard to section 12(2)(a) of the 2002 Act and regulations 16(1) and 17(1) of the Framework Regulations.

3.138 In relation to Policy Direction No.11, this draft RIA seeks to take into account the interests of all current and potential users of the 26 GHz spectrum, commercial and non-commercial. ComReg is of the view that the Preferred Option would best safeguard and promote those interests.

3.139 Based on this draft RIA, ComReg remains of the preliminary view that the Preferred Option would best encourage the efficient use of the 26 GHz band and, in particular, the portion of the 26 GHz band in which new rights of use would be assigned. In particular, there is likely to be a continued reliance on that portion of the 26 GHz band for P2P links for the foreseeable future. Assignment of new 26 GHz rights of use for P2P links should provide certainty that that portion of the 26 GHz band will be available for P2P links use for at least 10 more years, at which point demand for the band and its potential uses can be considered afresh. As also noted above, the Preferred Option should also remove any risks relating to uncertainty as to possible future harmonisation of the 26 GHz band for advanced mobile services.

3.140 The Preferred Option also appears to be the best measure by which to facilitate new entry and encourage efficient use of the 26 GHz band. This is because an auction, subject to reasonable features in its design such as competition caps, should ensure that the undertakings who obtain the new 26 GHz rights of use are those who most value those rights, and who are therefore those most likely to use those rights efficiently.

3.141 ComReg therefore remains of the preliminary view that the Preferred Option best accords with its statutory objectives in managing the 26 GHz band and that by pursuing the alternative option, an administrative assignment, ComReg would be likely to fail to meet some or all of its relevant statutory objectives.

Regulatory principles

3.142 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:

- 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
- 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

3.143 ComReg generally has regard to the requirement for predictability in managing spectrum though this requirement must always be weighed against all relevant factors, some of which may necessitate measures which are less predictable or which are not predictable. ComReg has had regard to the requirement for predictability in its consideration of how best to reassign the 26 GHz band, as illustrated below.

3.144 ComReg considers that regulatory predictability in relation to spectrum is best promoted by having an open, transparent, and non-discriminatory process for assigning new spectrum rights of use. ComReg also considers that, to the extent possible, it is best to take an approach to assigning new 26 GHz rights of use that is similar to that taken in the 2012 MBSA (800, 900, and 1800 MHz bands) and in the 2017 auction of 3.6 GHz rights of use. Both of those auctions were successfully completed to the general satisfaction of all participants.

3.145 ComReg notes that the Preferred Option would ensure that the future assignment of rights of use in the portion of the 26 GHz band at issue would be known as soon as is possible. This should result in utmost transparency and predictability, in terms of interested parties being aware of the availability of 26 GHz rights of use.

3.146 ComReg remains of the preliminary view that the alternative option, an administrative assignment, would be unlikely to promote regulatory predictability due to the previously described inherent uncertainties in administratively determining key parameters of spectrum assignments.

3.147 In that regard, network operators in Ireland (post MBSA) and further afield are becoming increasingly familiar with competitive auctions and the use of an auction on this occasion should therefore contribute to regulatory predictability. The Preferred Option would also represent the first occasion in which spectrum

rights of use, assigned on foot of an auction, would be reassigned on foot of an auction.

3.148 In addition, ComReg remains of the preliminary view that the Preferred Option should:

- incorporate appropriate competition caps in order to provide access to 26 GHz spectrum that can be used to provide fixed links while avoiding extreme outcomes; and
- better minimise the risk of award participants failing to win their desired 26 GHz rights of use for reasons other than competitive process within the award.

3.149 In light of the above, ComReg remains of the preliminary view that the Preferred Option, an auction, should best accords with the regulatory principle of promoting regulatory predictability.

Promoting efficient investment and innovation in New and Enhanced Infrastructures

3.150 ComReg remains of the preliminary view that the Preferred Option is consistent with this regulatory principle in that it should:

- facilitate a competitive release of the portion of the 26 GHz band at issue for fixed links at the earliest possible opportunity, thus ensuring that the winners of the new 26 GHz rights of use are appropriately incentivised to invest in new technologies and infrastructures and plan ahead in relation to the provision of backhaul;
- provide clarity as to how ComReg will address the possible future availability of the 26 GHz band for new mobile services;
- enable auction participants to bid according to their respective valuations of available the 26 GHz rights of use, based on their own business plans and market and financial positions, which should in turn result in efficient investment and/or innovation in fixed links.

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

3.151 ComReg is required to be objective, transparent, non-discriminatory, and proportionate in the exercise of its statutory functions under the Common Regulatory Framework.

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

- Regulation 11(2) of the Authorisation Regulations requires ComReg to grants rights of use for radio frequencies on the basis of selection criteria which are objective, transparent, non-discriminatory and proportionate; and

- Regulation 16(2) of the Framework Regulations requires ComReg 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.

3.153 ComReg at all times seeks to take account of and act in accordance with the above guiding principles of Irish and EU law.

3.154 ComReg, having had regard to the applicable statutory provisions, its RIA and other analyses, the advice of its external consultants, and all other relevant material, remains of the preliminary view that the Preferred Option would be an objectively justified, transparent, proportionate and non-discriminatory regulatory measure by which to assign new rights of use in the portion of the 26 GHz band at issue, of 10 years duration and for the purposes of deploying and operating P2P links.

4 Spectrum Award Details

4.1 Introduction

4.1 In Document 17/85, ComReg consulted on a number of auction formats and various design elements. This chapter sets out ComReg's unchanged preliminary view on certain spectrum award details and what would be the most appropriate award type and format, specifically as to the following:

- preferred auction format;
- frequency generic and frequency specific lots;
- packaging of available spectrum;
- competition caps;
- unsold lots;
- fees;
- licence duration; and
- PMP V P2P

4.2 The above matters have also been considered by ComReg's economic advisors, DotEcon, in Document 17/85a, and ComReg has had regard to the views expressed by DotEcon in forming its preliminary views as set out herein.

4.3 Chapter 4 of Document 17/85 set out ComReg's preliminary views on the current Point-to-Point (P2P) vs Point-to-Multipoint (PMP) use within the 26 GHz band.

4.4 ComReg did not receive any submissions from interested parties on four other proposed aspects of the award, set out in Chapter 4 of Document 17/85[81], and ComReg has not received any new information from other sources on those proposed aspects as to cause ComReg to alter its preliminary views. ComReg's preliminary views on those four aspects of award, as previously expressed in Document 17/85, are therefore unchanged.

[81] These are:
i). the current band plan and frequency arrangements within the portion of the 26 GHz band at issue and its current use;
ii). the relative advantages and disadvantages of Frequency Division Duplexing (FDD) and Time Division Duplexing (TDD) and why ComReg proposed that the new 26 GHz National Block Licences should permit FDD only;

4.2 Preferred auction format

ComReg's position in Document 17/85

4.5 In Chapter 5 of Document 17/85, ComReg identified and examined a number of potential formats for awarding new 26 GHz rights of use:

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

4.6 ComReg identified a number of risks[82] associated with this award process and assessed the extent to which certain auction formats would best mitigate those risks while also ensuring that the new rights of use in the portion of the 26 GHz band at issue are acquired by those users who most value them, and who bid accordingly.

4.7 In that consultation, ComReg was of the preliminary view that a Sealed Bid Combinatorial Auction (SBCA) format would be best suited to address such risks, for the following reasons:

- an SBCA is very quick to implement and requires only one stage to determine the winning bidders[83] (it also provides for an additional assignment stage, if necessary, to award specific frequencies) specific lots);
- the SBCA bidding process is comparatively simple and is unlikely to require any detailed bidder training, thus reducing implementation and preparation costs; and
- an SBCA is the auction format that is least vulnerable to strategic behaviour, especially tacit collusion, as bidders cannot observe and react to each other's behaviour over multiple rounds.

iii). current block sizes within the 26 GHz band;
iv). why ComReg proposed not to set any external Guard bands between adjacent National Block Licences and not to set a guard band between the FWALA and P2P licences;

[82] Aggregation risks, inefficiently unsold lots, gaming and complexity.

[83] ComReg noted that a CCA or CMRA would likely result in the efficient assignment of the radio spectrum and would be a suitable format in that regard, however both these formats are more complex and would require more time to complete than a SBCA.

4.8 ComReg further proposed that the SBCA use a 'second price rule'. This would require each individual winning bidder to pay at least its own opportunity cost and require every possible subset of winning bidders to pay their joint opportunity costs (i.e. the value denied to other bidders from the lots assigned to that group of winners). This approach would be an update to the pricing mechanism used in the 2008 26 GHz award and would be in line with the approach taken in other recent auctions (2012 MBSA and 2017 3.6 GHz auction).

Views of respondents

4.9 Eir agrees with the proposed use of a SBCA for granting new rights of use in the portion of the 26 GHz band at issue.

4.10 Vodafone submits that a SBCA worked well in 2008 but Vodafone's large investment in radio links in the 26 GHz band now creates issues with a SBCA format, in that there would be a reluctance to approve a bid that reflected, in its view, the artificially high value for 26 GHz rights of use at issue. [84] Vodafone suggests an alternative approach in which a preliminary round, that seeks bids at the minimum price, would enable bidders to have some information on demand and to bid accordingly, should a second round be required. In this regard, Vodafone preferred auction format is a Simple Clock Auction (SCA) followed by a process to automatically assign frequencies as close as possible to incumbents' current assignments.

4.11 The remaining respondents did not express any views on the proposed auction format.

ComReg's response and position

4.12 ComReg notes that Eir agrees with the proposed use of a SBCA. Vodafone's submissions are considered below.

Artificial high value for 26 GHz spectrum

4.13 ComReg does not agree with Vodafone's submission that "*there will be a reluctance to approve a bid reflecting this artificial high value for 26 GHz spectrum",* for the reasons set out below.

4.14 Bids that reflect each bidder's valuation of the preferred lots would not be likely to lead to an artificially high spectrum benchmark. In particular, the amount of each bid submitted in the course of the proposed SBCA would be confidential

[84] In particular, "*The current value to us is the cost of replacing this investment, creating a much higher value than the green field situation. From a Vodafone Group point of view, there will be a reluctance to approve a bid reflecting this artificial high value for 26 GHz spectrum, which potentially could become a benchmark for future auction in other countries*".

(i.e. it would be known only to the bidder concerned and not other bidders) and so it could not be used in any future benchmarking exercise. All that would be revealed, as to the amount of any winning bid, is that it must have exceeded the opportunity cost of assigning that winning bidder the lots which it won, but the exact amount of the difference between any winning bid and the associated opportunity cost would not be publicly available. Moreover, it is the prices resulting from an auction that are used by ComReg for any benchmarking exercises and under the proposed second-price rule for the 26 GHz SBCA, prices would be determined predominantly on the basis of the competition faced by winning bidders, and not their bid amounts.

4.15 In addition, if any bidder was to submit bids that did not reflect its true valuation of the lots which it sought to acquire then, in doing so, that bidder would risk an outcome that would not be in its best interests (i.e. failing to acquire any lots or as many lots as it wished to acquire) when a more favourable solution would have been more likely, had it made bids that reflected its true valuation.

4.16 Finally, where demand for spectrum does not exceed supply (as Vodafone submits is the case, in this instance) generic spectrum would be assigned to bidders in the proposed SBCA at the reserve price. Vodafone, in this regard, has not expressed any concerns as to proposed level of the minimum prices in the award.

Preliminary open round

4.17 In relation to Vodafone's submission that there should be an auction that includes an open stage, ComReg agrees with DotEcon that there would be no particular benefit in having an open stage as common value uncertainty would be likely to be limited and the structure of the 26 GHz band is relatively simple. In particular, while an open stage provides for price discovery, in this case, common value uncertainty is not expected to be a central concern.

4.18 Common value uncertainty typically arises where different bidders place similar valuation on the lots on offer due to common factors (such as likely demand development, equipment availability, commercial viability etc.). However, this is also subject to uncertainty as bidders must form expectations as to how these various common factors will develop. However, given that ComReg proposes that the 26 GHz rights of use at issue would be made available for fixed P2P links only, there should be relatively little uncertainty amongst bidders as to how these common factors will develop, given their experience during the 10 years of the current licences. In addition, idiosyncratic differences in value across bidders (e.g. due to different business models and uses, or different starting points in the case of incumbents vs new entrants) will likely mask any source of common value uncertainty, meaning an open stage would be unlikely to offer significant price discovery benefits.

4.19 Finally, and as considered in more detail in Section 5.2.2 of Document 17/85 and in Document 17/85a, DotEcon considers that there would be a higher risk of unsold lots under an SCA.[85]

Automatic assignment of frequencies.

4.20 Vodafone submits that the auction format should be one in which winning bidders who are also incumbents would be assigned new frequencies close to their current frequency assignments. ComReg considers that such an approach would restrict the range of frequencies that could be made available to new entrants (See Section 3.2) while DotEcon considers[86] that such an approach would be impractical for the following reasons:

- the individual licensees' migration costs and the weight of interest amongst competing parties is not known (for example, where one of two incumbent licensees might need to move);
- requesting statements of migration costs as inputs into an administrative frequency allocation rule would create a clear incentive for incumbent licensees to overstate such costs since, in contrast to a competitive auction process for frequency assignment, there would be no financial consequences from those statements; and
- it would be unfair to parties who wish to acquire spectrum (either new licensees entrants or incumbent licensees wanting more spectrum).

4.21 ComReg agrees with DotEcon's views as outlined above and thus remains of the preliminary view that an SBCA would be the best option for assigning new rights of use in the portion of the 26 GHz band at issue.

4.22 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.

[85] See also DotEcon Report (Document 17/85a).
[86] DotEcon Report, p18-19.

4.3 Frequency generic or frequency specific lots

ComReg's position in Document 17/85

4.23 ComReg previously noted that a frequency-generic approach could give bidders the problem of having to value generic lots but without knowing what retuning might be required, if specific frequencies were subsequently assigned. However, as against that, a frequency-specific approach[87] would be likely to increase the possibilities for exclusionary bidding – i.e. deliberately limiting one's frequency-specific bids in an attempt to fragment the band, so as to exclude rival bidders.

4.24 In Document 17/85, ComReg expressed its agreement with DotEcon that a frequency-specific approach should only be used where a clear need has been demonstrated. In that regard, ComReg requested detailed information[88] from interested parties on issues relating to any possible need to retune equipment and stated that it would make a final determination, as to whether to use frequency-generic or frequency-specific lots, following its assessment of such information together with any other advice received.

Views of respondents

4.25 Eir has no strong preference as to whether the auction be conducted in two stages (frequency-generic assessment stage followed by an assignment stage) or in a single stage with frequency specific lots.

4.26 Vodafone provided ComReg with its estimates of retuning costs which in summary are as follows:

[redacted]

[87] A further risk was that Bidders might fail to make a sufficient number of bids, only bidding for a limited number of frequency options leading to an inefficient outcome. However, this is relatively easily dealt with through the use of a particular bidding format.

[88] See Para 231 of Document 17/85.

[redacted]

4.27 Vodafone proposes an auction format in which incumbent winning bidders would automatically be assigned frequencies that are as close as possible to their current frequency assignments.

4.28 Three also provided certain information in relation to retuning costs:

- Three stated that it currently uses equipment from two vendors in the 26 GHz band, Huawei and Ceragon, with two different models of the Ceragon link set in use.

4.29 Three submits that the cost of retuning existing equipment (where possible) would be comparable to the cost of replacing that equipment entirely. Three is therefore of the view that it would be preferable to replace such equipment rather than retune it. For this reason, Three submits that a frequency-generic auction with a separate assignment stage could deliver a sub-optimal outcome and the auction should use a single stage frequency-specific approach.

4.30 Imagine estimates the cost of replacing its national links as "*thousands of euro in hardware costs alone*".

4.31 The respondents did not provide all of the information which ComReg requested in Document 17/85 concerning any possible retuning and/or replacing of equipment and the cost of same. No respondent provided:

- an estimate of the total number of man-hours that would be required to upgrade and/or replace equipment or the applicable hourly rate/s and total cost (total man-hours x hourly rate/s = total cost);
- details of any similar costs previously incurred by respondents in having to retune or replace equipment;
- an estimate of costs likely to be incurred in having to pay third parties such as equipment vendors or independent contractors;
- an assessment of the technical capabilities of transmitter equipment provided by third parties, such as equipment vendors or independent contractors.

ComReg's response and position

4.32 ComReg engaged directly with certain equipment manufacturers in order to ascertain whether the information provided by respondents was sufficient to inform its decision-making. On foot of information received, ComReg considers that the cost of having to retune or replace equipment would depend on a number of factors including the specific equipment used, the tuning range of the equipment, and whether a site visit by an engineer would be required in order to retune the links (as opposed to retuning them remotely). ComReg is generally satisfied as to the following:

- Current equipment in the 26 GHz band is generally tuneable within the sub-bands defined by different equipment manufacturers;[94]
- depending on the make/model of equipment, there can be up to 3 distinct tuning ranges that can cover the 26 GHz band;
- Equipment in the 26 GHz band can be retuned remotely with no site visits required where any movement is close to an existing frequency (e.g. a minimum of one block above or below and existing position) and depending on the make / model of equipment at a specific link; and

[94] While the exact range of these sub-bands is not standardised across equipment manufacturers, it typically corresponds with the lower half and top half of the 26 GHz band.

- Vodafone's estimate of the costs of having to retune to a different sub-band [redacted] is reasonable.

4.33 In considering an assignment approach, DotEcon advises that a balance should be struck between:

(i). providing opportunities for reallocation of the available spectrum for new entry; and

(ii). avoiding unnecessary migration costs for existing users needing to change frequencies.

4.34 In particular, and as observed by DotEcon, some moving costs may be necessary and efficient[95] to ensure that other bidders can receive contiguous frequency assignments. While unnecessary migration costs should be avoided where possible, it is also important to ensure, in the interests of openness, transparency and non-discrimination, that incumbent licensees are not given spectrum rights of use that continue beyond the expiry dates for same. This includes that incumbents do not have any right or entitlement to retain specific blocks where this would or could constitute a significant advantage to such incumbents and/or a corresponding disadvantage to potential new entrants who wish to obtain blocks / contiguous blocks (or, indeed, to any other incumbent who wishes to obtain more blocks and/or contiguous blocks).

4.35 DotEcon, having regard to incumbents licensees' current positions in the portion of the 26 GHz band at issue, expects that the need for frequency migration in practice is rather limited[96] – i.e. large-scale changes in frequency assignments, for incumbent licensees who retain generic spectrum holdings, are unlikely to arise. DotEcon considers that in most plausible scenarios, it should be possible for those incumbent licensees who hold the most blocks (Three and Vodafone) to retain at least some of their existing frequencies and, in any case, it should be possible for all incumbent licensees to obtain blocks fairly close to their existing holdings.

4.36 DotEcon's view is informed by the fact that the need for any incumbent licensee to move frequencies in order to accommodate a new entrant and/or other incumbent users is limited. In forming its view, DotEcon considered worst case scenarios by enumerating all possible configurations of the 19 available blocks (based on a 5-block and 4 block cap) where an incumbent licensee retains its current number of blocks.

4.37 Figure 3 shows the worst-case frequency assignment options available to each incumbent licensee in a frequency-generic award where all 19 blocks were

[95] DotEcon Report, p19.
[96] DotEcon Report, p19.

assigned, and if it were to retain the same number of blocks as currently assigned.

Operator	Max movement (up)	Max movement (down)
Vodafone	2	3
Three	1	1
BT	1	2
Irish Broadband	1	2

Figure 3: Maximum required movement per operator

4.38 In addition, DotEcon observes that:

- even if all incumbent licensees were to retain their existing number of blocks it would still be possible to consolidate all unassigned blocks by shifting an incumbent licensee by no more than three blocks;
- additional users (e.g. new entrants) can also be accommodated under certain scenarios without requiring incumbent licensees to move from their existing blocks, because there are four unused contiguous blocks;
- if any incumbent licensee does not retain all of its current blocks (for example, if Three was to reduce its block holding from five to four) this would create further opportunities to meet new demand without incumbent licensees having to move from their existing blocks; and
- where demand for the available 26 GHz rights of use does not exceed supply, further options would be available for incumbent licensees to remain within their existing blocks.

4.39 Finally, DotEcon notes that its analysis of worst case scenarios above does not imply that there is a guarantee that an operator will not move frequencies by more blocks than specified above but that an incumbent licensee will only have the option to bid for frequency ranges that are within a certain number of blocks away from that licensee's existing blocks. The final frequency assignments, and the extent to which incumbent licensees may have to move within the 26 GHz sub-band, would be determined based on bids submitted in the proposed SBCA..

4.40 In light of the information provided by respondents and the assessment of DotEcon, there are three relevant issues: (a) retuning to a different sub-band[97]; (b) retuning within the sub-band; and (c) pricing implications. These issues are addressed in turn below.

(a) Retuning to a different sub-band

4.41 It does not appear likely that the frequency assignments would change substantially, such that any incumbent licensee would be required to move to a different sub-band. In addition, the information provided by respondents indicates that incumbent licensees should not have any incentive to be assigned spectrum in a different sub band (i.e. blocks that are significantly different from their existing positions) given their estimated costs of having to retune to a different sub-band.

4.42 Provided that an incumbent licensee makes a bid that reflects its valuation of the block/s which it wishes to re-acquire / retain, in its preferred position, it is considered unlikely that any other bidder (new entrant or other incumbent) would place a higher valuation on those same block/s (existing or overlapping). As a consequence, an incumbent licensee should reflect its value for blocks that coincide with and/or are nearest to its preferred position which would mean it would that retuning to a different sub-band is unlikely to arise.[98] An alternative bidder can either be an incumbent or a new entrant to the band. In that regard:

- all incumbent licensees should have the same strong incentive to stay as close as possible to their existing location and value those existing / nearby blocks accordingly and bid accordingly; and

- a new entrant would have to bid more than an incumbent licensee in order to obtain that incumbent licensee's existing blocks; however, blocks that should be equally preferable to a new entrant would likely be available and at lower cost given that currently unassigned spectrum would not have any retuning value associated with it. .

4.43 In that regard, ComReg agrees with DotEcon's conclusion that "[*it*] *would be reasonable for an existing user who won frequency-generic lots to assume that it would be likely to win back a frequency assignment that allowed retuning, rather than needing equipment replacement*".[99]

[97] The sub-band refers to a portion of the available spectrum (i.e. upper and lower part of the band). For example, the exact reference point for different sub-bands is determined by the tuning ranges of different manufacturers.

[98] ComReg notes that the set of winning bidders will be determined by selecting the combination of bids that has the greatest total value. This may include an incumbents highest bid for a set of frequencies in which case it could remain in its existing position. Alternatively, given the value expressed by other bidders it may be required to move its existing position such that its final frequency assignment overlaps with its previous position.

[99] DotEcon report, p23.

4.44 Therefore, ComReg is of the preliminary view that any of the frequency assignments that are likely to emerge from the proposed SBCA would be unlikely to require any incumbent licensee to retune to a different sub-band.

(b) Within sub-bands

4.45 Certain retuning may be required within the 26 GHz sub-bands depending on the number of winning bidders and the extent to which incumbent licensees retain their existing number of blocks. As described above, it is likely that the costs to incumbent licensees who acquire blocks other than their existing blocks would be limited to retuning (again noting that in certain cases it could prove possible to assign the same blocks to incumbents in which case no retuning occurs or else to assign nearby blocks). DotEcon set out in detail the extent to which winning bidders would be offered assignment options close to their existing blocks.

4.46 In relation to Vodafone, the worst-case scenario (i.e. the scenario that would not offer assignment options corresponding to their current frequency position) would require Vodafone to either move up two blocks to the band edge, or move down at most three blocks [redacted] Further, this worst-case scenario would only arise where Vodafone retained 4 blocks and 3 bidders other than Vodafone were assigned 5 blocks each. As noted by DotEcon, "*this worst-case scenario for Vodafone occurs only in the somewhat implausible situation where three other winners have won five blocks each, and arises because of the need to "claw back" the two blocks above Vodafone's existing holdings in order to assign the other winners contiguous frequencies*."[100]

4.47 All remaining scenarios and the required assignment of other bidders would require a maximum retuning of two blocks in one direction. (See Annex 1 of DotEcon Report).

4.48 Vodafone did not provide any information on the extent to which retuning within the sub-band can achieved remotely, as identified by Three. However, Vodafone estimates that retuning within the sub-band would cost [redacted] ComReg is of the view that if such retuning costs were incurred, as a result of certain movements within the sub-band being required, then the quantum of such costs would not be especially large relative to the likely market value of the 26 GHz rights of use being acquired. The quantum of such costs as may be incurred (though only in certain scenarios which may not arise) would appear proportionate to the objective of having a spectrum competition that is open, transparent, and non-discriminatory and that provides opportunities for all participants, incumbents and new entrants.

4.49 Three did not provide any estimates of the costs of retuning within the sub-band, nor did it not provide any information in support of its submission that the cost of

[100] DotEcon Report, p20.

retuning beyond one block would be comparable to the cost of replacing the equipment entirely. In any event, even in a worst case scenario the maximum required movement would be to shift one block up or down from its current position and Three would have the option to bid for such a nearby frequency position. In addition, such a worst case scenario would only arise if all remaining winning bidders were assigned no more than 3 blocks, which is unlikely. If any bidder was assigned four blocks, as is more likely, then Three would have the option to compete for its existing frequency position.

(c) Pricing

4.50 Under a frequency-generic approach, incumbent licensees would be unlikely to pay a price significantly higher than would be the case under a frequency-specific approach since the final price paid is determined by competition from other bidders (best losers) rather than the specific bids of the winning bidders regardless of the assignment approach. As noted by DotEcon "(*assuming no strategic bidding) we would not expect the total prices to be paid by existing licensees to be substantially different under a frequency-generic or frequency-specific approach*."[101]

4.51 Finally, and as noted by DotEcon, the use of frequency-specific lots would raise the following concerns:

- Incumbent licensees would have strategies available by which to attempt to fragment currently unassigned 26 GHz rights of use, in an effort to exclude new demand (e.g. new entrants) given the need for contiguous frequency assignments; and
- it might be possible for a bidder to make price-driving bids intended to increase the price paid by an incumbent licensee (if that bidder knows that the incumbent licensee would face a relatively significant cost due to the need for new equipment).

4.52 For the above reasons, ComReg is of the preliminary view that a clear need for a frequency-specific approach has not been established and agrees with DotEcon that a frequency-generic award is most appropriate for award new rights of use in the portion of the 26 GHz band at issue.

[101] DotEcon report, p23.

4.4 Packaging of available spectrum

ComReg's position in Document 17/85

4.53 In Document 17/85, ComReg expressed its preliminary view that 2 × 28 MHz was an appropriate minimum lot size to accommodate technologically-neutral use for P2P links on a national basis.

Views of respondents

4.54 Eir agrees with ComReg's proposal to package the spectrum as 19 national block licences of 2 × 28 MHz size.

ComReg's response and position

4.55 Eir was the only respondent to comment on this issue and it supports the proposed packaging of spectrum. ComReg remains of the preliminary view that 2 × 28 MHz is an appropriate minimum lot size.

4.5 Competition Caps

ComReg's position in Document 17/85

4.56 In Document 17/85, ComReg expressed its preliminary view that a competition cap of five blocks is appropriate for the proposed SBCA because:

- it would better allow bidders to obtain sufficiently large contiguous blocks of spectrum to meet likely future requirements and would not unduly restrict the range of demand that could be expressed in the proposed auction;
- it would allow for a minimum of four winners winning at least four lots each (which is useable with commodity equipment);
- it would better ensure the efficient use of the 26 GHz rights of use at issue by minimising the potential for lots to be stranded and therefore unused; and
- DotEcon considers that setting a competition cap at five blocks would not appear unduly restrictive.

Views of respondents

4.57 Eir submits that there appears to be an inconsistency between the proposed competition cap of five blocks and the technical maximum channel bandwidth of 112 MHz, which equates to four blocks. Eir further submits that the proposed maximum channel bandwidth is adequate and that ComReg's duty to promote

efficient use of the spectrum would be better served by a spectrum cap of four blocks.

4.58 Imagine submits that a competition cap should ensure that there an adequate number of winners to satisfy the different potential use cases for the 26 GHz rights of use at issue, while also protecting incumbent licensees and offering opportunity for new entrants. Imagine further submits that demand in the other pioneer bands for 5G indicates that it is likely that mobile and non-mobile operators will be very interested in the 26 GHz rights of use at issue and, therefore, a competition cap should be set at a level that would allow for at least six winners.

ComReg's assessment

4.59 In Document 17/85a, DotEcon expressed its view that a lower competition cap of four blocks would require clear justification, given that Three already holds five blocks from the 2008 award. In that regard, DotEcon considers Eir's proposal for a competition cap of four blocks to be reasonable, given that the efficient deployment of P2P links using current technology can be provided using a maximum bandwidth of 112 MHz. Further, a competition cap of four blocks could further reduce the likelihood of incumbent winning bidders being offered frequency assignments that differ from their existing frequency positions.

4.60 However DotEcon is of the view that, in practice, the outcome of the award is unlikely to be affected regardless of whether the competition cap is four blocks or five blocks, given that a number of respondents expect that there will be a competition amongst bidders for the available 26 GHz rights of use, and the fact that Three is currently utilising all five of its currently licensed blocks.

4.61 ComReg agrees with DotEcon and notes that a competition cap of four has some merit. As set out in Document 17/85, a maximum bandwidth of 112 MHz would be adequate to meet current and future requirements. In that regard, five blocks may not be required by any bidder. However, ComReg notes that:

- A maximum bandwidth of 112 MHz is a technical specification relating to the maximum bandwidth between the two ends of a fixed link. An operator with five blocks would be free to deploy links in any of the blocks (as Three currently does) so long as none of the links exceeded the maximum bandwidth;
- Having a fifth block would provide an increased range of frequencies within which an operator could deploy fixed links;

- A competition cap of four blocks would restrict the range of demand that could be expressed (given that Three already has five blocks from the 2008 award) and such a restriction is not likely to be proportionate to the risk of competitive distortions;
- A competition cap of five blocks would be unlikely to affect the award outcome or create competition concerns; and
- A competition cap of five blocks would be better able to account for any future technological developments that may require five blocks.

4.62 In response to Imagine's submission, a competition cap that allowed for at least six winners would have to be set at three blocks (i.e. six winners of three blocks each plus a seventh winner of one block). In such a scenario, the single block could go inefficiently unsold, given the importance of contiguous blocks for some, though not all, potential bidders. Also, DotEcon notes that a three-block cap would require that there be at least seven bidders for a competitive auction and having that number of bidders is not necessary to protect competition in any downstream market.

4.63 A three-block competition cap would also result in two incumbent licensees (Vodafone and Three) having to reduce their current holdings. Further, and as noted by DotEcon, "*a 3-block cap would preclude the use of four contiguous blocks together to provide high capacity fixed links, which would significantly restrict usage possibility*"[102]. ComReg agrees and considers that a three-block competition cap would not be optimal to promote the efficient use of spectrum.

4.64 Therefore, ComReg, on balance, remains of the preliminary view that a competition cap of five blocks is most appropriate for this award.

4.6 Unsold lots

ComReg's position in Document 17/85

4.64 ComReg, in Document 17/85, expressed its preliminary view that it should retain its discretion as to how to treat any unsold lots, depending on the factual circumstances arising from the award process, and save that any unsold lots would not be assigned for a reasonable period of time after the process had ended.

Views of respondents

4.65 No responses were received on this aspect of the award type and design.

[102] DotEcon Report, p16.

ComReg's final position

4.66 ComReg did not receive any other submissions from respondents on this matters, nor is ComReg aware of any other information which would warrant an amendment to its proposals.

4.67 In light of the above, ComReg remains of the preliminary view that its proposals as to how to treat any unsold lots, as set out in Document 17/85, remain appropriate.

4.7 Fees

ComReg's position in Document 17/85

4.68 ComReg, in Document 17/85, expressed its preliminary view that a minimum price should be set in order to prevent bidders from acquiring 26 GHz rights of use at a price below the level that would be determined by full competition between bidders. Having no minimum price, or one that is too low, could lead to less intense competition if bidders have incentives to bid strategically in an attempt to keep prices artificially low).

4.69 A number of factors inform a decision as to the level at which a minimum price should be set:

a) a minimum price should not be so high as to choke off demand from serious bidders;

b) assigning spectrum below a price that would be determined by competition would fail to meet ComReg's statutory objectives;

c) a minimum price should be high enough to discourage participation by frivolous bidders;

d) a minimum price that is too low could lead to excessive take up of the spectrum rights of use being auctioned, simply because the price is low, which could result in the premature award of those rights of use inefficiently displacing valuable future uses; and

e) The minimum prices should not facilitate collusive behaviour (whether tacit or explicit) or otherwise fixing of demand.

4.70 ComReg expressed its preliminary view that there should be a minimum price equal to an upfront minimum SAF of €70k per 2 × 28MHz block plus 10 SUFs of €25k per block per annum, over the licence term, subject to annual indexation by CPI. This would result in an overall minimum price of about €245k (i.e. discounted sum of reserve price and SUFs) which would be close to the minimum price in the 2008 award.

Views of respondents

4.71 No responses were received on this aspect of the award process.

ComReg's final position

4.72 In light of the above, ComReg remains of the preliminary view that its minimum price proposals, as set out in Document 17/85, are appropriate.

4.73 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.

4.8 Licence duration

Summary of ComReg views

4.74 In section 4.6 of Document 17/85, ComReg set out its proposals on the duration for of the 26 GHz rights of use / licences to be granted under proposed award process.

4.75 Document 17/85 set out that a 10-year licence period would be appropriate, for the following reasons:

- it would be consistent with the duration of the licences granted on the same basis and for the same essential use in 2008, ComReg having noted that it was not aware (and still is not aware) of any material facts justifying a change in that approach;
- it would be consistent with the range of durations for similar spectrum rights of use, internationally - for example, the majority of EU Member States assessed have durations of between 1 and 10 years;
- it should provide a sufficient period of time to obtain a return on network investments (asset life of 8 years is used for the vast majority of the mobile elements); and

- a 10-year licence period is appropriate having regard to on-going developments in the 26 GHz band which could, over time, change its attractiveness for certain services and thus affect demand for rights of use in the band.

Views of respondents

4.76 ComReg received two responses (Imagine and eir)[103] on its proposal that new 26 GHz National Block Licences be of 10 years duration.

4.77 Imagine submits that the new 26 GHz National Block Licences should be aligned with the 3.6 GHz licences so as to be of 15 years duration.

4.78 Though Eir submits that a 10-year duration is very short in terms of earning a return on investment, it nevertheless considers, on balance and weighing up return on investment against the potential change in use of the 26 GHz over the next 5-10 years, that 10 years is a reasonable term.

ComReg's Assessment

4.79 ComReg notes Eir's general agreement with a licence duration of 10 years.

4.80 DotEcon remains of the view that 10-year licences are appropriate. While shorter licences may reduce the risk of speculative bidding, ComReg can use other measures to mitigate this risk while uncertainty over the timing of 5G should further reduce any incentives to bid speculatively for any of the 26 GHz rights of use at issue.

4.81 As to the submission that the new 26 GHz rights of use be of the same duration as the recently granted 3.6 GHz rights of use (15 years), DotEcon notes that the proposal for 10-year licences is due to the particular facts relating to the 26 GHz rights of use at issue and possible future utilisation of the 26 GHz band for 5G. This was not a matter for consideration in the case of the 3.6 GHz licences and so their duration was set at the more typical length of 15 years.

4.82 ComReg agrees with DotEcon that new 26 GHz National Block Licences longer than 10 years could increase the risk of some alternative future use of any or all of the spectrum at issue (i.e. for some purpose other than P2P links) being prevented or inhibited, for longer than would be the case if the licence duration was 10 years.

[103] Vodafone and Threes proposals in relation to duration concern an administrative award and the potential future provision of 5G and are assessed separately in Chapter 3.

4.83 Further, while licences shorter than 10 years may offer some potential benefits in terms reducing the risk of speculative bidding, such concerns would be largely addressed by licence conditions that would explicitly limit use of the 26 GHz rights of use to fixed links only (see section 2.4) and/or by ComReg clarifying its intentions with regard to any early liberalisation of those rights of use (see Section 3.2 - 'Speculative Acquisition')

4.84 Finally, 10 year licences should provide an appropriate period for investment amortisation as it would be in line with the asset lives of most mobile elements.

4.85 Therefore, ComReg remains of the view that new 10-year 26 GHz National Block Licences would be appropriate, having regard to the relevant facts including potential future use of the 26 GHz band and that 10 years should be sufficient time for investment amortisation, and noting that the matter has been considered through public consultation and having regard to relevant international practice and experience and ComReg's statutory remit.

4.9 P2P vs PMP

Summary of ComReg's view in Document 17/85

4.86 In Chapter 4 of Document 17/85, ComReg expressed its preliminary view that there is very little demand for PMP in the portion of the 26 GHz band at issue such that the new 26 GHz National Block Licences should be for P2P use only. In forming this view, ComReg had regard to relevant events and facts including Digiweb's decision to surrender its only PMP block in 2009, Telefónica's approved request to convert its PMP blocks to P2P blocks in 2012 (and the information provided by Telefónica in support of its request), and the fact that that, overall, there are no spectrum assignments for PMP across the fixed link bands.

Views of respondents

4.87 ComReg received responses from Imagine and Cambridge Broadband Networks Ltd (CBNL) on its proposal that the new 26 GHz National Block Licences permit P2P use only.

4.89 Imagine, in favour of ComReg's proposal, submits the following:

(i). There will be significant demand for the 26 GHz band for PMP, as well as for P2P, with PMP usage being particularly relevant to the wireless drop use case for Fibre-to-the-Home ("FTTH") (last 100m). However, FTTH providers would hoard the 26 GHz band because of the drop use case in the hope that PMP will be permitted at some stage in the future.

(ii). Specifying that the new 26 GHz rights of use may only be used for P2P would ring fence those rights of use from potential hoarding and ensure that they are used to deliver Next Generation Access (NGA) type services today.

4.90 CBNL, opposed to ComReg's proposal, submits the following:

- CBNL questions whether it is necessary for new 26 GHz National Block Licences to specify that deployment is for P2P only and encourages ComReg to reconsider this proposed restriction, for two reasons - .

(i). PMP and P2P are complementary technologies and it is therefore desirable for an operator to be able to freely select one or other technology depending on the local environment.

(ii). Owing to the intense interest surrounding millimetre wave spectrum for 5G, PMP technology in the 26 GHz band is advancing very rapidly. Therefore, there is scope for operator preferences to alter dramatically in the near future to encompass the use of both PMP and P2P in a single network.

ComReg's Assessment

4.91 ComReg expressed its preliminary view in Document 17/85 that the new 26 GHz National Block Licences should be for P2P use only. ComReg stated therein, and remains of the view, that it does not see any evidence which would justify adding complexity to the award by designing it in such a manner as to provide for the possibility of new 26 GHz National Block Licences permitting the deployment of PMP links.

4.92 With regard to Imagine's submission as to the risk of significant hoarding of new 26 GHz rights of use, in the hope that PMP use will be allowed at some stage in future, ComReg considers that any speculative hoarding will be avoided by having new 26 GHz National Block Licences for P2P use only.

4.93 With regard to Imagine's submission that the 26 GHz band will be the spectrum band of choice for FTTH providers, for PMP use, ComReg notes that no operator other than Imagine made any submission in this regard and all of the available evidence suggests the opposite.

4.94 Regulation 16(2) of the Framework Regulations provides that ComReg may, through licence conditions or otherwise, provide for proportionate and non-discriminatory restrictions to the type of radio network or wireless access technology where this is necessary in order to fulfil certain relevant objectives including to safeguard efficient use of spectrum.

4.95 In the present case, ComReg considers that it would be appropriate to restrict new 26 GHz National Block Licences to P2P, for the following reasons:

- Certain licensees have already converted their 26 National Block Licences from PMP to P2P use;
- There are no existing PMP users in the 26 GHz band nor have ComReg received any requests to provide for the same in 21 other spectrum bands used for P2P links;
- There has been no expression of interest or use of PMP in any of the bands allocated for individual P2P link licensing;
- The use of P2P links only for a national block assignment represents a more efficient use of the radio spectrum: For example:
    - 2 additional blocks would be required as guard bands.[104] Alternatively, these two additional blocks are likely to have an established use case for P2P as described above.
- Any demand that may exist now or over the duration of the licence can be accommodated in individual links in the upper part of the 26 GHz band and in 21 other spectrum bands used for P2P links

4.96 With regard to CBNL's submission that PMP and P2P are complementary technologies such that operators should be free to select one or other technology, depending on the local environment, ComReg has found no evidence – other than CBNL's submission – which indicates that undertakings wish to be able to select one or the other technology. Indeed, all available evidence indicates to the contrary in that all past National Block Licences for PMP were either surrendered or converted into P2P and, despite the fact that the current licensing framework for individual radio links permits licensed operators to deploy PMP technology in any of the available bands, no operators have yet chosen to do so.

4.97 With regard to CBNL's submission that there is scope for operators' preferences to alter dramatically in future, ComReg would again note that other bands are available for PMP, if any operator should desire to use same.

[104] Guard bands would be required in order to protect adjacent wireless communications (P2P links at the upper end of the 26 GHz band and FWALA services at the lower end).

5 Licence Conditions

5.1 Chapter 6 of Document 17/85 set out conditions that ComReg proposed attaching to the new 26 GHz National Block Licences, relating to the following:

- Channel Bandwidths available for use and the maximum bandwidth permitted;
- EiRP[105] and using the minimum amount to achieve the target availability, Automatic Transmit Power Control (ATPC) along with Adaptive Coding and Modulation and the mandated use of each within the band;
- The requirement to register each site with ComReg every time equipment is deployed and the process involved in these site registrations;
- Submission of site information on yearly basis as opposed to the original process of years 3,5,7 & 9; and
- International Equipment Standards (RE Directive[106]) that equipment will have to comply with in order to be eligible for use.

5.2 ComReg document 06/37cR ("Guidelines for National Point-to-Point and Point-to-Multipoint Block Licences in the 26 GHz Band") was used to inform the above licence conditions, with ComReg proposing a number of changes to certain conditions to reflect current market needs.

5.1 ACM and the RE Directive

5.3 Only one respondent, eir, submitted views on the proposed licence conditions. eir submitted views on nos. (ii) and (v) above - use of Adaptive Coding and Modulation[107] ("ACM") and the RE Directive.

[105] In radio communications systems, equivalent isotropically radiated power (EiRP) is the amount of power that a theoretical isotropic antenna (which evenly distributes power in all directions) would emit to produce the peak power density observed in the direction of maximum antenna gain.

[106] The Radio Equipment Directive (2014/53/EU) establishes a regulatory framework for placing radio equipment on the market.

[107] Adaptive Coding and Modulation is a term used to denote the matching of modulation, coding, and other signal and protocol parameters on a microwave link. The goal of ACM is to improve the operational efficiency on a microwave link by increasing network capacity over the existing infrastructure – while reducing sensitivity to environmental interferences.

5.4 **ACM** - eir submits that use of ACM should be left to the discretion of the Licensee, taking into account the specific requirements for the fixed link being deployed, that ACM is not always necessary (such as where there is low demand for capacity on a link), and that use of ACM should be encouraged but should not be mandated. eir also submits that ComReg appears to have overlooked the fact that ACM is sold by vendors as an additional feature, and at an additional cost.

5.5 **RE Directive** - eir submits it is not clear from Doc 17/85 if the requirement under the RE Directive that all antennas be at least "Class 3" (as defined by ETSI EN302 217-2) will apply to antennas licensed under the new 26 GHz National block licences. eir also asks if equipment on the market prior to 12 June 2017 (i.e. the date when the RE Directive came into effect) may be procured and used under the new 26GHz National Block Licences.

5.2 ComReg's Assessment

ACM

5.6 ComReg's proposal to mandate the use of ACM within the 26 GHz National Block Licences was with a view to promoting the efficient use of the portion of the 26 GHz band at issue. ACM can increase capacity and generate environmental benefits and cost savings, through fewer transmitters and reduced power consumption. eir submits that ACM is not always necessary for P2P links, particularly where capacity demand is low. ComReg, having considered eir's submission, would note the following:

- Most 26 GHz links are in urban and suburban areas where capacity demand is relatively high (as the amount of traffic tends to be significantly higher than in less populous rural areas). Hence 80% of deployed 26 GHz P2P links have capacities of 150 Mb/s plus and 88% have capacities of 100 Mb/s plus.[108]

- 28 MHz is the maximum Channel Spacing[109] under a current 26 GHz P2P link and far greater Channel Spacing's, up to 112 MHz, can be achieved under new 26 GHz National Block Licences that utilise ACM.

- Many P2P links in the two bands adjacent to the 26 GHz band use channel spacing's of 28 MHz or more - 67.5 % of links in the 23 GHz band and 90% of links in the 28 GHz band. This indicates lower demand for low capacity links than for higher capacity links.

[108] There are a total of 373 P2P links deployed in the individual 26 GHz P2P band as of 23/01/2018.
[109] Channel Spacing is the amount of bandwidth/capacity allotted to each channel in a P2P radio link. For example channel spacing of 3.5 MHz offers less bandwidth/capacity than higher bandwidths of 7, 14, 28, 56 and 112 MHz. The higher the channel spacing used, the more bandwidth/capacity available on a P2P radio link.

- The 26 GHz band is a capacity band and so there would be limited benefit in using it for low capacity links, which can be accommodated in lower bands such as 6 GHz or 8 GHz.

5.7 ComReg also notes that using ACM technology is not always necessary for P2P, particularly where there is low capacity, and that it does increase equipment costs. ComReg has therefore formed the final view that encouraging the use of ACM technology, rather than mandating its use, would be a more appropriate way to promote the efficient use of the portion of the 26 GHz band that will be assigned.

RE Directive

5.8 ComReg has stated in Guidelines to Applicants for Radio Links Licences (Document 09/89R2) that "any new products placed on the market on or after 12 June 2016 must be in compliance with the RED. For equipment already on the market, the transition period in which products compliant to the R&TTE Directive can be placed on the market is until 13 June 2017."

5.9 ComReg can confirm the following:

- any Apparatus manufactured or procured before 12 June 2017 may be used under the new 26 GHz National Block Licences provided it complies with the regulations and standards in force at the time it was manufactured; and

- any Apparatus procured on or after 13 June 2017 may be used under the new 26 GHz National Block Licences only if it also complies with the RE Directive.

5.10 ComReg has also stated in Document 09/89R2: "All antennas for Point-to-Point systems are required to be of at least 'class 3' standard as defined by ETSI EN302 217-2: Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 2: Digital systems operating in frequency bands from 1 GHz to 86 GHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU". This remains the case.

5.3 ComReg's Final Position

5.11 ComReg, having considered all submissions received and all other relevant information before it, has decided that the following conditions will attach to new 26 GHz National Block Licences:

(i). **Maximum channel bandwidths:** 26 GHz National Block Licences will permit maximum channel bandwidths of:

- 7 MHz, 14 MHz, or 28 MHz for a Licensee holding a single Block
- 56 MHz for a Licensee holding 2 or more contiguous Blocks
- 112 MHz for a Licensee holding 4 or more contiguous Blocks[110]

(ii). **EiRP and ATPC:** all P2P links deployed under 26 GHz National Block Licensees shall utilise:

- the minimum Equivalent Isotropic Radiated Power (EiRP) necessary to obtain the desired level of service and availability; and
- Automatic Transmitter Power Control (ATPC).

(iii). **Site registration**: A Licensee shall register each of its P2P sites with ComReg, through its online registration system, and

(iv). **Site information**: A Licensee, in respect of each P2P site registered with ComReg, shall provide ComReg, upon the commencement of the applicable 26 GHz National Block Licence and annually thereafter, with the following information, in aggregate form, relating to all Apparatus deployed at the registered P2P site:

- Site Name
- Site co-ordinates (easting/northing)
- Transmit Frequency
- Receive Frequency
- Channel Number
- Channel Bandwidth
- Whether the site is “transmit high” or “transmit low”

(v). **International Equipment Standards (RE Directive):** all Apparatus manufactured on or after 12 June 2017 must, and deployed under a 26 GHz National Block Licence, must comply with the RE Directive. Equipment that has been manufactured prior to this date must comply with the regulations and standards in force at that time.

[110] At present, the maximum Channel Spacing equipment vendors provide is 112 MHz. If at any point in the future channel spacing exceeds 112 MHz a licensee will be allowed to use these provided they hold the desired number of blocks to do so.

6 Transition Plan

6.1 The 26 GHz Transitional proposals

6.1 The transition plan proposal outlined in this Chapter will apply to all Existing Licencees and covers all outcomes from the proposed award process including the scenarios where:

- An existing Licensee wins some 26 GHz spectrum rights in the award process. The amount of spectrum rights won could be in respect of more or less than the spectrum currently assigned to it, and the frequency assignment could be in a different part of the 26 GHz band to that of its current assignment; and
- An existing licensee does not win any 26 GHz spectrum in the award process.

6.2 ComReg is of the view that it is important that all Existing Licensees are involved in the process to determine a 26 GHz transition plan as this would allow each Existing Licensee the opportunity of providing transition proposals to ComReg that reflect the specifics of its transition activities. This in turn would enable the formulation and implementation of a well-informed and robust transition plan by ComReg thereby facilitating an orderly and timely transition.

6.3 To determine a transition plan, a number of steps are likely to be required including:

- The collection of information from existing Licensees to inform ComReg's transition proposals, rules and transition plans; and
- The setting of transition plan rules in advance of the award process

Collection of information from Existing Licensees to inform ComReg's transition proposals, rules and transition plans

6.4 Whilst the precise nature and extent of transition activities for an Existing Licensee (including the time required by an Existing Licensee to complete its transition) would only be known following the outcome of the proposed award, it is nevertheless important for ComReg to obtain information from Existing Licensees (and potentially other interested parties) in advance so as to inform ComReg's transition proposals and rules for the 26 GHz band and to enable it to act in a timely manner.

6.5 Accordingly, ComReg proposes that:

- Between now and the start of the proposed award process, all existing licensees consider and, where practicable, make preparations for transition activities which might be required of them. As noted above, ComReg observes that there are a number of issues that an Existing Licensee can consider in seeking to mitigate the scale and time of any transition activity required; and

- During this process and prior to the award process itself, ComReg will in the first instance request information from Existing Licensees on their transition considerations which may include (but is not limited to) the likely transition activities required, timeframes and milestones

The setting of transition plan rules in advance of the award process

6.6 In order to define a 26 GHz transition plan, it is first necessary to define transition rules in advance of the award process. The transition rules proposed below would define:

- The parties who would be obliged to comply with rules;
- The elements of a transition plan
- The process for defining a transition plan
- Consequential outcomes such as the delayed commencement of a new licence

All existing Licensees and any bidder in the 26 GHz award process would be obliged to comply with the transition rules

6.7 Using the information available to it and in advance of the award process, ComReg would set out transition plan rules for the award process. Similar to previous spectrum award processes, ComReg proposes that all Existing Licensees and any participant in the 26 GHz award process would be obliged to comply with the transition plan rules defined for the 26 GHz band. In particular:

- ComReg proposes that the acceptance of the transition plan rules would be a condition of entry to the proposed 26 GHz award process; and

- If an Existing Licensee is not a bidder in the award process and further chooses not to accept the transition plan rules which ComReg defines for the 26 GHz band, then it would not be in a position to avail of the transition plan proposals described in this section. For the avoidance of doubt, such an Existing Licensee would remain entitled to fully enjoy its existing 26 GHz rights of use until licence expiry and, as discussed below, such an Existing Licensee would also be eligible to apply for an

individual P2P link licence under the Wireless Telegraphy Act (S.I 370 of 2009) with a maximum duration of 12 months.

The elements of a transition plan and the process for determining it

6.8 A transition plan for the 26 GHz band is likely to consist of similar elements to the transition plan determined for previous spectrum award process, insofar as it is likely to involve:

- The identification of all transition activities undertaken by the Existing Licensees and the order in which each activity would be taken;
- The setting of milestone dates for each transition activity identified;
- Where the transition activities of one Existing Licensee is dependent upon the transition activities of another, this would be clearly identified such that any consequential delays by one party due to the delay of another party can be clearly attributable to the responsible party;
- A robust and transparent mechanism to allow ComReg (including any of its agents or servants), Existing Licensees, winning bidders and other appropriate interested parties to monitor compliance with the transition activity milestones;
- The completion of transition activities prior to a deadline date as set by ComReg in the transition plan; and
- Attribution and acceptance of liability for liquidated damages payable by the Existing Licensee(s) to ComReg in the event of non-compliance by it/them with the transition activity milestones identified in the plan, where such Existing Licensee(s)' actions or omissions caused the non-compliance with the relevant milestone date (see further below).

The process to determine a 26 GHz Transition Plan

6.9 In determining the transition plan for the 26 GHz band ComReg proposes to use a similar process to that used in the MBSA process. In summary this would involve:

- The setting of transition arrangements and rules by ComReg in advance of the award process, which among other things could specify the end-date for the completion of transition activities in advance of determining the transition plan;

- The opportunity for Existing Licensees and winning bidders to collectively formulate an industry transition project proposal for ComReg to consider, and in the absence of collective formulation, to make one, or more submissions to ComReg as to the appropriate provisions for such a plan;

- The setting of the final transition plan, containing milestones and completion dates, by ComReg having considered the proposal(s) which have been received;

- The subsequent monitoring and reporting, against the progress of the relevant transition activity and the progress of the Existing Licensees against these milestones; and

- The completion of all of the transition activities by the existing licensees in accordance with the milestones determined by ComReg as set out in the final transition plan

Transition Proposal: The issue of individual P2P link licences under Wireless Telegraphy Act (S.I 370 of 2009) for a period of up to 12 months to facilitate the transition to either another part of the 26 GHz Band or out of the 26 GHz band.

6.10 As discussed above, where the transition plan activities of an Existing Licensee are required whereby the lots they currently hold are not the same lots they win as part of the new award process, they are likely to require a re-tuning of existing equipment in order to continue to use the spectrum for P2P use.

6.11 While ComReg does not know the extent of the transition plan activities at this point in time, ComReg believes that there are two potential scenarios where existing licensees will need to re-tune their equipment *within* the 26 GHz National Block Licences:

- **Scenario 1: Re-tuning within the same sub-band of the existing Radio Outdoor Unit (ODU).** This can be done by means of a link software upgrade and will not require the deployment of new equipment.

- **Scenario 2: Re-tuning into a different sub-band of the existing radio ODU.** This will require the deployment of new Radio ODU equipment, full link engineering and associated project management work.

6.12 ComReg believes that a period of six months would provide sufficient time in order to facilitate the re-tuning of existing equipment under Scenario 1 above.

6.13 ComReg believes that six months provides enough time to re-tune existing equipment to a new part of the 26 GHz band, whilst also ensuring that these transition activities do not unnecessarily delay the introduction of new licences.

6.14 With regard to Scenario 2 above, ComReg is of the view that a period of 12 months would provide sufficient time in order to facilitate the deployment of new Radio equipment for operation in a different sub-band to the existing radio ODU.

6.15 ComReg will grant licences in both these scenarios under its existing individual licencing regime with the Radio Link Licences being governed by the Wireless Telegraphy (Radio Link Licence) Regulations, 2009 (S.I. 370 of 2009).

6.16 Each individual P2P link in operation in the 26 GHz National Block licences that needs to be transitioned to a different part of the band will be migrated over to the licencing regime and will be paid for on a link by link basis for the duration of the licence.

- **Scenario 3: Re-tuning into a different band**. This would require the migration of the existing links into a new band and will require completely new equipment and all associated project management costs.

6.17 With regard to transition scenario 3 where an existing licensee has not won any new spectrum as part of the award process, ComReg believes that licence period of 12 months would be appropriate to facilitate a timely transition out of the spectrum.

6.18 This scenario would require the migration of the existing links out of the National Block Licences that the licensee currently holds and into either the existing individual 26 GHz P2P links or an alternative band.

6.19 ComReg would grant licences in this scenario under its existing individual licencing regime with the Radio Link Licences being governed by the Wireless Telegraphy (Radio Link Licence) Regulations, 2009 (S.I. 370 of 2009).

6.20 ComReg believes a period of 12 months is appropriate as the sourcing of equipment, link engineering, project management activities and the identification of suitable alternative spectrum may take longer than the transition of P2P links within the existing 26 GHz spectrum.

6.21 Each individual P2P link that needs to be migrated out of the spectrum would be migrated over to the individual licencing regime for a period of 12 months, with each link being licenced on a link by link basis.

6.22 The relevant fees that apply under the individual link licencing regime would be applicable to each individual link that will migrating over to the 12 month interim licence.

6.23 In the event that an Existing Licensee requires a P2P link for transition purposes for a period of less than 12 months then the licence fee will be applied pro-rata to the relevant annual fee using the number of months for which the licence is granted. ComReg is of the view that this will incentivise the timely transition to the new 26 GHz National Block channel plan arrangement.

7 Draft Decision Instrument

Introduction

The draft Decision Instrument (D.I.) below reflects ComReg's preliminary views as of the date of publication of this Response to Consultation and Draft Decision on the proposed 26 GHz Spectrum Award 2018 (Document 18/12). For ease of reading the draft D.I. reads as if it was a finalised document. However it is a draft document throughout and is subject to further consultation and consideration by ComReg and no final decisions have yet been made by ComReg as to the content and effect of any final D.I. as may be put into effect, for the purpose of granting new rights of use for radio frequencies in the portion of the 26 GHz band at issue. Therefore, and for example, though the draft D.I. describes and refers to the "26 GHz Band Licence Regulations 2018" and "Information Memorandum" as if these were both finalised documents, as of the date of publication of this document they are both draft documents. Further, if this draft D.I. should become a final D.I., whether in whole or in part, ComReg may make such amendments to the text of any final D.I as it considers necessary and without further consultation, where such amendments are editorial only and do not affect the substance of the final D.I., as to its meaning, purpose, or effect.

7.1 Definitions and Interpretations

In this Decision Instrument, save where the context otherwise admits or requires:

"26 GHz Band" means the portion of the radio frequency spectrum consisting of 3 300 MHz in the range 24.250 – 27.550 GHz;

"**26 GHz Band National Block Licence**" or "**Licence**" means a licence granted by ComReg pursuant to section 5 of the Wireless Telegraphy Act 1926 and the 26 GHz Band Licence Regulations 2018, of the type set out in Schedule 1 to the 26 GHz Band Licence Regulations 2018;

"**26 GHz Band Licence Regulations 2018**" means the Wireless Telegraphy (National Point-to-Point Block Licences) Regulations 2018 (s.i. XX/2018) made by ComReg pursuant to section 6 of the Wireless Telegraphy Act 1926 with the consent of the Minister under section 37 of the Communications Regulation Act 2002, a draft form of which is set out in the Information Memorandum;

"**Authorisation Regulations**" means the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations, 2011 (S.I. No. 335 of 2011);

"**Award Spectrum**" means the portion of the 26 GHz Band consisting of 2 × 532 MHz in the radio frequency ranges 24.745 – 25.277 GHz paired with 25.753 – 26.285 GHz

which shall be divided into 19 equal sized Lots of 2 x 28 MHz each for the purposes of conducting the sealed bid combinatorial auction 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;

"**Framework Regulations**" means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011, (S.I. No. 333 of 2011);

"**Information Memorandum**" means Document XX/2018, published by ComReg on [XX] 2018;

"**Licensee**" means an undertaking to whom a 26 GHz Band National Block Licence has been granted;

"**Minister**" means the Minister for Communications, Climate Change and Natural Resources;

"**Wireless Telegraphy Act 1926**" means the Wireless Telegraphy Act, 1926 (No. 45 of 1926), as amended.

7.2 Decision-Making Considerations

In arriving at its decisions as set out in this Decision Instrument 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. Consultation on the proposed 26 GHz Spectrum Award 2018 – ComReg Doc 17/85
b. DotEcon 26 GHz Award Auction Design Report – ComReg Doc 17/85a
c. Response to Consultation and Draft Decision on the proposed 26 GHz Spectrum Award 2018 – ComReg Doc 18/12
d. DotEcon Assessment of Responses to Consultation 1785 – ComReg Doc 18/12a
e. Non-Confidential Submissions to Consultation 1785 – ComReg Doc 18/12b

(ii). the consultants' reports commissioned by ComReg and the advice obtained by ComReg in relation to the subject matter of the documents and materials listed at (i) above; and

(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) and 19 thereof;

d) the Wireless Telegraphy Act, 1926 and, in particular, sections 5 and 6 thereof; and

e) applicable Policy Directions made by the Minister under section 13 of the Communications Regulation Act 2002.

In arriving at its decisions as set out in this Decision Instrument, ComReg has:

(i). given all interested parties the opportunity to express their views and to make submissions in accordance with Regulation 11 of the Authorisation Regulations and Regulation 12 of the Framework Regulations; and

(ii). 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 18/12 and their supporting annexes.

7.3 Decisions

ComReg has made the following decisions -

- ComReg will proceed with the release of the Award Spectrum using the auction format and in accordance with the procedures and rules as detailed in the Information Memorandum and will grant new 26 GHz Band National Block Licences which shall come into operation on 6th June 2018 (when all current rights of use for radio frequencies in the Award Spectrum shall expire) or as close to that date as possible.

- For the purpose of granting new 26 GHz Band National Block Licences, and subject to obtaining the required consent of the Minister in accordance with section 37 of the Communications Regulation Act 2002, ComReg will make regulations under section 5 of the Wireless Telegraphy Act 1926, to be titled the

26 GHz Band Licence Regulations 2018 and which shall prescribe, amongst other things -

(a) the form of such Licences;
(b) the period during which such Licences shall continue in force;
(c) the manner in which, the terms on which, and the period or periods for which such Licences may be renewed;
(d) the circumstances in which or the terms under which such Licences are granted;
(e) the circumstances and manner in which such Licences may be suspended or revoked;
(f) the terms and conditions to be observed by the holders of such Licences and subject to which such licences are deemed to be granted;
(g) the fees to be paid on the application, grant or renewal of such Licences or classes of such licences, subject to such exceptions as the appropriate authority may prescribe, and the time and manner at and in which such fees are to be paid; and
(h) matters which such Licences do not entitle or authorise the holder to do.

- ComReg will attach certain conditions to the rights of use for radio frequencies that form the Award Spectrum, as generally described in Chapter 5 of Document 18/12 and as shall be particularised in each 26 GHz Band National Block Licence.

- All 26 GHz Band National Block Licences will be of ten years duration such that they will commence concurrently on 6th June 2018, or on such later date as ComReg may specify, and they will all expire concurrently on 5th June 2028 or on the tenth anniversary of such later commencement date as may apply and all rights of use for radio frequencies assigned under such Licences shall commence and expire on the same dates as such Licences.

- 26 GHz Band National Block Licences will permit Licensees to keep, possess, install, maintain, work and use apparatus for wireless telegraphy for the purpose of operating Point-to-Point radio communications links only, on a national basis, and, for the avoidance of doubt, Licences will not permit Licensees to keep, possess, install, maintain, work or use apparatus for wireless telegraphy for any purpose other than operating Point-to-Point radio communications links;

- 26 GHz Band National Block Licences will permit Licensees to keep, possess, install, maintain, work and use Point-to-Point radio communications links equipment that utilises "Frequency Division Duplexing" technology only[111], and, in particular and for avoidance of doubt, Licences will not permit Licensees to keep, possess, install, maintain, work or use any form of Point-to-Point radio

[111] "Frequency Division Duplexing (FDD)" is a method for establishing a full-duplex communications link that uses two different radio frequencies for transmitter and receiver operation. The transmit direction and receive direction frequencies are separated by a defined frequency offset.

communications links equipment that utilises "Time Division Duplexing" technology.[112]

- All undertakings who may be granted 26 GHz Band National Block Licences shall be selected by their participation in an open and competitive selection procedure, specifically a "sealed bid combinatorial auction" using a second price rule, the format, processes, and rules of which auction are particularised in the Information Memorandum.

- The granting of a 26 GHz Band National Block Licence, to any undertaking who successfully participates in the sealed bid combinatorial auction and wins some quantum of the Award Spectrum, shall be conditional upon all such undertakings paying the applicable fees for such Licences (as determined by the auction conducted in accordance with the IM) and complying with the terms and conditions subject to which such Licences shall be deemed to be granted.

7.4 Statutory Powers Not Affected

6.24 Nothing in this Decision Instrument shall operate to limit ComReg in the exercise of its discretions or powers, or in the performance of its functions or duties, or in the attainment of any of its objectives under any laws applicable to ComReg from time to time.

COMMISSIONER

THE COMMISSION FOR COMMUNICATIONS REGULATION

THE XX DAY OF XX 2018

[112] "Time Division Duplexing (TDD)" is a method for emulating full-duplex communication over a half-duplex communication link. The transmitter and receiver both use the same frequency but transmit and receive traffic is switched in time.

Annex: 1 ComReg's Statutory Functions and Objectives

A 1.1 The Communications Regulation Acts 2002-2011[113] (the "2002 Act"), the Common Regulatory Framework (including the Framework and Authorisation Directives[114] as transposed into Irish law by the corresponding Framework and Authorisation Regulations[115]), and the Wireless Telegraphy Acts 1926 to 2009[116] 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 1.2 Apart from licencing 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 1.3 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 Annex does not necessarily mean that ComReg considers same to be of specific relevance to the matters at hand.

[113] 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.

[114] 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")

[115] 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.

[116] The Wireless Telegraphy Acts 1926 to 1988 and Sections 181 (1) to (7) and (9) and Section 182 of the Broadcasting Act 2009.

A 1.4 All references in this annex to enactments are to the enactment as amended at the date hereof, unless the context otherwise requires.

Primary Objectives and Regulatory Principles under the 2002 Act and Common Regulatory Framework

A 1.5 ComReg's primary objective in carrying out its statutory functions in the context of electronic communications are to:

- Promote competition[117]
- contribute to the development of the internal market[118]
- promote the interests of users within the Community[119];
- 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;[120] 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[121] in particular those designed to ensure effective competition[122]

Promotion of Competition

A 1.6 Section 12(2)(a) of the 2002 Act requires ComReg to take all reasonable measures which are aimed at the promotion of competition, including:

[117] Section 12 (1)(a)(i) of the 2002 Act.
[118] Section 12 (1)(a)(ii) of the 2002 Act.
[119] Section 12(1)(a)(iii) of the 2002 Act.
[120] 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.
[121] 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).
[122] 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 1.7 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 1.8 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.

Contributing to the Development of the Internal Market

A 1.9 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 electronic communications networks, electronic communications services 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 1.10 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.

Promotion of Interests of Users

A 1.11 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 electronic communications services
- 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 1.12 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.

Regulatory Principles

A 1.13 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 electronic communications networks and services;
- 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.

BEREC

A 1.14 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.

Other obligations under the 2002 Act

A 1.15 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[123];

- have regard to international developments with regard to electronic communications networks and electronic communications services, associated facilities, postal services, the radio frequency spectrum and numbering[124]; 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.[125]

Policy Directions

A 1.16 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.

Policy Direction No.4 on Industry Sustainability

A 1.17 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 where necessary

[123] Section 12(3) of the 2002 Act.
[124] Section 12(5) of the 2002 Act.
[125] Section 12(6) of the 2002 Act.

A 1.18 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 1.19 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 1.20 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 Management of the Radio Frequency Spectrum

A 1.21 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

A 1.22 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;
- the potential of alternative technology delivery platforms to support competition.

Other relevant obligations under the Framework and Authorisation Regulations

Framework Regulations

A 1.23 Regulation 17 of the Framework Regulations governs the management of radio frequencies for electronic communications services. 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 electronic communications services;
- that spectrum allocation used for electronic communications services 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 1.24 Regulation 17(2) provides that, unless otherwise provided in Regulation 17(3), ComReg must ensure that all types of technology used for electronic communications services may be used in the radio frequency bands that are declared available for electronic communications services in the Radio Frequency Plan published under Section 35 of the 2002 Act in accordance with EU law.

A 1.25 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 electronic communications services 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 1.26 Regulation 17(4) requires that, unless otherwise provided in Regulation 17(5), ComReg must ensure that all types of electronic communications services may be provided in the radio frequency bands, declared available for electronic communications services in the Radio Frequency Plan published under Section 35 of the Act of 2002 in accordance with EU law.

A 1.27 Regulation 17(5) provides that, notwithstanding Regulation 17(4), ComReg may provide for proportionate and non-discriminatory restrictions to the types of electronic communications services to be provided, including where necessary, to fulfil a requirement under the International Telecommunication Union Radio Regulations (“ITU-RR”).

A 1.28 Regulation 17(6) requires that measures that require an electronic communications service to be provided in a specific band available for electronic communications services 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 1.29 Regulation 17(7) provides that ComReg may only prohibit the provision of any other electronic communications service 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 1.30 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 1.31 Regulation 17(9) provides that Regulations 17(2) to (7) only apply to spectrum allocated to be used for electronic communications services, general authorisations issued and individual rights of use for radio frequencies granted after the 1 July 2011. Spectrum allocations, general authorisations and individual rights of use which already existed on the 1 July 2011 Framework Regulations are subject to Regulation 18.

A 1.32 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 1.33 Regulation 17(11) requires ComReg to, in the fulfilment of its obligations under that Regulation, respect relevant international agreements, including the ITU Radio Regulations and any public policy considerations brought to its attention by the Minister.

Authorisation Regulations

Decision to limit rights of use for radio frequencies

A 1.34 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 1.35 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 1.36 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 1.37 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 1.38 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 1.39 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 1.40 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 1.41 Regulation 10(02) 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 1.42 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 1.43 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 1.44 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 1.45 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 1.46 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.

Amendments of rights and obligations

A 1.47 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).

Other Relevant Provisions

Wireless Telegraphy Act, 1926 (the "1926 Act")

A 1.48 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 1.49 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 1.50 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 1.51 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 1.52 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.

Article 4 of Directive 2002/77/EC (Competition Directive)

A 1.53 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."