An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Review of the Satellite Earth Station Licensing Regime

Response to Consultation and Further Consultation

Response to consultation and further consultation

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1 Introduction

1.1 Background and Purpose

1.1 The Commission for Communications Regulation ("ComReg") is the statutory body responsible for the regulation of the electronic communications telecommunications, radio communications and broadcasting networks, postal and premium rate sectors in Ireland and in accordance with European ("EU") and Irish law. ComReg also manages Ireland's radio frequency spectrum ("radio spectrum" or "spectrum") and the national numbering resource.

1.2 Under the Communications Regulation Act 2002, as amended, ComReg has a range of functions and objectives in relation to the provision of electronic communications networks ("ECN"), electronic communications services ("ECS") and post which includes ensuring the efficient and effective use of the national radio spectrum resource. Readers are referred to Annex 1 for an overview of the legal framework and statutory objectives relevant to ComReg's management of the radio spectrum.

1.3 In its Radio Spectrum Management Strategy Statement ("RSMSS") for 2022 to 2024 (ComReg Document 21/136), ComReg committed to consult on, amongst other issues, the authorisation of Satellite Earth Stations ("SES") below 3 GHz during the strategy period 2022 -2024. ComReg is of the view that a review of the Satellite Earth Station licensing regime is timely due to the recent developments within satellite industry such as new use cases and related technology advancements (e.g. Low Earth Orbit ("LEO") constellations for the provision of broadband, satellite-based Internet of Things ("IoT") systems, imaging and monitoring of the earth and the atmosphere to understand the effects of climate change, etc.). While there has not been a significant demand for SES in Ireland to date, it seems likely that could change and with pace, due to industry advancements such as those outlined above. Therefore, it seems appropriate that ComReg should now ensure that the SES licensing regime is fit for purpose and future-proofed to meet any potential use case demand.

1.4 On 17 December 2021, ComReg issued a preliminary consultation on the review of the Satellite Earth Station licensing regime (ComReg Document 21/135).

1.5 The preliminary consultation examined, in particular:

- The current ComReg satellite licensing regime;

- Potential use cases for Satellite Earth Stations; and
- Emerging issues for Satellite Services.

1.6 ComReg also published a report (ComReg Document 21/135a) prepared by ComReg's economic and technical experts, DotEcon Limited ("DotEcon") and Axon Consulting ("Axon"), on the current situation regarding Satellite Earth Stations in Ireland and how this may develop in the future. Document 21/135a was informed by, amongst other things:

- Interviews, as conducted by DotEcon/Axon and ComReg, with several stakeholders (the "Stakeholder Interviews");
- Analysing fixed SES licensing regimes in other European countries, which included benchmarking the licence types, licence/technical conditions, fees, and frequency bands, etc. of those regimes with the current SES licensing regime in Ireland

1.2 Respondents to 21/135 and 21/135a

1.7 In response to Documents 21/135 and 21/135a, seven responses were submitted by the following parties:

- Amazon Web Services ("AWS");
- Avanti Communications Group plc ("Avanti");
- Eircom Limited and Meteor Mobile Communications Limited ("Eir");
- Eutelsat S.A. ("Eutelsat");
- Global Satellite Operators Association ("GSOA");
- OneWeb Communications SARL ("OneWeb"); and
- Space Exploration Technologies Corp. ("SpaceX")

1.8 ComReg thanks the interested parties for their submissions and has published the non-confidential versions of the submissions in ComReg Document 22/56s.

1.9 Having carefully considered the submissions, the points made therein and other relevant information, this document, among other things, sets out ComReg's

assessment of, and views in relation to, the matters raised by respondents.

1.10 This document and accompanying Consultant's Report (ComReg Document 22/56a) also set out proposals and preliminary views regarding:

- The Frequency Bands that will be allocated for SES
- The Technical Conditions associated with SES licensing
- The Fees associated with SES licensing

1.3 Structure of this document

1.11 This document is structured as follows:

- **Chapter 2:** sets out the responses received to ComReg document 21/135 and 21/135a. This includes ComReg's assessment of the responses.
- **Chapter 3:** sets out ComReg's proposed licensing framework for Fixed Satellite Services
- **Chapter 4:** sets out ComReg's Draft Fees RIA
- **Chapter 5:** sets out the proposed fees
- **Annex 1:** Summary of legal framework and statutory objectives relevant to the management of the radio spectrum

Chapter 2

2 Response to submissions received to Documents 21/135 and 21/135a

2.1 Introduction

2.1 This chapter sets out ComReg's consideration of respondents' views.

2.2 Summary of matters discussed in documents 21/135 and 21/135a

2.2 The responses received are generally supportive of the preliminary views as set out in Document 21/135 and Document 21/135a.

2.3 These include:

- Licence types;
- Frequency bands currently available SES licensing;
- Use cases for Satellite Earth Stations;
- Sharing and compatibility issues;
- SES Fees; and
- the regulatory environment for SES licensing.

2.3 Licence Types

SES Licence Types

2.4 ComReg's preliminary view in respect to SES licences as detailed in document 21/135 was:

- that there is a need to ensure that the licence types available for SES are fit for purpose;
- that the teleport facility licences as they stand may be outdated and incompatible with current technology and satellite systems;

- that any licence types available should not preclude any particular use case; and
- that the licensing regime should be suitable for any emerging or established technologies and should not favour one operating model over another.

Q. 1 ComReg seeks views of interested parties regarding the current SES licence types. Please provide evidence and reasoning for your views.

Views of Respondents

2.5 Respondents were broadly supportive of ComReg's existing SES licensing framework and the different licence types. Notwithstanding several respondents noted that there was scope for ComReg to make provision for additional use types.

2.6 A number of respondents also submit that ComReg should include the licensing framework for satellite terminals as part of this consultation.

i. SES Licence Types

2.7 Four respondents provided views on the different SES licence types within the existing framework.

2.8 GSOA believes that the approach taken by ComReg in licensing SES is satisfactory and the licence categories are fit for purpose.

2.9 Eutelsat welcomes the distinction made by ComReg in the existing licensing framework between Terminals for Satellite Services ("TSS") and SES and between shared and exclusive bands.

2.10 SpaceX supports the continued availability of both fixed earth station licences and teleport facility licences. SpaceX notes that access to both licence types will provide flexibility for operators to choose the approach that best meets their individual needs, while leaving room for future innovation in earth station design and deployment.

2.11 Eutelsat and OneWeb suggest that it would be beneficial in the licensing process if multiple Earth stations at the same location could be treated as one entity. OneWeb notes that this gateway licensing approach has been adopted in many other countries. Eutelsat seeks more flexibility in relation to the fees attached to Teleport licences to make this licence type more attractive.

ii. Satellite Terminals

2.12 Avanti, in its response, states, that in its view, there is fragmentation amongst the regulatory tools, rules and regulations for the satellite industry in Ireland. Avanti contends that regulation that is limited to Earth Stations, could result in one regulatory framework lagging behind another. Avanti encourages ComReg to include the regulatory framework for satellite terminals as part of the consultation process and look for what it considers a more harmonious approach that will encompass a more coherent, modern and up to date regulation for the satellite industry as a whole.

2.13 Avanti believes that ComReg should restructure not only the Earth Station regulations but other aspects of the satellite networks that are equally important such as user terminals and general authorisations.

2.14 GSOA observes that, licence-exempt Terminals for Satellite Services, are not within the scope of the Review.

2.15 GSOA also expresses its concern regarding some technical parameters for TSS in the Ka band[1], as follows:

(i) the EIRP limitation of 50 dBW for residential fixed user terminals within portions of the 27.5-30 GHz band; and

(ii) the exclusion zone of 12 nautical mile radius around the Dublin port for Earth Stations on Mobile Platforms ("ESOMPs") in the 27.5-30 GHz/17.3-20.2 GHz bands.

2.16 GSOA believes that the technical limitations that are outlined in ECC Decision (05)01, ECC Decision (06)03 and ECC Decision (13)01, ECC Decision (15)04 provide sufficient protection to existing systems and services and any additional restrictions are unnecessary.

ComReg's Assessment

i. SES Licence Types

2.17 ComReg welcomes the broad support from respondents in respect of the current SES licence types. ComReg notes the proposal from respondents that multiple stations at the same location should be treated as one entity and licensed accordingly. In this regard ComReg observes that the current Teleport Facility licence type[2] facilitates such an arrangement. However, ComReg further notes that the fees

[1] 26.5 GHz – 40 GHz

[2] A Teleport Facility means two or more Non-transportable Fixed Satellite Earth Stations which collectively provide access to or from an electronic communications network, and which are located at a single,

associated with Teleport Facility licences are different to other Fixed Earth Station ("FES") licence types and, as discussed in section 2.5.5 of this Chapter, are considered to be prohibitive by many respondents to this consultation.

2.18 In its Report, DotEcon notes that:

(i) a consolidated licence would allow the holder to operate any number of antennas using the same frequencies within a given area;

(ii) the application process would be sped up by not requiring ComReg to separately process each earth station as a separate application;

(iii) Teleport licences have never been granted by ComReg and there is no clarity on when they would be used in future; and

(iv) The potential benefits attached to the Teleport licence type could better be incorporated into a more flexible satellite licence type.

2.19 DotEcon recommends that the Teleport licence type be removed from the satellite licensing framework and that provision be made in the future satellite licensing framework to allow an FES licence to include multiple antennas at the same site.

2.20 ComReg agrees with the above observations and with DotEcon's recommendation to remove the Teleport licence type from the satellite licensing framework and adopt a fixed Earth station licence type that will accommodate multiple antennas using the same frequency at a single site. ComReg's proposals regarding FES licence types are discussed further in Chapter 3 of this document.

ii. Satellite Terminals

2.21 ComReg notes the views of Avanti and GSOA in respect of TSS. As outlined in 21/135 TSS are outside the scope of this consultation, notwithstanding, ComReg provides its assessment of the views provided below.

(a) Avanti

2.22 ComReg does not agree with Avanti that there is fragmentation in the regulatory framework for satellite services in Ireland. Rather, as is common in other jurisdictions, there is a single licensing framework for satellite earth stations and a separate framework for the exemption, as appropriate, of satellite terminals from licensing. ComReg observes that it has recently updated the framework for the exemption of

physically demarcated geographic location, and which collectively are capable of transmitting on more than one frequency to more than one Space Station simultaneously using steerable antennas,

satellite terminals[3] which takes account of relevant ECC Decisions regarding same. ComReg further observes that, as set out in its Radio Spectrum Management Strategy Statement[4], it will continue to update this framework on an ongoing basis to ensure that it is consistent with the relevant ECC Decisions and that it meets the needs of industry.

2.23 ComReg further notes that Avanti does not provide any reasons as to why it considers that the General Authorisation process should be included in this consultation process. ComReg observes that under Section 4 (1) of the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011), any person intending to provide an electronic communications network or service (ECN/ECS) shall, before doing so, notify the Regulator of his intention to provide such a service. The conditions attached to a General Authorisation are common to all providers of ECN/ECS regardless of the technology used[5]. The consultation at hand is specific to the licensing framework for SES and has no impact on the conditions pertaining to the General Authorisation and as such is outside of the scope of this consultation.

(b) GSOA

2.24 ComReg observes that it has applied certain restrictions to the operation of TSS in the Ka band to limit the instances of harmful interference from ESOMPs in Dublin port to fixed links operating from Three Rock Mountain[6] into Dublin City. ComReg considers that there may be merit in revisiting these restrictions, as pointed out by GSOA, to assess their continued appropriateness. Subject to resourcing, ComReg expects that this matter will be considered during the current 2022- 2024 strategy period. As stated in paragraph 2.22 above, ComReg will continue to update the framework for TSS on an ongoing basis to ensure that it is consistent with the relevant ECC Decisions and recommendations and that it meets the needs of industry.

[3] ComReg Document 20/47 R4 – Permitted Licence Exemptions for Terminals for Satellite Services – published 1 March 2022

[4] ComReg Document 21/136 – Radio Spectrum Management Strategy Statement 2022 to 2024 – published 17 December 2021

[5] The rights and obligations of ComReg in relation to the authorisation of ECN/ECS are reflected in Articles 3 and 6 of Directive (EU) 2018/1972 establishing the European Electronic Communications Code (the "Code"). It is envisaged that the Authorisation Regulations and Framework Regulations will be replaced with new domestic legislation giving effect to the Code over the course of the proposed licencing regime.

[6] Three Rock Mountain (53°14′43″N 6°14′21″W) is the main transmission site for a wide range of ECN/ECS into Dublin city (53°21′00″N 06°15′37″W).

2.4 Frequency Bands

2.25 In Consultation 21/135 ComReg noted that there are currently 17 different frequency bands available to SES for both Transmit and Receive operations all of which operate above 3 GHz[7]. SES Bands are split into two categories: shared or exclusive frequency bands and reflect the relevant allocations in the International Radio Regulations.[8]

2.26 Frequency bands which are shared are allocated for SES and other wireless services. The nature of this sharing depends on the allocation status (Primary or Secondary) of the other service(s) operating in the same band and has implications for how SES applications are processed and licensed.

2.27 Where two or more services are allocated the same frequency band on a Primary allocation basis, they enjoy equal status under the Radio Regulations. As such, a successful national and/or international coordination process is required before a licence can be issued.

2.28 In its interim Report, DotEcon notes the frequency bands currently available for SES licensing in Ireland, and further notes that some stakeholders suggest that there are frequencies allocated for satellite services in the Radio Regulations that are not currently available for SES in Ireland, including, for example:

- frequencies in bands below 3 GHz (e.g. the UHF[9], L[10] and S[11] bands) that may be particularly useful for IoT and/or earth exploration applications;
- frequencies in the Ka band[12], where several respondents commented on the fact that only 500 MHz (29.5 – 30.0 GHz) is available in the band in Ireland for SES, but the full 2.5 GHz (i.e. 27.5 – 30 GHz for Earth-to-space) could be opened up; and
- Furthermore, higher bands in particular within the Q and V bands[13] are likely to be suitable for some satellite services in the foreseeable future, both for use with gateway earth stations and potentially for inter-satellite

[7] The full listing of frequency bands available for SES is available in Annex 1 of document 21/135.
[8] https://www.itu.int/en/publications/ITU-R/pages/publications.aspx?parent=R-REG-RR-2020&media=electronic
[9] UHF of interest to the interviewees spans the 300 to 450 MHz frequency range.
[10] The L band spans 1 to 2 GHz
[11] The S band spans 2 to 4 GHz
[12] The Ka band spans 26.5 to 40 GHz
[13] The Q band spans 33 to 50 GHz and the V band from 40 to 75 GHz.

links. Access to frequencies in the 70/80 GHz range might also be useful for innovative and experimental satellite use, but commercial services in these bands is still likely to be some way off.

2.29 ComReg posed two questions in document 21/135 in regard to the frequency bands for SES in Ireland

Q. 2 ComReg seeks views of interested parties regarding the frequency bands currently available for SES as set out in ComReg document 00/64R314, and on the potential for opening up of frequency bands not already available, in relation to either the bands mentioned above, or any other bands considered relevant (noting that this does not included frequencies for use with licence-exempt terminals, which is not within the scope of this project). Views on use cases for these bands and likely time scales around demand for the spectrum would be helpful. Please provide evidence and reasoning for your views.

Q. 9 ComReg seeks views from interested parties on which frequency bands could be opened to SES in Ireland? Please provide evidence and reasoning for your views, along with supporting international harmonisation measures for these bands.

Frequencies below 3 GHz

Views of Respondents

2.30 Three respondents, AWS, Eutelsat and GSOA, provided views on frequency bands below 3 GHz.

2.31 Eutelsat submits that ComReg should follow the developments on the matter at the ITU.

2.32 GSOA and AWS both note that spectrum bands below 3 GHz have been allocated internationally to various satellite services, but these bands are not allocated in Ireland and thus are not currently available for SES licensing in Ireland. Both encourage ComReg to open these bands for SES licensing.

2.33 AWS submits that harmonising national regulations with EU and CEPT standards regarding SES usage in bands below 3 GHz would continue to make Ireland an investment-friendly destination for satellite services innovation.

2.34 AWS states that its customer use cases are primarily non-geostationary satellite orbit ("NGSO") Earth-Exploration Satellite Services ("EESS") that require nearly constant

[14] https://www.comreg.ie/media/2016/04/ComReg0064-R3.pdf

communications with their spacecraft, and this determines its choice of frequency bands for ground stations. AWS further states that its bandwidth requirements vary (from 60 kHz to 2 MHz) depending on the purpose of the communications and which frequency band is being used.

ComReg's Assessment

2.35 ComReg welcomes the views of respondents regarding the frequencies for satellite services below 3 GHz and notes the interest expressed therein regarding the requirement by the satellite industry for a licensing framework for same.

2.36 ComReg notes, that in its Report, DotEcon identifies that the ITU and ECA allocate frequencies in the VHF, UHF, L and S bands to various satellite services. DotEcon also notes in its Report that those allocations are for MSS, EESS and SOS and not for FSS.

2.37 However, ComReg observes that there are just three ECC Decisions[15] addressing the designation, harmonisation and protection of frequency bands below 3 GHz for use by satellite services. ECC Decisions (04)09 and (09)02 relate to MSS services in the L and S bands and ECC Decision (11)01relates to the protection of passive EESS in the L band. ComReg further observes that there are no ECC Decisions addressing the designation, harmonisation and protection of satellite services in the VHF and UHF frequency bands nor are there any work items in place with CEPT to develop such Decisions. However, ComReg notes that the ITU Radio Regulations does set out requirements regarding the use of bands below 3 GHz.

2.38 On the matter of spectrum harmonisation, ComReg set out in its Radio Spectrum Management Strategy Consultation (Document 21/90) that its approach to granting spectrum rights of use for ECN/ECS is informed by a number of factors, including the relevant EC and ECC harmonisations Decisions.

2.39 Furthermore, ComReg observes that it has granted several Test and Trial Licences to satellite operators to use frequency bands below 3 GHz for the provision of various services. In addition, ComReg further observes that these satellite operators have also expressed an interest in obtaining a full licence to provide commercial services utilising spectrum below 3 GHz. ComReg is of the view that while it is minded to open frequency bands below 3 GHz, the absence of the licensing regime for satellite services below 3 GHz has the potential to limit the rollout of satellite services and in turn, limit consumer choice in Ireland.

[15] ECC Decision (04)06, ECC Decision (09)02 and ECC Decision (11)01 https://docdb.cept.org/document/category/ECC_Decisions?status=ACTIVE

2.40 While ComReg intends to open the 400 MHz and 2 GHz bands for SES licensing (see section 3.3.2), ComReg aims to develop and consult, at the next stage of this consultation process, on the technical conditions that may need to be implemented in these bands to protect other service in the bands (if any) and services in adjacent bands while making the band(s) available for satellite services.

2.41 Where band(s) can be made available[16], ComReg will modify the frequency plan for Ireland[17] to add these allocations and then make these band(s) available through the satellite earth station licencing regime.

2.42 In advance of the development and consultation on these discrete matters, ComReg welcomes any further input.

Existing Frequency bands

Views of Respondents

2.43 Eutelsat, GSOA, OneWeb and SpaceX all submit that ComReg should open the entire Ka band for satellite services as is the case in other countries, claiming that it is critical for both existing and future satellite use.

2.44 Respondents supporting the opening of the entire Ka[18] [19] band submit that:

- the Ka-band is used to provide critical communications services, including broadband services needed to reduce the digital divide (OneWeb);
- In contrast to higher frequencies, the Ka-band has the advantage of lower rain fade, enabling robust connections even in inclement weather (SpaceX);
- Access to the upper Ka-band will not impact incumbent fixed users, due to the highly directional nature of fixed links and consequent ease of coordination between SES and fixed links (SpaceX);
- The Ka-band is used by several satellite operators not only for license-exempt terminals, but also for SES for very high-throughput transmissions, making it necessary to protect both uses in the same band, and therefore provide hand-in-hand regulation for both SES and user terminals (GSOA);

[16] Made available means that technical conditions can be established.
[17] Radio Frequency plan for Ireland | Commission for Communications Regulation (comreg.ie)
[18] 26.5 GHz – 40 GHz
[19] 12 GHz – 18 GHz

- ERC Decision (00)07 states that national administrations should enable the deployment of fixed stations, and uncoordinated SES in the bands 17.7-19.7 GHz. This decision also provides a list of mitigation techniques to avoid interferences between fixed services and satellite services. (Eutelsat); and

- The satellite industry has invested significantly in the development of satellites for the provision of fixed broadband access and connectivity to earth stations in motion (ESIM). The Ka-band is currently used by more than 100 satellites in geostationary orbit and over 1,000 satellites in non-geostationary orbit globally to provide, among others, broadband services to consumers and enterprises (Eutelsat).

2.45 In its response, Eir submits that:

- future bands standardised for 5G according to 3GPP (3GP 38-101 V16-8 FR2)[20] are in the Ka and V band, and so allocation of frequencies for SES in these bands should be outside the 3GPP standardised frequency ranges;

- coordination of frequencies for SES should not conflict with bands used for fixed links;

- the availability of 17 frequency bands for SES seems to be a very large allocation compared to other frequency use cases and deployments leading one to consider if overlapping of SES licences into those bands used for fixed links and mobile services is necessary;

- it is important to ensure that spectrum used for valuable and widespread use types should not be negatively impacted by SES;

- Terrestrial base stations are a key component of supplying mobile communications, services, especially large bandwidth, low latency communications. Frequencies used for technologies such as LTE(4G) and NR(5G) etc. should be fully protected from interference with frequencies allocated to SES;

- any future licensing decisions should continue to not licence SES in frequency ranges that overlap with harmonised bands for mobile services and bands allocated for fixed links; and

[20] https://www.etsi.org/deliver/etsi_ts/138100_138199/13810102/16.08.00_60/ts_13810102v160800p.pdf

- the 3.4 to 3.8 GHz band is currently licensed for 5G and so should be protected.

ComReg's Assessment

2.46 In respect of the Ka band ComReg notes that respondents from the satellite industry all support the opening of the entire band for the licensing of coordinated SES.

2.47 ComReg notes that the Ka band comprises the 27.5 to 30 GHz frequency band and is allocated at the ITU and ECA level on a co-primary basis to satellite and fixed services. However, ComReg also notes that in Ireland, the 27.8285-28.4445 GHz and 28.9485-29.4525 GHz frequency range is allocated to the fixed service and there are almost 500 licensed fixed links deployed in this band throughout the country. Under the current satellite licensing regime this portion of the Ka band is currently not identified for licensing of coordinated SES.

2.48 ComReg notes and agrees with DotEcon's assessment that where there are ECC Decisions and Recommendations in place that define the appropriate technical conditions and coordination procedures to enable coexistence between SES and fixed services in the Ka band there is no reason not to open it to both services. Consequently, ComReg intends to open the entire Ka band for coordinated SES licensing in accordance with the relevant ECC Decisions to ensure co-existence between the different co-primary users.

2.49 On the matter of uncoordinated SES and TSS use in the Ka band ComReg observes that their use is permitted in Ireland on a secondary basis in accordance with ComReg document 20/47R. As such, and contrary to the view expressed by GSOA, ComReg does not agree that their use should be protected. Regarding the submissions by Eir, ComReg observes that the allocation of spectrum for all [wireless services] including to the satellite services are set out in the Radio Frequency Plan for Ireland is in line with the outcomes of the ITU World Radiocommunication Conferences ("WRCs") and other relevant developments, such as the adoption of European harmonisation decisions and recommendations for a particular radio frequency band or service.

2.50 ComReg further observes that, contrary to the view expressed Eir, the availability of 17 frequency bands for SES is not a very large allocation compared to other frequency use cases. ComReg notes that, for example, there are 16 frequency

bands[21] allocated to fixed links use and 9 frequency bands[22] are allocated to the mobile and fixed cellular networks in Ireland.

2.51 In regard to the 3.4 – 3.8 GHz band, ComReg observes that:

- it is allocated to the Fixed, Fixed Satellite (space to earth) and Mobile services at the ITU, ECA and national level.
- the fixed satellite allocation in this band is for the use of terminals on a licence exempt basis i.e. terminals cannot cause interference to, or claim protection from interference from, other services.
- The licensed services in this band are afforded the same protection from harmful interference as pertains to all licensed services and any complaints would be investigated in accordance with ComReg's existing Radio Frequency Interference Investigation protocols[23].

2.52 Consequently, ComReg is of the view that there are no additional measures required to protect MFCN services in the 3.4 GHz – 3.8 GHz band.

Q/V and E Frequency bands

Views of Respondents

2.53 Eutelsat, OneWeb and SpaceX all support the opening of the Q/V[24] and E[25] bands for satellite services noting that these bands are allocated in the ITU and ECA allocation tables to fixed and satellite services on a co-primary basis. OneWeb and SpaceX both note that they expect these bands to be extensively used for satellite gateway connections to meet consumer demand. In addition, Eutelsat and SpaceX both press ComReg to adopt ECC Decision (21)01 at or before May 2022 to enable access to the 37.5 – 40 GHz band (space-to-Earth).

2.54 To support the opening of these bands, respondents submit that:

[21] 1.3 – 1.5 GHz, 2 – 2.3 GHz, 3.5 GHz, 6 GHz, 7 GHz, 8 GHz, 11 GHz, 13 GHz, 15 GHz, 18 GHz, 23 GHz, 26 GHz, 28 GHz, 38 GHz, 42 GHz, 80 GHz
[22] 700MHz, 800 MHz, 900 MHz, 1.4 GHz, 1800 MHz, 2.1 GHz, 2.3 GHz, 2.6 GHz, 3.6 GHz
[23] https://www.comreg.ie/industry/radio-spectrum/spectrum-compliance/radio-interference/
[24] The Q band spans 33 to 50 GHz and the V band from 40 to 75 GHz.
[25] The 71 GHz-76 GHz and 81 GHz – 86 GHz band

- ComReg should make as much spectrum available for fixed SES as possible to maximise the value of satellite networks for consumers, including in rural and remote areas. (SpaceX)

- footnote 5.561 of the ITU table of allocations already requires fixed, mobile, and broadcasting services in the 74-76 GHz band to protect stations of the fixed-satellite service. (SpaceX)

- given the current congestion in the Ka band with over 130 GSO satellites and several NGSO constellations, the satellite industry is increasingly looking at the Q/V and E bands for the future development of satellite communication. (OneWeb)

- the whole of the spectrum range between 37.5-50.2 GHz is required by feeder link Earth stations in the FSS allocations which require high spectrum bandwidth; such applications will alleviate the pressure on the Ka-band. (OneWeb)

- the Q/V and E bands enables access to wide bandwidths for the gateways of the forthcoming generation of high and very high throughput satellites. (Eutelsat)

- even though the demand in the 70/80 GHz band will probably not arise in the short term, the interest from the satellite operators to use these bands in the future should be noted. Ireland could consider the identification of this band for SES. (Eutelsat)

- ComReg should use this opportunity to authorise the use of spectrum bands above 100 GHz that are allocated on a co-primary basis to the fixed-satellite service. (Eutelsat)

ComReg's Assessment

2.55 ComReg notes the broad support of respondents for the opening of the Q/V and E bands for satellite services. ComReg observes that the 47.2-50.2 GHz and 50.4-52.4 GHz frequency bands are allocated on a primary basis to the fixed satellite service in the Earth-to-space direction *and* to the fixed and mobile services.

2.56 In its Report DotEcon notes that:

- ECC Decision (21)01[26] harmonises the use of the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz for use by GSO and NGSO systems in the fixed satellite service in the Earth-to-space direction. It also harmonises the use of the frequency band 51.4-52.4 GHz for use by GSO networks in the fixed-satellite service in the Earth-to-space direction; and

- that ECC Decision (21)01 anticipates the bands identified in that Decision will be used by the next generation of High Throughput and Very High Throughput Satellites, a move driven by congestion in lower bands and evolving satellite technology.

2.57 DotEcon observes that the ITU and ECC Decisions establish the appropriate technical conditions of use for these bands and ComReg licensing framework should be aligned accordingly. DotEcon further observes, and ComReg concurs, that the timely implementation of ECC(21)01 by ComReg, and any CEPT decisions that follow, is key to the growth of satellite industries in Ireland.

2.58 Consequently, ComReg intends to implement of ECC Decision (21)01 in accordance with its standard procedure of the implementation of ECC Decisions and Recommendations.

2.59 Regarding the E-band (71 GHz-76 GHz and 81 GHz-86 GHz), in its Report DotEcon observes that it is set to be considered as part of the ITU's World Radio Communications Conference 2027 (WRC-27)[27].

2.60 ComReg observes that:

- While the E-band is allocated to the satellite services at the ITU and ECA level, there is currently no ECC Decision or Recommendation in place regarding the designation and harmonisation of this band for satellite services;

- there is no CEPT work programme item to develop any ECC Decisions or Recommendations regarding the designation and harmonisation of this band for satellite services; and

[26] https://docdb.cept.org/download/3733

[27] Preliminary Agenda Item 2.5 for WRC-2027; to consider and take appropriate action in respect of the conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution 776 (WRC-19)

- there are no sharing and compatibility studies between satellite services and other services in this band, either in place, or under consideration by the relevant ECC project teams.

2.61 In its analysis of the Q/V and E bands, DotEcon notes that the development timeline is not clear for systems using these bands and during the interview phase of the consultation stakeholders offered varied comments on when they intend to make use of these bands for commercial services. DotEcon observes that the bandwidth requirements for satellite services in these bands has yet to be established and will not likely be determined until the relevant technologies are fully developed. Notwithstanding, DotEcon observes that the bandwidths available at these higher frequencies are larger than that at lower frequency bands and as such congestion is unlikely to be an issue. However, ComReg will need to give due consideration to other services when considering making these band available for SES.

2.62 DotEcon cautions ComReg against providing first mover advantage in these higher frequency bands noting that early licensees may use a premature frequency allocation to preclude other users.

2.63 ComReg agrees with DotEcon's analysis and recommendation that, absent any EC or ECC Decisions in this band to assist ComReg in the assignment of rights of use to FSS, the E-band should not form part of any revised licensing framework arising from this consultation process. Notwithstanding ComReg will continue to monitor international developments in respect of FSS in the E-band and consider the implementation of any EC and/or ECC Decisions and Recommendations as appropriate.

2.5 Use cases for satellite ground stations

2.64 In document 21/135 ComReg noted that DotEcon's interim report 21/135a identified the following broad use cases for satellite ground stations:

- Broadcasting
- Mobile Communications
- Internet of Things (IoT)
- Earth Exploration & Remote Sensing
- Broadband (traditional GEO vs LEO mega constellations); and

- GPS and navigation

Q. 3 ComReg seeks views of interested parties regarding ComReg: a) any use cases that do not fall into the broad categories outlined above; and b) views on any of the use cases identified and the understanding of these set out in the DotEcon report, in particular with regard to factors relating to use of satellite earth stations and licensing requirements.

Views of Respondents

2.65 Four respondents, Eutelsat, GSOA, OneWeb and SpaceX responded to this question. None of the respondents identified additional use cases that did not fall into the broad categories identified in the DotEcon Report that accompanied Consultation document 21/135.

2.66 However, the respondents provided the following views in respect to the use case categories identified:

- even though low earth orbit (LEO) satellite constellations can provide low latency communication services, the services that new high throughput and very high throughput geostationary (GSO) satellites can provide must not be overlooked. The latest generation of satellite services enables all types of users, from consumers to businesses, schools, hospitals, and governments to enjoy the social and economic opportunities that internet connectivity entails, whether they are in urban, rural or the remotest locations at affordable prices. (Eutelsat ,SpaceX)

- that satellite connectivity services are especially suited to aircraft and maritime connectivity. (Eutelsat, GSOA, OneWeb)

- fixed and mobile broadband satellite services are a key component for disaster relief when terrestrial services are not usable. (Eutelsat, SpaceX, OneWeb)

- Satellite provides connectivity and secure communications solutions to institutions and government, enterprises and individual users; (GSOA, OneWeb)

- Satellite contributes to the 5G and Cloud ecosystems; (GSOA)

- Inter-satellite services are also being developed in order to enhance permanent connectivity; (GSOA)
- inter-satellite services are expanding to accommodate data-dumping at any given time for Earth exploration satellite constellations to deliver images in real time; (GSOA)
- Satellite constellations today operate in GEO, MEO and LEO orbits, and the ground stations are getting increasingly diverse to better respond to the market demand. (GSOA)

ComReg's Assessment

2.67 ComReg notes the views of respondents and agrees generally with their observations that satellite technologies are well suited to the provision of services to the aircraft and maritime industries as well as the provision of fixed and mobile broadband to all areas, particularly remote areas and in disaster relief operations. ComReg observes that all these use cases were identified in DotEcon's Report 21/135a.

2.68 ComReg also notes and agrees with the respondents' views that satellite connectivity is suitable for the provision of secure services to governments, enterprises, schools and individual users and can contribute to the 5G and cloud ecosystems.

2.69 ComReg welcomes the additional details provided by some respondents regarding the uses of LEO and GSO constellations and the utility of satellite communications for the maritime, and aviation industries.

2.70 Noting that there were no additional use cases identified by respondents that could not be accommodated within the broad use cases identified in DotEcon's interim Report, ComReg proposes to proceed with the development of the new satellite regulatory regime.

2.5.2 Harmful Interference Between Satellite Earth Stations

ComReg's position in 21/135

2.71 In ComReg document 21/135 ComReg noted that:

- There is potential that SES could cause or experience harmful interference from other SES using the same frequency band;

- Any interference experienced can likely be easily managed due to the operational nature of SES;
- Any harmful interference experienced can easily be rectified with a directional change to protect against harmful interference from other ground stations;
- Any potential for harmful interference between ground stations for different LEO constellations may require significant geographical separation to manage this; and
- The techniques available to limit interference between GSO ground stations may not be as effective in the case of LEO systems.

Q. 4 ComReg seeks views in relation to any potential harmful interference between SES ground stations and also any potential for harmful interference that may occur as a result of newly launched LEO systems. Please provide evidence and reasoning for your views.

Views of Respondents

2.72 There was broad agreement among respondents that the likelihood of interference between two SES stations or between an SES and NGSO was low. Respondents did note that the most likely interference scenario was between NGSO earth stations due to the low elevation of the steerable antennas deployed.

2.73 In its response SpaceX submits that *"[t]here is little practical limitation on the number of [satellite earth stations] within Ireland arising from interference between them,"* and "any interference experienced" between satellite earth stations *"can likely be easily managed due to the operational nature of SES."*

2.74 Notwithstanding, Eutelsat, GSOA, OneWeb and SpaceX all agree that the prevention and mitigation of harmful interference between SES is best managed by cooperation and coordination between the various satellite operators. All noted that satellite systems must be coordinated in accordance with ITU coordination obligations.

2.75 OneWeb submits that the ITU has already defined Equivalent Power Flux Density ("EPFD") limits in the Radio Regulations to protect GSO networks from NGSO systems, and there are limits on GSO networks in Article 22 and Resolution 169 to protect NGSO systems. By following these existing ITU rules, OneWeb contends that it can collocate its gateways with some GSO gateways in several jurisdictions.

2.76 AWS submits that its ground station's global operations have not resulted in any interference reports in its 10 locations throughout the globe since operations began in 2019. AWS further submits that its ground station's antennas are highly directional and use a focused, narrow beamwidth with restricted antenna transmission angle to track a quickly-moving satellite and only transmit along its path. AWS does not have space interference concerns related to its ground station's operations as spectrum is used only as the satellite passes over the field of view.

2.77 Regarding coordination between NGSO gateways, OneWeb and GSOA agree that information sharing will enable coordination which would include, where necessary, discussions on the separation distance required between gateways and on any further mitigation techniques to be used to reduce the risk of harmful interference such as power limitations and the use of high gain antennas with high off-axis discrimination.

2.78 SpaceX submits that operator-to-operator coordination, coupled with policies that reward efficient use of spectrum such as a spectrum-splitting backstop, is the *gold standard* for promoting coexistence between satellite operators.

2.79 In particular respondents contend that:

- If a separation distance between gateways is required, this can be included in a formal coordination agreement. Pending the finalisation of such a coordination agreement between two NGSO systems, the ITU Radio Regulations require the later-filed system to eliminate any harmful interference into the earlier-filed system. (OneWeb)

- In the absence of a formal coordination agreement between two NGSO systems, new gateway earth station licences should not be issued for locations within a certain distance of another already-licensed gateway earth station. (OneWeb)

- In the case of harmful interference that can't be resolved, ComReg should have the power to require licensees to change or cease operations. (OneWeb)

- any action ComReg takes to resolve degradation to services should be done so in alignment with ITU coordination obligations and procedures regarding harmful interference, i.e., that later-filed systems should be asked to modify their operations to ensure that there is no harmful interference into more senior filings. (OneWeb)

- ComReg should encourage the completion of good faith coordination and implementation of interference avoidance techniques to manage interference situations. (GSOA)

2.80 SpaceX contends that, some satellite operators have failed to deploy even the most basic spectrum sharing capabilities in their systems, leveraging this inefficiency to stonewall coordination discussions and establish large keep-out zones around their ground stations. With this in mind, SpaceX proposes that ComReg should consider establishing minimum spectrum sharing capabilities as conditions for granting satellite earth station licences to non-geostationary satellite networks. Moreover, to prevent less capable systems from imposing undue obligations on more capable systems, ComReg should clarify, in its view, that more capable systems have first priority in earth station siting. Those systems without any, or with minimal, sharing capabilities should accept interference from, and not cause interference to, systems that have been designed to be efficient spectrum users.

2.81 SpaceX further opines that:

(i) ComReg should not adopt overly prescriptive, complex, mediated, or inefficient siting or coordination requirements that could slow deployment to consumers and impose unnecessary time and cost burdens on operators and ComReg alike;

(ii) Well-designed rules will drive rapid operator-to-operator coordination without preconceived conditions that could unintentionally undermine technical discussion;

(iii) ComReg could consider imposing a spectrum-splitting backstop in the event operator-to-operator coordination is not completed by the time both operators have commenced service in Ireland. Under this approach, operators would strive to reach a coordination agreement before both systems have commenced service in Ireland. If such an agreement is not reached, the operators would split the spectrum evenly once operational. This suboptimal solution for both parties would incentivise operators to find a better solution through private coordination; and

(iv) In the event of ComReg imposing a spectrum splitting solution SpaceX proposes that ComReg could also consider providing first choice of spectrum in the split to the more technologically efficient, flexible, and robust system. This approach will create a “race to the top” effect that will promote innovation and competition leading to

more choices for Irish consumers. Operator-to-operator coordination, coupled with efficiency-rewarding policies, is far superior to other alternatives.

ComReg's Assessment

2.82 ComReg agrees with DotEcon's view that *"The advent of new NGSO systems, with steerable antennas operating at lower elevations, means that the interference environment around SES is becoming more complex".* However, ComReg observes that DotEcon further states that it has not identified any major concerns that cannot be managed in a straightforward manner.

2.83 ComReg notes that respondents agree that co-ordination between satellite service providers is the best approach for the prevention and mitigation of harmful interference between SES. In this regard ComReg welcomes that the respondents are all in favour of adopting the relevant ITU co-ordination procedures.

2.84 ComReg agrees with DotEcon's assessment that geographic separation between SES avoids harmful interference. DotEcon observes that the number of SES licences in Ireland is likely to remain relatively low and that operators will have flexibility in respect to the siting of Earth stations. Consequently, the availability of sites to accommodate SES is expected to be sufficient.

2.85 ComReg agrees with OneWeb that any requirement for separation distances between Earth stations identified by operators during the coordination process should be detailed in any inter-operator coordination agreement. ComReg also agrees that new SES licences should not be issued for locations within a certain distance of an existing licensed SES within the same frequency band. However, site-sharing could be considered subject to a coordination agreement with the incumbent licensee. ComReg's proposals in this regard are set out in section 3.4 of this document.

2.86 ComReg observes that licences for SES are, and will continue to be, granted only following an assessment by ComReg to ensure coexistence with existing deployments. This is likely to require the application of technical conditions to prevent harmful interference between Earth stations. In the event of harmful interference arising ComReg will investigate and take whatever actions it considers appropriate to the circumstances at hand.

2.87 ComReg agrees with SpaceX's views in (i) and (ii) above that there should be well designed rules for operator coordination that are efficient and effective and do not impose unnecessary time or cost burdens on operators and ComReg alike.

ComReg's proposals in this regard are set out in Chapter 4 of this document.

2.88 In regard to SpaceX's comments in (iii) and (iv) above, ComReg notes and agrees with DotEcon's analysis of SpaceX's "spectrum splitting" proposal and the difficulty it presents in implementation given that all licence applications would have to be processed at the same time in order for it to be effective. ComReg notes that DotEcon proposes that ComReg adopt an alternative framework for operator co-ordination which is discussed in detail in section 3.4 of this document.

2.5.3 Harmful Interference from other Terrestrial Uses

Terrestrial service such as 5G

2.89 In consultation 21/135 ComReg noted that:

- There is potential for harmful interference from existing terrestrial services to SES;
- The high directionality of SES antennas means that such interference can often be more difficult to rectify than the interference experienced between ground stations; and
- Concerns have been raised by stakeholders that the emergence of 5G could limit the spectrum available to satellite operators.

Q. 5 ComReg seeks views from interested parties regarding any potential interference to SES from other terrestrial uses, such as 5G. Please provide evidence and reasoning for your views.

Views of Respondents

2.90 Respondents Eutelsat, GSOA, SpaceX and OneWeb each expressed concerns regarding the potential for harmful interference to SES from 5G services in bands where there are both co-channel and adjacent channel allocations to the different services.

2.91 Eutelsat submits that:

- the long distance over which a satellite downlink signal must propagate makes it weaker when compared to terrestrial signals, hence earth stations

are very sensitive to interference from other users (especially terrestrial users) both in-band and in adjacent bands;

- In the case of satellite uplink bands, it is not only the interference to IMT stations from transmitting SES which needs to be considered for compatibility studies, but also the aggregate interference from IMT stations into the satellite receiver;
- In the case of co-frequency, co-coverage sharing, constraints must be applied to both earth stations and base stations for their coexistence because of high level of interferences, which in practice, is almost infeasible;
- ComReg should ensure the protection of satellite services from harmful interference coming from 5G base stations, especially in the 3.8-4.2 GHz and the 27.5-30 GHz bands; and
- Sharing in adjacent bands also raises difficulties and requires mitigation techniques for compatibility. IMT base station out-of-band emissions can saturate the low noise block converter of FSS earth stations in the adjacent band, as well as cause in-band interference to FSS signals. Mitigation techniques include, among others, the use of guard bands, filters, emission limits to be applied at the base station and separation distances. It should be noted that it may not be feasible to ensure separation, particularly if FSS earth stations are deployed in large numbers or without the knowledge of their locations

2.92 SpaceX submits that ComReg should adopt appropriate technical and operational rules to ensure that 5G services do not cause harmful interference to SES. By striking this careful balance, ComReg can ensure all Irish consumers and businesses have access to broadband connectivity in even the farthest reaches of the country.

(i) The 26 GHz and 28 GHz frequency bands

2.93 OneWeb submits that allocation of the 26 GHz band for terrestrial 5G and the 28 GHz band for space-based (satellite) usage is sound and will avoid interference in these bands.

2.94 Eutelsat submits that ComReg should ensure the protection of satellite services from harmful interference coming from 5G base stations, especially in the 3.8-4.2 GHz and the 27.5-30 GHz bands.

2.95 GSOA notes that numerous ITU and CEPT reports have established the strict

conditions under which IMT and FSS can coexist. For example, ITU-R Report M.2109 (WRC-15) and S.2368 (WRC-19) have concluded on separation distances in the order of 100km between the services. ComReg rightly refers to the ECC and EC deliverables concerning the usage of the 3400-3800 MHz and 24.25-27.5 GHz bands.

2.96 GSOA is concerned about potential out-of-band emissions from the adjacent 26 GHz band by terrestrial IMT/5G systems into the 28 GHz band. It submits that;

- Increases in power by terrestrial IMT/5G systems in the 26 GHz band could increase terrestrial IMT/5G out-of-band emissions into the 28 GHz band. Increased out-of-band emissions in the 26 GHz band could adversely affect the interference environment in the 28 GHz band by interfering with the ability of satellite receivers in space to receive signals from earth stations.

- requests that ComReg limit out-of-band emissions from terrestrial IMT/5G operations in the 26 GHz band into the 28 GHz band to protect satellite broadband service in the adjacent 28 GHz band.

- requests that ComReg ensure that the *aggregate level* of terrestrial IMT/5G out-of-band emissions from the 26 GHz band into the adjacent 28 GHz band does not cause harmful interference to satellite receivers in the 28 GHz band.

2.97 SpaceX submits that the expansion of 5G services could limit the spectrum available to satellite operators. In its response to the 26 GHz consultation, SpaceX explained that its network uses gateway earth stations in frequency bands (27.5-29.1 GHz) immediately adjacent to the upper portion of the 26 GHz band, beginning with two earth stations that were recently authorized in Ireland. These earth stations are essential to provide the backhaul for the high-speed data traffic used by Irish consumers and will continue to be essential as SpaceX deploys its next generation infrastructure.

(ii) The 40.5-43.5 GHz frequency bands

2.98 Eutelsat submits that in the Q and V bands, special care should be given to the protection of the satellite gateways and earth stations before any conclusion is taken regarding the use of the 40.5-43.5 GHz band for IMT.

2.99 OneWeb requests that proper consideration be taken before licensing the 42 GHz (40.5-43.5 GHz) range for terrestrial 5G. OneWeb further submit that the co-frequency scenario between NGSO satellite gateways and 5G deployment will have to be studied, in order to define adequate protection criteria around the gateway location as part of the 5G licensing process.

(iii) The 3400-3800 MHz frequency bands

2.100 The GSOA submits that the problems for satellite service providers using C-band are acute. GSOA contends that despite ECC and EC reports and decisions, most countries in Europe have not implemented any mitigation measures ensuring the protection of FSS in 3400-3800 MHz, basically forcing the users of satellite services to migrate their operations above 3800 MHz (and in a few cases, to other FSS frequency bands). Even worse, some European countries have not established the conditions to ensure appropriate protection of FSS operating above 3800 MHz from the out-of-band emissions of IMT 5G operating in 3400-3800 MHz, in the absence of IMT power limits and/or guard bands. In other cases, some administrations acknowledge the issue of poorly filtered 5G unwanted emissions and note that adjacent band impact into FSS Earth stations would still present critical issues.

ComReg's Assessment

2.101 ComReg notes the views of respondents in relation to the potential for harmful interference between FSS and 5G services. ComReg observes that respondents did not provide any evidence of actual instances of harmful interference into FSS from 5G services. This is likely because, to date, there is little real experience of FSS and 5G services operating in the same or adjacent frequency bands.

2.102 Notwithstanding, ComReg observes that there are a number of EC and ECC work items, both ongoing and complete, that address the matter of sharing and compatibility between FSS and 5G. These are addressed below.

(i) The 26 GHz and 28 GHz frequency bands

2.103 ComReg observes that in 2021 it published a study and Information Notice on the future use of the 26 GHz band in Ireland[28,29]. The 26 GHz Band consists of 3,250 MHz of spectrum in the 24.25 - 27.5 GHz frequency range. Its propagation characteristics along with the large contiguous bandwidth potentially available make the band suited for providing high-capacity wireless broadband ("WBB") services over relatively small areas as well as the provision of point-to-point radio links and other services such as Radio Astronomy ("RA") and Earth-Exploration Satellite Services ("EESS"). The 26 GHz Band is an important band, given that it is one of the three pioneer radio spectrum bands identified as being suitable for

[28] Information Notice – 26 GHz Band 5G Study | Commission for Communications Regulation (comreg.ie)
[29] 26 GHz Band 5G Study | Commission for Communications Regulation (comreg.ie)

the deployment of “5G” services in Europe[30].

2.104 The 26 GHz Band is harmonised for WBB in Europe under European Commission Implementing Decision (EU) 2019/784[31], as amended by Decision (EU) 2020/590[32] , which obliges Member States by 30 June 2020 to “designate and make available on a non-exclusive basis” the 26 GHz Band for terrestrial systems capable of providing wireless broadband electronic communications services in compliance with the essential technical conditions set out in the Annex. These technical conditions include the following requirements;

- In order to limit interference into satellite receivers, the main beam of any Active Antenna System (AAS) outdoor base stations is only allowed to point below the horizon.

- For the protection of EESS in the band 23.6 – 24 GHz where all emissions are prohibited, 5G base station out-of-band emission limits (in terms of total radiated power a composite antenna radiates) are -33 dBW/200MHz for deployments before 1 January 2024 and -39 dBW/200MHz for deployments after 1 January 2024. For user terminals, the corresponding levels are -29 dBW/200MHz and -35 dBW/200MHz.

2.105 ComReg is satisfied that the provisions of Decisions (EU) 2019/784 and Decision (EU) 2020/590 are sufficient to protect satellite services operating in the adjacent bands and no additional measures are required.

2.106 As noted in its Radio Spectrum Strategy Management Statement for the period 2022 – 2024 Compreg is monitoring developments in the 26 GHz band and if demand arises will consult on releasing this band in line with the EU Decisions.

(ii) The 40.5-43.5 GHz frequency bands

2.107 ComReg observes that the in its Opinions on a "Strategic Roadmap towards 5G in Europe"[33], the Radio Spectrum Policy Group (“RSPG”) identified the 40.5-43.5 GHz and 66-71 GHz frequency bands as priority bands for the rollout of 5G terrestrial wireless systems in the Union. The RSPG considered the band 40.5-43.5 GHz as a viable option for 5G in the longer term, taking into account the support from mobile industry and the need to take into account the general balance between the mobile

[30] See RSPG16-032 FINAL - Opinion on spectrum related aspects for next-generation wireless systems (5G), published November 2016.
[31] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D0784&from=EN
[32] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020D0590&from=EN
[33] Documents RSPG16-032 final (9 November 2016) and RSPG18-005 final (30 January 2018)

and satellite sectors to access the 40-50 GHz frequency range.

2.108 Pursuant to that Opinion the European Commission submitted to CEPT a mandate to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems for priority frequency bands above 24 GHz[34.]

2.109 In response to Tasks (1, 2 and 4) of the EC mandate on 40.5-43.5 GHz frequency band, CEPT is drafting a Report which will consider, amongst other things, whether specific out-of-block limits are needed below 40.5 GHz for coexistence with services in the adjacent 39.5-40.5 GHz frequency band. This issue was not envisaged when the mandate was first developed.

2.110 The future use of the 40.5-43.5 GHz frequency band will be subject to any decisions adopted by the EC and/or ECC. Therefore, ComReg intends to continue to monitor and input into the discussions on this matter at the EC and ECC. ComReg will consider the appropriate implementation of any EC and/or ECC decisions adopted following the completion of this work by CEPT.

(iii) The 3400-3800 MHz frequency bands

2.111 ComReg observes that European Commission Decision (EU) 2019/235[35] amends the European Commission Decision 2008/411/EC[36] as regards the relevant technical conditions applicable to the 3400 – 3800- MHz band. These EC Decisions acknowledge that the band is co-shared on a primary basis for FS and FSS but have left it to NRAs to decide what they want to licence in the band. Decision (EU) 2019/235 states that:

> *"The legal framework for using the 3 400-3 800 MHz frequency band set out by Decision 2008/411/EC should remain unchanged in terms of ensuring continued protection of existing services, other than terrestrial electronic communications networks, within the band. In particular, if retained in the band, earth stations in the fixed satellite service (FSS, space-to-earth) should be given continued protection through appropriate coordination between*

[34] https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66338

[35] COMMISSION IMPLEMENTING DECISION (EU) 2019/ 235 - of 24 January 2019 - on amending Decision 2008/ 411/ EC as regards an update of relevant technical conditions applicable to the 3•400-3•800 MHz frequency band - (notified under document C(2019) 262) (cept.org)

[36] 2008/411/EC: Commission Decision of 21 May 2008 on the harmonisation of the 3400 - 3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (notified under document number C(2008) 1873) (Text with EEA relevance) - Publications Office of the EU (europa.eu)

those systems and wireless broadband networks managed at national level on a case-by-case basis."

2.112 ComReg does not licence satellite ground stations in the 3.6 GHz band and that receive only satellite terminals in the 3.6 GHz band are permitted on a licence exempt basis in accordance with S.I. 197 of 2005[37]. The 3.6 GHz band is licensed in Ireland for the provision of Mobile and Fixed Cellular Networks ("MFCN")[38].

2.113 ComReg notes the issues of the GSOA in respect of the 3400 – 3800 MHz band but does not consider them to be part of this consultation. These issues should be raised by the GSOA with the countries in question and the relevant CEPT working groups as appropriate.

Fixed Links

2.114 In document 21/135 ComReg noted that in several cases, certain frequency bands are allocated to both Fixed Services and Fixed-Satellite Services on a Co-Primary basis. For example, the 17.7 – 19.7 GHz frequency band is allocated at a European level to fixed services and coordinated SES, however ComReg has, thus far, not allocated the 17.7 – 19.7 GHz frequency band for SES licensing.[39]

2.115 ComReg expressed the view that any current or future shared use of frequency bands is subject to a national coordination process and considers sharing/compatibility studies undertaken by CEPT and/or the ITU. In this regard ComReg was of the view that the publication of fixed link data would assist operators in the planning of SES and assist in the mitigation of potential interference.

Q. 6 ComReg seeks views from interested parties regarding any potential interference between SES and fixed links. Please provide evidence and reasoning for your views.

Views of Respondents

2.116 Respondents Eutelsat, GSOA, OneWeb and SpaceX each noted that the coexistence between SES and fixed links has long been managed through coordination by national regulators. Eutelsat and OneWeb submit this coordination would be facilitated by the publication by ComReg of fixed link location information

[37] https://www.irishstatutebook.ie/eli/2005/si/197/made/en/print#:~:text=S.I.-,No.,For%20Wireless%20Telegraphy)%20Order%202005&text=The%20Commission%20for%20Communications%20Regulation,Telegraphy%20Act%2C%201972%20(No.

[38] 3.6 GHz Band Spectrum Award | Commission for Communications Regulation (comreg.ie)

[39] The 17.7 – 19.7 GHz frequency band is available for uncoordinated TSS on a licence-exempt basis (i.e. non-interfering, non-protected). See ComReg Document 20/47R3

which is discussed in section 2.5.4 below.

2.117 AWS submits that it does not have terrestrial interference concerns related to the operation of its Earth stations because it has proven in other jurisdictions that they can co-exist with terrestrial users in similar bands.

2.118 Eir maintains that there is little evidence in its network of harmful interference from SES due to the fact there is currently no overlap between frequencies used for the different technologies and applications. Eir further submits that this should be maintained and urge ComReg not to licence SES in frequency ranges that overlap harmonised bands for mobile services and bands allocated for fixed links.

2.119 OneWeb submits that once a satellite gateway license is granted, ComReg would also need to inform and seek opinions for any new fixed radio link application in the vicinity of the gateway.

2.120 GSOA contends that the implementation of 5G technology in Fixed Service applications such as Fixed Wireless Access ("FWA") presents risks of interference to incumbent services, including into FSS Earth station receivers. These new FWA applications need to be scrutinized and specific frameworks would need to be developed to ensure that other incumbent services are duly protected.

2.121 GSOA further notes that ComReg specifically refers to the 17.7-19.7 GHz band which an increasing number of Ka-band satellite systems in GEO, MEO or LEO are using to deliver services in all regions, including in Europe. This band is earmarked as part of ECC Decisions 13(01) and 15(04) on ESOMPs (GSO and NGSO) which Ireland has implemented: it would be very unfortunate if the license-exemption which several categories of satellite terminals (TSS) are benefiting from could be challenged by the introduction of new types of 5G FWA services using the same frequency bands. GSOA therefore asks ComReg to exercise an extreme vigilance on the type of Fixed Radio Links that are licensed in the 17.7-19.7 GHz band to avoid a situation where coexistence with FSS may be seriously challenged.

2.122 SpaceX submits that the risk of interference between directional, fixed links and SES is low and readily managed through common frequency planning and coordination techniques. This is particularly true in higher frequencies, where both fixed links and SES feature high gain, directional beams that enable users to coexist with minimal physical and angular separation, both in rural and urban areas.

2.123 To ensure equal access to spectrum, SpaceX contends that ComReg should develop a unified light-licensing process for fixed links and SES in higher frequency bands such as the Ka, Q/V, and E bands. Under this framework, satellite operators would

apply for earth stations through the eLicensing system and, provided there is no risk of harmful interference to existing users, automatically receive a licence. This process would ensure that both fixed links and satellite operators can have equitable access to shared spectrum with similar application processing times.

ComReg's Assessment

2.124 ComReg notes the views of respondents that the coexistence between SES and fixed links has long been managed through coordination by national regulators. ComReg agrees with respondents that the publication of information on the location of fixed links and SES can assist in ensuring coexistence between both services. This is discussed in detail in section 2.5.4 below.

2.125 ComReg further agrees that the highly directional nature of point-to-point fixed links is such that the risk of interference with SES is low and readily managed through frequency planning and coordination techniques.

2.126 ComReg notes the submission by Eir that it has not experienced harmful interference arising from SES due to the fact there is currently no overlap between frequencies used for the different technologies and applications.

2.127 ComReg does not agree with OneWeb's contention that ComReg would need to inform and seek opinions from SES licensees for any new application for fixed radio links in the vicinity of the gateway. ComReg observes that, as set out in DotEcon's Report, its existing licensing process is to check for potential interference and whether national coordination measures are needed when processing SES and fixed links licence applications, ensuring existing users are protected against interference from new licensees. Consequently, ComReg is of the view there is no need to specifically notify nearby existing SES users.

2.128 Regarding the potential for interference by new FWA systems operating in the 18 GHz band to FSS, ComReg notes that currently circa 3,000 fixed link licences have been issued for the band, but there are currently no P-MP deployments in the 18 GHz band.[40] Notwithstanding, the GSOA correctly points out that any new FWA applications would need to be scrutinised and specific frameworks would need to be developed to ensure that other incumbent services are duly protected. ComReg observes that this would be a matter for CEPT to study and adopt any necessary decisions and recommendations to ensure compatibility and sharing with existing services.

[40] This includes approximately 1,000 dual polarity links.

2.129 ComReg observes TSS operating in the 17.7-19.7 GHz band would be on a licence exempt basis and would not be able to claim protection from interference from primary services in the band. ComReg notes and agrees with DotEcon's view that the coexistence between licence exempt terminals and other primary users of the band is primarily a matter for CEPT technical studies and harmonisation decisions. Consequently, ComReg encourages GSOA to raise their concerns with CEPT.

2.130 ComReg does not agree with SpaceX's proposal for a "light licensing regime" but accords with DotEcon's observation that this proposal is largely the same as the existing process and offers no real benefits to either ComReg or licensees.

2.5.4 Information Policy

2.131 In consultation 20/136, ComReg noted that the stakeholder interviews suggested that ComReg should make available details from its own licensing database, and that this would often be sufficient for operators to resolve interference without ComReg having to intervene. To facilitate this ComReg stated that it intends to publish the fixed links licence and SES licence data on www.siteviewer.ie during the 2022-2024 period.

Q. 7 ComReg seeks views from interested parties on what type of information would help operators resolve coordination problems and the extent to which this would reduce the risk of interference (both between SES and between SES and terrestrial services)? Please provide evidence and reasoning for your views.

Views of Respondents

2.132 All respondents were of the view that the publication of information regarding the location of fixed links and SES would assist in the co-ordination of services and reduce the risk of harmful interference. In responding to this question, several respondents (Eutelsat, GSOA, OneWeb and SpaceX) made additional comments in relation to co-ordination and harmful interference which are addressed in section 2.5.3 above.

2.133 In particular the respondents note the following:

- it could be useful to have some information on the deployment of fixed links and earth stations such as the coordinates, frequencies and power, to prevent some interference issues. However, this information should not

replace a coordination process and it cannot resolve interference issues. The regulator has a role to play in managing interferences. (Eutelsat)

- there is merit in plotting the location of SES deployments in Siteviewer. This would be very useful to help understand deployment scenarios and possible interference risks and mitigations. (Eir)
- information sharing of licensed SES and terrestrial services available can help initiate the coordination process and reduce the risk of interference by potentially providing operators the ability to implement preventive techniques to minimize in-line events with other systems. (GSOA)
- providing general operational characteristics can help other NGSO operators with interference avoidance techniques. (GSOA)
- making the locations of licensed SES and other terrestrial services available publicly can help coordination discussions. (OneWeb)
- ComReg should ensure that its Siteviewer tool includes sufficient and current data about fixed links to enable meaningful interference. At a minimum, this information about fixed links should include the latitude, longitude, altitude, and azimuth of the transmitting and receiving antennas and the radiofrequency properties of each (e.g., centre frequency, bandwidth, antenna input power density, antenna maximum gain, antenna gain pattern, receive noise figure, polarisation). The publication of detailed fixed links data on Siteviewer will, not only aid terrestrial operators, but also SES by enabling more rapid gateway siting, coordination, and deployment. This facilitation is particularly important for spectrum bands that are shared on a co-primary basis between terrestrial and satellite networks. (SpaceX)

ComReg's Assessment

2.134 ComReg welcomes the broad support of respondents to its proposal to publish the location the fixed links licence and SES licence data on www.siteviewer.ie during the 2022-2024 period.

2.135 ComReg notes and agrees with respondents that this would assist in the co-ordination of satellite services and reduce the risk of harmful interference between fixed links and satellite services.

2.136 ComReg agrees with Eutelsat that the publication of this information should not replace a coordination process between service providers, nor can it resolve

interference issues. ComReg will continue to exercise its function to maintain the integrity of the radio spectrum and to respond to complaints of harmful interference through its existing processes.

2.137 ComReg notes and agrees with DotEcon's observation that making this information available may mean that satellite operators naturally choose to locate SES away from each other such that harmful interference is not a concern.

2.138 Chapter 3 of this document details the information that ComReg proposes to publish on the location the fixed links licence and SES licence data on www.siteviewer.ie.

2.5.5 SES Fees

2.139 In ComReg document 21/135 ComReg notes that the fees for SES would be set out in a further consultation. However, in the interim, DotEcon provided some preliminary views, the response to which will inform its second report and ComReg's proposals on SES Fees. These are:

- As a minimum requirement, SES licence fees need to be sufficient for ComReg to recover its administrative costs relating to processing applications for and issuing SES licences; and
- maintaining the regulatory functions for interference management to a sufficient degree to be able to resolve problems expeditiously (even if these seldom occur).

2.140 Further, DotEcon also considered the possibility for setting different fees for different licence types on the basis of the interference analysis carried out by ComReg for each licence type. For example, Earth stations within a limited area may be charged as if they were a single Earth station.

2.141 There is likely to be a low risk of interference and opportunity costs in respect of the spectrum used by SES will in most cases be modest or close to zero. However, there are some exceptions to this[41] and fees would need to reflect such cases.

2.142 In relation to the structure of fees ComReg may set fees, per earth station, per satellite constellation served or per antenna; and related to bandwidth. However, DotEcon does not believe that either administrative costs or opportunity costs vary significantly with the number of constellations served from a given ground station or even per antenna used at a given location. Therefore, there may be no obvious

[41] For example, SES might sterilise spectrum for terrestrial services in some small exclusion zone and fees may need to reflect the value of the excluded use within that exclusion zone

rationale for such charging structures.

Q. 8	ComReg seeks views from interested parties on the above including:

a) the proper definition of SES to apply for licensing purposes given the potential for 'light-weight' ground stations being used for some applications (such as IoT downlinks);

b) the structure of the fee schedule (e.g., per earth station, per satellite constellation, bandwidth);

c) any pricing methodologies or approaches that would be suitable for estimating SES fees. ComReg also seeks views of interested parties on the existing charging structure and aspects of that approach that require change or not;

d) what basis should be used to allocate administrative costs, especially given that some SESs may need little or no interference protection (i.e., different fees for different licence types; and

e) how to deal with competing terrestrial uses that might be precluded in exclusion zones around SESs needing interference protection and reflect the opportunity cost imposed so that new ground stations locate themselves efficiently.

Views of Respondents

2.143 Four respondents, AWS, Eir, Eutelsat and OneWeb provided submissions to question 9.

2.144 AWS, Eutelsat and OneWeb are all of the view that the current fee structure is not reflective of new satellite systems and thus warrants review. In its response AWS submits that licence fees should not prevent the development of innovative services and that a low fee that covers the cost of processing and coordinating requests is the norm in most jurisdictions. It notes that low fees make sense for use cases with low administrative costs, for example, for earth stations, which have little to no interference protection.

2.145 Specifically on the matter of bandwidth, both OneWeb and Eutelsat note that new satellite systems use considerably larger bandwidths and that the current fee structure is dissuasive. Eutelsat proposes that ComReg should reduce or cap the fees for higher frequencies and/or for wider bandwidths while for IoT narrowband systems the fees should be reduced. OneWeb proposes that unit prices should be reduced significantly as the bandwidth grows.

2.146 In its submission AWS cautions ComReg against setting fees in linear progression with bandwidth without taking into consideration the usage patterns. It submits that low duty cycles satellite systems should not be charged the same as those systems using the spectrum constantly.

2.147 With particular regard to the fees associated with Teleport licences OneWeb submits that should the definition of a Teleport licence be applied to an NGSO Gateway this would result in a punitive licence fee in excess of €2 million. OneWeb requests clarity from ComReg regarding how it intends to classify NGSO Gateways and the fees associated with same.

2.148 OneWeb is of the view that an NGSO gateway composed of several antennas using the same frequencies in the same location should be authorised under a single licence. OneWeb considers that since the opportunity cost for an array of such antennas is no different than for a single antenna, the array licence fee should be the same fee as for one antenna, with possibly some administrative fees per antenna.

2.149 Eir submits that it may be appropriate to align fees to the specific use case. For example, if SES is used to provide mobile services the SES licence fee should be proportionate to the spectrum fees paid by mobile network operators.

ComReg's Assessment

2.150 ComReg notes the views of respondents that consideration should be given to the current fee structure .ComReg agrees with DotEcon's analysis that as there is no scarcity of spectrum for satellite services there is no role for opportunity cost pricing for determining an efficient allocation. Consequently, ComReg's guiding principle is that the fixed and common costs associated with the licensing and interference monitoring framework of SES needs to be recovered efficiently and equitably across the different types of users.

2.151 Regarding the submission by Eir, ComReg agrees with DotEcon's assessment that is not realistic to set different fees for specific users or use cases which would require strict definitions of the various use cases applicable to the associated fees. Such a proposal would be difficult to set up and administer and keep pace with the changing use cases. ComReg agrees with DotEcon's recommendation to use bandwidth as a proxy for use case value for the purpose of distributing administrative costs between high and low value users.

2.152 ComReg's proposals in respect of fees for SES are detailed further in Chapter 4 of this document.

2.5.6 Regulatory Environment

2.153 DotEcon, in its interim report 21/135a, noted that several stakeholders made general comments about the importance of a stable regulatory environment whilst remarking that the regulatory burden can affect whether an operator will set up SES in a particular country.

2.154 The stakeholder interviews identified some areas where improved clarity in ComReg's guidelines would help but did not suggest that ComReg's current application and licensing process prevented them from operating in Ireland.

Q. 10 ComReg seeks any additional views from interested parties on the current SES licensing regime and guidelines? Please provide evidence and reasoning for your views.

Views of Respondents

2.155 Respondents to this question did not provide any additional views on the current SES licensing regime and the associated guidelines.

2.156 However, Eutelsat, GSOA and OneWeb all submit that the satellite industry requires a long investment horizon and as such certainty and predictability of the regulatory regime, including spectrum allocation is essential to attract investment.

ComReg's Assessment

2.157 ComReg notes that respondents did not propose any additional amendments to the current SES licensing regime and guidelines.

2.158 ComReg agrees with respondents that there is a requirement for regulatory certainty and predictability. In this regard, ComReg observes that, as set out in ComReg's ECS Strategy Statement 2021 – 2023[42], one of its roles is to facilitate innovation by creating a stable investment environment and predictable regulatory regime, ensuring industry can develop and grow new products and services.

2.159 ComReg observes that there has been considerable technological advances within the satellite industry in recent years. This view is supported by the both the stakeholder interviews and the submissions provided to this consultation. ComReg

[42] Electronic Communications Strategy Statement 2021-2023 | Commission for Communications Regulation (comreg.ie)

further observes, and as set out elsewhere in this Chapter, respondents from the satellite industry were in agreement that existing regulatory regime needs to be updated to reflect these technological advances.

2.160 Consequently, in fulfilling its role to create a stable investment environment and predictable regulatory regime ComReg must balance the need for regulatory certainty with the requirement to ensure that the licensing frameworks in place for the different ECN/ECS services meets the needs of the different service providers.

2.161 The implementation of any new regulatory regime requires the dedication of considerable time and resources by ComReg. ComReg observes that it generally takes 24 months from initial consultation to final Decision and implementation of a new licensing framework. ComReg is of the view therefore that any new licensing regime needs to be robust and froward looking so that it can continue to meet industry needs for many years.

Adoption of CEPT Decisions

2.162 As set out in Consultation Document 21/135, ComReg recognises that there is a need to adopt certain decisions with minimal delay but would note that any decision would require a thorough review before adopting, with a view first to the national requirements of implementing the decision and how this may affect different services within and adjacent to a particular band.

2.163 ComReg would also note that it is not its practice to incorporate draft or provisional CEPT decisions into Irish regulation before they are finalised and approved by a ECC Plenary meeting.

2.164 Consequently, ComReg sought views in relation to the implementation of CEPT decisions.

Q. 11 ComReg seeks any additional views from interested parties on the current process for the implementation of ECC Decisions for the exemption from licensing of TSS? Please provide evidence and detailed reasoning for your views.

Views of Respondents

2.165 Respondents, Eutelsat, GSOA, OneWeb and SpaceX are supportive of ComReg's approach to the implementation of ECC Decision for the exemption from licensing of TSS and all commend the speed with which ComReg has done this.

2.166 Eutelsat submits that this ensures a thriving ecosystem for the deployment of satellite activities in Ireland.

2.167 SpaceX, however, argues that more can still be done to facilitate deployment of innovative user terminals and ESIMs. SpaceX proposes that ComReg should explicitly reference ETSI standard 303 981 in its exemption for ESIMs communicating with NGSO fixed satellite systems. SpaceX believes that this would be consistent with ComReg's decision to reference the standard in its exemption for fixed satellite terminals. It further contends that this would ease the regulatory burden while enabling the rapid deployment of services such as Starlink to Irish consumers and businesses.

2.168 Eir submits that the exemption from licensing should follow similar technical conditions and type approval processes as those for other use cases such as mobile communication terminals.

2.169 GSOA requests ComReg to adopt recent ECC Decision (21)01 of 5 November 2021 (updated 4 March 2022) on the use of the bands 47.2-50.2 GHz and 50.4-52.4 GHz by the fixed-satellite service (Earth-to space) when further amending the TSS regime.

2.170 GSOA submits that ComReg should harmonise technical conditions for ESOMPS and ESIMS operating in Ka-band, based on relevant ECC Decisions and increase the allowed EIRP up 60 dBW for uncoordinated TSS and to remove the exclusion zone around Dublin port for ESOMPs in full accordance with ECC Decisions (13)01 and (15)04.

2.171 Finally, in its submission SpaceX disagrees with DotEcon's view that, as set out in section 4.5.1 of 21/135a, it would be inappropriate to adopt provisional versions of CEPT decisions. SpaceX submits that there is significant innovation benefit to opening up new markets and spectrum bands to serve consumers and businesses with next-generation connectivity, particularly where the new services are spectrally efficient (with a low risk of harmful interference to incumbent users) and independent of whether a harmonised framework exists. SpaceX further submits that if ComReg is concerned about pre-empting final rules, it could issue licences on a non-interference, non-protected basis pending final rules, and operators would then assume the risk of changes in the regulatory structure. Finally, SpaceX submits that while Test & Trial Ireland[43] is a helpful mechanism for enabling operators to explore innovative new technologies, it is not a panacea.

ComReg's Assessment

2.172 ComReg notes the support of respondents for its overall approach to the implementation of ECC Decisions for the exemption from licensing of TSS.

[43] https://www.testandtrial.ie

ComReg's approach is consistent with its approach to the exemption of all users terminals including mobile communications terminals. As set out in its Radio Spectrum Management Statement, ComReg will continue with this approach going forward.

2.173 Regarding the specific issue of ETSI standard 303 381 raised by Space X, ComReg notes that the most recent update to the Permitted Licence Exemptions for Terminals for Satellite Services document 20/47R4 in March 2022 now includes a reference to ETSI Standard 303 981.

2.174 Regarding GSOA's requests for ComReg to implement ECC Decision (21)01 and to harmonise technical conditions for ESOMPS and ESIMS operating in Ka-band, based on ECC Decisions ECC Decision (13)01 and (15)04, ComReg will consider these as part of next revision of the Permitted Licence Exemptions for Terminals for Satellite Services document.

2.175 ComReg does not agree with SpaceX's submission that it should adopt CEPT decisions prior to final approval. ComReg observes that the harmonisation of radio spectrum is a key driver for the roll out of radio communications services. The process of CEPT harmonisation is necessarily a collaborative one which requires active participation of NRAs, standards bodies and industry. ComReg is of the view that the implementation of CEPT Decisions prior to final adoption could undermine the CEPT decision making and approvals process. ComReg notes and agrees with DotEcon's observation that it is better to wait for the final adoption of CEPT Decisions so that the relevant technical matters are settled rather than attempting to pre-empt them.

2.176 ComReg also concurs with DotEcon that the window to open bands "early" once these conditions are clear would be reasonably narrow and the benefit of earlier access to the spectrum would be small.

2.177 On this basis ComReg agrees with DotEcon's view that it would not be appropriate for ComReg to pre-empt the CEPT decision making process via the adoption of draft decisions.

2.178 Finally, ComReg is of the view that Test & Trial Ireland[43] remains the best mechanism to enable novel services to be trialled in advance of the finalisation of any CEPT decision.

Chapter 3

3 Proposed Revised Licensing Framework for Fixed Satellite Services

3.1 Overview

3.1 In Annex C of ComReg 22/56a, DotEcon undertakes a detailed review of the current Satellite licensing framework and associated technical parameters, as set out in the existing Satellite Licensing guidelines document 00/64R3. As part of its review, DotEcon assesses the parameters and their continued applicability to the Irish case, in the light of the relevant CEPT and ITU recommendations and the international best practices. This includes:

- Licence Types;
- Frequency Bands allocated to Satellite Licensing In Ireland;
- Sharing and Compatibility issues;
- Technical conditions;
- Licence Duration; and
- Application Process;

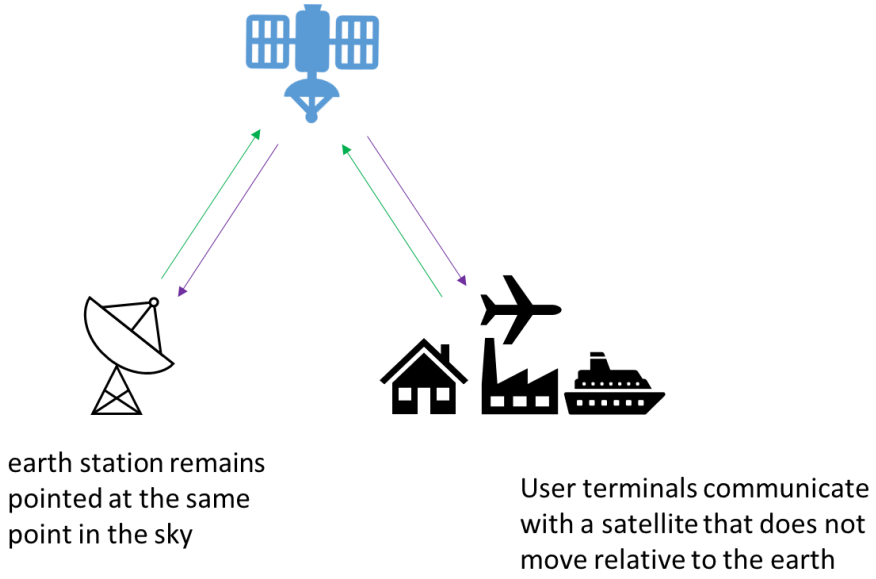
3.2 This chapter synopsises DotEcon's conclusions and readers are referred to the DotEcon Report (Document 22/56a) for a detailed discussion on this review of the Satellite Licensing Framework.

Satellite operations which require Earth Stations

3.3 As set out in Document 21/135, a satellite earth station ("SES") is a type of radio equipment used to communicate with a space station (satellite) from the Earth's surface. SES can be used to provide data, broadband and telephony connections as well as backhaul, broadcast feeder links, telemetry, and satellite control.

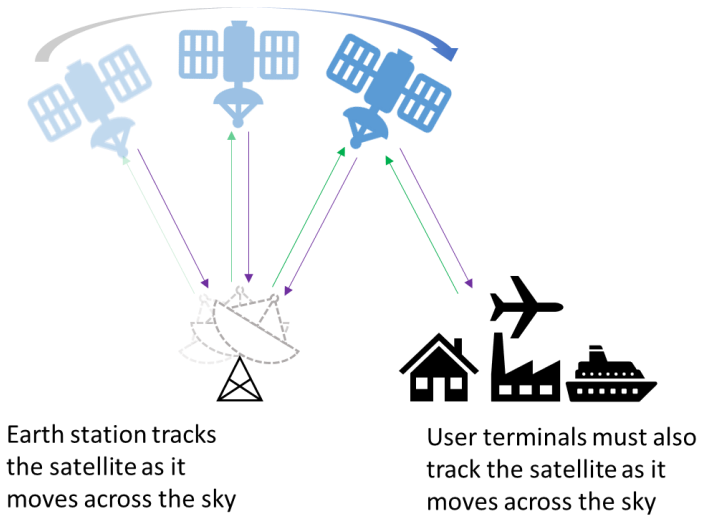
3.4 ComReg has identified four different types of SES operations which require licensing, (a) Geostationary Satellite Orbit Earth Stations, (b) Non-Geostationary Satellite Orbit Earth Stations, (c) Receive Only Earth Stations, and (d) Transportable Earth Stations.

(a) **Geostationary Satellite Orbit (GSO)**



3.5 The ITU defines a geostationary satellite as a geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator thus remains fixed relative to the Earth. As a result, GSO Earth Stations point at fixed point in the sky. GSO satellites generally operate in both transmit (Earth-to-space) and receive (space-to-Earth) modes.

(b) **Non-Geostationary Satellite Orbit (NGSO)**



3.6 Non-geostationary orbit (NGSO) satellites occupy a range of orbital positions (LEO[44] satellites are located between 700km-1,500km from the Earth, MEO[45] satellites are located at 10,000km from the Earth), and do not maintain a stationary position, but instead move in relation to the Earth's surface. Like GSO, these satellites also generally operate in both transmit (Earth-to-space) and receive (space-to-Earth) modes.

(c) **Receive Only Earth Stations**

3.7 Receive Only Earth Stations are SES that operate on a receive only basis and do not transmit back to the satellite (space-to-Earth). They are generally used for by Earth exploration-satellite services[46], meteorological-satellite services[47], and space research services[48] for receiving data only, for example such as meteorological data for weather forecasting purposes. Receive Only Earth Stations normally operate on a secondary licence exempt basis however, the nature of some services is such that operators may request that the station is protected from harmful interference. ComReg's existing satellite licensing regime makes provision for the protection of Receive Only Earth Stations which are considered on a case by case basis.

[44] LEO means a Low Earth Orbit satellite

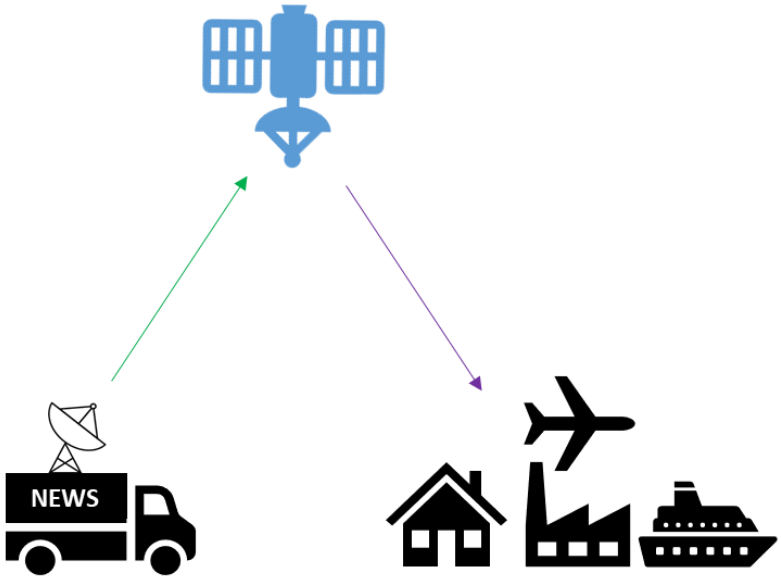
[45] MEO means a Medium Earth Orbit satellite

[46] A radiocommunication service between earth stations and one or more space stations, which may include links between space stations, in which information relating to the characteristics of the Earth and its natural phenomena, including data relating to the state of the environment, is obtained from active sensors or passive sensors on Earth satellites.

[47] An earth exploration-satellite service for meteorological purposes.

[48] A radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes

(d) **Transportable Earth Stations (TES)**



3.8 Transportable Earth Stations ("TES") are SES used to transmit live or recently recorded footage from different locations and are commonly referred to as Satellite News Gathering stations which are used, for example, by RTE, BBC, Sky news, etc. TES licences are often only required on a temporary basis to address particular sporting or similar short-term events.

3.2 Licence Types

3.9 ComReg notes DotEcon's view, in Section 6 of its report, that ComReg's current SES licence structure is largely fit for purpose, however DotEcon recommends that some changes should be made to accommodate the four identified types of SES operations above which would require licensing, in particular:

(a) a single SES licence should allow the licensee to operate (transmit/receive or transmit) any number of antennas/earth stations within a given radius at a single site (provided it informs ComReg of the number of antennas as part of the licence application process);

(b) following the first point, the Teleport licence category (which has never been used) becomes redundant and should be removed from the SES framework; and

(c) protected, receive-only operation should only be available to operators who provide evidence that they cannot operate under licence exemptions, and the issuing of receive-only licences should be entirely at ComReg's discretion.

3.10 ComReg notes DotEcon's views, and while the current SES licence types are fit for purpose, ComReg agrees that changes are required to the current licence types to ensure that they remain so.

3.11 As such, ComReg proposes to split the four SES licence types into two categories: Fixed Earth Stations ("FES") and Transportable Earth Stations ("TES") as detailed below.

Fixed Earth Stations

3.12 ComReg proposes that the Fixed Earth Station category will incorporate SES licence types (a), (b) and (c) above.

3.13 For the reasons set out in Chapter 3 of this document, ComReg proposes to remove the Teleport licence type and allow satellite ECN providers to deploy any number of antennas/earth stations within a given radius at a single site under the Fixed Earth Station licence type.

3.14 Receive only SES licences would be restricted to earth stations for services such as meteorological satellite services, Earth exploration satellite services, and space research. For example, regarding Earth exploration-satellite services, the band 6 425 – 7 250 MHz is planned to be used globally by the Copernicus Imaging Microwave Radiometer ("CIMR").[49] Certain Earth stations used for these types of services do not transmit any information but do receive important information and therefore their use of certain frequencies may require protection from harmful interference.

3.15 The factors that would inform ComReg's decision as to whether to afford protection from harmful interference to a receive only SES would include, but is not limited to, the following:

- The geographic location of the receive only SES;
- The frequency(ies) where protection is sought;
- The type of service used by the receive only SES;

[49] CIMR - eoPortal Directory - Satellite Missions

- The number of licences issued to Primary users in the frequency band in question; and
- Whether the service is defined as a Primary or Secondary[50] service in the ITU Radio Regulations.[51]

Transportable Earth Stations

3.16 In the second category of SES ComReg proposes to retain the Transportable Earth Station (TES) licence type as it remains an important mode of communication for Satellite News Gathering operations.

Q. 1 ComReg welcomes views of interested parties on its proposed satellite licence types as detailed above. Please provide evidence and reasoning for your views

3.3 Frequency Bands

3.17 As set out in ComReg document 21/135 there are currently 17 different frequency bands available to SES operations above 3 GHz. SES frequency bands are either shared or exclusive frequency bands and reflect the relevant allocations in the ITU Radio Regulations.

3.18 Frequency bands which are shared are allocated for SES and other wireless services. The nature of this sharing depends on the allocation status (Primary or Secondary) of the other service operating in the same band and has implications for how SES applications are processed and licensed.

3.19 Where two or more services are allocated the same frequency band on a Co-Primary allocation basis, they enjoy equal status under the Radio Regulations. As such, a successful national and/or international coordination process is required before a licence can be issued.

3.20 In its Report, DotEcon notes the frequency bands currently available for SES licensing in Ireland, and further notes that some stakeholders suggest that there are

[50] Stations of a secondary service:
a) shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;
b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date; and
c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

[51] https://www.itu.int/pub/R-REG-RR

frequencies allocated for satellite services by the Radio Regulations that are not currently available for SES in Ireland, including, for example:

- frequencies in bands below 3 GHz (e.g. the UHF, L, and S bands) that may be particularly useful for IoT and/or earth exploration applications;
- frequencies in the Ka band, where several respondents commented on the fact that only 500 MHz (29.5 – 30.0 GHz) is available in the band in Ireland for SES, but the full 2.5 GHz (i.e. 27.5 – 30 GHz for Earth-to-space) could be opened up.

3.21 Furthermore, higher frequency bands, in particular the Q and V bands are likely to become useful for use with SES.[52] Access to frequencies in the 70/80 GHz range might also be useful for innovative and experimental satellite use.

3.22 ComReg is mindful that in considering the opening of any frequency bands, those proposals must meet its statutory objectives to ensure the efficient management and use of the radio spectrum, and to promote and create conditions for effective competition in the provision of ECN and ECS.

3.3.2 Frequency Bands Below 3 GHz

3.23 ComReg notes that there are a number of frequency bands below 3 GHz allocated by the ITU and ECA to satellite services and that there was a broad interest in the opening of these bands for SES licensing in Ireland.

3.24 ComReg notes DotEcon's proposal that ComReg should consider opening the 401 MHz - 403 MHz, 2 025 MHz – 2 110 MHz and 2 200 MHz – 2 290 MHz bands for licensing in accordance with any relevant recommendations as set out by the ITU. While DotEcon notes that at present, there are no CEPT Decisions in relation to use of these bands for SES, it is not aware of any decisions/guidelines that would prevent ComReg from adopting such an approach.

3.25 Generally, ComReg assigns spectrum rights of use in the frequency bands where, in addition to ITU Recommendations, there are also EC and ECC Decisions, Recommendations and Reports in place that harmonise the relevant frequency bands for a particular service and, where necessary, sets out associated technical conditions and any sharing and compatibility requirements.

3.26 ComReg is of the view that the international harmonisation is a key factor in

[52] https://docdb.cept.org/download/3733

determining the demand for and the supply of radio spectrum, given its benefits in terms of facilitating economies of scale in the manufacture of radio equipment (which lowers both the cost of deploying wireless networks and the cost of wireless devices for consumers), and the minimisation of interference between users.

3.27 International harmonisation, and the benefits provided by it are particularly important for smaller countries such as Ireland, with limited ability to affect the technology roadmaps typically adopted by global suppliers of radio equipment.

3.28 ComReg considers that, if it decided to open these bands for satellite services, absent any guidance from the ECC, it must satisfy itself that the extant ITU Recommendations are sufficient to enable same. Alternatively, ComReg may need to develop and consult on the technical conditions appropriate for these bands in order to protect other services in the bands (if any) and in adjacent bands.

3.29 Therefore prior to making a determination in respect of the frequency bands below 3GHz for satellite services ComReg is minded to consider this matter further and, where appropriate, seek expert advice on how best to proceed.

401 MHz – 403 MHz band

3.30 ComReg notes that the ITU has published three Recommendations regarding the use of the 401 MHz – 403 MHz[53]:

(a) Recommendation ITU-R SA.1258-1 – Sharing of the frequency band 401-403 MHz between the meteorological-satellite service, earth exploration-satellite service and meteorological aids service;

(b) Recommendation ITU-R SA.2044-0 – Protection criteria for NGSO data collection platforms in the band 401-403 MHz; and

(c) Recommendation ITU-R SA.2045-0 – Basic general partitioning and sharing conditions for the band 401-403 MHz for future long-term coordinated use of data collection systems on geostationary and non-geostationary MetSat and Earth exploration-satellite service systems.

3.31 ComReg further notes that article 5.264A of the ITU's Radio Regulations sets out the maximum EIRP limits which should apply to SES operating in the 401 MHz - 403

1.1 [53]The 401 MHz - 403 MHz band is also allocated to Meteorological Aids (MetAids) services on a Co-Primary basis. In its current Radio Spectrum Management Strategy Statement ComReg has identified a work item to implement a licensing regime for Meteorological Aids (MetAids) services during the 2022-2024 period.

MHz band.

3.32 Interested parties are invited to provide views on the potential opening of the 401 MHz – 403 MHz band for SES.

2025 MHz - 2110 MHz and 2200 MHz - 2290 MHz bands

3.33 There are a number of services which are allocated on a Co-Primary basis in the 2 025 MHz – 2 110 MHz[54] and 2 200 MHz – 2 290 MHz[55] bands. Recommendation ITU-R SA.1273 sets out the power flux-density levels from the space research, space operation and earth exploration-satellite services required to protect the fixed service in the bands 2 025-2 110 MHz and 2 200-2 290 MHz band.

3.34 Currently, in Ireland fixed radio links are licensed in the 2 025 MHz – 2 110 MHz and 2 200 MHz – 2 290 MHz bands with just 15 live licences, one-third of the number of fixed links licensed in 2010 in this band.

3.35 ComReg notes that it has to date issued a number of Trial licences for SES to use the 2 025 MHz – 2 110 MHz and 2 200 MHz – 2 290 MHz bands for earth exploration-satellite services and interested parties have expressed a requirement for SES licences in the bands.

3.36 Interested parties are invited to provide views on the potential opening of the 2 025 MHz – 2 110 MHz and 2 200 MHz – 2 290 MHz bands.

3.3.3 Other Frequency Bands

3.4 GHz – 3.8 GHz band

3.37 In ComReg Document 00/63R3, the 3.4 GHz – 3.8 GHz and 3.8 GHz – 4.2 GHz bands are listed as being available for licensing for SES receive operations, however in 2017 the rights of use for the 3.4 GHz – 3.8 GHz band were assigned to five operators for the provision of MFCN.[56] ComReg notes that the award of the 3.4 GHz – 3.8 GHz band has effectively closed the band to SES licensing and therefore will not include the 3.4 GHz – 3.8 GHz band as part of the future SES licensing regime. ComReg further notes that it has never issued a SES licence for the 3.4 GHz – 3.8 GHz band.

[54] SPACE OPERATION (Earth-to-space) (space-to-space), EARTH EXPLORATION-SATELLITE (Earth-to-space space-to-space), FIXED, MOBILE, and SPACE RESEARCH (Earth-to-space) (space-to-space)
[55] SPACE OPERATION (space-to-Earth) (space-to-space), EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space), FIXED, MOBILE, and SPACE RESEARCH (space-to-Earth) (space-to-space)
[56] https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/3-6ghz-band-spectrum-award/

3.38 ComReg proposes to continue to make the 3.8 GHz – 4.2 GHz band available for SES licensing. However, ComReg notes that the European Commission has issued a mandate to CEPT to assess spectrum needs for the use of the 3.8 GHz – 4.2 GHz band by terrestrial wireless broadband systems providing private local-area network connectivity ('private local networks') and to develop harmonised technical conditions for the shared use of the 3.8 GHz – 4.2 GHz band. ComReg intends to monitor the discussions and work by CEPT and the EC regarding the mandate and will consider the future use of the 3.8 GHz – 4.2 GHz for SES following any decisions by CEPT or the EC regarding the band.

Ka-band

3.39 In its report, DotEcon notes that the 27.5 GHz – 30 GHz band is widely used by satellite operators and has been opened to satellite services by NRAs in several European countries. DotEcon further notes that several stakeholders were strongly in favour of any revised licensing regime including the full 27.5 – 30 GHz range and is of the view that the band should be opened as part of a future SES licensing regime.

3.40 ComReg agrees with DotEcon's view regarding the 27.5 GHz – 30 GHz band, and notes that in 2020 and 2021 it issued several Trial licences for the 27.5 GHz – 30 GHz band for SES operations.

3.41 ComReg observes that the following documents have been published by the ECC or ITU to ensure that the band can be shared by different services:

(a) Recommendation ITU-R SF.1719 on sharing between fixed links and transmitted SES in the 27.5-29.5 GHz band;

(b) ECC Recommendation T/R 13-02 on channel spacing for 28 GHz fixed links;

(c) ECC/DEC/(05)08 on SES use of 29.5-30 GHz (the SES band that is not shared with fixed links and is already included in the guidelines); whereas

(d) ECC/DEC/(05)01 notes that coordinated FSS earth stations can still make use of the whole band 27.5-29.5 GHz.

3.42 In view of the potential demand for SES licences in the band, ComReg proposes to open the 27.5 GHz – 30 GHz band for SES licensing in accordance with the ITU and ECC Recommendations and Decisions.

Q/V Band

3.43 In its report, DotEcon notes that satellite operators, particularly those with NGSO

constellations providing satellite broadband, would like ComReg to make higher frequency spectrum available as soon as possible. Congestion in space resources, as the number of satellites deployed grows rapidly, coupled with advances in satellite technology that require large bandwidths for hight throughput broadband services, are leading demand for spectrum to exceed what is available in the Ku- and Ka-bands, with the Q and V bands (33-75 GHz) being the next bands that will be used for SES.

3.44 DotEcon further notes that ECC Decision (21)01, published in November 2021, identifies two ranges in the Q/V bands that ought to be allocated on a primary use basis to fixed satellite services (FSS), Earth-to-space, anticipating use of the bands by the next generation of High Throughput and Very High Throughput Satellites. These frequency ranges are:

- 47.2 – 50.2 GHz; and
- 50.4 - 52.4 GHz.

3.45 ComReg concurs with DotEcon regarding the Q/V bands and proposes to open the 47.2 GHz – 50.2 GHz and 50.4 GHz – 52.4 GHz bands for SES licensing in line with ECC Decision (21)01 in order to meet the expected demand for SES in these bands.

E Band and bands above 100 GHz

3.46 Regarding the 70/80 GHz band (E-band), DotEcon notes that it has also been highlighted as a potentially useful band for SES operations and the band is set to be considered as part of the ITU's World Radio Communications Conference 2027 (WRC-27). DotEcon also notes that some stakeholders highlighted that some frequencies above 100 GHz might become relevant.

3.47 DotEcon is of the view that the development timeline remains unclear for systems using these bands and stakeholders have offered diverse comments as to when they intend to make use of them for commercial services. It further noted that SpaceX states its development of 70/80 GHz equipment (and that of their competitors) is well beyond the experimental phase, claiming it will be ready to deploy equipment using these bands to provide services imminently, while other stakeholders expect to see deployment within the next five years.

3.48 ComReg agrees with DotEcon's suggestion that ComReg should monitor developments in the E-band and in bands above 100 GHz bands but does not need to open them to satellite services directly as compatibility and sharing studies in these bands have not yet been published by the ECC or ITU.

3.49 Regarding the E-band, ComReg notes that the use of the E-band for satellite services was discussed at ITU WRC-19, and Resolutions 178[57], 775[58] and 776[59] were agreed by the ITU. It is intended that WRC-24 would consider the results of the studies required under the Resolutions and take appropriate action to ensure sharing and compatibility of services in the band. Therefore, ComReg will monitor the discussions within the ITU and will consider the opening of the E-band for SES licensing following the publication of any relevant ECC Decision, and/or ECC or ITU Recommendation or Report on sharing and compatibility of services in the band.

Q. 2 ComReg welcomes views of interested parties on its proposals regarding frequency bands for SES as detailed above. Please provide evidence and reasoning for your views

3.4 Sharing and Compatibility

3.4.1 Coordination between FSS

3.50 In its report, DotEcon proposes a framework for inter-operator coordination in Ireland for SES which provides for licensees' rights to operate and limit the potential for harmful interference between SES operators. This would include setting a limited geographical exclusion zone to protect SES against harmful interference and introducing a notification process which would allow interested parties to submit views on any proposed new SES deployments.

Implementation of the inter-operator coordination framework

3.51 ComReg notes and agrees with DotEcon's assessment that GSO to GSO interference is unlikely and is best addressed through coordination between satellite operators. However, it is less clear to ComReg what the potential is for GSO to NGSO, and NGSO to NGSO, earth station interference. ComReg observes that the ITU has in the past published several Recommendations regarding the coordination of satellite services in shared bands. However, there are no CEPT Reports, Decisions or Recommendations on the sharing and compatibility of GSO to NGSO,

[57] Studies of technical and operational issues and regulatory provisions for non-geostationary fixed-satellite service satellite system feeder links in the frequency bands 71-76 GHz (space-to-Earth and proposed new Earth-to-space) and 81-86 GHz (Earth-to-space)
[58] Sharing between stations in the fixed service and satellite services in the frequency bands 71-76 GHz and 81-86 GHz
[59] Conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services

and NGSO to NGSO, earth stations. Indeed, the rollout of large NGSO constellations is a recent development which means that there is limited precise experience to draw upon in terms of coordinating NGSO earth stations within the same bands.

3.52 ComReg notes DotEcon's proposal to address the issue of coordination ComReg should consider introducing an inter-operator coordination process. ComReg observes that such a process would ensure it meets its statutory objectives to ensure the efficient management and use of the radio spectrum, and to promote and create conditions for effective competition in the provision of ECN and ECS. To that end, ComReg proposes to introduce a notification process for new NGSO SES licence applications which would provide interested parties an opportunity to consider the technical parameters of the proposed deployment. Where an incumbent licensee considers that a proposed deployment would cause harmful interference to an existing SES, then it would need to submit evidence that coexistence would not be feasible as it would cause harmful interference. The publication of the information notice would only occur where there is an existing incumbent NGSO SES licensee in the same band as a proposed NGSO SES.

3.53 Regarding coordination between SES and fixed links in the same band, ComReg is of the view that no inter-operator coordination process is required and ComReg would continue to manage coordination of those services as part of its day-to-day technical assessment of licence applications. However, ComReg observes that the publication of the technical information of existing licences in shared bands would assist operators in planning future network deployments.

Information policy

3.54 ComReg is of the view that one of the keys to the effective co-existence of shared services across bands is the provision of technical information regarding existing licences. ComReg notes that the ECC has undertaken multiple feasibility studies to facilitate shared usage across all bands by, for example, the FS and the fixed satellite service. In several Decision documents, the ECC has decided that CEPT member states should publish licence information to facilitate future deployments and the co-sharing of bands. [60]

3.55 The provision of licence information would not only assist ComReg in meeting its objectives of promoting competition between undertakings and ensuring the efficient use of spectrum, but it would also be in line with ComReg's 'Open by Default' approach to data, ensuring that data collected as part of its regulatory duties should be considered for publication as Open Data in line with Ireland's Open Data Strategy

[60] Examples of this can be found in ERC Decision (00)07, ERC Decision (00)02, and ECC Decision (21)01

2017 – 2022[61] for the benefit of all interested parties.

3.56 ComReg notes that Regulation 10(13) of the Framework Regulations 2011[62] provides that "*The Regulator shall, subject to the protection of the confidentiality of any information which it considers to be confidential, publish from time to time such information as would, in the opinion of the Regulator, contribute to an open and competitive market*". In addition, Recital 57 of the European Electronic Communications Code ("EECC") provides that: "*Information gathered by national regulatory and other competent authorities should be publicly available, except in so far as it is confidential in accordance with national rules on public access to information and subject to Union and national rules on commercial confidentiality.*"

3.57 ComReg is of the preliminary view that it would publish the following licence information for both SES and fixed radio links:

(a) ComReg's licence reference number;
(b) Licensee name;
(c) Longitude and latitude ;
(d) Azimuth;
(e) Beamwidth;
(f) Antenna Polarisation;
(g) Power to the antenna and radio receive threshold;
(h) Antenna size, maximum gain;
(i) Transmitter antenna height above ground;
(j) Transmitter antenna elevation angle;
(k) Assigned bandwidth;
(l) Assigned centre frequency; and
(m) Reference antenna pattern

Q. 3 ComReg welcomes views of interested parties on its proposals regarding sharing and compatibility of NGSO SES as detailed above. Please provide evidence and reasoning for your views.

[61] Goal 5.1 of ComReg's Electronic Communications Strategy Statement for 2021 to 2023.
[62] S.I No. 333 of 2011, the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011

3.5 Technical Conditions

3.58 The assessment of compatibility between SES and other incumbent services (i.e. fixed service and RAS) requires the development of harmonised technical parameters for the differing systems. The technical parameters for the shared use of frequency bands are generally set out by CEPT and/or the ITU. In the absence of any relevant publication by the ITU or CEPT, National Regulatory Authorities must consider what conditions of use should be established to ensure the shared use of frequency bands by different services.

3.59 In that regard, ComReg herein considers DotEcon's observations and recommendations regarding conditions of use and sets out ComReg's preliminary views regarding the potential requirements for to ensure efficient use of the frequency bands and to mitigate harmful interference.

3.60 In its Report, DotEcon has assessed the current technical parameters as set out in ComReg document 00/63R3 - Satellite Earth Station (SES) Guidelines ("the Guidelines") with the aim of considering what, if any, changes may be required for a revised SES licensing regime.

3.61 The technical aspects considered by DotEcon are as follows:

(a) Telecommunications Equipment Directive

(b) Reference standards

(c) Operation mode

(d) Maximum transmit power

(e) Site clearance

(f) Airport exclusion and notification zones

(g) Other technical parameters

Telecommunications Equipment Directive

3.62 DotEcon notes that ComReg's Guidelines should be updated to make reference to DIRECTIVE 2014/53/EU relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

3.63 ComReg notes that Directive 2014/53/EU was transposed into Irish law as Statutory Instrument number 248/2017 - European Union (Radio Equipment) Regulations

2017.[63] ComReg intends to update all references to relevant legislation in the Guidelines.

Reference standards

3.64 Currently, ComReg follows the ETSI standards in the Radio Frequency Plan for Ireland for each band. In its report, DotEcon has carried out a benchmark of the practices adopted regarding ETSI reference standards by other European national regulatory authorities ("NRA") in their SES guidance documents.

3.65 ComReg notes DotEcon's benchmark analysis and agrees that its Guidelines should make reference to relevant ETSI standards for specific frequency bands to provide clarity to applicants and licensees. Therefore, ComReg intends to include relevant references to ETSI standards in the next revision of the Guidelines.

Operation mode

3.66 DotEcon notes that SES frequencies can be operated under two configurations or modes, namely:

(a) Earth-to-Space or transmitting SES.

(b) Space-to-Earth or receiving SES.

and, a single frequency band may not be limited to a single mode of operation, and it may be indistinctly used in both operation modes if required.

3.67 DotEcon notes that ComReg's allocation of frequency bands to services aligns with the ITU's allocations as set out in the Radio Regulations.

Maximum transmit power

3.68 DotEcon notes that ComReg's Guidelines state that "*licensees must ensure that non-ionising radiation ("n.i.r.") emissions […] are within the limits specified in the guidelines published by the International Commission for Non-Ionising Radiation Protection (ICNIRP) . Emission levels must comply with any radiation emission standards adopted and published by ICNIRP, any radiation emission standards of CENELEC and any other radiation emission standards specified by law*".

3.69 From its benchmarking exercise of other NRA, DotEcon noted that rather than defining NIR emission limits, NRAs tend use to define the maximum "transmit power" or "EIRP". Of the six countries benchmarked, four define specific / customised EIRP

[63] https://www.irishstatutebook.ie/eli/2017/si/248/made/en/print

limits for some of the bands under consideration, while the other two resort to international standards for the definition of the EIRP limits. DotEcon further notes that the specified limits considered broadly align with the relevant ETSI's recommendations, ranging from 40-50 dBW in low bands and rising to ~60 dBW in high bands.

3.70 DotEcon are of the view, depending on the current effectiveness of the NIR limits to meet ComReg's objectives, it may consider:

(a) Keeping the current technical requirements, without any modifications; or

(b) Replacing the existing requirements by the EIRP recommendations.

3.71 ComReg notes DotEcon benchmarking analysis and its views. To date, ComReg has not specified maximum EIRP limits in its Guidelines. However, it does take account of power limits as specified by the ECC and ITU in their relevant documents when processing applications for SES licences to ensure that licensed SES are aligned with any harmonised power limits. ComReg intends to make it clear in the Guidelines that any SES power limits are also subject to transmit power limits as specified in any relevant ECC Decisions, Reports and/or ITU Recommendations.

Site clearance

3.72 DotEcon notes from its benchmarking analysis that for the majority of the countries reviewed, they do not provide site clearance mechanisms although the UK acknowledges the importance of a good planning and protection of the SES, details are not provided in their guidelines or licensing procedures manuals.

3.73 DotEcon is of the view that given that no explicit site clearance requirements are imposed in the other (benchmarked) European jurisdictions, and operators are bound by the General Authorisation conditions on avoiding harmful interference to other systems, there does not seem to be any obvious need or justification for setting such specific requirements in the SES Guidelines.

3.74 ComReg notes DotEcon's analysis and agrees with its recommendation that the site clearance reference in its Guidelines should be removed.

SES operation in close proximity to airfields

3.75 ComReg observes that it is internationally recognised that there is a need to protect aircraft avionics from the possibility of harmful interference arising from earth stations

operating in close proximity to airfields[64]. Under the current SES licensing regime, the deployment of SES in areas around airports is restricted. In order to ensure that the safety of aircraft is not affected by the SES, a licensee must comply with requirements that are set out in ComReg Document 00/64R2 the Guidelines for Satellite Earth Station Licences in frequencies above 3 GHz[65].

3.76 Since the publication of ComReg Document 00/64R2 the ECC has published ECC Report 272 *"Earth Stations operating in the frequency bands 4-8 GHz, 12-18 GHz and 18-40 GHz in the vicinity of aircraft"*[66] which examines earth stations operating in the vicinity of aircraft and their ability to comply with high intensity radiated field (HIRF) levels established by the European Aviation Safety Agency (EASA) to protect aircraft safety systems. Report 272 concludes that SES operatingin the proximity of, or within airfields, are required to comply with the EIRP levels specified in Table 1 of that Report.

3.77 ComReg observes that as part of its benchmarking exercise of other NRAs' licensing of SES, DotEcon also considered requirements regarding airport exclusion and notification zones. DotEcon notes that the approaches adopted by NRAs towards the definition of airport exclusion and notification zones varies, however, they observe that:

i) it is common to define rules to protect airport zones from harmful interference,

ii) when minimum distances are set, these fall in the same range of those defined by ComReg, and

iii) rules currently established by ComReg's Guidelines are slightly more restrictive than those set in ECC Report 272 but within the same order of magnitude regarding minimum distance from the aircraft (1 km wide vs 610 m wide)

3.78 Therefore, ComReg proposes to continue to apply the current requirements as set out in ComReg's Guidelines, and any other relevant requirements as specified in ECC Report 272, to would ensure the aeronautical safety of aircraft.

3.6 Licence Duration

3.79 ComReg notes that under the existing satellite licensing regime licences are granted

[64] Airfield covers both, airports and helipads.
[65] Microsoft Word - ComReg0064R2
[66] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://docdb.cept.org/download/1315

for a period of 1 year and are then required to be renewed. However, these licences may be granted for a period greater than 12 months but not exceeding 60 months from the date of commencement, at the request of the licensee.

3.80 ComReg also notes that currently temporary licences are available for FSES only, and for periods of not less than one month but no greater than 11 months and are mainly applicable to TES. Temporary licences cannot be renewed.

3.81 ComReg observes that 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.

3.82 ComReg favours granting rights of use for spectrum of fixed duration, and that then expire. ComReg is of the views that fixed-term licences should:

- promote competition between undertakings and the efficient use of spectrum and it should contribute to development of the internal market;
- be wholly compatible with the Common Regulatory Framework;
- allow licensees sufficient time to make a return on their investments, in line with the expected life-cycles of any technologies deployed;
- provide enough flexibility to deal with any international harmonisation of a spectrum band, for example at EU-level, as may occur after fixed-term licences in that band have been granted;
- ensure that there are no long-term barriers to a co-ordinated approach to the bands (particularly important where a co-ordinated approach is necessary to introduce new services); and
- ensure that there can be a co-ordinated approach to bringing about the desired change but without creating perverse incentives for incumbents to hold out in order to gain more rents.

3.83 In determining what duration for rights of use is suitable for fixed satellite services, ComReg notes that:

(a) There is no spectrum scarcity in the bands allocated to FSS;

(b) There is a need for ComReg to balance operator certainty regarding the licensing of SES in the long term and ComReg's efficient management and use of the radio spectrum; and

(c) ComReg must first consult on any proposed changes to frequency allocations or licensing regimes which may be, for example, as a result of the outcome of ITU World Radio conferences and/or harmonising decisions by the European Commission. Therefore, incumbent licences will be aware of any potential changes many years in advance of decisions being made.

3.84 Therefore, ComReg is of the preliminary view that a 12-month licence period, with the option to renew annually, is appropriate for the following reasons:

- It is consistent with the licence duration of other licence types issued by ComReg such as fixed radio links, business radio, etc. which are not awarded via a competitive process; and
- That licensees have the option to renew a licence upon payment of an annual fee, which requires licensees to consider each year if their spectrum assignment is still required or if they need to make any changes to their licence; and
- It is consistent with the licence duration for SES by other European NRAs.

Q. 4 ComReg welcomes views of interested parties on its proposals regarding technical conditions for SES as detailed above. Please provide evidence and reasoning for your views.

Chapter 4

4 Draft Fees RIA

4.1 Introduction

4.1 In December 2021 ComReg published a consultation and associated DotEcon Report where it considered and identified current and potential future Satellite Earth Station ("SES") use cases and related matters which would assist ComReg in identifying what, if any, changes to the regime may be required to ensure it is fit for purpose and future proofed. The review of the SES licensing regime takes account of wider spectrum management matters regarding, such as the frequency bands used for SES, but also considers whether the existing fees regime is fit to support the list of use cases identified by ComReg and DotEcon following it detailed stakeholder engagement process.

4.2 In that regard, this chapter sets out ComReg's draft Regulatory Impact Assessment ("RIA") on the procedure for setting spectrum fees for SES and provides ComReg's preferred option having regard to the impact on stakeholders, competition, and consumers. It concludes with an assessment of the Preferred Option against ComReg's statutory remit, including relevant functions, objectives, duties and principles (as outlined in Annex 1).

4.3 ComReg conducted this draft RIA having careful regard to the relevant information available to it, including:

- the first DotEcon Report (Document 21/135a);
- the second DotEcon Report (Document 22/56a);
- the views of respondents to Document 21/135; and
- the stakeholder interviews conducted in 2021.

4.2 RIA Framework

4.4 A RIA is an analysis of the likely effect of a proposed new regulation(s) or regulatory change(s) and, indeed, of whether regulation is necessary at all. The RIA should help identify regulatory options and establish whether the proposed regulation is likely to have the desired impact, having considered relevant alternatives and the impacts on stakeholders. The RIA is a structured approach to the development of policy and

analyses the impact of regulatory options. In conducting a RIA, the aim is to ensure that all proposed measures are appropriate, effective, proportionate and justified.

4.5 A RIA should be carried out as early as possible in the assessment of regulatory options, where appropriate and feasible. The consideration of the regulatory impact facilitates the discussion of options, and a RIA should therefore be integrated into the overall preliminary analysis. This is the approach which ComReg follows in this Consultation and this draft RIA should be read in conjunction with the overall Consultation. The RIA will be finalised in the final Decision arising from this Consultation, having considered responses to this Consultation.

4.6 In conducting the RIA, ComReg has regard to the RIA Guidelines [67] , while recognising that regulation by way of issuing decisions, for example imposing obligations or specifying requirements in addition to promulgating secondary legislation, may be different to regulation exclusively by way of enacting primary or secondary legislation.

4.7 To ensure that a RIA is proportionate and does not become overly burdensome, a common sense approach is taken towards a RIA. As decisions are likely to vary in terms of their impact, if after initial investigation, a decision appears to have relatively low impact ComReg may carry out a lighter RIA in respect of that decision.

4.3 Structure for the RIA

4.8 In assessing the available regulatory options, ComReg's approach to the RIA is based on the following five steps:

- **Step 1:** describe the policy issue and identify the objectives;
- **Step 2:** identify and describe the regulatory options;
- **Step 3:** determine the likely impacts on stakeholders;
- **Step 4:** determine the likely impacts on competition; and
- **Step 5:** assess the likely impacts and choose the best option.

4.9 In the following sections, ComReg identifies the specific policy issues to be addressed and relevant objectives. (i.e., Step 1 of the RIA process). Before moving on to Step 1 of the RIA, ComReg first makes some relevant observations below on

[67] Guidelines on ComReg's Approach to Regulatory Impact Assessment – ComReg Document 07/56a - https://www.comreg.ie/publication/guidelines-on-comregs-approach-to-regulatory-impact-assessment

the stakeholders involved and on ComReg's approach to Steps 3 and 4.

4.4 Identification of stakeholders and approach to Steps 3 and 4

4.10 Step 3 assesses the likely impact of the proposed regulatory measures on stakeholders. Hence a necessary precursor is to identify such stakeholders.

4.11 In this RIA, stakeholders fall into two main groups:

- Consumers (Impact on consumers is considered separately below);
- Industry stakeholders.

4.12 The industry stakeholders comprise the providers and users of SES for the relevant use cases, which include:

- Broadcasting
- Mobile Communications
- Internet of Things (IoT)
- Earth Exploration and Remote Sensing
- Broadband (GEO[68] and LEO[69] constellations); and
- GPS and navigation

4.13 Step 4 assesses the impact on competition of the various regulatory options available to ComReg. In that regard, ComReg notes that it has various statutory functions, objectives and duties which are relevant to the issue of competition.

4.14 Of themselves, the RIA Guidelines and the Ministerial Policy Direction on Regulatory Impact Assessment[70] provide little guidance on how much weight should be given to

[68] A geosynchronous equatorial orbit (GEO) is a circular geosynchronous orbit 35,786 km (22,236 mi) in altitude above Earth's Equator (42,164 km (26,199 mi) in radius from Earth's centre) and following the direction of Earth's rotation.

[69] A low Earth orbit (LEO) is an Earth-centred orbit near the planet at an altitude of less than 1000 km but could be as low as 160 km above Earth.

[70] Ministerial Direction dated 21st February 2003

the positions and views of each stakeholder group (Step 3), or the impact on competition (Step 4). Accordingly, ComReg has been guided by its primary statutory objectives which it is obliged to seek to achieve when exercising its functions. ComReg's statutory objectives in managing the radio frequency spectrum, as further outlined in Annex 1, include:

- promote competition[71];
- contribute to the development of the internal market[72];
- promote the interests of users within the Community[73];
- 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[74];
- promote efficient investment and innovation in new and enhanced infrastructures[75].

4.15 In addition, ComReg is guided by regulatory principles and obligations provided for under the Common Regulatory Framework. Such principles and obligations are outlined further at Annex 1 and include:

- Regulation 19 of the Authorisation Regulations[76] permits ComReg to impose fees for rights of use, which reflect the need to ensure the optimal use of the radio frequency spectrum. ComReg is required to ensure that any such fees are objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose; and
- Regulation 17(3) of the Framework Regulations provides that, notwithstanding Regulation 17(2), ComReg may, through licence conditions or otherwise, provide for proportionate and non-discriminatory restrictions to

[71] Section 12 (1)(a)(i) of the 2002 Act.

[72] Section 12 (1)(a)(ii) of the 2002 Act.

[73] Section 12(1)(a)(iii) of the 2002 Act.

[74] Section 12(1)(b) of the 2002 Act.

[75] Regulation 16(2)(d) of the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011, S.I. No. 333 of 2011 (the "Framework Regulations").

[76] European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011, S.I. No. 335 of 2011.

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).

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

4.5 Step 1: Identify the policy issues & the objectives

Policy Issues

4.17 The spectrum available for SES services is a finite resource with many different services and users. The management of this resource involves the careful consideration of a broad range of factors (e.g., administrative, regulatory, social, economic, and technical) with a view to ensuring that radio spectrum is optimally and efficiently used.

4.18 This may also involve balancing a range of competing factors, including:

- appropriately meeting the requirements of all radio services, including commercial and public uses, such as public safety, national security, and health care; and

- promoting competition including ensuring that users derive maximum benefit in terms of price, choice, and quality, contributing to the development of the internal market, and promoting the interests of users within the Community.

4.19 Effective spectrum management also requires flexibility and responsiveness to adapt to changes in, among other things, technologies, demand from spectrum users and end-users, market developments and public policy. In that regard, ComReg identifies two broad regulatory tools that are relevant in allowing it to effectively manage to radio spectrum being made available for SES:

(i) Information Policy; and

(ii) Spectrum Fees.

Information Policy

4.20 ComReg is of the view that the information policy of the SES Licensing regime applications is likely to be central to the performance of its spectrum management functions. As noted by DotEcon, providing information on existing spectrum users' deployments is essential if SES licence applicants are expected to plan around existing users and if operator coordination is to be key to avoiding harmful interference.[77]

4.21 In some cases, where there is a possibility of harmful interference either between SES operators or with other terrestrial users, this can be best managed if the operators themselves have access to the necessary information to undertake a preliminary assessment regarding the likelihood of harmful interference (and the necessary mitigation/coordination procedures) and would be much more effective than trying to use fees for achieving an efficient outcome. In this way, the information policy of the SES Licensing regime applications is likely to be central to ensuring the efficient assignment and use of the radio spectrum

4.22 ComReg currently provides useful information on deployments to interested parties on mobile base stations on the Siteviewer[78] database and also fixed radio links through the eLicensing[79] platform. In Document 21/136, ComReg signalled its intention to also make fixed radio links licence information publicly available on Siteviewer. ComReg noted that providing access to fixed radio link licence information would provide greater transparency regarding what services are

[77] Document 22/56a, section 7.5.
[78] https://siteviewer.comreg.ie/#explore
[79] https://elicensing.comreg.ie/

deployed in particular areas and would assist operators with their network planning.

4.23 With that in mind, ComReg's information policy should be viewed as complementary to the role of spectrum fees, which is the subject of this RIA.

Spectrum Fees

4.24 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. 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 its statutory objectives as set out in Section 12 of the 2002 Act and Regulation 16 of the Framework Regulations.[80]

4.25 In that regard, the effective management of radio spectrum requires more than a purely technical consideration of spectrum efficiency. Functional and economic considerations must also be considered, including the extent to which the utilisation of spectrum meets a user's specific needs and the social and economic value that can be derived from it. This is particularly relevant in the current case where there is a variety of different users, providing different services using different technologies based on existing licence conditions (including spectrum fees).

4.26 Following stakeholder interviews, DotEcon identified several use cases that are supported by the operation of SES. Respondents to the consultation process provide some further details in relation to the use cases identified but did not suggest any additional uses. Therefore, ComReg is satisfied that the following are the relevant use cases in its consideration for this RIA. Readers are referred to Section 3 of Document 21/135a (the DotEcon Report) for further information on each of the following use cases.

- Broadcasting;
- Mobile Communications;
- Internet of Things (IoT);
- Earth Exploration and Remote Sensing;

[80] The rights and obligations of ComReg in relation to the imposition of fees for rights of use are reflected in Articles 3 and 42 of Directive (EU) 2018/1972 establishing the European Electronic Communications Code (the "Code"). It is envisaged that the Authorisation Regulations and Framework Regulations will be replaced with new domestic legislation giving effect to the Code over the course of the proposed licencing regime.

- Broadband; and
- GPS and Navigation.

4.27 ComReg periodically conducts reviews of its licensing frameworks to ensure they remain fit for purpose. For instance, ComReg is also reviewing the Fixed Links licensing framework and will carry out a review of the PMR licensing framework in due course. In regard to satellite services, ComReg notes that the landscape has developed rapidly in recent years, aided in part by the significant rollout of constellations of LEO satellites. The rapid deployment of LEO satellite constellations has enabled satellite broadband providers to provide a higher quality of service covering a wide coverage area.

4.28 While there are various methods of determining the level of a licence fee, some approaches, or even a combination of same, are likely to be more suitable than others. Therefore, the main policy issue to consider in this RIA is, in the context of ComReg's statutory objectives, how best to establish an objectively justified, transparent, non-discriminatory and proportionate fees framework for the SES licensing regime which facilitates the uses cases identified above.

Objectives

4.29 ComReg aims to design and carry out its review of the SES licensing regime in accordance with its broader statutory objectives (as outlined in Annex 1) including the promotion of competition in the electronic communications sector.

4.30 In addition, the focus of this RIA is to assess the impact of the proposed measure(s) (see regulatory options below) on stakeholders, competition, and consumers. ComReg can then identify and implement the most appropriate and effective means by which to set spectrum fees for the SES frequency bands, while achieving its relevant statutory objectives under section 12 of the 2002 Act of promoting competition by, among other things:

- Encouraging efficient use and ensuring effective management of radio frequencies;
- Promoting regulatory predictability by ensuring a consistent regulatory approach;
- Safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition.

4.31 ComReg notes that, in achieving its objectives, it seeks to choose regulatory

measures which maximise the benefits for consumers in terms of price, choice and quality.

4.6 Step 2: Identify and describe the regulatory options

4.32 The current SES licensing framework has been in place since 2007 and has enabled ComReg to effectively licence SES in Ireland that provide for a variety of uses. ComReg will evaluate the existing SES fees regime as an option, given its utility to date, and also to fully understand the impact of any change to an alternative option. Therefore, ComReg notes that **Option 1** is to maintain the status quo and extend the use of the existing SES fees regime for the foreseeable future.

4.33 Readers are referred to ComReg Document 00/64R3 for full details on the current fees for Fixed Earth Stations and Transportable Earth Stations. However, to aid readers assessment of this RIA, the following summary is provided:

- **First**, if a licensee is operating in the exclusive SES bands, the fee is €100 for each of the first ten licences and €25 per licence beyond this.
- **Second**, if a licensee is operating in one of the non-exclusive bands, then the fee for an SES Licence can range from anything between €50 and €2,500 depending on three factors:

  (i) Which frequency band? – where a licensee can choose from a range of frequency bands which are exclusive (12.5 – 12.75 GHz and 14.0 – 14.25 GHz) and/or shared (which range from 3 GHz to 30 GHz)[81]

  (ii) What is the antenna power limit? – where a licensee can choose an EIRP across three different EIRP categories.[82]

  (iii) What is the bandwidth required? – where a licensee can choose between five different bandwidth categories[83].

4.34 Option 1 (the existing fees regime) is illustrated in Figure 1 below.

[81] The full list of satellite frequency bands is provided in Appendix of Document 00/64R3.
[82] **1.** EIRP < 50 dBW **2.** 50 dBW ≤ EIRP ≤ 75 dBW **3.** EIRP > 75 dBW
[83] **1.** BW < 0.5, **2.**0.5 ≤ BW < 2, **3.** 2 ≤ BW < 11, **4.** 11 ≤ BW < 40, **5.** 40 ≤ BW ≤ 80, **6.** BW > 80

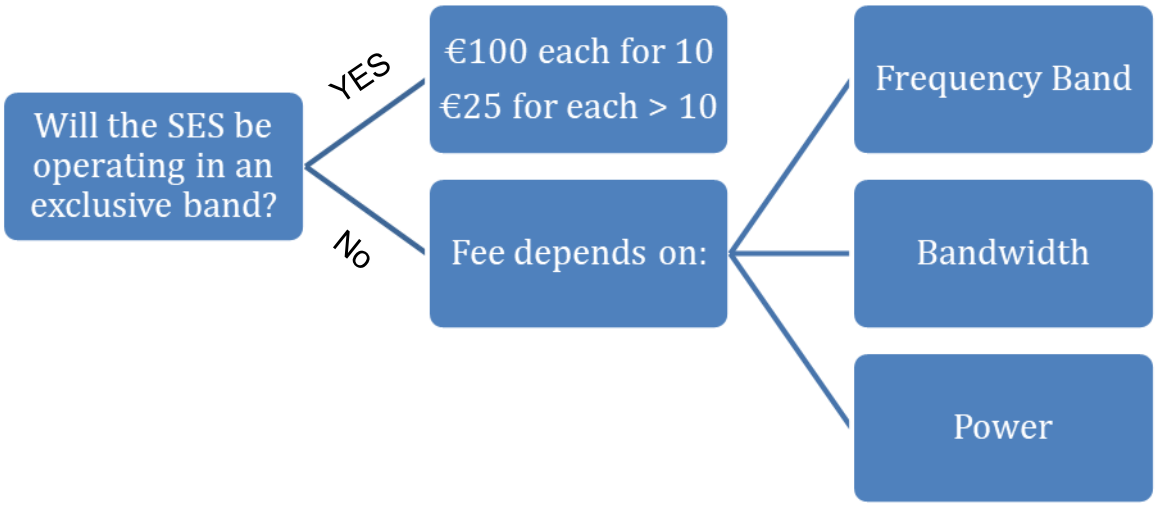


Figure 1: The current method for determining fees for SES (Option 1)

4.35 In relation to other potential options, there are various methods of determining spectrum fees and some approaches (or a combination of approaches) are likely to be more suitable than others. ComReg does not favour any one process for assigning new rights of use of spectrum as a matter of principle; it decides the most appropriate process in each individual case. Each approach 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 circumstances, including the characteristics of the spectrum to be assigned, the types of rights of use to be awarded and the anticipated demand for the spectrum

4.36 At a high-level there are broadly two approaches to setting spectrum fees:

- **Administrative cost recovery:** a minimum requirement for fees is that ComReg recovers its administrative costs associated with managing spectrum licences. The cost recovery methodology in an administrative-based approach that sets total spectrum fees equal to the overall spectrum management costs. This is one of the simplest methodologies available, albeit widely adopted, especially when there is no threat of spectrum scarcity, and it may contribute to fostering spectrum demand. Spectrum fees should also allow spectrum regulators to recover reasonable administrative costs. Such costs include:
    - one-off costs of awarding spectrum and issuing licences;

- policing licence conditions; and
- monitoring and resolving interference problems.

- **Opportunity cost based**: This encapsulates a range of approaches where there are varying levels of scarcity and potential scarcity that need to be resolved. They can be classified into two categories.
  - A competitive market mechanism such as an auction where the interaction of bidders during the award determines who wins the spectrum and the price paid.
  - Administratively determined fees which typically aim to proxy opportunity cost and/or provide incentives for licensees to use spectrum in an efficient way. Such approaches include Administrative Incentive Pricing ("AIP")[84] or Universal System Performance Pricing methodology ("USPP")[85].

4.37 Clearly, there is a sequencing in determining the appropriate fees approach. If it is the case that the spectrum can be used freely, or relatively freely, across alternative potential users over a sufficiently long period, then an administrative cost recovery approach is more likely to be appropriate. In this circumstance, no further consideration of alternative approaches would be required because there would be no opportunity cost that needs to be reflected in fees because other users are not precluded.

4.38 Therefore, prior to setting out the regulatory options available to it, ComReg first assesses the extent to which issues of scarcity arise, or could arise, in the licensing of SES rights of use.

Assessment of interference and conflicts in demand

4.39 The information contained in this section is based on a number of sources of information, including but not limited to:

- the initial research and interviews with stakeholders conducted in late 2021;
- the First DotEcon Report (Document 21/135a);

[84] This attempts to set prices equal to opportunity cost, such that only the highest value users have an incentive to take up licences in the band

[85] This estimates the value of spectrum based on a set of relevant factors that are selected in advance (e.g. bandwidth).

- responses to Documents 21/125 and 21/135a (Document 22/56s); and
- the Second DotEcon Report (Document 22/56a).

4.40 In the context of SES, spectrum scarcity is determined by the likelihood that harmful interference would be created by licensing SES to a particular user and the resulting impact on the ability of other operators to use the same frequencies. Interference needs to be considered because it might imply an opportunity cost that needs to be reflected in SES licence fees and more specifically to the extent that other users are precluded by the need to protect SES and/or among terrestrial users.

4.41 DotEcon outlines two potential areas of interference that could create opportunity costs in the assignment of SES licences. [86]

(i) Interference amongst SES; and

(ii) Interference between SES and other terrestrial users

4.42 ComReg assesses each in turn below.

Interference amongst SES

4.43 There are two types of SES relevant to this assessment (i) Geostationary[87] ("GSO") systems and (ii) Non-geostationary ("NGSO")[88] systems.

4.44 In its first Report, DotEcon was of the preliminary view that there was unlikely to be any significant interference between GSO SES, or between a GSO and NGSO ground station. This arises because both receivers and transmitters on SES are highly directional and point to the sky thereby limiting interference. Similarly, stakeholder interviews did not indicate any concerns about interference between these SES and, in any event, interference between these SES is avoidable (e.g. by using elevation masks). Further, in response to Document 21/125, stakeholders agreed with DotEcon that harmful interference between two GSO systems, or between NGSO and GSO, is unlikely[89].

[86] See Section 4.1 of Document 21/135a

[87] Objects in GSO have an orbital speed that matches the Earth's rotation, yielding a consistent position over a single longitude. As a result, they appear fixed in the sky when observed from the ground. GSO satellites are at around 36 000 kilometres above the Earth.

[88] NGSO satellites at medium Earth orbits (MEO) altitudes are between 8 000 and 20 000 kilometres above the Earth and low Earth orbits (LEO) altitudes are between 400 to 2 000 kilometres above the Earth. NGSO satellites move across the sky during their orbit around the Earth, NGSO operators must deploy a fleet of satellites, generally called "constellations", to provide continuous service from these altitudes.

[89] The Second DotEcon Report, Document 22/56a, p22.

4.45 However, in relation to interference between NGSO and NGSO constellations, the stakeholder interviews indicated a greater potential for interference and that geographical separation would be necessary to manage this potential interference. The potential for interference between NGSO constellations arises because antennas used to communicate with various satellites in the constellation are multi-directional from the same ground station and the techniques available to limit interference between neighbouring GSOs cannot be replicated effectively between NGSOs.

4.46 The Second DotEcon Report agrees that sufficient geographic separation would be necessary to avoid harmful interference. However, this is not expected to create any issue of scarcity (in terms of access to suitable sites and spectrum) within Ireland. DotEcon notes that interference only arises if NGSO operators have an incentive to place SES in proximity to each other. However, such issues are most unlikely to arise for the following reasons[90].

- There are currently fewer than sixty live SES licences in Ireland, of which only 16 are FES transmit licences and operators have sufficient flexibility[91] in their site selection. The supply of available sites in Ireland is more than enough to accommodate the needs of all SES operators.
- Many of the current licences belong to established use cases (e.g., broadcasting, government/community institutions) and growth in demand for SES to service these use cases is expected to be limited given the maturity of these use cases.
- Furthermore, the use of different types of technology, in particular optical links for intra-satellite communications, should reduce the number of earth stations needed to provide a given level of coverage by passing data through a LEO system to the nearest SES. Over large distances, intra-satellite links may transfer data faster than fixed line networks as the optical signals are travelling in free space.
- Newer LEO systems aiming to provide high-capacity broadband may increase in the future, however, the satellite services are less than 0.1% of the overall market. Further, the number of LEO operators is likely to remain relatively small

[90] The Second DotEcon Report, Document 22/56a, p22.

[91] DotEcon notes that if stakeholders have full flexibility as to where to position their earth stations, then we would not expect there to be any issue of scarcity (in terms of access to suitable sites and spectrum) within Ireland, in particular given expectations over the likely relatively small number of SES in operation.

and depending on their system deployment, some satellite broadband providers may not require earth stations in all countries in Europe.[92]

- If ComReg were to make available licence information of existing SES, operators might naturally choose to locate away from each other such that harmful interference would not be a concern because operators could coordinate. As discussed in Section 3.4, ComReg proposes to provide this information as a proportionate measure to reduce potential for harmful interference.

4.47 Therefore, ComReg agrees with DotEcon that there is neither scarcity in sites for SES at present, nor any evidence that the increase in NGSO systems will create spectrum scarcity for SES in the foreseeable future. As a result, interference between SES is likely manageable through coordination and modest geographic separation of SES.

Interference amongst terrestrial users

4.48 SES share frequency bands (except for two exclusive bands) on a co-primary basis with other services ("terrestrial users") and interference may occur between these uses and SES (e.g., the 28 GHz fixed links band overlaps with the Ka band used by SES). Terrestrial uses primarily refers to fixed links but also refers to other services that may be provided in the future over these bands e.g., 5G. In particular, stakeholders have raised concerns that the expansion of 5G services in the 26 GHz band could limit the spectrum available to satellite operators. ComReg assesses the potential for interference/scarcity from Fixed Links and 5G below.

Fixed Links

4.49 In relation to Fixed Links, ComReg agrees with DotEcon that coexistence between SES and fixed links is feasible, and likelihood of harmful interference would be low. In particular, ComReg notes the following.

- Interference between terrestrial uses and satellite services is easily managed/avoided (i.e., because SES antennas point to the sky whereas, say, fixed links follow the curvature of the Earth and the difference in angles will often prevent interference occurring).[93]

[92] A Technical Comparison of Three Low Earth Orbit Satellite Constellation Systems to Provide Global Broadband. Inigo del Portillo, Bruce G. Cameron, Edward F. Crawley - 2019
[93] The First DotEcon Repot, Document 21/135a, p23

- ComReg already assesses potential interference when processing fixed links and SES licence applications ensuring existing users are protected against interference from new licensees.[94]

- Interference can be avoided through coordination because satellite operators can position earth stations where they will not interfere with fixed links. Further, ComReg are to make available further information on fixed links and SES licences (through Siteviewer) which should support operator coordination between SES and fixed links.[95]

- There is general consensus amongst respondents to Document 21/135 that coexistence between SES and fixed links is feasible and potential instances of interference are likely to be low.[96]

4.50 Some stakeholders in response to Document 21/135 expressed concern about coexistence between SES and point-to-multipoint ("PMP") fixed links. More specifically, it is claimed that that it is potentially more difficult to plan SES operations around PMP links because there are multiple endpoints to a point to multi-point link (i.e. the location of the PMP system is known, but the other points change frequently)[97].

4.51 However, DotEcon is of the view that coexistence between SES and PMP links could be successfully managed through a transparent information policy and interference assessment at the application stage following the practice as currently set for case for PP links. Furthermore, ComReg notes that there are currently just two PMP link licences[98] in Ireland. Although this may change in the future, demand for PMP is likely to remain low and even where they do arise, they can be managed in the same way as PP links on application. In addition, ComReg intends to make PMP licence information available along with PP licence information.

4.52 Therefore, ComReg is of the preliminary view that interference issues in relation to fixed links are manageable.

5G spectrum

4.53 Concerns expressed by respondents around scarcity/interference in relation to 5G

[94] The Second DotEcon Report, Document 22/56a, p23
[95] Ibid
[96] See sections 2.5.2 and 2.5.3
[97] The first DotEcon Report, Document 21/135a, p29.
[98] Both licences are in the 28 GHz band.

fall into three categories:

(i) Potential for interference between SES and 5G services in the same band;

(ii) Reduced availability of bands for satellite as further bands are assigned to 5G; or

(iii) Out of band interference from 5G services in adjacent bands.

4.54 In relation to (i), in most cases, 5G services will operate in bands assigned to mobile and there should not be any significant interference between mobile terrestrial services and SES in neighbouring bands (e.g. 26 GHz and the Ka band), provided that technical conditions to limit out of band emissions are enforced. The only exception to this is the 3.4 GHz 3.8 GHz band, which has already been awarded[99] in Ireland, and in which there is some overlap with bands included in the SES guidelines for receive operation. ComReg can confirm that no significant issues in relation to this arose during the consultation on this band, nor has it arisen since as the licensed SES operate above 3.9 GHz.

4.55 Further, if any bands are assigned to 5G and SES, these will typically be in the higher frequencies (e.g. mmWave bands) which we would expect mobile operators to only require in larger towns and cities. Alternatively, SES are generally located in rural areas therefore, there is a large amount of scope for coordination and satellite operators can position their earth stations accordingly to minimise the risk of disruption in the future.[100]

4.56 In relation to (ii), the process of making spectrum available to 5G could potentially reduce spectrum available for SES increasing potential for scarcity in the future. However, DotEcon[101] advises that this issue is likely to be limited in practice:

- bands are harmonised for mobile (or any other) use at an international level, and this is neither a matter for ComReg in isolation nor within the scope of this review; and

- in any event, any future decisions regarding the bands that are being considered for future IMT use (e.g. 42 GHz) would most likely specify out-of-band emission limits in order to ensure the appropriate protection of any existing satellite services.

[99] 3.6 GHz Band Spectrum Award | Commission for Communications Regulation (comreg.ie)
[100] Second DotEcon Report, Document 22/56a, p26.
[101] Second DotEcon Report, Document 22/56a, p27.

4.57 Furthermore, ComReg notes that such changes are made over a period of time and availability of spectrum for SES would be considered at an international level when such decisions are made. ComReg can assess such scenarios in future reviews to the extent necessary, noting that SES is already allocated across 17 bands with over 6 GHz available in total.

4.58 In relation to (iii), the out of band 5G interference refers to 26 GHz potentially not giving sufficient protection for neighbouring Ka band users. However, this is a matter for any future 26 GHz award and DotEcon advises that ComReg should take into account relevant technical studies, such as CEPT Report 068,[102] when it awards spectrum in that band. ComReg is of the view that such concerns are easily addressed in the context of any future 26 GHz Award as part of its normal practice in assigning spectrum rights of use.

4.59 Finally, ComReg notes that demand for SES licences in Ireland is comparatively low relative to other licence types as indicated in the table below. Although new use cases may require a large amount of spectrum, there is no evidence of a continuous growth in demand. This is consistent with views of respondents that, in general, operators have a relatively high degree of flexibility over where they can locate a SES, particularly where the satellite operator is providing an international service and can choose to locate a SES across different countries.

Licence Type	Number of live licences as of June 2022
Satellite	54
Fixed Links (Point-to-Point and Point-to-Multipoint)	15,066
Business Radio	877
Radio Amateurs	2104

Table 1: Live licences as of June 2022

4.60 In light of the above, ComReg is of the preliminary view that there are no interference

[102] CEPT Report 068 – Report B from CEPT to the European Commission in response to the Mandate "to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union" Harmonised technical conditions for the 24.25-27.5 GHz ('26 GHz') frequency band. https://docdb.cept.org/download/119

or scarcity issues arising in respect of future 5G services.

Conclusion on interference and scarcity

4.61 From the above, it is clear that there is no significant interference and/or scarcity issues arising in respect of SES. To the extent that there is potential for interference in the future, this is likely to be very rare and the impact would be decidedly limited:

- First, there are good technical reasons why interference is unlikely to arise over the period of this review. For example, much of the rationale for a likely lack of interference relates to the fact that transmitter and receivers are highly directional which vary across different use cases, and this is very unlikely to change in the future;
- Second, the potential for interference is already assessed ex-ante by ComReg when processing SES licence applications ensuring existing users are protected against interference from new licensees. This will continue to be the case in the future;
- Third, it is more likely that discussions regarding coordination between applicants and licensees will occur than actual scarcity, meaning that the information policy is important in achieving efficient resolution of the limited conflicts that might occur between users;
- Fourth, in relation to bands potentially being provided for 5G use in the future, it is important to note that this is not currently planned. However, should it occur, it would only happen over a long period and beyond the period of this review. The impacts of any such a reallocation could be considered by ComReg in any future review; and
- DotEcon is of the view that while ComReg should not assume that opportunity costs would always be close to zero, scarcity is sufficiently unlikely that it does not see any need to account for potential opportunity costs in the current fee schedule. This issue of potential scarcity can be revisited in future reviews.

4.62 In light of the above, ComReg agrees with DotEcon[103] that there is no efficiency role for the fees in terms of ensuring licences are assigned to the highest value users, as there is currently no evidence to suggest that scarcity is present or likely to materialise in the foreseeable future. The overall level of fees does not need to be

[103] The Second DotEcon Report, Document 22/56a, p48.

any higher than necessary to cover ComReg's administrative costs. In that regard, the various regulatory options that would provide for opportunity cost pricing are not considered further in this draft RIA.

Related Fixed Links Projects.

4.63 ComReg notes that its views in relation to SES are in contrast to its preliminary views in relation to the Fixed Links Review[104] where ComReg is of the preliminary view that fixed links are already at risk of potential scarcity in the future and more widespread congestion in the future than is currently the case.

4.64 ComReg notes that the circumstances pertaining to the Fixed Links Review are substantially different for a number of reasons.

- **First**, there are no issues of potential scarcity or interference in SES for the reasons set out in the earlier assessment. For Fixed Links there is some scarcity in certain bands in the Dublin area and a risk of potential scarcity in other bands/areas of the country. On this basis ComReg has strong spectrum management grounds for an opportunity cost-based approach to that licensing regime. Those grounds do not present in ComReg's review of SES licensing.

- **Second**, the potential for significant migration between Satellite Bands under an administrative cost recovery option is unlikely to arise. This is because of the ITU allocation of bands to specific services and, generally, operational bands of a satellite are decided prior to the launch of a satellite, therefore migration between bands is limited. .[105]

- **Third**, the potential for increased spectrum hoarding incentives for SES under an administrative cost recovery option is low because the cost of holding those rights of use would not reduce significantly. More pertinently, licensees are dependent on specific bands due to the ITU allocation decisions. Such a scenario does not arise in respect of Fixed Links where licensees have preferences across a wide range of bands and can substitute between bands over a period of time. (i.e. chains of substitution do not exist to the same extent with SES).

4.65 Furthermore, ComReg notes and agrees with the views of DotEcon in ComReg's

[104] See ComReg Document 21/134.

[105] For example, since around 2010 onwards, a large number of satellite deployments have used the K band (11 GHz – 30 GHz) to take advantage of the large bandwidth available within the band's range. Future satellite deployments may be designed to operate in the Q and V bands.

proposal on Fixed Links, congestion has already occurred in Dublin, and there is a large number of users of the spectrum with growing demand for bandwidth. Alternatively in relation to SES:

- Demand for SES is low, and while new use cases may require additional spectrum, there is not a continuous growth in demand;
- DotEcon expects the SES demand to remain well below the level that would create scarcity of sites/spectrum or material opportunity costs for the foreseeable future;
- it is not feasible to incentivise the small number of satellite operators to spread out across bands, because they are often dependent on a specific band, whereas fixed links licensees are more likely to have a range of suitable bands available to them when installing a new link, and therefore some will respond to price differences; and
- It is easier to resolve conflicts between SES by operator coordination, given the smaller number of users and the fact they are not reliant on key sites/paths.

4.66 Finally, ComReg would note that its views on the use of administrative cost pricing for SES are not fixed and are subject to review in the future. While ComReg does not expect the situation to change for the foreseeable future, should circumstances change sufficiently, it may revert to opportunity-cost pricing at that time.

Remaining regulatory options

4.67 ComReg already outlined that **Option 1,** as outlined earlier, **is the status quo option**. In light of the assessment on scarcity and interference above, ComReg notes that its basis for the remaining regulatory options is limited to fees based on administrative cost recovery. However, such charges can be implemented in a number of ways. In particular, administrative costs can be applied equally across all licensees or applied depending on how licensees use the spectrum such that some licensees could incur more administrative costs than others.

4.68 ComReg agrees with the view of DotEcon[106] that an approach that sets fees specifically for various use cases is likely to be difficult because of the variety of different use cases and the business cases that would support each would need careful assessment by ComReg. In particular, the level of fees at which operation is

[106] The Second DotEcon Report, Document 22/56a, p49.

economically viable is likely to vary significantly between the use cases. For example, satellite broadband services provided by the emerging LEO systems are likely to have a higher valuation for SES when compared to lower value applications, such as earth exploration or telemetry. This would also lead to an unduly complicated set of fees that would be subject to regular change. In any event, information required for such as assessment is unlikely to be available. Furthermore, because fees are administratively based, ComReg should be able to control for issues around the choking off of demand for low value users (such as earth exploration, telemetry, and university research projects). Therefore, ComReg does not consider such an approach as a valid regulatory option.

4.69 Further, ComReg notes that removal of one or more of the three factors used to determine fees in Option 1 (i.e., frequency band, bandwidth and power) would have an impact on existing stakeholders. Therefore, in order to consider the impact on existing stakeholders, the regulatory options in this RIA should consider the inclusion or otherwise of each of the three factors, noting that the removal of all factors would correspond to the same administrative fee applying to all licensees regardless of usage. The inclusion of a particular factor means that administrative costs (or at least some portion of common costs) would be allocated according to that factor (i.e. if power was used as a factor, administrative costs would be allocated in proportion to the power used).

4.70 However, consideration of these three factors would lead to eight different options if each combination of factors was considered independently, in addition to Option 1 (which also maintains the level of fees rather than setting it based on administrative costs). However, ComReg considers that the interactions between the different factors are not sufficiently strong to merit defining regulatory options based on combinations of factors, but instead regulatory options can be based on individual factors. As a result, these options are not necessarily mutually exclusive. Therefore, each option below, following Option 1, considers one of the factors and assesses whether that factor is necessary to ensure the effective licensing of SES services across all combinations that include that factor. In this way, if any particular combination of factors is required to ensure the effective functioning of the SES Licensing framework, the preferred option will provide for the same.

4.71 Therefore, the regulatory options are as follows, noting that each option would cover the administrative costs incurred by ComReg to licence SES:

- **Option 1 -** the existing framework for setting fees would continue to apply, including the three factors to determine the fees for SES;

- **Option 2** - Frequency bands (including whether exclusive or non-exclusive) would be retained as a factor for setting administrative fees for SES. A licensee's fee for SES would depend on the frequency bands (including whether exclusive or non-exclusive) associated with its licence;

- **Option 3 -** Power would be retained as a factor for setting administrative fees for SES. A licensee's fee for SES would depend on the power level associated with its licence;

- **Option 4 -** Bandwidth would be retained as a factor for setting administrative fees for SES. A licensee's fee for SES would depend on the bandwidth associated with its licence; and

- **Option 5 -** No factor would be retained for setting administrative fees for SES. A flat fee would apply to all licensees irrespective of frequency band, bandwidth, or power.

4.7 Impact on Stakeholders

Identification of stakeholders

4.72 Step 3 assesses the likely impact of the proposed regulatory measures on stakeholders. Hence a necessary precursor is to identify such stakeholders who, in this RIA, fall into two main groups:

(i) industry stakeholders as described above; and

(ii) competition and consumers.

4.73 ComReg sets out below a comparative analysis of each of the three options regarding pricing outlined above, in terms of their impact on stakeholders, competition and consumers.

Impact on industry stakeholders

4.74 This section provides information on the impacts on industry stakeholders (as outlined above) arising from the regulatory options above.

4.75 ComReg notes that there are two broad categories of impacts relevant in this section:

- First, the impacts arising from how rights of use are assigned in each of the regulatory options (i.e., "Assignment Impacts"); and

- Second, the impact of the regulatory option on spectrum fees paid by Existing Licensees or would be paid by future licensees (i.e., “Financial Impacts”).

4.76 Assignment Impacts refer to the nature and quantum of spectrum rights of use to be assigned to licensees. The choice of preferred option can impact an operator’s ability to obtain the rights of use necessary to satisfy efficient demand and deliver one or more use cases. These impacts typically arise where issues such as congestion and scarcity arise, and/or where there is uncertainty about future fees and the extent to which they may change. As discussed earlier, there are no issues regarding scarcity and interference. Consequently, the Assignment Impacts are likely to be limited across all options.[107]

4.77 In relation to Financial Impacts, it is worth noting at the outset that the financial impacts that would arise from any of the Options would be relatively minor, with the majority of Licensees facing reduced fees in the non-exclusive bands. The largest fee increases would depend on the circumstances of particular users and their spectrum assignments; however, the largest increases would arise for users who currently operate in the exclusive bands and operate with high power and or high bandwidth (depending on the preferred option(s)). ComReg notes that the majority of any increases would be in the order of hundreds of euro. SES licence revenues are already broadly in line with total administrative cost and any change would primarily be a redistribution of fees among users. Notwithstanding, for completeness and to inform its’s overall preferred option, ComReg provides its preliminary views on the impact on stakeholders below, which it will revise following response to this consultation.

4.78 With that in mind, ComReg notes that the impact of any one option depends on the extent to which each factor (i.e. band, bandwidth or power) varies across each Licensee. If, for example, all licensees use the same bandwidth then the use of this factor to distribute administrative costs will result in those costs being the same for all Licensees, and consequently would align with Option 5. Alternatively, if bandwidth varies across users, the applicable fees and associated impacts will also vary and impact stakeholders differently depending on how much bandwidth is used by them. Therefore, in order to determine stakeholder’s potential views, it is useful to assess the extent to which Licensees differ in their choice of 1. Power, 2. Frequency Band and 3. Bandwidth.

[107] ComReg notes that under Option 1 there is some uncertainty that this regime would persist in the future given the issues raised in this consultation. Option 5 is marginally simpler to understand compared to other because it is a flat fee regardless of uses.

1. Power

4.79 The vast majority of SES Licensees operate in the 50 dBW to 75 dBW range. Further, there are currently no users that considered higher power users (i.e. >75dBW). Therefore, the use of power (Option 3) is unlikely to be a significant issue for most stakeholders who would likely be indifferent about the inclusion of power as a factor to allocate administrative costs. Most users would pay a broadly similar fee and be similar to Option 5 which is a flat administrative fee across all Licensees.

2. Frequency Bands

4.80 In relation to frequency bands, current licences are spread between exclusive and non-exclusive frequency bands. Sixteen licences are for spectrum in the 14.0-14.25 GHz exclusive band. No live licences are approved for use in the other exclusive band (12.5 – 12.75 GHz). The remaining licences are spread across the shared-use bands though the majority are in the following Ku sub-bands:

- 10.7-11.7 GHz;
- 13.75-14 GHz;
- 14-14.25 GHz; and
- 14.25-14.5 GHz

4.81 Therefore, removing consideration of frequency bands (including whether exclusive or non-exclusive) when setting administrative fees for SES could potentially create asymmetric impacts across different stakeholders. In particular, the removal of the distinction between exclusive and shared use will increase the fees paid by existing licensees of exclusive bands. This arises because fees for the exclusive use bands are significantly lower[108] than for the shared bands and are based on the number of SES licences held in those bands. In particular, the annual fee is €100 for each of the first 10 earth stations and €25 for each additional earth station.

4.82 ComReg assesses the potential impact on users of exclusive bands and non-exclusive bands below.

Impacts on users of exclusive bands

4.83 SES Licensees that operate in the exclusive bands (circa 40% of all SES Licensees)

[108] There is one instance where fees in the shared bands could be lower – i.e. a licensee that require 0.5MHz at a power less than 50 in Band greater than 30 GHz. Currently, there are no such Licensees.

would likely prefer if fees remain at a similarly low level (e.g. €100). The removal of bands as a consideration would mean that there would be no price differential associated with operating in any frequency band, including whether the band is exclusive to SES. Users of exclusive bands would pay an administrative cost-based fee the same as shared band users for using the spectrum. Under Options 3, 4 and 5 all users of exclusive bands would have an increase in fees ranging in hundreds to low thousands of euros (single digit).

4.84 Therefore, ComReg is of the preliminary view that users of the exclusive bands (and particularly those that only use the exclusive bands)[109] would likely prefer Option 1 because, as noted above, there is a flat €100 fee for licences in the two SES exclusive bands. As noted by DotEcon, this effectively gives licensees in the exclusive bands a discount in the order of 90% relative to fees for the shared bands and this discount would be of the same order of magnitude. Similarly, such users would likely prefer Option 2 and the retention of bands and the distinction between exclusive and non-exclusive, noting that the €100 would be sufficient to cover ComReg's incremental costs of processing a licence.[110]

4.85 In relation to the remaining options, current users of the exclusive bands would also be likely to favour Option 4 because these Licensees (currently at least) tend to have lower bandwidth needs and would therefore also be likely to prefer to keep bandwidth as a consideration in determining fees[111]. The majority of SES Licensees using the exclusive bands operate in a similar power range to users of the non-exclusive bands and are therefore likely to be indifferent to the removal of power (Option 3) as a consideration for fees. Overall, these Licensees would prefer any option over Option 5 (or combination of options that excludes the use of bands) because such options would remove the consideration of frequency bands from determining fees entirely.

Impacts on users of non-exclusive bands

4.86 SES Licensees in the non-exclusive bands (circa 60% of all Licensees) are charged depending on the band and the bandwidth they wish to be assigned at a particular power. Option 5 removes all considerations of those three factors and SES licensees would be assigned rights of use based on administrative cost recovery which would be spread equally across Licensees. Therefore, all SES Licensees (except those who also have licences in the exclusive bands) would prefer Option 5 to Option 1,

[109] There are 5 SES Licensees that only use the exclusive bands. There are some exclusive users that may prefer alternative options because they have a large amount of licences

[110] See Chapter 5 (Fees) and Section 8 of the Second DotEcon Report (Document 22/56a)

[111] It should be noted that this is not true of all Licensees and some Licensees in the exclusive bands have higher bandwidth requirements and would likely prefer Option 3.

noting that Option 1 is not based on administrative cost recovery and attracts higher fees for almost all bands regardless of power and bandwidth requirements[112]. Even those licensees who may be marginally better off under Option 1 currently would likely prefer Option 5 because the same fee would apply even if their power or bandwidth requirements increased in the future.

4.87 The extent to which a licensee would prefer any of the remaining options over Option 5 would depend on their usage requirements. For example, under Option 4 (retention of bandwidth), it is likely that the majority of licensees operating in the non-exclusive bands would see a reduction in their fees but some large bandwidth users could face increases. Similarly, licensees with lower bandwidth requirements but higher power requirements would likely prefer options that removed power considerations because that would pass more administrative costs to higher bandwidth users. However, as noted above, most licensees tend to have licences that operate within the same range (i.e., 50 - 75 dBW) so would likely be largely indifferent on use of power in determining fees.

3. Bandwidth

4.88 In relation to Bandwidth, and as illustrated in Figure 1, the typical bandwidths used by licensees vary widely. At the low end, many operators use less than 10 MHz, with some using less than 1 MHz. Other SES licences require much larger bandwidths, for example over 500 MHz. Therefore, the use of bandwidth is likely to cause fees to vary across stakeholders and impact licensees differently.

[112] Only bands above 15 GHz with bandwidth requirements above 0.5 MHz would likely have lower fees than Option 1. There are currently no licensees fulfilling this requirement.

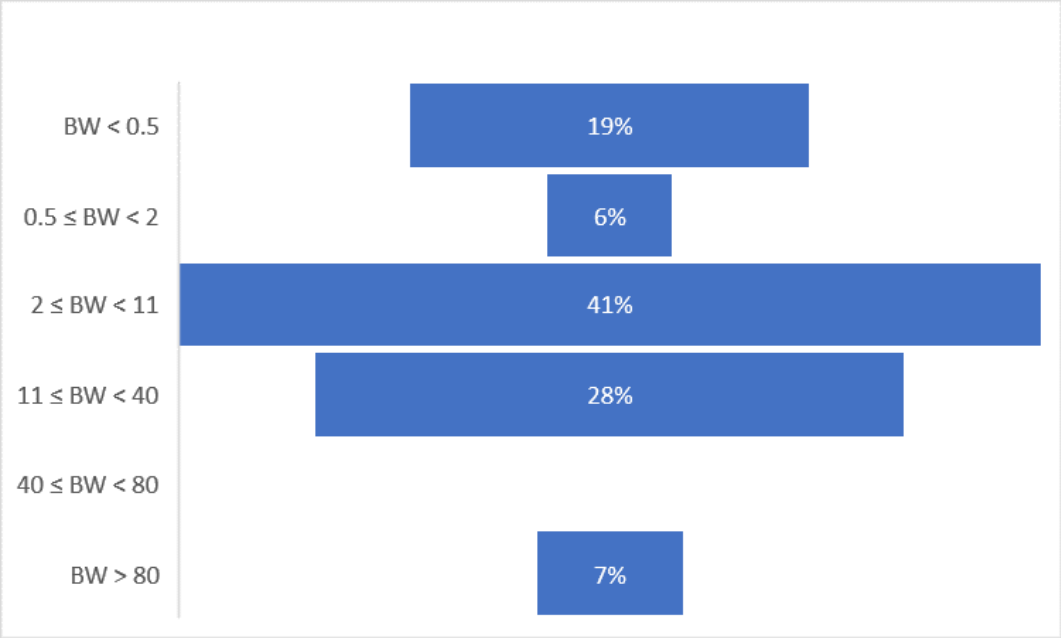


Figure 2: Percentage of licensees that use different bandwidth categories

4.89 The use of bandwidth as a factor simply means that the more bandwidth that is used the higher the fee, noting that overall total fees only cover ComReg's administrative costs. Figure 2 provides a high-level illustration of bandwidth use across licensees and the additional cost associated with bandwidth would fall approximately in line with same. For example, in regard to users of the non-exclusive bands:

- Low bandwidth users (up to 2 MHz) would face fee decreases. Depending on the frequency band that they are operating in under the current licensing regime, they may see fee decreases of hundreds of euros.
- In general, medium bandwidth users (between 2 MHz and 39 MHz) would see a reduction in their licence fees in most instances.[113]
- ComReg observes that there are currently no large bandwidth users (between 40 MHz and 79 MHz). Large bandwidth users would likely see fee increases relative to the existing fee schedule, depending on their spectrum requirements.

[113] Low power users (EIRP < 50 dBW) in the high frequency bands would likely face fees that are either comparable or slightly higher than under the current regime. However, ComReg observes that there are currently no licences issued fall within these conditions.

- A small number of licensees use very large bandwidths greater than 1 GHz. These licensees would face the highest increase, noting that overall fees are no higher than administrative costs.

4.90 Overall, the impact on SES Licensees ultimately depends on their usage requirements and there will inevitably be some Licensees that pay more while others would pay less under any Option relative to Option 1. However, as noted at the outset, because fees only cover administrative costs the impact on stakeholders is very modest with increases and/or decreases mainly in the hundreds of euros, with only one or two licensees facing an increase of around €10,000 per year reflecting higher bandwidth use in of the exclusive bands.

4.8 Impact on competition

4.91 There are different elements to competition that are relevant in determining the impact of any of the preferred options. There is a natural overlap between the aims of the fee methodology and an assessment of ComReg's compliance with some of its statutory obligations, particularly that of promoting competition, in accordance with Section 12 of the 2002 Act.

4.92 These include:

(a) Encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources[114] ("Efficiency and Spectrum Management")

(b) Ensuring that there is no restriction or distortion of competition in the electronic communications sector[115] ("Distortions to competition");

(c) Promoting efficient investment and innovation in new and enhanced infrastructures[116] ("Efficient Investment"); and

(d) Safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition[117] ("Infrastructure based competition"). [118]

4.93 ComReg assesses each in turn below.

[114] Section 12(2)(a) of the 2002 Act.
[115] Section 12(2)(a) of the 2002 Act.
[116] Regulation 16(2) of the Framework Regulations.
[117] Regulation 16(2) of the Framework Regulations.
[118] Impact on consumers assessed separately below.

Efficiency and Spectrum Management

4.94 Under Option 1, ComReg's current fee schedule is based on:

- whether the frequencies used are in a satellite exclusive frequency band or a frequency band that is shared with other services;
- the bandwidth licensed; and
- antenna power (EIRP).

4.95 In principle, these are sensible as proxies for opportunity cost imposed on other users. However, absent evidence that opportunity costs are an issue to be concerned with, the approach to setting fees should be kept as straightforward as possible and additional costs should not be imposed, without good reason. Given ComReg's assessment of scarcity and interference above there would appear to be no efficiency or spectrum management reason to charge fees in this way. Therefore, Option 1 is unlikely to be necessary to encourage efficient use and ensure the effective management of the radio spectrum.

4.96 In relation to Options 2 to 5 which are based on administrative cost recovery, ComReg notes the views of DotEcon[119] that, while there are no efficiency grounds for setting the overall level of fees significantly above administrative costs, there may be efficiency arguments around ensuring that:

(i) each licensee covers the incremental costs incurred by ComReg as a result of its licence; and

(ii) fixed costs are distributed to avoid inefficiently choking off demand.

4.97 In relation to (i), incremental cost of processing a licence application would be the same across all options and there would be no difference between options. ComReg sets this fee at €100 per licence (See Chapter 3).

4.98 In relation to (ii), the concern here is that more marginal, low value users (such as earth exploration, telemetry, and university research projects[120]) could be priced off if too large a share of the common costs is recovered from them. As noted by DotEcon[121] if the administrative costs are spread evenly across all licences, there

[119] The Second DotEcon Report, Document 22/56a, p43.

[120] includes satellites for research projects (e.g. run by universities or national research funding agencies) which may be budget constrained and unlikely to operate large amounts of ground station infrastructure (potentially working with ESaaS operators instead). See Document 20/135a Section 3.2.1.

[121] The Second DotEcon Report, Document 22/56a, p49.

may be a number of potential licensees that are priced out of the market with zero benefit, harming businesses and/or consumers that may have benefitted from those services. There is a risk that Option 5 could result in such outcomes because administrative costs are applied evenly across all licensees under that Option.

4.99 If under Option 2, fees remained substantially lower in exclusive bands and low value users are able to choose the frequency bands they use freely, then such concerns would not arise. However, ComReg agrees with the views of DotEcon[122] the current discount applied in these bands (which effectively amounts to a 90% discount) is both unnecessary and unreasonable given the lack of scarcity of SES spectrum. In particular, ComReg notes that there are no efficiency or spectrum management reasons as to why the exclusive use of certain bands attracts a 90% discount. Moreover, it is likely that some low value users will have a preference for bands other than the exclusive bands.

4.100 Furthermore, and wholly apart for the designation of certain frequency bands as exclusive, there is no basis for charging different fees depending on the frequency band required by a licensee. As noted at the outset of this draft RIA, there are no interference and scarcity concerns related to any of the bands under consideration. As noted by DotEcon, "*Even if there is more spectrum in the higher frequencies, there is no obvious scarcity of spectrum for SES in any of the bands, nor are any material opportunity costs likely to emerge in the near future. Therefore, there is no need to have per MHz charges that differ across bands to capture relative scarcity (or potential scarcity) of spectrum.*"[123]

4.101 Under Option 3, while the risk is lower than Option 5, there would still be a risk that low value users would be choked off because while these low value users have low bandwidth requirements, they do not generally operate at lower power. As noted in the impact on stakeholders above, most licensees typically fall into the 50 – 75 dBW category and power is not a distinguishing factor across licensees. Therefore, the retention of power as a factor in determining fees could increase the risk of choking off such use cases where higher power was required. Conversely, ComReg is not aware of any use case that has low power and high bandwidth requirements.

4.102 Under Option 4, and because low value users are typically defined in relation to bandwidth used (which is low), there are clear advantages to allocating common costs in proportion to the bandwidth used. Under this Option, these users would cover the incremental cost of processing a licence, however the remaining administrative costs would be kept low in line with low bandwidth use, reducing the

[122] The Second DotEcon Report, Document 22/56a, p51.
[123] The Second DotEcon Report, Document 22/56a, p50.

risk of these users being choked off unnecessarily.

4.103 Therefore, ComReg is of the preliminary view that Option 4 is preferred from an efficiency and spectrum management perspective.

Distortions to competition[124]

4.104 Option 1 has delivered a variety of important use cases, including Earth exploration, IoT, GSO Broadband, NGSO Broadband, Mobile Communications and broadcasting. These services have been delivered for over ten years and ComReg is unaware of any anti-competitive hoarding having occurred in that time. This is unsurprising given that there has been no interference or scarcity issues in the intervening period. Furthermore, ComReg notes that because there are no interference or scarcity issues arising in the assignment of SES then issues around spectrum hoarding etc. are highly unlikely to arise in the context of administratively set fees under Options 2 - 5.

4.105 Potential distortions or restrictions to competition in the assignment of SES rights of mainly arise in relation to fees potentially choking off efficient access. DotEcon observes[125] that there is an argument for applying Ramsey pricing principles to the fee structure meaning that the administrative cost still needs to be covered, but high-value users would pay a greater share than low value users, ensuring that prices for smaller users are kept low enough to enable them to operate.

4.106 With that in mind, ComReg recognises that some licensees would be affected by high or poorly structured fees. This is particularly relevant if bandwidth use does not fully capture the value of a particular service. DotEcon notes[126] that there may well be a small number of use cases where the assumption about the value/bandwidth relationship does not apply to the same extent as for other use cases. The most significant example is the case of a low value, low bandwidth user (and some Earth exploration applications, for example, may fall into that category).

4.107 ComReg also notes that the range of users and applications may proliferate as it becomes easier to deploy large numbers of low-cost, low-power satellites that nevertheless meet capacity requirements. This includes satellites for research projects (e.g. run by universities or national research funding agencies) which may

[124] DotEcon notes that the primary concern regarding competition that is strictly relevant to SES licensing would be that operators might use interference protection rights that come with SES licences to preclude others from deploying earth stations in Ireland (or certain parts of Ireland). However, this concern is unlikely to arise, is unrelated to fees and is assessed separately this paper.
[125] The Second DotEcon Report, Document 22/56a, p49.
[126] The Second DotEcon Report, Document 22/56a, p50.

be budget constrained and unlikely to operate large amounts of ground station infrastructure (potentially working with ESaaS operators instead). Such users utilise low value applications, such as earth exploration, telemetry, and university research projects. Such projects depending on their output have high social and economic value.

4.108 Similarly, IoT users have very low bandwidth requirements. Most IoT systems rely on terrestrial network infrastructure. However, when such infrastructure is not available or does not provide sufficient coverage, satellite communication clearly has a role in providing IoT connectivity. IoT networks and services typically transmit low bandwidth chunks of data at regular intervals (e.g., status updates, measurements, and vehicle positioning). Such IoT systems have little or no requirement for higher bandwidths and the existing fees under Option 1 are highest (even at low bandwidths) in the lower frequencies (e.g., 3GHz) which are of most relevance to IoT users.

4.109 Any concerns from such stakeholders on the level of fees are likely to be resolved by administrative cost pricing, provided it reflects incremental administrative costs, and by not charging where no additional interference analysis/management is necessary[127]. As discussed in 'Impact on Stakeholders' above, the risk of fees choking off efficient demand is higher under Options 3 and 5 and least likely to arise under Option 4 because this option significantly reduces the cost of low bandwidth uses.

4.110 Overall, ComReg is of the view that while distortions to competition are unlikely under all options, Option 4 is the least likely to result in distortions to competition , primarily because low value users are least likely to be choked off under that option.

Efficient investment and innovation

4.111 Creating the conditions for promoting efficient investment and innovation in new and enhanced infrastructure involves ComReg exercising its regulatory functions in an appropriate and predictable fashion, thus providing regulatory certainty. As noted by DotEcon, the timeframe for a satellite project is many years, and investors need to know that the regulation will be suitable several years into the future.[128] Indeed, stakeholders noted in the trade-off between good geography and the regulatory regime, it often makes sense to prioritise the latter (especially within a broad area, where geographical conditions are similar, and a marginally better location is

[127] Document 21/135a, p30.
[128] Document 21/135a, p21.

outweighed by a significantly better regulatory environment.[129]

4.112 Any option should provide certainty that the regulatory framework, which often underpins investment decisions will not change unnecessarily and require operators to make subsequent and additional investments and/or costly changes to their network. Promoting competition and encouraging efficient investment, in ComReg's preliminary view, means allowing for a cost-effective deployment of SES services and preventing inefficient duplication of investment caused by predictable changes to the regulatory regime. With that in mind, it is important that any option considers the likely long run development of the market so as to avoid future changes to the regulatory framework that could have been foreseen or give rise to additional cost.

4.113 Under Option 1, it is likely that investment in networks used to deliver services up to now could be considered efficient given the benefits to consumers and competition. However, it is unlikely that this Option can persist in the long run because the fee structure attempts to proxy opportunity cost where no opportunity costs exist or are likely to exist in the foreseeable future. Further, ComReg's assessment of use cases indicate that low value uses may become more prominent in the future and the fees structure under Option 1 could choke of such use cases depending on the requirement of those use cases. Such use cases can also encourage innovation and development involving new radio technologies or services and the SES regime can provide longer term spectrum access in the delivery of those services.

4.114 Options 2 – 5 are based on administrative cost recovery and would provide some regulatory predictability if changes were unlikely to be required. Option 4 is unlikely to require any changes for the foreseeable future because it best protects against choking off of low value use. Alternatively, Options 3, 4 and 5 have a higher risk of choking off demand (because bandwidth is not considered) and therefore changes may be required over the same period. Therefore, Option 4 would be more likely to promote efficient investment.

Infrastructure based competition

4.115 Infrastructure based competition is competition among operators that physically own networks. This could be a fixed operator competing with a mobile operator or two operators which have similar networks competing against each other. As a general point, the SES regime provided under either Option would enhance the possibilities for infrastructure-based competition because it would allow operators to deploy services using SES even when alternative infrastructures are available (e.g.,

[129] Ibid

fixed/fibre/mobile).

4.116 As noted by DotEcon[130], in many cases, bands are shared between satellites and terrestrial services (primarily fixed links) that might compete for the same end customers, for example satellite broadband and FWA. There are now also several large LEO constellations in development to provide broadband, with some already launched and providing services. These ISPs focus on bringing broadband to areas with limited connectivity, but with lower latency possible due to the significantly closer proximity to the earth of LEO satellites.

4.117 DotEcon also observes that faster speeds and low latency will make these services competitive with terrestrial services in remote areas (e.g. Starlink intends to provide speeds of over 100 Mbps and latency as low as 20 ms).[131] This will provide increased competition in rural areas particularly those not currently served by fibre and more relevantly areas of the country where providing broadband is difficult due to geographic terrain (e.g., Black Valley and other related areas). Fees set to cover administrative costs across all options provides low-cost access to spectrum rights of use.

4.118 In relation to other use cases, there is strong potential for infrastructure-based competition between satellite and other terrestrial services in relation to the Internet of Things (IoT). IoT systems communicate small amounts of information at a time, with devices only communicating with satellites for short bursts at any given time. This enables Satellite IoT systems to share spectrum efficiently with other services as they require less bandwidth, while not continuously transmitting, thereby reducing the possibility of interference.

4.119 IoT networks and services typically transmit low bandwidth chunks of data at regular intervals (e.g., status updates, measurements, and vehicle positioning). Further, such services tend to require low power in order to prolong better performance with every transmission. Satellite can also provide such requirements over long distances with low risk of interference which cuts down the amount of other infrastructure required to deploy a large-scale IoT project.

4.120 IoT systems using SES could be constrained by fees that do not reflect that IoT systems have very low bandwidth requirements. Indeed, infrastructure competition between satellite and terrestrial networks could be restricted if fees do not reflect this requirement. For example, mobile networks typically have a very low incremental cost of carrying IoT because of low bandwidth nature of the traffic. The potential for

[130] The Second DotEcon Report, Document 22/56a, p29.
[131] The First DotEcon Report, Document 21/135a, p16

satellite providers to compete on a similar basis is important and should not be constrained in any way by how fees are structured. The proliferation of IoT systems means that infrastructure-based competition between satellite and terrestrial services will become more important in the future.

4.121 With that in mind, Option 4 best provides for this competition because it lowers the cost for services that require low bandwidth, such as IoT, and better allows for infrastructure-based competition.

4.122 Therefore, while there is unlikely to be a significant difference between Options 2 to 5, Option 4 is likely to better encourage infrastructure-based competition.

4.9 Impact on consumers

4.123 It can be generally assumed that what is good for competition, and what promotes investment in infrastructure, is good for consumers. This is because increased competition between operators brings benefits to their customers in terms of price, choice and quality of services. In that regard, options that are good for competition above are likely to be good for consumers.

4.124 Satellite services play an important role in enabling the applications that are often taken for granted today and includes emerging technologies that deliver improved ways of delivering services to consumers and providing more productive capacity throughout the economy. The use cases are discussed in detail in both DotEcon reports, however, these use cases can be categorised into (i) those that are provided directly to consumers and businesses in downstream markets and (ii) those that are used as inputs to other services that consumers value.

4.125 In summary and in relation to downstream services directly used by consumers, these include:

- Satellite broadband, which currently has a relatively marginal use but will be more relevant in very rural/remote areas where it might be the only means of connection.
    - LEO constellations will focus on bringing broadband to such areas with lower latency possible due to the significantly closer proximity to the earth of LEO satellites.
    - GSO systems will continue to be vital to provide services and advent of new high throughput and very high throughput GSO satellites has solidified their importance to the modern satellite sector.

- Households and businesses receive television distributed via satellite broadcast and there is still a large installed base of satellite TV receivers; therefore, the service is expected to remain important for the foreseeable future.

4.126 In summary, and in relation to inputs used to provide services that consumers are likely to value, the following are most relevant.

- Internet of Things (IoT) devices are used in a growing number of industries, such as agriculture, shipping and logistics, generally for telemetry and control purposes.

- Earth exploration and remote sensing satellites capture and transmit images of and information about the Earth's surface from space. This covers a wide range of end user applications, including scientific observation, weather mapping, climate monitoring and defence uses.

- Satellite links can now serve as a complement to terrestrial communications networks, both as a reliable backup and as a primary means of providing backhaul services in some cases (e.g. from areas with no available fibre), because they are capable of the required throughputs.

4.127 Consumers are likely to prefer those options which maintain or improve services and while at the same time not deterring entry or efficient investment. With that in mind, consumers are unlikely to have strong preferences between the different options because most use cases are provided for across all options that charge based on administrative costs. As noted above, the impacts on stakeholders and competition are relatively modest across all options. That said, consumers are likely to prefer Options 2 - 5 over Option 1 because Option 1 was designed based on use cases over 15 years ago. Alternatively, Options 2 – 5 have been designed following stakeholder engagement over the most likely use cases.

4.128 In relation to Options 2 – 5, consumers may prefer options that avoid providers facing increased input costs to downstream services. For example, consumers that use services that have high bandwidth requirements (e.g., broadband services) may not prefer Option 4 to the extent that it increases spectrum fees. However, as noted above, such increases are negligible relative to the entire user base which those providers are competing for, and such increases are highly unlikely to increase the cost of these services. Rather, consumers are likely to be more concerned with services that could be choked off and are therefore not available at all. Therefore, consumers are likely to prefer Option 4 because it reduces the risk of low value users being choked off for providing services.

4.129 In light of the above, ComReg is of the preliminary view that consumers are likely to prefer Option 4.

4.10 ComReg's preferred option

4.130 This RIA considers a number of regulatory measures available to ComReg within the context of the analytical framework set out in ComReg's RIA Guidelines (i.e., impact on industry stakeholders, impact on competition and impact on consumers). This section complements that analysis and provides an assessment of the extent to which any regulatory measure would, if implemented, be likely to achieve one or more of ComReg's statutory objectives in the exercise of its related statutory function or functions.

4.131 In light of the above, ComReg is of the preliminary view that Option 4 is preferred in terms of the impact on stakeholders, competition and consumers mainly because it is the Option that best provides for the provision of all use cases referred to in this consultation and appropriately weights the burden of administrative costs on those users most likely to benefit from the deployment of those costs.

4.11 Assessment of the Preferred option against ComReg's relevant statutory objective

4.132 This RIA identifies and considers the options potentially available to ComReg, within the context of the RIA analytical framework as set out in ComReg's RIA Guidelines (impact on industry stakeholders, the impact on competition and the 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 radio spectrum. This includes 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 frequency bands that are used to deliver SES.

4.133 In this section, ComReg assesses the Overall Preferred Option in the context of other statutory provisions relevant to the management of Ireland's radio frequency spectrum (which are summarised in Annex 1 of this document). It is not proposed to exhaustively reproduce those statutory provisions here. However, set out below is a summary of all statutory provisions which ComReg considers to be particularly relevant to the management and use of the radio frequency spectrum with an

assessment (to the extent not already dealt with as part of the draft RIAs) of whether, and to what extent, the Overall Preferred Option accords with those provisions. In carrying out this assessment, ComReg has highlighted below some of the relative merits / drawbacks which would arise if it was to select some of the alternative options assessed under the draft RIA above.

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

- general provisions on competition;
- contributing to the development of the internal market;
- to promote the interest of users within the Community;
- efficient use and effective management of spectrum;
- regulatory principles;
- relevant Policy Directions and Policy Statements; and
- general guiding principles (in terms of spectrum management, setting of fees and licence conditions).
    - Objective justification;
    - Transparency;
    - Non-discrimination; and
    - Proportionality.

4.11.1 General Provisions on Competition

4.135 There is a natural overlap between the aims of the draft RIA and an assessment of ComReg's compliance with some of its statutory obligations and, in particular, one of its statutory objectives under section 12 of the 2002 Act of promoting competition by, among other things:

- ensuring that users derive maximum benefit in terms of choice, price and quality;

- ensuring that there is no distortion or restriction of competition in the electronic communications sector; and
- encouraging efficient use and ensuring effective management of radio frequencies.

4.136 In so far as the promotion of competition is concerned, Regulation 16(1)(b) of the Framework Regulations further requires ComReg to ensure that:

- 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. [132]

4.137 Certain other provisions also relate to ComReg promoting and protecting competition in the electronic communications sector including:

- Regulation 16(2) of the Framework Regulations which requires ComReg inter alia to apply objective, transparent, non-discriminatory and proportionate regulatory principles by, inter alia, safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition;
- Regulation 9(11) of the Authorisation Regulations which requires ComReg to ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies; and
- General Policy Direction No. 1 on Competition (26 March 2004) which requires ComReg to focus on the promotion of competition as a key objective, including removing barriers to market entry and supporting new entry (both by new players and entry to new sectors by existing players).

4.138 Based on the assessment provided in the RIA above, ComReg's view is that the Preferred Option in the draft RIA would best safeguard and promote competition to the benefit of consumers for the reasons set out in this RIA i.e. (Impact on Competition above). In particular:

- ComReg completed a detailed assessment which shows that no interference and/or scarcity issues arise in respect of the frequency bands used for SES

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

meaning that no potential licensee would be denied access to what would be an essential input for those services.

- Spectrum fees are set solely to cover administrative cost and are set by reference to the bandwidth required which reduces the risks of lower value (low bandwidth users) being choked off from utilising the spectrum in the delivery of services.

4.11.2 Contributing to the development of the Internal Market

4.139 In achieving the objective of contributing to the development of the Internal Market, another of ComReg's statutory objectives under section 12 of the 2002 Act, ComReg considers that the following factors are of relevance for SES:

- the extent to which the Overall Preferred Option would encourage the establishment and development of trans-European networks and the interoperability of pan-European services, by facilitating, or not distorting or restricting, entry to the Irish market by electronic communication services providers based or operating in other Member States; and

- to ensure the development of consistent regulatory practice and the consistent application of EU law, the extent to which ComReg has had due regard to the views of the European Commission, BEREC and other Member States in relevant matters, in selecting an option and considering any regulatory action required by ComReg in respect of such an option.

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

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

4.141 ComReg notes the case studies completed by DotEcon which shows that fees under Option 1 are at the lower end of the fees range compared to other jurisdictions. With

that in mind, the overall Preferred Option would be highly unlikely to restrict the development of trans-European networks because over all fees are broadly the same as Option 1 and any increases are primarily in the order of hundreds of euros. Further, ComReg refers to its preliminary finding that the Overall Preferred Option is highly unlikely to choke off demand for satellite-based services because fees are set at the lowest level subject to recovering administrative costs. Finally, ComReg notes that its preferred Option does not set different charges for specific users or use cases. Such an approach would also be in line with service and technology-neutrality requirements by not preferring existing services and technologies by virtue of incumbency.

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

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

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

- ComReg considered the international aspects of the satellite licensing in Section 3.2 and 3.4 of Document 21/135 and noted that satellite services operate on an international basis and most stakeholders highlighted the importance of implementing CEPT harmonisation decisions as quickly as possible.

- Annex B of the Second DotEcon report carefully considered SES licensing regimes in other jurisdictions (including fees). ComReg considered same in forming its view on the overall preferred Option. ComReg considered the fees regime in other jurisdictions in other to determine whether ComReg's proposed fees were excessive , considering fees charged in other jurisdictions.

- ComReg issued a Request for Information ("RFI") and received 18 responses from members of the Independent Regulators Group ("IRG")[133] which ComReg issued in order to gather, among other things, the most up to date information on SES Licensing; and

- ComReg and DotEcon held stakeholder meetings with international equipment manufacturers and vendors to inform its Preferred Option.

4.11.3 Promote the interest of users within the community

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

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

4.11.4 Efficient use and effective management of spectrum

4.146 Under section 10(1) of the 2002 Act, it is one of ComReg's functions to manage the radio frequency spectrum in accordance with a Policy Direction under section 13 of the 2002 Act. Policy Direction No. 11 of 21 February 2003 requires ComReg to ensure that, in managing spectrum, it takes account of the interests of all users of the radio frequency spectrum (including both commercial and non-commercial users) (see discussion on this policy direction below). Importantly, in pursuing its objective to promote competition under section 12(2)(a), ComReg must also take all reasonable measures to encourage efficient use and ensure effective management of radio frequencies. Section 12(3) of the 2002 Act also requires that in carrying out its functions, ComReg shall seek to ensure that measures taken by it are proportionate having regard to the objectives set out in section 12.

4.147 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.

4.148 In relation to Policy Direction No. 11, the draft RIA set out above considers the

[133] The Independent Regulators Group ("IRG") a group of European National Telecommunications Regulatory Authorities (NRAs) that functions as a forum for exchange of best practices and discussions on regulatory challenges in communications between NRAs

interests of all users of the radio frequency spectrum (and assesses the extent to which such interests are consistent with ComReg's own statutory obligations), both commercial and non-commercial. ComReg is of the view that the Overall Preferred Option is one that would safeguard and promote those interests. In particular, ComReg refers to the discussion on same in 'Spectrum management and efficiency above'.

4.149 ComReg is of the preliminary view that the Overall Preferred Option complies with the obligations contained in the above statutory provisions. ComReg is also of the preliminary view that Option 1 would fail to satisfy the above provisions to the same extent, if at all considering the increased requirement for bandwidth in the future.

4.11.5 Regulatory Principles

4.150 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; and
- promoting efficient investment and innovation in ECS networks and infrastructure.

Regulatory Predictability

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

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

- promoting regulatory predictability in relation to availability of spectrum rights to other users of spectrum by applying an open, transparent, and non-discriminatory approach to accessing spectrum for Satellite services; and
- promoting regulatory predictability in relation to ensuring that the process used to determine fees is predictable and not subject to significant change such that it would compromise efficient investments.

4.153 In relation to the first objective, ComReg's approach is consistent with its general

treatment of a scarce resource such that rights of use should be assigned to those who value it the most. In that regard, ComReg's scarcity and interference assessment provides clear evidence that spectrum rights of use for Satellite services are not scarce and therefore an administrative cost recovery approach is appropriate having regard to its statutory objectives.

4.154 In relation to the second objective, ComReg refers to its assessment under efficient investment below and its view that the conditions for promoting efficient investment and innovation in new and enhanced infrastructures investment involves ComReg taking its regulatory functions in an appropriate and predictable fashion as provided under Option 2. In that regard, ComReg considered that the timeframe for a satellite project is many years and investors need to know that the regulation will remain appropriate into the future. Therefore, ComReg notes that the fees proposed in this consultation would be unlikely to change save for annual CPI adjustments.

4.155 Considering the above, ComReg is of the view that the Overall Preferred Option complies with the regulatory principle of promoting regulatory predictability.

4.11.6 Efficient Investment and Innovation in New and Enhanced Infrastructures

4.156 ComReg considers that the Overall Preferred Option is consistent with the aims of this regulatory principle for the reasons set out in Section 4.11. Further, ComReg notes that:

- it provides for a range of outcomes and differentiated services noting that this option has been designed with existing and potential use cases in mind and consulted in detail on same in Document 21/135 and associated documents. ComReg was conscious that lower value (lower bandwidth) use cases may be choked off even within an administrative cost recovery approach and therefore applied an approach which takes account of bandwidth in determining the fees level.

- Its preferred option was informed by engagement with industry stakeholders including a detailed assessment on potential use cases and an analysis recent trends and developments in the satellite industry that might impact on demand and requirements for earth stations.

4.157 ComReg also refers to the discussion on same in Efficient Investment and Innovation in Impact on Competition section above.

4.11.7 Relevant Policy Directions and Policy Statements

4.158 ComReg has taken due account of the Spectrum Policy Statement issued by the then DCENR in September 2010,its Consultation on Spectrum Policy Priorities issued in July 2014 and its Statement of Strategy 2021 to 2023[134]. ComReg notes that the core policy objectives, principles and priorities set out therein are broadly in line with those set out in the 2002 Act and in the European Electronic Communications Code (which has repealed the Common Regulatory Framework) and, in turn, with those followed by ComReg in identifying the Overall Preferred Option.

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

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

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

4.161 This Policy Direction provides that:

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

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

4.163 ComReg is cognisant of the fact that the three-year objective described in this policy direction has now long expired. In any case, ComReg is of the view that the Preferred

[134] https://www.gov.ie/en/publication/1a70d-statement-of-strategy-2021-2023/

Option is aligned with the objectives of the current Programme for Government. For example, in its Impact on Competition assessment above, ComReg recognises that some satellite services might be competing for end users with terrestrial services, (e.g., for rural broadband provision) and considered the extent to which such issues may arise in designing the SES regime. However, ComReg agreed with the views of DotEcon that precluding access to the market is unlikely because Satellite operators have a reasonable amount of flexibility when planning their networks and the impact of any blocking behaviour would be very marginalised.

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

4.164 This Policy Direction provides that:

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

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

4.166 ComReg observes that this policy direction concerns the sustainability of the industry as a whole rather than the position of individual players. In that regard, ComReg notes that total fees are broadly stable under its preferred option and may reduce depending on how licensees decide to deploy their networks in the future.

4.167 Notwithstanding, in its RIA above, ComReg has considered the impact of its Preferred Option in the context of all industry stakeholders, including different types of industry stakeholders, and refers the financial impact on these stakeholders in the Impact on Stakeholders section above. This shows that while Option 2 may result in some very modest increases for certain stakeholders, and in most cases in the order of hundreds of euro. This is highly unlikely to threaten industry sustainability.

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

4.168 This Policy Direction provides that:

> *"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".*

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

4.170 In carrying out the draft RIA, ComReg has considered the Preferred Option in light of the interests of various categories of industry stakeholders and consumers. In particular, ComReg considered whether interference and scarcity issues would arise and noted that even where such interference might arise users could coordinate sufficiently to overcomes such issues.

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

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

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

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

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

- the regulatory principle set out in Regulation 16(2) of the Framework Regulations requires ComReg in pursuing its objectives to apply objective, transparent, non-discriminatory, and proportionate regulatory principles by, amongst other things, ensuring that, in similar circumstances, there is no discrimination in the treatment of undertakings providing electronic communications networks and services.

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

4.175 ComReg is of the view, having regard to the applicable legislation and legal principles, its draft RIAs and other analyses, its expert advice and reports, and the material to which it has had regard, that the Overall Preferred Option is objectively justified, transparent, proportionate, and non-discriminatory. In particular, the preferred option:

- is objectively justified given the detailed assessment provided in this RIA, including that it would be unlikely to distort or restrict competition and it better encourages the efficient use of the radio spectrum;
- would not give rise to discrimination in the treatment of undertakings because:
    - Fees are based solely on administrative cost recovery and the allocation of these costs varies only in so much as a licensee requires more bandwidth.
    - Any change in fees arising from the Overall Preferred Option arise because the situation of some licensees is materially different from the other (i.e. some licensees have higher bandwidth requirements).
- whether fees increase, or decrease does not depend on the stakeholder but rather on the bandwidth;
- is transparent because, among other things:
    - the methodology is set out in Chapter 3 and the DotEcon Report whereby fees are determined based on the following formula:

$$annual\ fee\ (in\ €) = 100 + 30\ (BW)$$

    - ComReg provides an assessment of the impact on stakeholders (including financial impact) in the RIA above; and
    - The fees Chapter sets out how the preferred option would be implemented, including examples of same.
- is proportionate because, among other things:
    - the preferred option would accord with ComReg's statutory objectives and regulatory principles as described above;

- there do not appear to be less onerous means by which these objectives and principles could be achieved;
- ComReg relies primarily on its information policy (discussed at the outset of the RIA) rather than fees to achieve its statutory functions, objectives and duties.

Conclusion

4.176 In light of the above, ComReg is satisfied that the Preferred Option complies with those statutory functions, objectives and duties relevant to its management of the radio frequency spectrum.

Chapter 5

5 Fees

5.1 Introduction

5.1 In Chapter 5 ("the Draft RIA") ComReg set out its preliminary view that Option 4 was its preferred option, which sets fees based on administrative cost and taking bandwidth as a parameter in the calculation of same. This chapter further specifies this approach and considers other matters in relation to fees that will apply to the pricing of SES.

5.2 This chapter is divided into the following sections:

- Proposed Fees under ComReg's preferred option (Option 4)
- Examples of new fees compared to existing regime.
- Indexing of Fees to the Consumer Price Index ("CPI")
- Future Fees Review

5.2 Proposed fees

5.3 ComReg's administrative costs for managing the SES licensing framework are in the region of €140k per annum. Furthermore, the incremental cost of processing any SES licence application is estimated at approximately €100. Therefore, in order to ensure that every Licensee[135] pays at least the incremental cost of processing a licence, €100 will act as a floor on all fees regardless of the bandwidth associated with the licence.

5.4 Under the preferred Option the fee calculation would be a two-part tariff.

- The first part, a constant applied to all licences, reflects the incremental cost of any SES licence application to ComReg.

[135] ComReg notes and agrees with DotEcon that concerning administrative costs there is no tangible difference between TES and FES licences. The same assessment for interference is undertaken by ComReg for TES and FES applications. The removal of the exclusive band will essentially charge TES and FES licences under the same fee structure.

- The second part of the tariff calculation is a per-MHz charge that distributes ComReg's fixed costs in proportion to bandwidth.

5.5 This provides for an incremental administrative cost and a per-MHz cost based on bandwidth, outlined as follows:

$$annual\ fee\ (in\ €) = \ 100 + 30\ (BW)$$

5.6 This implements Option 4 because each licensee covers the incremental costs incurred by ComReg as a result of its licence and the remaining fixed costs are distributed to avoid inefficiently choking off demand.

5.7 The per-MHz charge distributes ComReg's fixed costs in proportion to bandwidth. The €30 per MHz charge has been derived to recover the remaining fixed costs of the SES licensing regime, based on the licences currently in operation. This per MHz charge allows fees to increase linearly in proportion to bandwidth used, helping to avoid instances of inefficiently choked off demand for low value users.

5.8 Licences that are required for less than 12 months will continue to be adjusted pro-rata, as is the case under the current licensing regime, outlined as follows:

$$temporary\ license\ fee\ (in\ €) = A * \left(\frac{B}{12}\right)$$

where A is the relevant annual fee and B is the number of whole months for which the licence is granted.

5.3 Examples

5.9 ComReg provides the following examples to illustrate how fees are implemented in practice and would change relative to the current framework.

Example 1: Exclusive Bands

A Licensee requires 32 MHz (Bandwidth) in the Ku Band 14.0 – 14.25 (Frequency Band) at an EIRP of 52 dBW (Power).

Under the current framework the annual fee would be **€100** because the frequency band is in the exclusive bands and no other factors are considered.

Under the proposed framework the licence fee would be **€1,060** consisting of the following.

€1060 = €100 + (30 x 32)

Example 2: Medium Bandwidth Users

A Licensee requires 12 MHz (Bandwidth) in the Ku Band 10.7 - 11.7 (Frequency Band) at an EIRP of 65 dBW (Power).

Under the current framework the annual fee would be **€1,500** because under Table 3 of Document 00/64R3, this Licence falls within the following.

- the 10-15 frequency band category
- 11 ≤ BW < 40 Bandwidth category
- the 50 dBW ≤ EIRP ≤ 75dBW power category

Under the proposed option the licence fee would be **€460** consisting of:

€460 = €100 + (30 x 12)

Example 3: High Bandwidth Users

A Licensee requires 1,000 MHz (Bandwidth) in the 17.3 GHz Band (Frequency Band) at an EIRP of 60 dBW (Power).

Under the current framework the annual fee would be **€24,375** because under Table 3 of Document 00/64R3, this Licence falls within the following.

- the 15 - 20 frequency band category
- the 50 dBW ≤ EIRP ≤ 75dBW power category
- BW > 80 Bandwidth category; and €24,375 = €1375 + (1,000 - 80) x 25

Under the proposed option the licence fee would be **€30,100** consisting of:

€30,100 = €100 + (30 x 1,000)

Example 4: Low Bandwidth Users

A Licensee requires 1 MHz (Bandwidth) in the 3.6 – 4.2 GHz Band (Frequency Band) at an EIRP of 55 dBW (Power).

Under the current framework the annual fee would be **€1,500** because under Table 3 of Document 00/64R3, this Licence falls within the following.

- the 3-10 frequency band category
- the 50 dBW ≤ EIRP ≤ 75dBW power category
- 0.5 ≤ BW < 2

Under the proposed option the licence fee would be **€130** consisting of:

€130 = €100 + (30 x 1)

5.4 Indexing of fees

5.10 DotEcon advise that SES fees should be indexed on an annual basis according to CPI. In particular, DotEcon advises that

- ComReg needs some way for fees to increase in line with its administrative costs over time and indexing in line with CPI should prevent the need for ComReg to review and potentially change fees frequently, even if administrative costs do increase at times.

- Operators face less uncertainty when planning investments if fees are indexed rather than updated in line with new administrative cost estimates, because they are likely better able to forecast inflation than they would be able to predict changes in ComReg's costs.

5.11 ComReg agrees that fees should be indexed for inflation (using CPI), and this is consistent with ComReg's long established approach of applying a CPI adjustment annual licence fee.[136] The CPI is the official measure of inflation in Ireland and is, therefore, an appropriate and accessible benchmark for measuring changes to the value of money. In this regard, the Central Statistics Office notes that the CPI "*can also be used to update or determine the value of a sum of money from the past e.g. the equivalent value of £2,000 in 1951 to today's level. In effect, the CPI shows the change in the value of money over time*"[137] .

5.5 Future fee reviews

5.12 DotEcon advise that there may also be further need for ComReg to revise the fees in the future in response to changes in the number of licences issued and/or significant changes to its administrative costs.

5.13 ComReg agrees that fees may require a change in the future to account for an increase/decrease in the number of licensees and or an increase in bandwidth required. Such changes would spread the administrative cost over more or different licensees and are likely to occur to some extent every year. As a result, there may be some minor over, or under contributions to administrative costs each year. However, it is simply not practical to continually change fees to account for changes in how licensees contribute to administrative costs, particularly where such changes would be relatively minor. Furthermore, because fees overall are modest any impacts on stakeholders arising from such an approach is likely to be negligible.

5.14 As noted previously, it is important to provide certainty on fees over a reasonable period. Therefore, in order to provided sufficient certainty to licensees over a reasonable period, ComReg does not propose to review fees for at least 5 years, save for some exceptional circumstances that may arise.

5.15 The values for both the administrative cost floor and per MHz cost are based on ComReg estimates. These estimates take into account one-off costs for issuing licences, policing license conditions and monitoring interference problems.

[136] See Document 15/131 and Document 16/49

[137] Frequently asked questions March 2016.indd (cso.ie)

5.16 The constant administrative cost reflects the incremental cost of processing an additional SES licence, which comes out at approximately €100.

Chapter 6

6 Submitting Comments and Next Steps

6.1 Submitting Comments

6.1 All input and comments are welcome. Please reference comments to the relevant section / paragraph number in each chapter and annex in this document, as this will assist the task of analysing responses and ensuring that all relevant views are taken into account. Please also provide reasoning and supporting information for any views expressed.

6.2 ComReg invites views from interested parties on all aspects of the Consultation over the next six (6) weeks. ComReg has given an additional two weeks over the normal four weeks identified in ComReg's Consultation Procedures.[138]

6.3 The six-week period for comment will run until 16:00 on 15 August 2022, during which time ComReg welcomes submissions in written form (e-mail) to marketframeworkconsult@comreg.ie, clearly marked – Submissions to ComReg Document 22/56.

6.4 Electronic submissions should be submitted in an unprotected format so that they may be readily included in the ComReg submissions document for electronic publication.

6.5 ComReg appreciates that respondents may wish to provide confidential information if their comments are to be meaningful. In order to promote openness and transparency, ComReg will publish all respondents' submissions to this notice, as well as all substantive correspondence on matters relating to this document, subject to the provisions of ComReg's guidelines on the treatment of confidential information (Document 05/24).

6.6 In this regard, respondents should submit views in accordance with the instructions set out below. When submitting a response to this notification that contains confidential information, respondents must choose one of the following options:

A. Submit both a non-confidential version and a confidential version of the response. The confidential version must have all confidential information clearly marked and highlighted in accordance with the instruction set out below. The separate non-

[138] See https://www.comreg.ie/media/dlm_uploads/2015/12/ComReg_1134.pdf

confidential version must have actually redacted all items that were marked and highlighted in the confidential version.

OR

B. Submit only a confidential version and ComReg will perform the required redaction to create a non-confidential version for publication. With this option, respondents must ensure that confidential information has been marked and highlighted in accordance with the instructions set out below. Where confidential information has not been marked as per our instructions below, then ComReg will not create the non-confidential redacted version and the respondent will have to provide the redacted non-confidential version in with option A above.

6.7 For ComReg to perform the redactions under Option B above, respondents must mark and highlight all confidential information in their submission as follows:

(a) Confidential information contained within a paragraph must be highlighted with a chosen colour;

(b) Square brackets must be included around the confidential text (one at the start and one at the end of the relevant highlighted confidential information); and

(c) A Scissors symbol (Symbol code: Wingdings 2:38) must be included after the first square bracket.

For example, *"Redtelecom has a market share of [✂25%]."*

6.2 Next Steps

6.8 When it has concluded its review of all submissions received and other relevant material, ComReg's intention would be to publish a response to consultation with a draft decision.

6.9 While ComReg cannot provide further clarity on the overall timelines at this juncture, as this will depend, among other things, on the nature of responses received to this consultation, ComReg hopes to issue the above by the end of 2022.

Annex 1: Summary of legal framework and statutory objectives relevant to the management of the radio spectrum

A 1.1 The Communications Regulation Acts 2002 as amended [139] (the "2002 Act"), the Common Regulatory Framework (including the Framework and Authorisation Directives [140] as transposed into Irish law by the corresponding Framework and Authorisation Regulations[141]), and the Wireless Telegraphy Acts1926 to 2009[142] 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 licensing and making regulations in relation to licences, ComReg's functions include the management of Ireland's radio frequency spectrum in accordance with ministerial Policy Directions under Section 13 of the 2002 Act, having regard to its objectives under Section 12 of the 2002 Act, Regulation 16 of the Framework Regulations and the provisions of Article 8a of the Framework Directive. ComReg is to carry out its functions effectively, and in a manner serving to ensure that the allocation and assignment of radio frequencies is based on objective, transparent, non-discriminatory and proportionate criteria.

A 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

[139] The Communications Regulation Act 2002 (as amended), 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.

[140] 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")

[141] 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.

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

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.

New European Electronic Communications Code

A 1.4 On 20 December 2018, the EECC entered into force. The EECC replaces the EU Common Regulatory Framework adopted in 2002 (and amended in 2009) under which ComReg has regulated electronic communications since 2003.

A 1.5 With some limited exceptions (see Article 124 of the EECC), Member States had until 21 December 2020 to transpose the EECC into national law[1]. The DECC is responsible for the transposition of the EECC[2] and ComReg has assisted the DECC in that regard as appropriate.

A 1.6 ComReg understands that the EECC is unlikely to be transposed into national law until at least Q3 2022. However, for the avoidance of doubt, electronic communications providers must continue to comply with their obligations, ComReg will continue to regulate the electronic communications sector under its existing powers, and redress mechanisms for customers will continue unchanged until new legislation is introduced.

A 1.7 Notwithstanding, and for the avoidance of doubt, ComReg is satisfied that, to the best of its knowledge, the proposals contained in this document will not conflict with the objectives of the EECC or the obligations likely to be imposed on ComReg under national legislation implementing same.

A 1.8 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 1.9 ComReg's primary objectives in carrying out its statutory functions in the context of electronic communications are to:

- promote competition[143];
- contribute to the development of the internal market[144];

[1] With the exception of Articles 53(2), (3) and (4), and Article 54 (See Article 124).

[2] See, for example, https://assets.gov.ie/162712/1d774c6b-55d4-4b04-9253-8be6f24fb3ba.pdf

[143] Section 12 (1)(a)(i) of the 2002 Act.

[144] Section 12 (1)(a)(ii) of the 2002 Act.

- promote the interests of users within the Community[145];
- 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[146]; 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 [147] in particular those designed to ensure effective competition [148].

Promotion of Competition

A 1.10 Section 12(2)(a) of the 2002 Act requires ComReg to take all reasonable measures which are aimed at the promotion of competition, including:

- 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 1.11 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

[145] Section 12(1)(a)(iii) of the 2002 Act.

[146] 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.

[147] 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).

[148] Regulation 16(1)(a) of the Framework Regulations.

- ensure that, in the transmission of content, there is no distortion or restriction of competition in the electronic communications sector.

A 1.12 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 1.13 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 1.14 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 1.15 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 1.16 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 1.17 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 1.18 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 1.19 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;[149]
- 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[150]; 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.[151]

[149] Section 12(3) of the 2002 Act.

[150] Section 12(5) of the 2002 Act.

[151] Section 12(6) of the 2002 Act.

Policy Directions[152]

A 1.20 Section 12(4) of the 2002 Act provides that, in carrying out its functions, ComReg must have appropriate regard to policy statements, published by or on behalf of the Government or a Minister of the Government and notified to the Commission, in relation to the economic and social development of the State. Section 13(1) of the 2002 Act requires ComReg to comply with any policy direction given to ComReg by the Minister for Communications, Energy and Natural Resources ("the Minister") as he or she considers appropriate, in the interests of the proper and effective regulation of the electronic communications market, the management of the radio frequency spectrum in the State and the formulation of policy applicable to such proper and effective regulation and management, to be followed by ComReg in the exercise of its functions. Section 10(1)(b) of the 2002 Act also requires ComReg, in managing the radio frequency spectrum, to do so in accordance with a direction of the Minister under Section 13 of the 2002 Act, while Section 12(1)(b) requires ComReg to ensure the efficient management and use of the radio frequency spectrum in accordance with a direction under Section 13.

A 1.21 The Policy Directions which are most relevant in this regard include the following:

Policy Direction No.3 on Broadband Electronic Communication Networks

A 1.22 ComReg shall in the exercise of its functions, take into account the national objective regarding broadband rollout, viz, the Government wishes to ensure the widespread availability of open-access, affordable, always-on broadband infrastructure and services for businesses and citizens on a balanced regional basis within three years, on the basis of utilisation of a range of existing and emerging technologies and broadband speeds appropriate to specific categories of service and customers.

A 1.23 ComReg is conscious that the three year objective described in this policy direction has now expired making this direction less relevant currently.

Policy Direction No.4 on Industry Sustainability

A 1.24 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.

[152] ComReg also notes, and takes due account of, the Spectrum Policy Statement issued by the Department of Communications Energy and Natural Resources in September 2010.

Policy Direction No.5 on Regulation only where Necessary

A 1.25 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 1.26 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 1.27 ComReg shall ensure that, where market circumstances are equivalent, the regulatory obligations imposed on undertakings in the electronic communications market in Ireland should be equivalent to those imposed on undertakings in equivalent positions in other Member States of the European Community.

Policy Direction No.11 on the Management of the Radio Frequency Spectrum

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

General Policy Direction No.1 on Competition (2004)

A 1.28 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 1.29 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 1.30 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 1.31 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 1.32 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 1.33 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 ITU Telecommunication Union Radio Regulations.

A 1.34 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 1.35 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 1.36 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 1.37 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 1.38 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 1.39 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 1.40 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 1.41 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 1.42 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 1.43 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 1.44 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 1.45 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 1.46 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 1.47 Regulation 10(2) also requires that any attachment of conditions under Regulation 10(1) to rights of use for radio frequencies must be non-discriminatory, proportionate and transparent and in accordance with Regulation 17 of the Framework Regulations.

Procedures for limiting the number of rights of use to be granted for radio frequencies

A 1.48 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 1.49 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 1.50 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 1.51 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 1.52 ComReg is required to ensure that any such fees are objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose and take into account the objectives of ComReg as set out in Section 12 of the 2002 Act and Regulation 16 of the Framework Regulations.

Amendment of rights and obligations

A 1.53 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 as amended

A 1.54 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 1.55 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 1.56 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 1.57 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 1.58 Section 6(2) provides that Regulations made by ComReg under Regulation 6 may authorise and provide for the granting of a licence under Section 5 subject to special terms, conditions, and restrictions to persons who satisfy it that they require the licences solely for the purpose of conducting experiments in wireless telegraphy.

Broadcasting Act 2009 (the "2009 Act")

A 1.59 Section 132 of the 2009 Act relates to the duties of ComReg in respect of the licensing of spectrum for use in establishing digital terrestrial television multiplexes and places an obligation on ComReg to issue:

- two DTT multiplex licences to RTÉ by request (see Sections 132 (1) and (2) of the 2009 Act); and
- a minimum of four DTT multiplex licences to the BAI by request (see Sections 132 (3) and (4) of the 2009 Act) for the provision of commercial TV content.

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

A 1.60 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."