Commission for
Communications Regulation

Mobile Satellite Services with Complementary Ground Component Authorisation Regime

Consultation Document and Draft Decision

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Contents

Annexes

Section Page

Table of Figures

Section **Page**

Table of Tables

Section Page

Chapter 1

1 Introduction

1.1 This consultation and draft Decision sets out the proposed authorisation scheme in Ireland for the complementary ground component ("CGC") elements of a mobile satellite service, further to European Commission Decision 626/2008/EC of 30 June 2008 (the "Authorisation Decision"), which set forth a process for the selection and authorisation of systems providing mobile satellite services ("MSS"), and EU Decision 2009/449/EC[1] (the "Selection Decision") which selected Inmarsat and Solaris (now EchoStar) as the 2GHz MSS operators, and required Member States to authorise these operators to provide MSS with CGC in their jurisdictions, and related EU Decisions[2].

1.2 The Authorisation Decision requires National Regulatory Authorities to grant to the selected applicants the authorisations necessary for the provision of complementary ground components of mobile satellite systems on their territories[3]. The purpose of this consultation is to give effect to that requirement.

1.3 This document is laid out as follows:

- Chapter 1 sets out the legal and policy background, including relevant EU Decisions;
- Chapter 2 sets out the technical conditions;
- Chapter 3 sets out the RIA;
- Chapter 4 sets out the proposed fee structure;
- Chapter 5 sets out the draft Decision;
- Chapter 6 sets out the process for submitting comments;
- Annex 1 contains a table of mitigation measures; and,
- Annex 2 contains the draft Regulations.

[1] Commission Decision of 13 May 2009 on the selection of operators of pan-European systems providing mobile satellite services.

[2] Commission Decision of 14 February 2007 on the harmonised use of radio spectrum in the 2 GHz frequency bands for the implementation of systems providing mobile satellite services.

[3] Article 8(1) of the Authorisation Decision.

1.1 Background

1.4 The Commission for Communications Regulation (ComReg) is the statutory body responsible for the regulation of the electronic communications (telecommunications, radiocommunication and broadcasting networks), postal and premium rate sectors in Ireland in accordance with European Union (EU) and Irish law.

1.5 ComReg also manages the radio frequency spectrum ("radio spectrum" or "spectrum") and the national numbering resource, among other responsibilities. Radio spectrum is a valuable national resource underpinning important economic, social and communications activities.

1.6 MSS are radio communication services provided by an electronic communications network between a mobile earth station and one or more space stations, or between mobile earth stations by means of one or more space stations, or between a mobile earth station and one or more complementary ground components used at fixed locations.

1.7 For the purposes of this consultation ComReg seeks to adopt a technology-neutral approach, so far as possible.

1.2 The Authorisation Decision

1.8 The 2008 Authorisation Decision set forth a process for the selection and authorisation of MSS systems, as well as monitoring and enforcement. The purpose of the Authorisation Decision is to "facilitate the development of a competitive internal market for mobile satellite services ("MSS") across the Community and to ensure gradual coverage in all Member States" (Article 1).

1.9 The European Commission noted that satellite communications, by their very nature, cross national borders and, as such, are susceptible to international or regional in addition to national regulation (recital 6). Furthermore, the European Commission noted that MSS could, in particular, improve coverage of rural areas in the Community, thus bridging the digital divide in terms of geography, strengthening cultural diversity and simultaneously contributing to the competitiveness of European information and communication industries (recital 5).

1.3 MSS Authorisation at EU Level

1.10 The Authorisation Decision created a procedure for the common selection of MSS systems that use the 2 GHz band in accordance with the Harmonisation

Decision (Decision 2007/98/EC [4]). It also laid down provisions for the coordinated authorisation by Member States of the operators selected under that procedure to use the assigned spectrum.

1.11 Recital 11 of the Authorisation Decision notes that selection criteria for MSS systems "should exceptionally be harmonised so that the selection process results in availability of MSS across the European Union." The European Commission noted that high up-front investment required for the development of mobile satellite systems and the associated high technological and financial risks necessitate an economy of scale for such systems in the form of wide pan-European geographic coverage, so that they remain economically viable (recital 11).

1.12 The European Commission noted that in order to ensure consistency of authorisation approaches between different Member States, provisions relating to the synchronised assignment of spectrum and harmonised authorisation conditions should be established at the Community level, without prejudice to specific national conditions compatible with Community law (recital 13).

1.13 Title III of the Authorisation Decision therefore sets forth provisions for authorisations. Member States must ensure that the selected applicants have the right to use the specific frequencies identified in the selection process and the right to operate a mobile satellite system (Article 7). This right of use is subject to a set of MSS common conditions specified in Article 7(2), which include that the applicants meet milestones six to nine in the Annex within 24 months of the selection decision.

1.14 These milestones commenced with satellite mating (integration of the communication and service modules on the spacecraft), culminating in milestone nine with provision of "continuous commercial MSS" to cover the geographical area to which the applicant committed.

1.15 Other conditions in Article 7(2) require applicants to honour the commitments they gave in their applications and to provide annual reports.

1.16 It is important to note that Article 7(2)(e) of the Authorisation Decision provides that "any necessary rights of use and authorisations" must have a duration of 18 years from the date of adoption of the Selection Decision[5], i.e. a 2027 expiry (see section 1.5).

[4] Commission Decision 2007/98/EC of 14 February 2007 on the harmonised use of radio spectrum in the 2 GHz frequency bands for the implementation of systems providing mobile satellite services.

[5] The date of adoption of the Selection Decision was 13 May 2009.

1.17 Member States must ensure that their NRAs grant to the selected applicants the authorisations necessary for the provision of complementary ground components (CGC) of mobile satellite systems on their territories (Article 8).

1.4 Complementary Ground Components - Authorisation at National Level

1.18 The Authorisation Decision noted that complementary ground components are an integral part of a mobile satellite system and are used, typically, to enhance the services offered via the satellite in areas where it may not be possible to retain a continuous line of sight with the satellite due to obstructions in the skyline caused by buildings and terrain (recital 18).

1.19 The European Commission noted that the authorisation of such complementary ground components will therefore mainly rely on conditions related to local circumstances. They should therefore be selected and authorised at national level, subject to conditions related to local circumstances (recital 18).

1.20 The definition of CGC is set forth in Article 2(2)(b) as "ground-based stations used at fixed locations, in order to improve the availability of MSS in geographical areas within the footprint of the system's satellite(s), where communications with one or more space stations cannot be ensured with the required quality."

1.21 CGC authorisations also are subject to CGC common conditions[6], in particular:

- operators shall use the assigned radio spectrum for the provision of complementary ground components of mobile satellite systems;
- complementary ground components shall constitute an integral part of a mobile satellite system and shall be controlled by the satellite resource and network management mechanism; they shall use the same direction of transmission and the same portions of frequency bands as the associated satellite components and shall not increase the spectrum requirement of the associated mobile satellite system;
- independent operation of complementary ground components in case of failure of the satellite component of the associated mobile satellite system shall not exceed 18 months; and,

[6] Article 8(3) of the Authorisation Decision.

- rights of use and authorisations shall be granted for a period of time ending no later than the expiry of the authorisation of the associated mobile satellite system.

1.5 Selection Process

1.22 Following the Authorisation Decision, the EC conducted a comparative selection process for the selection of operators authorised to use the harmonised spectrum.

1.23 Pursuant to the Selection Decision ("Decision 2009/449/EC"), Inmarsat Mobile Ventures Limited (“Inmarsat”) and Solaris Mobile Limited (now EchoStar Mobile Limited or “EchoStar”) were each selected as operators of pan-European systems providing MSS, and were authorised to use the following frequencies in each Member State:

- Inmarsat : from 1980 to 1995 MHz for Earth to space communications and from 2170 to 2185 MHz for space to Earth communications; and
- Solaris Mobile Limited: from 1995 to 2010 MHz for Earth to space communications and from 2185 to 2200 MHz for space to Earth communications.

Licensing Regime Structure

1.24 ComReg issued a consultation on MSS with CGC in December 2009[7] (“the 2009 consultation”), however, it is considered now necessary to issue a completely new consultation and draft Decision as there has been significant technical and regulatory developments since that initial consultation and the proposals in that particular consultation have since been overtaken by events.

1.25 In 2009, there were no concrete plans for the type of service that CGC might support. It is now understood that Inmarsat proposes to develop and roll out the ground-based (CGC) element of the MSS system to support a hybrid mobile broadband service to aircraft, as part of a combined satellite and terrestrial system. Inmarsat’s CGC network is intended to be similar in purpose to the Direct Air to Ground (DA2G) networks which provide broadband service to aircraft in the United States.

1.26 ComReg further notes the 2011 European Commission Decision[8] regarding modalities for co-ordinated application of the rules on enforcement with regard to MSS pursuant to Article 9(3) of the MSS Decision. This Decision enables

[7] ComReg document 09/96.

[8] Commission Decision of 10 October 2011 (Decision 2011/667/EU).

co-ordination at European Union level of enforcement procedures relating to the common conditions in the Authorisation Decision, but not enforcement of purely national conditions.

1.27 In its previous consultation ComReg observed that, in terms of the licensing regime structure for MSS with CGC, it was envisaged that the MSS with CGC provider could operate under a General Authorisation, with a spectrum right of use (i.e. a wireless telegraphy licence) for the CGC issued under the Wireless Telegraphy Act 1926.

1.28 Additionally, and in order to provide for an appropriate licence fee structure for the CGC component, regulations will be required under s.6(1) of the Wireless Telegraphy Act 1926. These regulations will require the consent of the Minister: see Annex 2 for a copy of the draft Regulations.

1.29 These arrangements will meet Article 8(1) of the Authorisation Decision which provides that Member States shall, in accordance with national and community law, ensure that their competent authorities grant to the applicants selected in accordance with the provisions of the Authorisation Decision the authorisations necessary for the provision of complementary ground components of mobile satellite systems on their territories.

Chapter 2

2 Technical and Operational Conditions

2.1 Introduction

2.1 This chapter looks at MSS with CGC from a technical perspective and describes both the systems and their possible uses. It also considers the spectrum bands assigned by the European Commission to Inmarsat and EchoStar and users of the adjacent spectrum bands. Finally, interference scenarios and compatibility studies are considered and the mitigation measures are set out that ComReg intends to include in the licences for the use of a CGC within the overall network.

2.2 Systems and Service Possibilities

2.2 MSS systems in the 2 GHz band could be used for a variety of telecommunications services such as high-speed internet or Public Protection and Disaster Relief ("PPDR"), and could assist rural broadband coverage within remote areas. MSS could also be used for services such as machine-to-machine communications, automatic tracking or aeronautical services.

2.3 Systems capable of providing MSS must include at least one or more space station and may include a CGC. The CGC could be used both at fixed and temporary locations in order to improve the availability of the MSS, for example, in zones where communications with one or more space stations cannot be ensured with the required quality.

2.4 The CGC element overcomes the impact of shadowing of the mobile satellite's signal made by buildings, geographical features and other "clutter", by using ground-based transmitters to fill in the shadow areas. Furthermore, it can provide for increased network capacity with a subsequent decrease in latency in traffic hotspots. The content distributed by the MSS with CGC could be comparable to that provided by other terrestrial networks, with handsets having roaming capabilities with the networks of Mobile Network Operators ("MNO"s) where such an agreement is reached.

2.5 The main elements of a MSS with CGC network are: a fixed satellite gateway (consisting of a number of earth stations); the MSS satellite; the CGC network (which is connected to a fixed IP network via the satellite gateway and may be connected into a roaming partner's mobile network or have a direct connection to the fixed IP network); and the user terminals. User terminals could vary from

handsets to other mobile user terminals, such as those used in vehicles, ships or aircraft. See Figure 1.

2.6 Furthermore, a number of calibration earth stations may be necessary to test, calibrate and maintain the operation of the satellite and therefore the MSS network across all Europe. There may be a requirement to deploy these in Ireland.

2.7 All of the elements of the hybrid satellite / ground network (apart from any roamed coverage on partnering networks) must be under the direct control of the MSS network operator via the space segment, comprising the earth station and the MSS satellite.

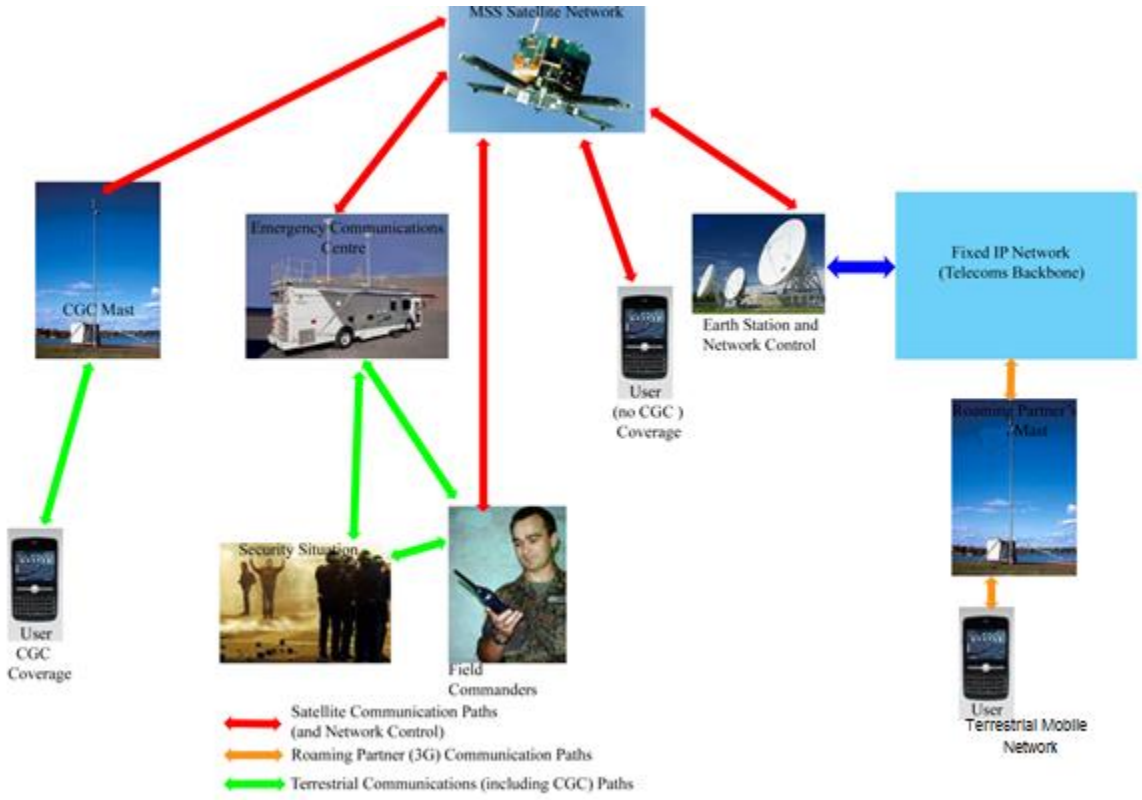

Fig.1: Generic Diagram of a MSS with CGC System.

2.8 The near blanket coverage of the MSS signal also allows for the provision of a number of different types of services. The rapid deployment of temporary CGC base stations could provide PPDR services within coverage "blackspots" and in areas and scenarios where the normal communications networks have failed.

2.9 Pursuant to the Authorisation Decision, the MSS operators have committed that the space segment will cover a service area of at least 60% of the aggregate land area of each Member State, from the time the provision of MSS (following

satellite launch) commences. Furthermore, pursuant to the Authorisation Decision, licensees must also ensure that MSS are available to at least 50% of the population of each Member State.

2.2.1 Aeronautical System Description

2.10 Another possible service being considered (by Inmarsat) involves using the MSS with CGC system to offer a mobile broadband service (for passengers and for operational requirements [9] to aircraft flying over Europe. This would constitute a European-wide aviation network, with the CGC segment providing additional capacity required in areas of dense air traffic or where there is no ground based coverage.

2.11 The CGC segment could consist of base stations at various locations in Europe and hybrid ground-to-air terminals installed on the aircraft. These hybrid terminals would communicate with both the satellite and ground-based segments and use equipment compliant with 3rd Generation Partnership Project ("3GPP") Long Term Evolution ("LTE") based technology, switching automatically between the different segments using an on-board network communicator comprising of an intelligent router and control server for optimal service delivery. See Figure 2.

[9] Noting, that this latter use is subject to the agreement and subsequent authorisations by other sector specific regulators.

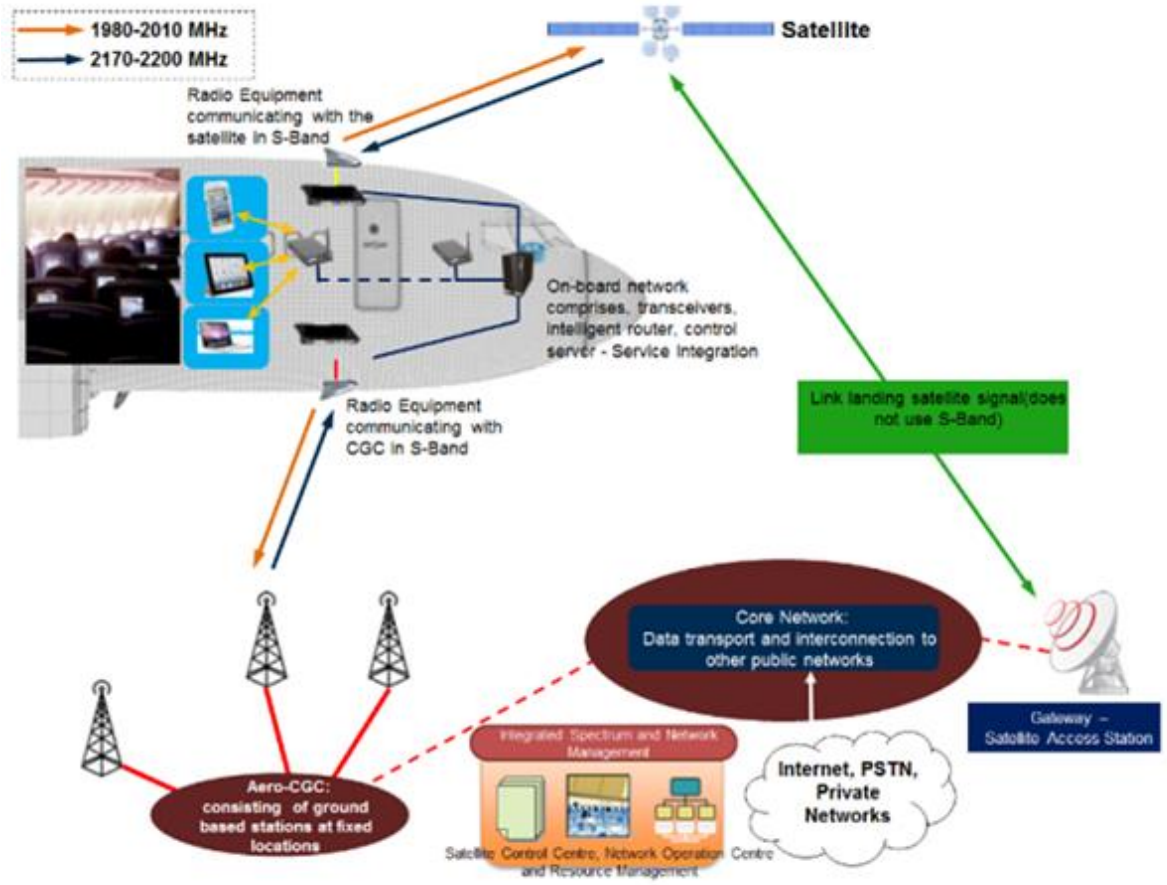

Fig.2: Aeronautical MSS with CGC System

2.3 Spectrum Details

2.12 The frequency bands assigned by the Authorisation Decision to Inmarsat are: 1980 – 1995 MHz for the Earth to space (E-s) satellite segment and terrestrial uplinks ("UL") and 2170 – 2185 MHz for the space to Earth (s-E) satellite segment and terrestrial downlinks ("DL"). EchoStar was assigned the frequency band 1995 – 2010 MHz for the Earth to space (E-s) satellite segment and terrestrial uplinks and 2185 – 2200 MHz for the space to Earth (s-E) satellite segment and terrestrial downlinks. ComReg intends to issue the licences for the use of a CGC segment in accordance with the Harmonisation Decision[10].

2.13 The frequencies to be used by the CGC must be the same frequencies and in the same direction as those used by the satellite. Noting that these CGC

[10] Decision 2007/98/EC: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:043:0032:0034:EN:PDF

frequencies are assigned on condition that their use is under the control of the MSS network operator. The UL frequency range will be used for user terminal-to-CGC base station (and/or satellite) and the DL frequency range for CGC base station (and/or satellite) to user terminal.

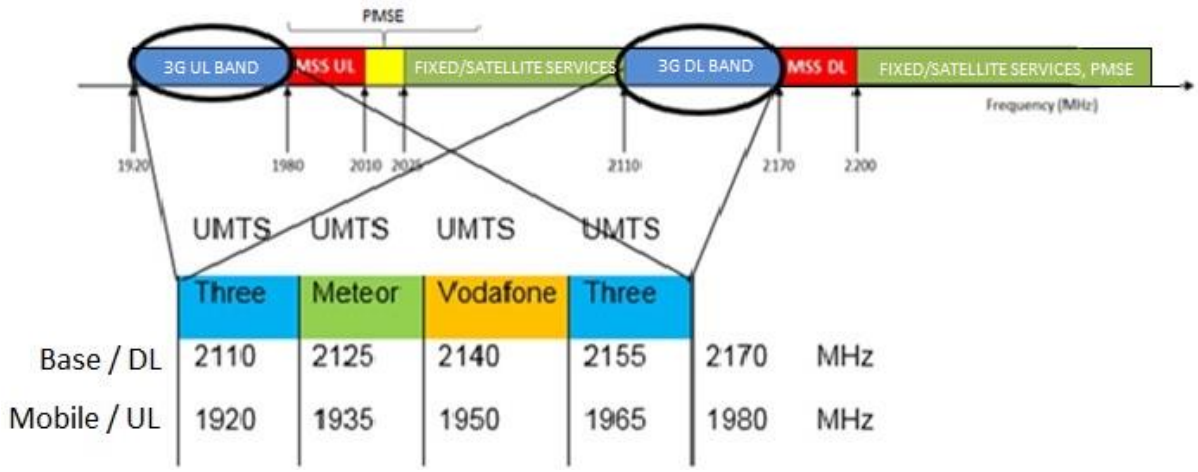

Fig.3: Services and Systems Around the 2 GHz Bands Including Relevant 3G Terrestrial Mobile Licence Holders in Ireland.

2.14 Figure 3 above shows the MSS 2 GHz bands and the services in the adjacent bands. The MSS with CGC licence holders must ensure that there is no harmful interference experienced by users of Primary Services[11] in the adjacent bands. The 2010 - 2025 MHz band has been harmonised as part of a European Commission Decision (EU) 2016/339[12] for portable or mobile wireless video links and cordless cameras ("VLCC") used for Programme Making and Special Events ("PMSE"). The 2025 - 2110 MHz and 2200 - 2290 MHz bands are allocated to Fixed and Satellite Services. 2200 - 2290 MHz is also used for PMSE services.

2.15 Figure 3 also shows the 1920 - 1980 MHz and 2110 - 2170 MHz paired bands which are used by terrestrial 3rd Generation, Universal Mobile Telecommunications System ("UMTS / 3G") mobile services in Ireland. The MSS with CGC licence holders will be required by ComReg to insert a 300 kHz guard band from within their spectrum assignment to protect these services. This requirement is discussed further in section 2.6.

[11] See Article 5.23 of the Radio Regulations of the International Telecommunication Union.

[12] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2016.063.01.0005.01.ENG

2.16 Studies carried out by the European Conference of Postal and Telecommunications Administrations ("CEPT") concluded that the coexistence of systems capable of providing MSS and systems providing terrestrial-only mobile services in the same spectrum in the 2 GHz bands without harmful interference is not feasible in the same geographic area[13]. Consequently the 2GHz band has been designated to MSS on a primary basis. This means that non-MSS systems using the 2 GHz bands above should not cause harmful interference to nor claim protection from systems providing MSS. Examples of such systems include VLCC for PMSE which are assigned on a secondary basis.

2.4 ETSI Standards

2.17 The European Telecommunications Standards Institute ("ETSI"), under mandate from the European Union, was tasked with developing Harmonised European Standards, EN 302 574-1[14] for CGC base stations, EN 302 574-2[15] and EN 302 574-3[16] for CGC aeronautical terminals and EN 301 473[17] for MSS aeronautical terminals. These were all updated in 2016. Operators wishing to provide aeronautical services must develop the system's network equipment in full conformance with these ETSI standards.

[13] See EC Decision 2007/98/EC

[14] http://www.etsi.org/deliver/etsi_en/302500_302599/30257401/02.01.02_60/en_30257401v020102p.pdf

[15] http://www.etsi.org/deliver/etsi_en/302500_302599/30257402/02.01.02_60/en_30257402v020102p.pdf

[16] http://www.etsi.org/deliver/etsi_en/302500_302599/30257403/02.01.01_60/en_30257403v020101p.pdf

[17] http://www.etsi.org/deliver/etsi_en%5C301400_301499%5C301473%5C02.01.01_30%5Cen_301473v020101v.pdf

2.5 Interference Issues, Compatibility Studies and Mitigation Measures.

2.5.1 Generic Systems.

2.18 Recognising that there is a possibility of harmful interference to 3G / UMTS mobile services operating in the bands adjacent to the MSS UL band, i.e. 1920 – 1980 MHz (see Figure 3 above), some mitigation techniques against such interference will need to be implemented by the MSS operators.

2.19 A number of studies were conducted by the Electronic Communications Committee ("ECC") of the CEPT, namely CEPT Report 13[18], which deals with 'Harmonised technical conditions for the use of the 2 GHz bands for Mobile Satellite Services in the European Union' and was developed in response to the mandate from the European Commission. Similarly ECC Report 197[19] was developed, which deals with compatibility between transmitting MSS user terminals in the band 1980 – 2010 MHz and Electronic Communications Systems (“ECS”) operating in adjacent bands.

2.20 Considering interference caused by MSS User Terminals transmitting to a satellite towards ECS Base Stations ("BS"), ECC Report 197 concluded that based on the cell noise rise equal to 0.8 dB and the 5% capacity loss criterion applied to the network and the reference cell, no additional mitigation is required provided that a 300 kHz guard band is retained at 1980 MHz.

2.21 Of relevance also is CEPT Report 39[20], 'To develop least restrictive technical conditions for 2 GHz bands', which builds on the work carried out in ERC Report 065[21], 'Adjacent band compatibility between UMTS and other services in the 2 GHz band'. CEPT Report 39 developed a Block Edge Mask (“BEM”) approach (consisting of in-block and out-of-block limits) to be applied for protection of ECS base stations in the 1920 - 1980 MHz bands. ComReg will oblige the MSS with CGC operators to implement a 3GPP block edge mask from CEPT Report 39. See Table 1 below. An in-block power limit 62 dBm / 5 MHz and 55 dBm / MHz will apply.

[18] http://www.erodocdb.dk/docs/doc98/official/pdf/CEPTRep013.pdf

[19] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP197.PDF

[20] http://www.erodocdb.dk/docs/doc98/official/pdf/CEPTRep039.pdf

[21] http://www.erodocdbdk/Docs/doc98/official/pdf/REP065.PDF

Frequency range of out-of-block emissions	Maximum mean out-of-block EIRP	Measurement bandwidth
–10 to –5 MHz from lower block edge	11 dBm	5 MHz
–5 to 0 MHz from lower block edge	16.3 dBm	5 MHz
0 to +5 MHz from upper block edge	16.3 dBm	5 MHz
+5 to +10 MHz from upper block edge	11 dBm	5 MHz
Other blocks	9 dBm	5 MHz

EIRP: Equivalent Isotropically Radiated Power.

Table 1: Base Station Block Edge Mask Out-of-Block EIRP Limits per Antenna.

2.5.2 Aeronautical Systems.

2.22 The studies conducted by the ECC considered that CGC systems have characteristics similar to ECS base stations but did not consider potential use of so called aeronautical CGC systems, which introduce new interference scenarios. Subsequently, the ECC developed ECC Report 233 [22] which considers “Adjacent band compatibility studies for aeronautical CGC systems operating in the bands 1980 – 2010 MHz and 2170 – 2200 MHz”. This report identifies certain technical and operational requirements for an aeronautical CGC system within the 2GHz MSS band, necessary to ensure protection of the mobile services operating in the adjacent bands (i.e. 1920 - 1980 MHz and 2110 - 2170MHz).

2.23 The conclusions of this report show that the aeronautical ground stations will not create any harmful interference to the ECS, VLCC or Mobile Communications on Aircraft ("MCA") systems in adjacent bands.

2.24 With regard to the aeronautical terminals operating in the CGC system, the report shows that in some cases (for example when an aeronautical terminal is transmitting with high power at low altitudes), interference issues could potentially occur. Systems such as 3G cellular networks, MCA, LTE-public mobile use by CGC of other MSS systems and video systems such as VLCC and PMSE in the same band and in adjacent bands could experience interference. For example, interference into the 3G UL band (1920 - 1980 MHz) caused by a MSS aeronautical terminal (on the aircraft) transmitting to a CGC terminal in the MSS UL band (1980 - 2010 MHz).

[22] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP233.PDF

2.25 The report looks at eleven potential interference scenarios in relation to the above systems and recommends five mitigation techniques, the first three of which apply to the CGC aeronautical terminals directly and the following two applying to the adjacent systems. For the last five scenarios involving MCA, PMSE and ECS FDD systems, compatibility can be achieved with the basic system parameters. ComReg intends to oblige the MSS operators to implement relevant mitigation techniques as set out in ECC Report 233. See Table 1 in Annex 1.

2.26 These five mitigation techniques are the use of transmitter filters, adjusting the relative power outputs of the systems for various heights, aircraft fuselage attenuation and the use of block edge masks. See Table 1 in Annex 1.

2.6 Conclusion

2.27 In conclusion, ComReg expects MSS licensees to fulfil their technical and operational obligations with respect to the EU regulatory framework as set out in the relevant European Commission Decisions. For operation of a MSS system both with and without a CGC element, measures must be taken to ensure that there is no harmful interference experienced by users of Primary Services in adjacent bands.

2.28 The ECC and CEPT compatibility studies referred to must be taken into account and relevant mitigation techniques used such as those in ECC Reports 197 and 233, the relevant ETSI harmonised standards and the block edge mask from CEPT Report 39. ComReg will oblige the MSS with CGC operators to insert a 300 kHz guard band within the 1980 – 2010 MHz band at 1980 MHz.

2.29 For aeronautical MSS with CGC systems, the network equipment must be developed in full conformance with ECC Report 233 and the relevant ETSI standards.

Chapter 3

3 Draft RIA on the Procedure to Determine Spectrum Fees for CGC

3.1 Introduction and Background

3.1 As noted in Chapter 1, two licensees were selected by the European Commission to share the 2 GHz frequency band with each licensee being assigned 2 x 15MHz on a pan-European basis. The Decision of 2008 requires Member States to ensure that their competent authorities grant to the selected applicants the authorisations necessary for the provision of complementary ground components of mobile satellite systems on their territories. Accordingly, individual NRAs such as ComReg will authorise the CGC element within their respective jurisdictions, and have several key issues to consider: these include the process for authorisation of the CGC; the conditions to be applied to any authorisation; monitoring and enforcement of those conditions; and the appropriate authorisation fees.

3.2 In that regard, this chapter sets out ComReg's draft RIA (Regulatory Impact Assessment) on the procedure for setting spectrum fees for CGC.

3.3 It is important to note that due to the exceptional background to this consultation, namely a Community procedure for the common selection of operators of mobile satellite systems that use the 2 GHz frequency band, the scope of this RIA is necessarily limited and furthermore the analysis in this RIA may not be applicable to spectrum licence fee structures that might be proposed by ComReg in the future.

3.4 ComReg conducted this draft RIA having regard to:

- the background as described in Chapter 1;
- the DotEcon Report (Document 17/19a); and
- correspondence from licensees since the publication of ComReg document 09/96.

RIA Framework

3.5 In general terms, a RIA is an analysis of the likely effect of a proposed new regulation or regulatory change, and, indeed, of whether regulation is necessary at all. A RIA should help identify the most effective and least burdensome regulatory option and should seek to establish whether a

proposed regulation or regulatory change is likely to achieve the desired objectives, having considered relevant alternatives and the impacts on stakeholders. In conducting a RIA, the aim is to ensure that all proposed measures are appropriate, effective, proportionate and justified. The scope of a RIA might be limited by the particular circumstances of the policy proposal concerned, as is the case for this RIA.

Structure of a RIA

3.6 As set out in ComReg's RIA Guidelines,[23] there are five steps in a RIA. These are:

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

Step 2: Identify and describe the regulatory options.

Step 3: Determine the impacts on stakeholders.

Step 4: Determine the impact on competition.

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

3.7 In the following sections ComReg identifies the relevant stakeholder groups, specific policy issues to be addressed and relevant objectives (i.e. Step 1 of the RIA process). This is followed by the identification of fundamental policy issues.

3.8 ComReg then considers these policy issues in accordance with the four remaining steps of ComReg's RIA process.

Identification of Stakeholders

3.9 The focus of Step 3 is to assess the impact of the proposed regulatory options available to ComReg on stakeholders. A precursor to the subsequent steps in the RIA, therefore, is to identify the relevant stakeholders. Stakeholders consist of two main groups:

- consumers; and
- industry stakeholders.

3.10 There are a number of key industry stakeholders in relation to the matters considered in this chapter: These are:

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

- MSS licence holders, namely Inmarsat and EchoStar; and
- Alternative spectrum users, particularly Mobile Network Operators (MNOs).

3.11 Prior to receiving submissions on ComReg's various proposals contained in this consultation, ComReg has, in the following analysis, taken a reasonable and pragmatic approach to considering the likely impact of each option on the various stakeholders having regard to its experience and expertise and the views of interested parties.

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

3.13 Of themselves, the various RIA guidelines provide little guidance on how much weight should be given to the positions and views of each stakeholder group (Step 3), or the impact on competition (Step 4). Accordingly, ComReg has been guided by its statutory objectives, which it is obliged to pursue when exercising its functions. ComReg's statutory objectives in managing the radio frequency spectrum, include:

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

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

Identify the Policy Issues and Identify the Objectives (Step 1)

Policy Issues

3.15 Regulation 19 of the Authorisation Regulations permits ComReg to impose fees for rights of use that reflect the need to ensure the optimal use of the radio frequency spectrum.

3.16 In addition, 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.

3.17 In this regard, and as set out in Chapter 1, it is useful to note the following European Commission Decisions:

- The 2 GHz frequency band was allocated to MSS in accordance with Commission Decision 2007/98/EC (the "Harmonisation Decision").[24]
- Decision 626/2008/EC (the "Authorisation Decision") set out plans for running a comparative selection procedure for the selection of operators of mobile satellite systems; and
- Decision No. 2009/449/EC[25] confirmed the selection of Inmarsat Ventures Ltd. and Solaris Mobile Ltd. (now EchoStar) as operators for pan-European systems providing Mobile Satellite Services ("MSS") together with the specific frequency bands awarded to each of them.

3.18 Therefore, Inmarsat and EchoStar, as a result of decisions taken by the European Commission, have rights of use in Ireland and all other EU Member States to use the frequencies 1980 - 2010 MHz (Earth to space) and 2170 - 2200 MHz (space to Earth) for the provision of MSS services (which includes associated CGC) for a period of 18 years from the selection Decision, expiring in May 2027.[26]

[24] Systems capable of providing MSS should include at least one or more space station and they could include complementary ground components (CGC).

[25] EC Decision 2009/449/EC on the selection of operators of pan-European systems providing mobile satellite services (MSS) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:149:0065:0068:EN:PDF

[26] Paragraph (d) of Article 8.3 of the MSS Decision provides that "*rights of use and authorisations shall be granted for a period of time ending no later than the expiry of the authorisation of the associated mobile satellite system*" (eighteen years from the date of the Selection Decision).

3.19 In this context, the assignment of MSS with CGC provision and certain conditions attached to the assigned right of use were established by the European Commission. This situation is exceptional, as ComReg is required to set fees that ensure the optimal use of spectrum where the rights of use to that spectrum were assigned administratively by a separate entity that did not use a competitive award process.

3.20 Efficient spectrum assignment generally requires rights of use to be assigned to those users able to make the best economic use of it, and for the users of the assigned spectrum to make use of it in the way that generates the greatest social benefit. Where demand for spectrum is greater than supply, achieving these objectives is typically supported by use of a market mechanism for assignment,[27] such as a well-designed auction with prices set on the basis of opportunity cost, which can help to:

1. establish the efficient assignment of spectrum amongst bidders, based on bidders' willingness to pay (which can be expected to represent the economic value they are able to generate[28]); and
2. establish the opportunity costs of the assignment, setting suitable spectrum usage fees at a level that represents market value (and could be considered fair) and encourages the winning bidder(s) to utilise the spectrum more efficiently.

3.21 Use of a market mechanism also removes the burden on ComReg to make complex judgements (based on incomplete information) in relation to assigning the spectrum and the suitable level of fees, as it can better elicit relevant information about the value (and efficient assignment) of the spectrum that is likely not available to ComReg.

3.22 However, the European Commission did not assign the rights of use to spectrum using a market mechanism, and instead used a comparative award procedure to assign rights of use to two eligible applicants across all Member States. This approach did not assess the opportunity cost of the radio spectrum or bidders' willingness to pay, and it is therefore debatable whether this comparative award was economically efficient from an assignment point of view. ComReg, in Chapter 3 of Document 15/140, has

[27] Wherever spectrum is scarce, this implies that there is an 'opportunity cost' associated with distributing the spectrum to particular uses and users. It is likely given the use of similar frequencies for MBB that there would have been a high demand for this spectrum.

[28] This is in the typical case where there are no significant economic externalities leading to market failure.

already set out its substantive concerns in relation to the administrative assignment of valuable spectrum.[29]

3.23 Therefore, ComReg's objective to ensure the optimal use of spectrum is already limited by the European Commission's Decision to assign rights of use using a comparative award process. As a result, ComReg has no means to accurately establish the opportunity cost through use of a market mechanism such as an auction (as ComReg has tended to use for assignment of other spectrum).

3.24 A number of issues arise in respect of the selection procedure[30] used by the European Commission that affect the ability of ComReg to set spectrum fees in a way that best ensures the efficient use of spectrum and reflects the need to ensure the optimal use of the radio spectrum. In particular, this selection procedure:

- was based solely on an assessment of whether applicants had demonstrated the required level of technical and commercial development of their respective mobile satellite system;
- was dependent on the licensee providing mobile satellite services; and
- did not reveal any information about the participants' valuation of the spectrum assigned.

3.25 Consequently, ComReg is of the view that the award format chosen by the European Commission may not have assigned the spectrum to the most efficient users of the spectrum. The assignment of spectrum by the European Commission using a comparative award procedure means it did not consider alternative uses/users in determining the efficient assignment and, as a result, the opportunity cost from the use of the spectrum. Therefore, absent a suitable fee structure, the assignees have little incentive to consider that the frequencies administratively assigned to them might be more efficiently used by other users.

3.26 Absent the option of using a market mechanism, ComReg must establish another methodology for establishing the fees to be charged for MSS with CGC. ComReg notes that setting fees for radio spectrum rights of use more

[29] In summary, this chapter sets out that where demand for spectrum is likely to exceed supply, auctions should produce the most efficient outcome. An auction is economically efficient, ensuring that licences are awarded to those bidders with the highest willingness to pay, which should normally correspond to their ability to generate most economic and social value.

[30] Commission Decision of 13 May 2009 on the selection of operators of pan-European systems providing mobile satellite services (MSS) (notified under document number C(2009) 3746) (2009/449/EC),

generally where the assignment has already been decided is not straightforward, and could lead to inefficient use and or distortions to competition since:

- prices that are set too low could lead to to unfair competition with others who are paying more for their similar spectrum[31]; or
- prices that are set too high could lead to scarce spectrum (a valuable public resource) being unused, or under-used, e.g. with an operator choosing not to deploy CGC sites at the expense of diminished coverage or service quality.

3.27 In setting out a procedure for assessing the impacts of setting spectrum fees which reflects its relevant statutory functions, duties and objectives, ComReg does not wish to adversely affect the extent to which certain uses may be precluded or would otherwise be provided for, particularly in light of the assignment Decision already made by the European Commission. ComReg also does not wish to reduce incentives to provide such services where the impact would be neutral in terms of any effects on competition, or which may result in more efficient uses of spectrum to the benefit of consumers without having any distortive effect upon competition, particularly in mobile markets.

3.28 Therefore, the main policy issue assessed in this RIA is to determine a procedure for setting spectrum fees where that spectrum has already been assigned through a comparative assessment procedure that must reflect the need to ensure the optimal use of the radio spectrum and must also be objectively justified, transparent, non-discriminatory and proportionate. As noted above, the background to this consultation is exceptional and may necessitate analysis that might not be appropriate for future ComReg spectrum-related consultations.

Objectives

3.29 A key objective is set out in Regulation 19 of the Authorisation Regulations that requires that spectrum fees must reflect the need to ensure the optimal use of the radio spectrum and must also be objectively justified, transparent, non-discriminatory and proportionate.

3.30 In addition, the focus of this RIA is to assess the impact of the proposed measure(s) (see regulatory options below) on stakeholders, competition,

[31] In more normal circumstances with potential alternative users in the short run, there would be additional concerns about the fee being too low and limiting incentives to use spectrum more efficiently (e.g. the need to invest in R&D and/or roll-out services to recoup the fees may be diminished).

and consumers. ComReg can then identify and implement the most appropriate and effective means by which to set spectrum fees for 2 GHz spectrum rights of use, while achieving its core statutory objectives under section 12 of the 2002 Act of promoting competition by, among other things;

- Ensuring that users derive maximum benefit in terms of choice, price and quality;
- Encouraging efficient use and ensuring effective management of radio frequencies;
- Ensuring that there is no distortion or restriction of competition in the electronic communications sector;
- Contributing to the development of the internal market; and
- Promoting the interest of EU citizens.

Identify and Describe the Regulatory Options (Step 2)

3.31 An important consideration in setting spectrum fees for the CGC component is whether an opportunity cost methodology is appropriate, and, if so, how this approach is implemented and what alternative uses should be considered.

3.32 ComReg's current approach to setting spectrum fees is set out in Section 7.6 of its Spectrum Strategy Statement and, in particular, that:

- spectrum fees for rights for ECS are an important tool by which ComReg can ensure the efficient use of such rights; and
- the level of the spectrum fee (and any minimum price) will continue to be determined on a case by case basis in light of the relevant circumstances of the spectrum award (such as the particulars of the rights of use/spectrum band, international benchmarks etc.)

Opportunity Cost Pricing

3.33 ComReg has previously used opportunity cost pricing as an appropriate method of encouraging the efficient use of the radio spectrum. The opportunity cost of the radio spectrum is the value associated with the best alternative use that is denied by granting access to one user rather than to the alternative.

3.34 As outlined by ComReg's advisor DotEcon, opportunity cost is supportive of the efficient assignment of spectrum in three main ways.

1. If prices are set below opportunity cost there may be competing demands for spectrum that need to be reconciled.
2. In the long run, spectrum prices based on opportunity cost provide appropriate price signals to economise on spectrum use and switch between bands in response to scarcity.
3. It provides an incentive for an inefficient user of spectrum to return that spectrum to ComReg.

3.35 Therefore, for the purposes of determining fees for CGC, DotEcon, while recognising the constraints imposed by the assignment of the spectrum in a comparative procedure, recommends that opportunity cost pricing should be the basis on which any associated fees are determined. In particular, DotEcon[32] notes that such an approach for the purpose of determining CGC fees:

- ensures equality of treatment with similar spectrum in Ireland;
- avoids creating distortions with regard to competition with mobile operators; and
- is in line with a spectrum management policy that considers long run efficiency effects.

3.36 Where demand exists for similar spectrum, there are likely to be alternative uses of spectrum, and so pricing could arguably be based on the highest value alternative uses. The current use of mobile frequencies (1800 MHz, 2100 MHz, and 2600 MHz) suggests that the 2 GHz spectrum could be used for mobile network capacity or fixed wireless services. In particular, the spectrum concerned is adjacent to the IMT-2000 terrestrial frequencies and could be a natural candidate for mobile broadband use in FDD and or TDD systems.

3.37 This is also consistent with ComReg's current approach to the assignment of rights of use for valuable spectrum. ComReg is of the view that applying a consistent pricing mechanism even where the assignment has already been determined will provide stakeholders with greater predictability about how spectrum rights of use for valuable bands are assigned. In that regard, DotEcon notes that "*the fact that spectrum has already been assigned by the EC without applying opportunity cost pricing at the time of award does not mean that ComReg should now make an exception for this spectrum from its typical approach of seeking to set charges based on opportunity*

[32] Section 2.2 of DotEcon Report.

cost. Carving out particular spectrum bands or licences for exceptional treatment undermines the benefits of a consistent and predictable regulatory approach to spectrum pricing." [33]

3.38 Therefore, ComReg is of the view that, in this case, spectrum fees that are reflective of opportunity cost are appropriate for MSS with CGC. In light of the way in which the spectrum has already been assigned, there are two options to consider in terms of the relevant definition of opportunity cost:

1. A shorter run opportunity cost approach where all alternative uses that exist are not considered in determining appropriate CGC fees (reflecting the fact that ComReg has no option to assign the spectrum to other users over the course of the licence duration).

2. A longer run opportunity cost approach where all alternative uses that exist are considered in determining appropriate CGC fees, taking into account the alternative value that could have been achieved were ComReg free to assign it at its discretion.

Option 1 – Alternative uses not considered in determining CGC fees.

3.39 Decisions 626/2008/EC and 2009/449/EC require Member States to ensure that the selected applicants have the right to use the radio spectrum identified in the Decisions and have the right to operate a MSS with CGC system. As the MSS with CGC frequency bands have been made available on a pan-European basis in accordance with the applicable EC Decisions, any other use of these bands shall not cause harmful interference to systems providing MSS and may not claim protection from harmful interference caused by systems providing MSS.

3.40 As a result, the assigned spectrum cannot be used on the same basis with users other than the MSS licensee. Therefore, over the duration of the licence, there is no alternative user permitted by the assignment Decision made by the European Commission other than the MSS licensee and the opportunity cost over the period is essentially zero. As such, this option would cover administrative charges only which would be collected to cover the spectrum management costs associated with administering each licence.[34]

Option 2 – All alternative uses are considered in determining CGC fees.

[33] DotEcon Report, p11.

[34] Article 12 Authorisation Regulations.

3.41 Option 2 considers a broader notion of opportunity cost which includes alternative uses of the radio spectrum not considered in Decision 2007/98/EC. This approach includes all relevant alternative uses in determining spectrum fees and aims to avoid distorting incentives in the shorter run. In terms of longer-run efficiency this approach considers the use of spectrum beyond the expiry of the licence and provides more appropriate price signals to promote efficient use.

3.42 Longer-run efficiency considerations are important as fees set in such a manner will help to promote efficient assignment of the radio spectrum in the future, including beyond the expiry of current MSS licences. In the long-run, MSS licences will expire and the spectrum will become available for re-assignment. It is important to provide appropriate long-run incentives to facilitate efficient assignment as it is currently unclear what decisions will be taken on expiry.

3.43 Opportunity cost pricing gives appropriate incentives at the point where the licence expires. On expiry, MSS with CGC services might be expected to make a claim on use of the spectrum and anticipating the application of opportunity cost pricing gives appropriate incentives at the point that licence expires, particularly given the likelihood of alternative users. In the longer-run, prices based on opportunity cost provide appropriate price signals and incentives both to use available spectrum more efficiently and to switch to alternative bands where issues of scarcity arise. ComReg also notes that such incentives are best maintained by generally applying a consistent and predictable approach to pricing spectrum.[35]

3.44 Given the existence of likely alternative demand, Option 2 involves a non-zero opportunity cost. However, given that the users have already been assigned the rights of use to the radio spectrum, and the fact that fees would only be charged for the CGC part of the network, it is necessary to consider whether the level of charges might discourage efficient use of the option to deploy a CGC. As noted by DotEcon there is *"some conflict between trying to ensure that general principles of opportunity cost pricing are applied and at the same time not discouraging efficient use of the CGC. This tension is unavoidable given that the EC did not set an opportunity cost based charge for the MSS licence itself*."[36]

3.45 Therefore, while Option 2 would give fees reflective of opportunity cost, the fees would need to be set conservatively, at a value that is likely to be below

[35] Any deviation from this approach for a specific band needs to being justified by there being a sufficient benefit.

[36] DotEcon Report, p11.

the market value of the spectrum. This is necessary to ensure that use of the spectrum assigned by the European Commission is not unduly discouraged, but that, when used, the associated fees encourage users to consider the opportunity cost of its use[37]. This conservative approach is necessary as an attempt by ComReg to estimate the opportunity cost more precisely runs the risk of the two assigned users not deploying the CGC component, and ComReg is cognisant of the fact that, for varying stated reasons, no services have as of yet launched in the 7 years since the licences were awarded. As noted above, the background to this consultation is exceptional and requires ComReg to put in place measures that would not be suitable where ComReg had control over the assignment of rights of use in the first instance.

Impact on Stakeholders

3.46 ComReg notes Inmarsat's most recent views are set out in Inmarsat's 2016 Annual Report to the Member States of the European Union (EU) in compliance with Article 7(d) of EU Decision 626/2008/EC (the MSS Decision) where it notes that:

3.47 "*Inmarsat has long argued that any fee imposed on the use of the ground segment of the hybrid network should be based on administrative cost recovery or calculated on a proportionate number of base stations (CGC) and/ or income generated in country."*[38] [Emphasis added]

3.48 Income generated is not an appropriate basis on which to calculate spectrum fees as it essentially acts as a tax on the use of the radio spectrum. In effect, this approach could cause fees to increase where an operator generates more income as a result of the more efficient use of the spectrum. In addition, income generated is likely to vary between operators, with the result that large income generators and potentially more efficient users would pay a higher fee for the same amount of spectrum compared to alternative less efficient users. Further, if an operator generated no income from the use of the radio spectrum, such an operator would have no incentive to return the spectrum to ComReg. Therefore, ComReg does not consider this approach appropriate.

3.49 Inmarsat and EchoStar seem most likely to prefer Option 1 as spectrum fees set at this level would only cover the administrative cost of assigning

[37] For example, fees set at this level should encourage MSS Licensees to consider alternative bands as expiry approaches.

[38] Inmarsat's Annual Report to the Member States of the European Union (EU) in compliance with Article 7(d) of EU Decision 626/2008/EC (the MSS Decision), p26.

the spectrum to MSS licensees. This would also provide MSS licensees access to a valuable essential input substantially below the longer-run opportunity cost of its use, and with a competitive advantage if either MSS licensee decided to provide services that could compete at the margin with those offered by MNOs, for example.

3.50 While Inmarsat and EchoStar would likely prefer Option 1, Inmarsat appears to accept charging in proportion to number of base stations and as a result may have no significant objection to Option 2, as it is based on a proportionate number of base stations. In that regard, and as set out in Chapter 4 spectrum fees for the CGC component are charged on a per site basis which converts a national opportunity cost to a per site basis.

3.51 Therefore, the opportunity cost is calculated proportionate to the number of base stations and would not make CGC operations unviable where they are of a limited scale.[39] This allows MSS licensees to better take account of spectrum fees depending on the service they wish to offer and the size of network deployed. This is also in line with ComReg's objectives as pricing off CGC applications given the assignment Decision already made by the European Commission is not efficient as there are no alternative users who can be accommodated over the duration of the licence.

3.52 ComReg also observes that the applicable fees using Option 2 are similar to those set by other European jurisdictions where Inmarsat and EchoStar also have rights of use in. As outlined in Chapter 4 of the DotEcon Report, for fees decided on a per base station basis, the broad range is €432 – €21,978. The fees per base station as set out in Chapter 4 fall within the lower end of this range. Therefore, while Inmarsat and EchoStar are likely to prefer Option 1 they may have no objection to Option 2 particularly where it is calculated on a per site basis.

3.53 Similarly, MNOs would likely prefer Option 2. Option 1 would provide MSS licensees access to similar service and technology-neutral spectrum that is not available to MNOs on a comparable basis. This Option would provide MSS licensees with opportunities to provide certain services in competition with MNOs given that the price charged would be at a significantly lower level than similar spectrum currently assigned to the MNOs.

3.54 Option 2 also provides a predictable regulatory framework such that stakeholders are aware that ComReg in providing for the efficient use of

[39] As set out in Chapter 4 (Fees), the fees for 2 x 15 MHz on a national per MHz basis amount to €5,054,146 per annum. This would be significantly in excess of CGC operations which only required a small number of base stations.

valuable spectrum[40] will use a consistent approach to spectrum pricing. Such an approach reduces the extent to which alternative users of the radio spectrum could be assigned the same or similar spectrum on more preferable terms in any follow up process. In addition, this approach provides more predictably for stakeholders about the pricing mechanism that will be used in the future. In that regard, DotEcon observes that "*a predictable regulatory framework in which spectrum users can anticipate that the pricing of future spectrum bands will typically be based on opportunity cost should assist with efficient decision-making about spectrum use and associated investments in network equipment*." ComReg is satisfied that this is a reasonable and pragmatic approach given the exceptional circumstances of this award.

Impact on Competition

3.55 As noted in Chapter 2, the relevant spectrum is adjacent to the 2.1 GHz mobile band with each MSS licensee assigned 2 x 15 MHz of spectrum. In addition, there is terminal equipment available to allow this spectrum to provide services similar to those currently being provided by MNOs[41].

3.56 A key concern is that CGC should not create an alternative means to deliver services competing unfairly with existing services such as mobile by avoiding paying an opportunity cost-based price for spectrum. As noted by DotEcon, "*If a current licensee pays less than the opportunity cost for spectrum, there may be potential to distort competition with services provided by other parties paying opportunity cost*." [42]

3.57 In that regard, Option 1 is likely to have the most detrimental impact on competition and could allow licensees to compete unfairly with alternative users of similar spectrum because:

- the opportunity cost associated with this option is zero and only administrative costs would apply for the full 2 x 15 MHz of spectrum;
- MSS licences could be assigned valuable spectrum at a price likely to be significantly below the opportunity cost of the spectrum;
- alternative mobile users would be paying the full opportunity cost for the use of similar spectrum; and

[40] In particular where demand for a particular spectrum band is likely to be strong given the likely uses.

[41] DotEcon Report, p14.

[42] DotEcon Report, p15.

- it provides opportunities not related to underlying efficiency for MSS licensees to provide competition to mobile services at the margin.

3.58 Alternatively, Option 2 carries a lower risk of distorting competition because it applies fees that account for the value of the spectrum to alternative users, and means that large-scale deployment (at a level that would allow competition with mobile services) could only be achieved at a cost that is suitably reflective of opportunity cost.[43]

3.59 In addition, under Option 2 spectrum fees for the CGC component are set in a manner that will help promote the efficient assignment of spectrum in the future when current MSS licences expire. As noted by DotEcon, spectrum pricing should provide appropriate signals for efficient spectrum use over longer horizons anticipating re-licensing and re-planning of spectrum. [44]

3.60 ComReg also agrees with DotEcon that despite the implied opportunity cost of zero under Option 1, this spectrum should not as a result be treated differently to other spectrum bands and spectrum charges should be based on a broader notion of opportunity cost. As a result there are likely to be broad benefits in applying a consistent and predicable approach to pricing spectrum.

3.61 Therefore, for the reasons as set out above ComReg is of the preliminary view that Option 2 would have the most positive impact on competition.

Impact on consumers

3.62 MSS systems may be used for a variety of telecommunications[45] and broadcasting/multicasting services such as high speed internet, mobile TV or public protection and disaster relief, and may help improve rural broadband coverage within the EU. In addition, the CGC component can be used for example to:

- ensure quality of service in areas where communication with the space station cannot be guaranteed
- provide additional capacity in traffic hotspots; or

[43] As set out in Chapter 4 of the DotEcon Report, compared with the annual fees charged for national authorisations in other countries, the proposed fees for Ireland are quite high. This is consistent with the dual objective that aims to ensure operators deploying a network large enough to compete with mobile operators will need to pay fees that approximately represent opportunity cost (to prevent unfair competition), whilst fees for smaller networks are sufficiently low to avoid disincentivising deployment.

[44] DotEcon Report, p10.

[45] DotEcon report, p6.

- provide temporary coverage in disaster areas.

3.63 Therefore ComReg considers that the preferred option should provide adequate incentives to encourage rollout of these services in a timely manner without having a distortive effect on competition.

3.64 Under Option 1, certain consumers[46] would likely benefit from small scale services, however it may also provide additional competition in mobile services even where it occurs on the margin. However, this would create competitive distortions in the long run as MSS licensees would be able to provide these services at a lower cost due to an administrative decision to provide access to similar spectrum resources at a lower price rather than to any underlying efficiency advantages an MSS licensee may hold.

3.65 In order for fees to be effective, they should be set at a level that is reflective of, or given the circumstances of this award, approaching the opportunity cost of holding the spectrum. Under Option 2, MSS licensees would have the correct incentives to ensure the assigned spectrum was used more efficiently and increase the scope for a broader range of services to be provided to consumers.

3.66 Option 2 is likely to have the most beneficial impact on consumers as it limits the risk of competitive distortions and does not discourage MSS licensees to provide innovative high value CGC applications. In particular Option 2:

- takes a conservative approach to estimating the opportunity cost as there is some uncertainty due to concerns about the level of fees dis-incentivising rollout; and
- charging for spectrum on a per site basis ensures CGC applications are viable at a limited scale.

3.67 Finally, as described above (Impact on competition) Option 2 is not likely to lead to a distortion of competition. Therefore, by extension, Option 2 would be better and more preferable for consumers than Option 1.

3.2 ComReg's Preferred Option

3.68 The exceptional circumstances arising from the spectrum assignment decisions made by the European Commission, as described above necessitate the need for fees that are reflective of opportunity cost to be estimated outside a market mechanism.

3.69 Notwithstanding, and given the specific circumstances pertaining to the assignment of MSS spectrum, ComReg is of the view that Option 2 and

[46] Those consumers in regions where MSS Licensees with CGC component may operate a service.

considerations of all alternative uses in determining CGC fees represents a reasonable and pragmatic approach to estimating fees that are reflective of opportunity cost, and is the more appropriate regulatory option to adopt in the context of the RIA analytical framework. In particular, Option 2:

- takes account of longer-run opportunity cost and avoids creating potential competitive distortions in mobile markets;
- would accord with ComReg's statutory objective of encouraging the efficient use and ensuring the effective management of spectrum by taking account of long-run efficiency considerations;
- sets the fees conservatively that are reflective of opportunity cost to ensure MSS licensees are not discouraged from rolling out services;
- provides greater regulatory predictability about the pricing mechanism ComReg will apply to similar bands in the future;
- would pre-empt any structural competition concerns before they materialise;
- would better enable ComReg to prevent anticompetitive effects arising in the market and would therefore better protect the interest of consumers and ensure the efficient rollout of services; and
- is in line with the advice provided by DotEcon.

Chapter 4

4 Fees

4.1 Introduction

4.1 This chapter considers matters in relation to fees that will apply to the pricing of the satellite Complementary Ground Component (CGC).

4.2 In Chapter 2 ("the RIA") ComReg set out its preliminary view that spectrum fees based on opportunity cost are appropriate for MSS with CGC. The preferred option is to consider all likely alternative uses and implement an opportunity cost pricing approach that considers alternative uses to CGC.

4.3 Given the preferred option, ComReg considers the recommendations in the DotEcon report and describes ComReg's approach to determining the structure and levels of fees that will apply to the CGC. This chapter is divided into the following sections:

- Fee structure ; and
- Level of Fees, including:
  - Benchmarking; and
  - Proposed prices.

4.2 Fee Structure

4.4 The Harmonisation Decision[47] designates the use of the 2 GHz band solely for mobile satellite services, with potential CGC components. Further to the Selection Decision[48], Inmarsat and EchoStar will be the only users of the spectrum for the duration of the licence. ComReg's advisor, DotEcon, observes that operators are under no obligation to deploy a CGC, and if the cost of doing so is too high relative to the additional revenue that they would gain, they may instead decide not to roll out a CGC component. As a result, the assigned spectrum might not be used for CGC. Within this context, ComReg is of the view that the pricing structure should have the objective of encouraging the roll out of a CGC where efficient to do so.

4.5 As outlined in the RIA, the circumstances surrounding the assignment of this spectrum are exceptional. As a result, spectrum fees in this instance aim to

[47] Decision 2007/98/EC

[48] Decision 2009/449/EC

encourage the efficient use of the radio spectrum in the context of the assignment of spectrum having already occurred absent any consideration of the value of the spectrum and a commercial case, if any, for a large scale network deployment. Therefore, the fee structure may need to consider all possible types of uses consistent with any MSS licensee's commercial rollout. This requires ComReg to consider the use of spectrum on a minimum scale as ComReg cannot rule out such uses, and the use of spectrum even on such a scale would accrue some benefits and be preferable to the CGC not being rolled out at all. This provides MSS licensees with greater flexibility to scale up to commercial use and fit their demand profile. The remainder of this section discusses the proposed structure of the CGC fees under the following headings:

- Per site or lump sum charges;
- Time-profiled and non-linear; and
- Geographical variation charges.

4.2.1 Per Site v Lump Sum charges

4.6 DotEcon outlines two alternatives structures for setting fees for CGC, namely:

- To set a single fixed fee for using CGC on a national basis deploying as many base stations as the MSS licensee deems necessary (no incremental fee per base station); or
- To set an annual charge for each individual base station deployed (an incremental charge is applicable for each base station).

Single Fixed Fee

4.7 A single fixed fee at the opportunity cost could render CGC operations unviable if they are of limited scale. Where such networks are of limited scale charging based on how similar spectrum is used by alternative users (i.e. a large number of base stations across the state) would likely result in a spectrum fee that is not viable relative to the possible commercial value. A single fixed fee in this instance may make such small scale deployments, which can in themselves yield high social value, unviable.

4.8 ComReg is of the view that pricing off of small scale CGC applications in this manner is not efficient over the term of the licence and due to the Harmonisation Decision[49] there are no alternative users that can be accommodated in this spectrum over the same period. Therefore, such a pricing structure is not

[49] Commission Decision 2007/98/EC

appropriate given the likely base station deployment over the duration of the licence.

Per Base Station Charge

4.9 Given the above, a per base station charge may be more appropriate for CGCs since it accommodates small scale operations such as ground-based aeronautical services. Furthermore, where a MSS licensee wishes to increase scale, the marginal costs of rollout will increase and it will approach the opportunity cost faced by larger scale operators using similar spectrum (e.g. MNOs).

4.10 ComReg is of the view that this approach helps to reduce the risk of removing rollout incentives for small scale deployments while at the same time exposing operators to higher fees that are reflective of the opportunity cost of their use if a larger scale deployment occurs.

4.11 ComReg intends that such a charge will also apply to temporary base stations in the operator's possession, whether owned or otherwise contracted. This is to allow for a more flexible deployment by operators where operational needs require it. Once it is licensed, a temporary station could be deployed following notification to ComReg of the intended location.

4.12 In relation to 'Calibration Earth Stations' which are used in the calibration of the MSS space segment, ComReg also intends that these will be charged an annual fee in the same manner.

Number of Sites Consistent With a National Rollout

4.13 Setting a per base station charge that reflects opportunity costs requires a conversion from an estimate of the value of a national licence (per annum) to an individual per base station charge. As a result, it is necessary to set out an assumption of the number of base stations that would be applicable for a national fee.

4.14 DotEcon notes that on average a mobile operator in Ireland would have circa 2,200 sites providing mobile services using the 800 MHz, 900 MHz, 1800 MHz and 2100 MHz frequency bands.[50]

4.15 DotEcon also observes that it might be possible to offer a more urban service on a smaller number of sites than the full 2,200 used for a full mobile network. However, pricing on the basis of a smaller number of sites raises the price which could then have the undesired effect of discouraging deployment of smaller scale services if the applicable fee per base station is excessive.

[50] This was informed by ComReg's recent mobile network modelling exercises (Section 2.1.1 and 5.7 of Documents 15/62b and 16/09 respectively).

4.16 ComReg agrees with this suggested approach to assessing the number of relevant sites when calculating the per base station fee. In particular, it achieves the correct balance between not discouraging the deployment of CGC while minimising the likelihood of any distortions to competition. In that regard, ComReg notes that:

- the 2,200 sites is based on the use of spectrum including frequency bands with better propagation characteristics than that used for MSS. Using 2.1 GHz spectrum only would likely require many more sites to operate a full mobile network. Therefore, 2,200 sites is likely an underestimate of the number of sites that might be required to operate a large-scale service competing at the margin with mobile or fixed wireless broadband services. In turn, calculating a per base station fee on the basis of this number of sites should entail little or no risks of creating unfair competition with those operators accessing spectrum at opportunity cost;
- under the Harmonisation and Selection Decisions this spectrum has already been assigned to two licensees and the fees should not discourage the use of the radio spectrum. Therefore, in the circumstances pertaining, there is greater scope for an adverse impact if a smaller number of sites is used (leading to a greater per base station fee);
- this approach would likely be sufficient to prevent a distortion to competition in the mobile market as:
    - it would take MSS licensees time before a competing mobile service with sufficient scale could be deployed and the incentives to do so with a limited amount of spectrum are low;
    - the ability of a MSS licensee to find a sufficient number of suitable sites and/or obtain planning permission to roll out mobile or related services in urban areas is likely to limit the extent to which such licensees would attempt to compete in these areas and distort competition[51]; and
    - ensures that deployment of networks large enough to compete with mobile requires fees that are reflective of the opportunity cost of the spectrum used.

[51] This is already a constraint on MNOs currently as outlined in Section 4.2 of the Spectrum Strategy Statement. It is also unlikely that consumers of mobile and related services would be interested in such services absent a national footprint.

- this approach provides a reasonable and pragmatic solution to balancing the benefits to users from services using the CGC being deployed in this spectrum while ensuring it is unlikely to distort competition.

4.2.2 Time Profiled and Non-Linear Charging

4.17 DotEcon observed that while a per site charge is preferable it may create an incentive to minimise the number of sites deployed, potentially at the expense of quality of service or coverage. As a result, there is a tension between creating long run incentives for efficient spectrum allocation and allowing for incentives to promote rollout over the duration of the licence.

4.18 Time-profiled or non-linear charging are two approaches that could reduce potential disincentives.

Time-Profiled

4.19 Time-profiled charging involves annual fees that increase over the duration of the licence. In this way, early deployment is encouraged and allows the fee to approach the opportunity cost of its use as the licence expires. Notwithstanding, DotEcon highlights certain disadvantages with this approach that make this approach inappropriate, namely that:

- It is not clear if extensive early investment is necessarily desirable;
- The choice of time periods and discount is largely arbitrary; and
- Spectrum prices need to approach long-run opportunity cost sufficiently in advance of the end of the licence to provide appropriate incentives for planning future spectrum use at that point in time.

Non-Linear

4.20 An alternative to a time-profiled structure would be to offer quantity discounts on a smaller number of sites. Given the assignment to licensees has already taken place, offering discounts for a small number of sites would aim to encourage those users to roll out the assigned spectrum. If licensees decide to increase the number of base stations and compete, even at the margin, with mobile services it would subsequently face a spectrum fee that is reflective of the opportunity cost, reducing the risk of competitive distortions.

4.21 Time-profiled or non-linear charging would require an assessment of the applicable time period or number of discounted sites. The effect of introducing additional pricing structures to reduce charges for certain periods is unnecessary given the measures already taken to provide a balance between encouraging the rollout of services and preventing distortions to competition.

4.22 DotEcon is of the view that time-profiled or non-linear charging is not necessary in structuring the fees for CGC as it involves additional complexity that is not justified given that a reasonable compromise on rollout can be obtained with a simpler linear per site charge.

4.23 In that regard, ComReg is satisfied that a per base station charge aligned with a conservative estimate of the market value of the spectrum is sufficient to reduce the risk of removing rollout incentives for small scale deployments. As outlined in Chapter 4 of the DotEcon Report[52], for fees decided on a per base station basis, the broad range is €432 – €21,978. The fees as set out in Chapter 4 fall within the lower end of this range and are unlikely to reduce incentives for deployment of the CGC.

4.2.3 Geographical variation in charges

4.24 DotEcon also considered whether a geographical variation in charges was required such that the deployment of CGC sites should be encouraged in rural areas rather than in more valuable urban areas where population densities are higher. Notwithstanding, while observing that there can be good reasons for using such an approach, DotEcon did not recommend the use of a geographical variation in charges for CGC as it would appear that most of the benefits can be achieved absent geographical variations provided per base station fees are conservatively set.

4.25 ComReg notes that there are circumstances where pricing should reflect geographic variation in opportunity cost if demand for spectrum to supply mobiles services in urban areas is higher. For example, such variations were reflected in the minimum prices in the 3.6 GHz Award Process. This was appropriate in that award because:

- population density is higher in urban areas, which is likely to reduce the unit costs of providing capacity and enhance the value of spectrum; and
- there are potentially multiple different users of the 3.6 GHz spectrum each with different potential uses in either urban or rural areas; and
- urban areas have a population inflow above the residential population due to commuting into urban centres;

4.26 Therefore, a higher urban minimum price was necessary to prevent bidders having incentives to make attempts to keep the price of that spectrum artificially low in the Award Process.

[52] Document 17/19a published in parallel with this document.

4.27 The circumstances pertaining in consideration of fees for the CGC component are substantially different because:

- there is no issue of using fees to provide a disincentive to collusion within a competitive award process (such as an auction) as fees are being determined by ComReg for using spectrum that is already allocated;
- there are only two potential users of the radio spectrum as assigned by the European Commission;
- the commercial value of rolling out mobile satellite services is not dependent on the population density of a particular area;
- the extent to which licensees can rollout in urban areas only is limited (para 3.16 above); and
- the actual auction outcome of the 3.6 GHz award will demonstrate whether a premium exists for more urban areas.

4.28 In relation to fees for a CGC, ComReg is of the view that a geographic variation in prices is not necessary. As set out in Section 4.3 below, DotEcon recommends a conservative estimate per MHz per capita across the entire state. Therefore:

- taking account of any geographic variation would require a lower price in rural areas and a higher price in urban areas.
- setting fees at a level lower than an already conservative estimate in rural areas runs the risk:
    - of fees that are not reflective of opportunity cost and are at a level that would fail to promote the efficient assignment of spectrum when current MSS licences expire; and
    - of creating distortions to competition in rural areas.
- as noted in Para 4.16, ComReg does not consider it likely that MSS licensees will consider the rollout of services provided by MNOs in urban areas and, therefore, the extent to which mobile competition may be harmed in those areas is limited.

4.29 Therefore, ComReg agrees with the views of DotEcon that a geographic variation in prices is not necessary in pricing CGC fees.

4.3 Level of Fees

4.30 This section considers matters in relation to fees that would potentially apply to rights of uses assigned to MSS licensees Inmarsat and EchoStar. In this section, ComReg:

- considers DotEcon's benchmarking analysis and recommendations (Document 17/19a); and
- sets out the proposed fees that will be applicable to rights of use assigned by the European Commission in its comparative award.

4.31 ComReg notes that part of the approach to setting fees for CGC use includes benchmarking of comparable spectrum auctions in order to provide a conservative estimate on the market value of the spectrum. In doing so, ComReg is conscious that only two operators have been assigned rights of use to this spectrum, and in order to ensure that there are incentives to use the assigned spectrum to provide services, the associated fees need to be set conservatively. Therefore, this process will result in fees that are set conservatively and will likely be less than the hypothetical market price (on a national and per base station basis) that would be determined by a competitive award where alternative users could express valuations for the said spectrum through bids.

4.32 This approach is necessitated by the exceptional circumstances arising from the spectrum assignment decisions made by the European Commission, as described in the RIA (Chapter 3). Notwithstanding, this is a reasonable and pragmatic approach that best provides for fees to allow for the rollout of services while encouraging the optimal use of the radio spectrum.

4.3.1 DotEcon Benchmarking Approach[53]

4.33 DotEcon's approach to setting fees for the CGC component of Mobile Satellite Services includes benchmarking of comparable licence prices across different jurisdictions. This approach uses frequency bands that are technically and commercially most comparable to the MSS/CGC frequencies. The DotEcon report concludes that the following bands are appropriate in this regard.

- The L band (1452 - 1492 MHz) - 3 benchmarks
- 1800 and 1900 MHz bands - 72 benchmarks

[53] ComReg also notes DotEcon's view that the results are estimates generated at a specific point in time, based on the data available at the time (such as the sample of historic awards, and estimates of population levels and PPP exchange rates) as well as country and award specific parameters (such as licence duration and the appropriate discount rate). Data may be subject to revision over time and the relevant parameters could vary depending on the specific nature and requirements of the study. As such, the results for particular bands may differ across various benchmarking exercises, and those presented here may therefore not align precisely with those published by ComReg in previous or future benchmarking reports.

- 2100 MHz band - 50 benchmarks
- 2300 MHz band - 11 benchmarks; and
- 2600 MHz band – 42 benchmarks

4.34 Auctions used in benchmarking arise in different jurisdictions and are invariably structured differently in terms of how the price is paid and the term of the licence. In addition, various macroeconomic factors such as inflation and currency limit the extent to which those final prices in a spectrum award are comparable across different jurisdictions. Therefore, it is necessary to make adjustments to ensure any benchmarked valuations are adjusted to a common basis.

4.35 DotEcon uses the following approach to ensure that licence prices across different jurisdictions are adjusted to a common basis:

1. Prices are expressed in MHz per head of population to correct for population and quantum of spectrum assigned in an auction.[54]
2. The stream of ongoing payments associated with the licence (e.g. Spectrum Usage Fees and instalment payments) are adjusted to account for the Present Value (PV)[55].
3. Differences in licence terms are accounted for by normalising to a 10 year licence term (MSS/CGC Licences that are valid until 13th May 2027).[56]
4. Prices are expressed in 2017 Euros. This is necessary because the benchmarks includes a wide range of countries beyond the Euro area.[57]

4.36 Furthermore, in order to take account of differences in market conditions in considering these bands and the recommended estimate, DotEcon places greater weight on:

- European benchmarks where greater uniformity across market conditions is expected;
- awards that have occurred in the last decade; and

[54] Auction prices are weighted in with respect to MHz assigned and population covered by the licence.

[55] DotEcon uses a discount rate of 9% for all PV calculations.

[56] Assumes a constant annual value of spectrum.

[57] Individual minimum prices were adjusted for currency differences using Purchasing Power Parity (PPP) exchange rates to account for price differences across countries and converted into a common currency (US Dollar). Prices in US Dollars in the year of the award are then adjusted for US inflation. This established comparable prices in real US dollars which is ultimately expressed in Euro.

- competitive benchmarks which are defined as auctions where the licence price for at least one lot exceeded the reserve price for that lot category[58].

4.37 Separately, DotEcon uses an objective and transparent rule to identify outliers using standard definitions of outliers[59] rather than excluding data points in an ad-hoc manner. In that regard, DotEcon excluded observations that:

- lie more than three standard deviations away from the sample mean; or
- lie more than three times the interquartile range away from the 75th percentile

4.38 ComReg agrees with the overall approach used by DotEcon for the following reasons:

- It uses bands that are technically and commercially comparable to the MSS/CGC frequencies.
- The approach is consistent with previous benchmarking approaches designed to set conservative minimum prices, i.e. 3.6 GHz award.
- It takes account of the differences between jurisdictions and makes appropriate adjustments;
- It gives a range of estimates that allows ComReg to establish a conservative estimate of value; and
- It uses an objective and transparent rule to identify outliers.

[58] The more competitive the auction, the more likely final auction prices are likely to reflect opportunity cost of the spectrum concerned. DotEcon defines a competitive auction to be one where the license price for at least one lot exceeded the reserve price for that lot.

[59] Outliers are observations that are far removed from the rest of the sample and are unlikely to be comparable to Ireland.

4.39 Table one below provides a summary of DotEcon's conservative value estimates for each band category.

Band	Value, € (per MHz per pop)
L Band	€0.07
1800/1900	€0.25
2100 MHz	€0.35
2300 MHz	€0.01
2600 MHz (Paired)	€0.05
2600 MHz (Unpaired)	€0.04

Table 2: Conservative Value Estimates for Selected Bands

4.40 In considering the above, DotEcon recommends fees in the range €0.05 to €0.35, and a benchmark of €0.25 as likely to be the most relevant for making a conservative estimate of the opportunity cost of the 2 GHz MSS/CGC spectrum.

4.41 ComReg agrees with the estimate as recommended by DotEcon and is of the view that the recommended benchmark is suitable given:

a) the proximity of the MSS spectrum to the 2100 MHz band; and

b) the need to make the proposed prices appropriately conservative in relation to the likely value of the spectrum.

4.3.2 Proposed Prices

4.42 The price per MHz per population as set out above is converted to a national fee per annum. As discussed above in Section 4.2.1, ComReg considers it appropriate to use a per site charge and that 2,200 is an appropriate number of sites. This implies that an annual fee per site of €2,300 is appropriate for MSS licensees that wish to utilise a CGC component.

Fee/MHz/Pop	Population	National fee per annum,	Site Assumption	Fee per site per annum,
€0.25	4,714,000[60]	€5,054,146	2,200	€2,300

Table 3: Fees for CGC Ground Component.

4.43 Finally, the fee per site will be adjusted annually using the Consumer Price Index (CPI) with a view to ensuring that the value of these fees remains constant in real terms over the term of licence.

[60] IMF World Economic Outlook, Oct 2016

Chapter 5

5 Draft Decision

5.1 This chapter sets out, in draft form, a Decision document based on the positions set out by ComReg in the preceding chapters and their supporting annexes.

5.1 Definitions and Interpretation

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

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

"Access Regulations" means the European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011, S.I. No. 224 of 2011;

"Authorisation Decision" means the Decision of The European Parliament and of The Council of 30 June 2008 on the selection and authorisation of systems providing Mobile Satellite Services (MSS), Decision 626/2008/EC;

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

"CGC" means the Complementary Ground Components of Mobile Satellite Services shall mean ground-based stations used at fixed locations, in order to improve the availability of MSS in geographical areas within the footprint of the Mobile Satellite System, where communications with one or more space station cannot be ensured with the required quality;

"Communications Regulation Act 2002" means the Communications Regulation Act, 2002, (No. 20 of 2002), as amended;

"ComReg" means the Commission for Communications Regulation, established under section 6 of the Communications Regulation Act 2002;

"EchoStar" Means EchoStar Mobile Limited;

"EU" means European Union;

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

"Harmonisation Decision" means Commission Decision of 14 February 2007 on the harmonised use of radio spectrum in the 2 GHz frequency bands for the implementation of systems providing Mobile Satellite Services, Decision 2007/98/EC;

"Inmarsat" means Inmarsat Ventures Limited;

"ITU" means International Telecommunication Union;

"Minister" means the Minister for Communications, Climate Action and Environment;

"Ministerial Policy Directions" means the policy decisions made by Dermot Ahern TD, then Minister for Communications, Marine and Natural Resources, pursuant to section 13 of the Communications Regulation Act 2002 (as amended), dated 21 February 2003 and 26 March 2004;

"Modalities Decision" means the Commission Decision of 10 October 2011 on modalities for coordinated application of the rules on enforcement with regard to Mobile Satellite Services (MSS) pursuant to Article 9(3) of Decision 626/2008/EC, Decision 2011/667/EU;

"MSS" means the Mobile Satellite Services and shall mean electronic communications networks and associated facilities capable of providing radio-communications services between a mobile earth station and at least one or more space station, or between mobile earth stations by means of one or more space station, or between a mobile earth station and one or more complementary ground component used at fixed locations;

"MSS with CGC Regulations" means the Wireless Telegraphy (Mobile Satellite Services with Complementary Ground Component) Regulations 2017, a draft form of which is set out in Annex 2 to ComReg Document 17/19 [this Document];

"MSS with CGC Spectrum" means the frequency bands 1980 to 2010 MHz (Earth-to-space) and 2170 to 2200 MHz (space-to-Earth);

"RIA" means Regulatory Impact Assessment; and

"Satellite Failure" means the failure of the MSS satellite to operate according to the parameters as notified to the ITU in milestone 1 in the Annex to the Authorisation Decision;

"Satellite Launch Failure" means the failure of the satellite to launch correctly or to deploy into the assigned orbital position as notified to the ITU;

"Selection Decision" means Commission Decision of 13 May 2009 on the selection of operators of pan-European systems providing Mobile Satellite Services (MSS), Decision 2009/449/EC; and

5.2 Considering

5.2 In arriving at its decisions in this document, ComReg has had regard to:

(1) the contents of, and the materials and reasoning referred to in, as well as the materials provided by respondents in connection with, the below-listed ComReg documents:

(a) 17/[19] The Consultation Document;

(b) 17/[XX]the response to Consultation; and

(2) the consultants' reports commissioned, and the advice obtained by ComReg in relation to the subject-matter of the documents and materials listed above;

(3) the powers, functions, objectives and duties of ComReg, including, without limitation those under and by virtue of:

(a) the Communications Regulation Act 2002, and, in particular, sections 10, 12 and 13 thereof;

(b) the Framework Regulations, and, in particular, Regulations 12, 13, 16 and 17 thereof;

(c) the Authorisation Regulations, and, in particular, Regulations 9, 10, 11, 12, 15, 16, 17, 18, 19, 21, 23 and 24 thereof;

(d) Regulation 6(1) of the Access Regulations;

(e) the Harmonisation Decision;

(f) the Authorisation Decision;

(g) the Selection Decision;

(h) the Modalities Decision;

(i) Sections 5 and 6 of the Wireless Telegraphy Act, 1926; and

(j) the applicable Ministerial Policy Directions made by the Minister under Section 13 of the Communications Regulation Act 2002, and, noting that it has:

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

(ii) evaluated the matters to be decided, in accordance with ComReg's RIA Guidelines (ComReg Document 07/56a) and the RIA Guidelines issued by the Department of An Taoiseach in June, 2009, as set out in the various chapters of Document 17/[XX] [document to which the final decision will be attached] and their supporting annexes, ComReg has decided:

5.3 Noting

5.3 That Regulation 12, paragraphs (a) (b) and (c) of the Authorisation Regulations, covers the use of frequency bands that have been harmonised across the European Union and where the selection procedure is in accordance with EU rules then ComReg as the Regulator: *'shall not impose any further conditions, additional criteria or procedures which would restrict, alter or delay the grant of the right of use concerned provided that all the conditions which have been specified by the Regulator to be complied with by the holder of the right of use in the state have been satisfied. '*

5.4 Furthermore that according to Article 7 of the Authorisation Decision, *Member States, in this case ComReg on behalf of Ireland: 'shall ensure that the selected applicants, in accordance with the time-frame and the service area to which the selected applicants have committed themselves, in accordance with Article 4(1)(c), and in accordance with national and Community law',* have the right to use the specific radio frequency identified in the Harmonisation Decision.

5.4 Decides

5.5 Subject to obtaining the consent of the Minister, to the making of the MSS with CGC Regulations pursuant to section 6 of the Wireless Telegraphy Act 1926, prescribing relevant matters in relation to MSS with CGC, including prescribing the form of the Licences concerned, their duration and the conditions and restrictions subject to which they are granted;

5.6 under section 5 of the Wireless Telegraphy Act 1926, and pursuant to the MSS with CGC Regulations, to grant a Licence to both EchoStar and Inmarsat as selected pursuant to the Selection Decision;

5.7 On payment of the fees prescribed thereby, to grant MSS with CGC Licences to both EchoStar and Inmarsat, under section 5 of the Wireless Telegraphy Act

1926 for the period, and subject to the conditions and restrictions (including conditions as to revocation), prescribed in the MSS with CGC Regulations, including, as appropriate, the schedules to the MSS with CGC Licences as currently set out in Annex [XX] of the Response to Consultation Document 17/[XX] [document to which the final Decision will be attached];

5.8 The following sub-bands of MSS with CGC Spectrum will be assigned as follows:

(1) Inmarsat: from 1980 to 1995 MHz for Earth-to-space communications and from 2170 to 2185 MHz for space-to-Earth communications;

(2) EchoStar: from 1995 to 2010 MHz for Earth-to-space communications and from 2185 to 2200 MHz for space-to-Earth communications; and

(3) to retain its discretion pursuant to Regulation 17(3)e of the Framework Regulations, regarding how it might treat MSS with CGC spectrum, including the revocation of any MSS with CGC Licence issued; should satellite launch failure or satellite failure occur and where no replacement satellite is put in place matching the parameters notified to the ITU in Annex 1 to the Authorisation Decision, 18 Months from the date of satellite launch failure or satellite failure.

5.5 Statutory Powers Not Affected

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

[●] [CHAIRPERSON, or COMMISSIONER]

THE COMMISSION FOR COMMUNICATIONS REGULATION THE DAY OF [●] 2017

Chapter 6

6 Submitting Comments

6.1 Submitting Comments

6.1 All comments are welcome. However, it would make the task of analysing responses easier if comments were referenced to the relevant chapters and sections from this document.

6.2 The consultation period will run from 20th March 2017 to 28th April 2017, during which the Commission welcomes written comments on any of the issues raised in this paper.

6.3 Having analysed and considered the comments received, ComReg will review the consultation on the MSS with CGC Authorisation regime and publish a report on the consultation which will, inter alia summarise the responses to the consultation.

6.4 In order to promote further openness and transparency, ComReg will publish all respondents' submissions to this consultation, subject to the provisions of ComReg's guidelines on the treatment of confidential information – ComReg Document 05/24. We would request that electronic submissions be requested in an un-protected format so that they can be appended into the ComReg submissions document for publishing electronically.

Please Note

6.5 ComReg appreciates that many of the issues raised in this paper may require respondents to provide confidential information if their comments are to be meaningful.

6.6 As it is ComReg's policy to make all responses available on its website and for inspection generally, respondents to consultations are requested to clearly identify confidential material in a separate annex to their response.

6.7 Such information will be treated subject to the provisions of ComReg's guidelines on the treatment of confidential information – ComReg Document 05/24

6.8 Respondents should note, that it is ComReg's intention to publish all correspondence received in relation to the licensing, use and management of the spectrum bands covered by this, subject to the provisions of ComReg's guidelines on the treatment of confidential information

6.9 Responses should be clearly marked as Submissions to Consultation on Mobile Satellite Services with Complementary Ground Component Authorisation Regime (ComReg 17/19) and must be submitted in written form (post or email) to the following address:

Market Framework Division

Commission for Communications Regulation

Block DEF, Abbey Court

Irish Life Centre

Dublin 1

D01 W2H4

Ireland

Email: marketframeworkconsult@comreg.ie

Annex 1: Mitigation Measures

Table 1: Summary of Study Results (from ECC Report 233).

Summary of Aero CGC in the band 1980 - 2010 MHz		
Scenario ID	**Interfering Aeronautical MSS/CGC component**	**Potentially interfered-with system component**
1	Aeronautical terminal transmitting to the satellite (1980-2010 MHz)	ECN Receiving BS (1920-1980 MHz) and Conventional CGCs of other MSS systems in the 2GHz MSS band (1980-2010 MHz)
		M1, M2, M4
2	Aeronautical terminal transmitting to the aeronautical CGC ground station (1980-2010 MHz)	ECN Receiving BS (1920-1980 MHz) and Conventional CGCs of other MSS systems in the 2GHz MSS band (1980-2010 MHz)
		M1, M2
3	Aeronautical terminal transmitting to the aeronautical CGC ground station (1980-2010 MHz)	DA2GC FDD ground station (2010-2025 MHz)
		M1, M2, M5
4	Aeronautical terminal transmitting to the satellite (1980-2010 MHz)	DA2GC FDD ground station (2010-2025 MHz)
		M1, M2, M4
5	Aeronautical terminal transmitting to the aeronautical CGC ground station (1980-2010 MHz)	VLCC receiver (2010-2025 MHz)
		M3
6	Aeronautical terminal transmitting to the satellite (1980-2010 MHz)	VLCC receiver (2010-2025 MHz)
		M3
7	Aeronautical terminal transmitting to the aeronautical CGC ground station (1980-2010 MHz)	MCA receiving BS (1920-1980 MHz)
8	Aeronautical terminal transmitting to the satellite (1980-2010 MHz)	MCA receiving BS (1920-1980 MHz)
9	Aeronautical CGC ground station transmitting to the aeronautical terminal (2170-2200 MHz)	MCA receiving MS (2110-2170 MHz)
10	Aeronautical CGC ground station transmitting to the aeronautical terminal (2170-2200 MHz)	Receiving MS in ECN FDD systems (2110-2170 MHz)
11	Aeronautical CGC ground station transmitting to the aeronautical terminal (2170-2200 MHz)	PMSE receiver (2200-2290 MHz)

Note the various interference scenarios, potentially interfered-with system component and mitigation measures M1 - M5.

Mitigation Measures:

- M1: Improved Transmitter filtering.
- M2: E.I.R.P reduction depending on aircraft altitude.
- M3: Shielding / receiver depointing (including natural terrain shielding).

- M4: Fuselage attenuation
- M5: Co-siting of different ground stations.

For the aeronautical terminal the improved transmitter filtering (improved unwanted emissions) mitigating measure is reflected in the harmonised standards EN 302 574-2 and EN 302 574-3.

Annex 2: Draft Regulations

The draft Regulations, as presented in draft format, are subject to the Minister providing his consent under section 37 of the Communications Regulation Act 2002, as amended, and therefore in this respect may be subject to further change.

STATUTORY INSTRUMENTS

S. I. No. of 2017

Wireless Telegraphy (Mobile Satellite Service and Complementary Ground Component) Regulations 2017

(Prn.)

The Commission for Communications Regulation, in exercise of the powers conferred on it by section 6(1) of the Wireless Telegraphy Act, 1926 (No. 45 of 1926) (as substituted by section 182 of the Broadcasting Act 2009 (No. 18 of 2009)), and with the consent of the Minister for Communications, Climate Action and Environment, pursuant to section 37 of the Communications Regulation Act 2002 (No. 20 of 2002), hereby makes the following regulations:

Citation

1. These Regulations may be cited as the Wireless Telegraphy (Mobile Satellite Service and Complementary Ground Component) Regulations 2017.

Interpretation

2. (1) In these Regulations, unless the context otherwise requires:

"Act of 1926" means the Wireless Telegraphy Act, 1926 (No. 45 of 1926);

"Act of 1972" means the Wireless Telegraphy Act, 1972 (No. 5 of 1972);

"Act of 2002" means the Communications Regulation Act, 2002 (No. 20 of 2002);

"Apparatus" in relation to Licences means apparatus for wireless telegraphy as defined in section 2 of the Act of 1926 for the purpose of providing a Mobile Satellite Service with Complementary Ground Component and in relation to a Licence, means apparatus for wireless telegraphy to which the licence relates;

"Authorisation Regulations" means the European Communities (Electronic Communications Networks and Services)(Authorisation) Regulations, 2011 (S.I. 335 of 2011);

"Base Station" means apparatus for wireless telegraphy, used at a fixed location under the control of the associated Space Station and its network management mechanism as set out in the Schedule to these Regulations;

"Commission" means the Commission for Communications Regulation;

"Complementary Ground Component" means Base Stations used at fixed locations in order to improve the availability of a Mobile Satellite Service in geographical areas within its footprint, where communications with one or more Space Stations cannot be ensured with the required quality;

"Decision of 2008" means Decision 626/2008/EC of the European Parliament and of the Council on the selection and authorisation of systems providing Mobile Satellite Services;

"Decision of 2009" means Decision 2009/449/EC of the European Commission on the selection of operators of pan-European systems providing Mobile Satellite Services;

"Decision of 2011" means Decision 2011/667/EU of the European Commission on modalities for coordinated application of the rules on enforcement with regard to Mobile

Satellite Services pursuant to Article 9(3) of Decision No. 626/2008/EC of the European Parliament and the Council;

"Earth Station" means a station located either on the earth's surface or within the major portion of the earth's atmosphere and intended for communication;

"Electronic Communications Network" and "Electronic Communications Service" have the meanings assigned to them in the Framework Regulations;

"ETSI" means the European Telecommunications Standards Institute;

"Framework Regulations" means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations, 2011 (S.I. 333 of 2011);

"Harmful Interference" has the meaning set out in the Framework Regulations;

"Licence" means a Licence granted under section 5 of the Act of 1926, to keep, have possession of, install, maintain, work and use Apparatus in a specified place in the State;

"Licence Commencement Date" means the date, as specified in the Licence, upon which the Licence comes into effect;

"Licensee" means the holder of a Licence;

"Mobile Earth Station" means an Earth Station in the Mobile Satellite Service intended to be used while in motion or during halts at unspecified points;

"Mobile Satellite Service" means electronic communications networks and associated facilities capable of providing Radiocommunications Services between a Mobile Earth Station and one or more Space Stations, or between Mobile Earth Stations by means of one or more Space Stations, or between a Mobile Earth Station and one or more Complementary Ground Components used at fixed locations, where such a system shall include at least one Space Station;

"Radiocommunications Service" means a service as defined in the Radio Regulations of the International Telecommunication Union involving the transmission, emission and or reception of radio waves for specific telecommunication purposes;

"Radio Equipment Directive" means Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014, on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC;

"Space Station" means apparatus for wireless telegraphy that is located on an object which is beyond the major portion of the earth's atmosphere and which is not a high altitude platform;

"Station" means one or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying out a Radiocommunications Service;

"Temporary Base Station" means a Base Station used at a fixed location for a temporary period of time;

"Undertaking" has the meaning set out in the Framework Regulations.

(2) In these Regulations:

(a) a reference to an enactment or regulation shall be construed as a reference to the enactment or regulation as amended or extended by or under any subsequent enactment or regulation;

(b) a reference to a Regulation or a Schedule is to a Regulation of or Schedule to these Regulations unless it is indicated that a reference to some other enactment is intended;

(c) a reference to a paragraph or subparagraph is to the paragraph or subparagraph of the provision in which the reference occurs unless it is indicated that reference to some other provision is intended;

(d) a reference to a Directive of the European Parliament and Council shall be construed as a

reference to the Directive as amended or extended by any subsequent Directive; and

(e) a reference to a Decision of the European Commission shall be construed as a reference to the Decision as amended or extended by any subsequent Decision.

(3) A word or expression that is used in these Regulations and that is also used in the Act of 1926 has, unless the context otherwise requires, the same meaning in these Regulations that it has in that Act.

(4) A word or expression that is used in these Regulations and that is also used in the Act of 2002 has, unless the context otherwise requires, the same meaning in these Regulations that it has in that Act.

(5) A word or expression that is used in these Regulations and that is also used in the Framework Regulations or in the Authorisation Regulations has, unless the context otherwise requires, the same meaning in these Regulations that it has in those Regulations.

(6) The Interpretation Act 2005 (No. 23 of 2005) applies to these Regulations.

Licences to which these Regulations apply

3. These Regulations apply to Licences to keep, have possession of, install, maintain, work and use apparatus for wireless telegraphy for the purpose of the provision of a Mobile Satellite Service with Complementary Ground Component ("MSS with CGC"), in the form set out in the Schedule to these Regulations.

Application for Licences and Form of Licences

4. (1) An Application for a Licence shall be made to the Commission and shall be in writing in such form as may be determined by the Commission from time to time.

(2) A person who makes an Application under paragraph (1) of this Regulation shall furnish to the Commission such information as the Commission may reasonably require for the purpose of its functions under these Regulations and, if the person, without reasonable cause, fails to comply with this paragraph, the Commission may refuse to grant a Licence to the person.

(3) The Commission may grant a Licence in accordance with the provisions of Regulation 9 of the Authorisation Regulations.

(4) A Licence shall be in the form specified in the Schedule to these Regulations with such variation (if any) (whether by addition, deletion or alteration) as the Commission may determine from time to time or in any particular case.

Duration of Licences

5. (1) A Licence to which these Regulations apply shall, unless it has been withdrawn by ComReg or surrendered by the Licensee, be in force until 13 May 2027.

(2) A Licence granted under these Regulations shall automatically expire on the expiry of authorisation of the associated mobile satellite system.

Conditions of Licences

6. It shall be a condition of any Licence to which these Regulations apply that the Licensee shall:

(1) ensure that it complies with the conditions contained within the Licence and these Regulations;

(2) ensure that any Apparatus complies with the Decision of 2008, the Decision of 2009, and the Decision of 2011;

(3) ensure that it makes payments of the correct fees as set out in Regulation 8;

(4) ensure that Apparatus installed, maintained, possessed or kept under the Licence is capable of operating within the radio frequency spectrum specified in the Licence concerned;

(5) ensure that where the Apparatus is worked or used, as appropriate, it is worked or used only on such radio frequency spectrum as specified in the Licence concerned;

(6) ensure that in each calendar year in which the Licence is in force, and in any event on or before the anniversary of the Licence Commencement Date of each such year, it submits updated information to the Commission in respect of part 1 and part 2 of its Licence;

(7) furnish such information and reports as may be requested by the Commission from time to time;

(8) ensure that the Apparatus, or any part thereof, shall be installed, maintained, worked and used so as not to cause Harmful Interference;

(9) ensure that the Apparatus or any part thereof, complies with Article 3 of the Radio Equipment Directive;

(10) upon becoming aware of any event likely to materially affect its ability to comply with these Regulations, or any conditions set out or referred to in any Licence, notify the Commission of that fact in writing within 5 working days;

(11) ensure that if the address of the Licensee or the person to whom the Licence has been

assigned changes, the Licensee or assignee shall, as soon as possible, notify the Commission in writing of the change;

(12) comply with any special conditions imposed under section 8 of the Act of 1972 and subject to which this Licence is deemed by subsection (3) of that section to be issued;

(11) not, without the prior consent of the Commission (which shall not be unreasonably withheld) assign the Licence or any of the powers, duties or functions conferred by it or otherwise transfer any of the rights or obligations conferred by it;

(12) where consent is granted, under paragraph 11 of this Regulation, ensure that the assignee is contractually obliged to provide to the assignor such details as the Commission may request from time to time;

(13) comply with all obligations under the relevant international agreements relating to the use of apparatus or the frequencies to which they are assigned;

(16) that where an Undertaking requests Wholesale Access, the Licensee shall not unreasonably refuse the request and shall ensure that any offer made is on reasonable and non-discriminatory terms;

(17) that, where the Commission requests information in regards to any Wholesale Access offering made to an undertaking: the Licensee shall supply in full the requested information, in the form requested by the Commission, not later than twenty working days after the receipt of the request;

(18) ensure that it uses the radio spectrum assigned under the Decision of 2008 and the Decision of 2009 for the provision of Complementary Ground Components of Mobile Satellite Systems;

(19) ensure that the Complementary Ground Components shall constitute an integral part of a Mobile Satellite System and shall be controlled by the satellite resource and network management mechanism;

(20) ensure that the Complementary Ground Components shall use the same direction of transmission and the same portions of frequency bands as the satellite components of the associated Mobile Satellite Service and shall not increase the spectrum requirement of the associated Mobile Satellite Service;

(21) ensure that the Commission is notified within 5 working days of the failure of the satellite component of the associated Mobile Satellite Service; and

(22) ensure that any independent operation of Complementary Ground Components in case of failure of the satellite component of the associated Mobile Satellite Service shall not exceed 18 months from the date of failure.

Enforcement, Amendment, Withdrawal and Suspension

7. (1) Enforcement by the Commission of compliance by a Licensee with conditions attached to its Licence shall be in accordance with the Authorisation Regulations.

(2) The Commission may amend any Licence from time to time in accordance with the Authorisation Regulations.

(3) Without prejudice to paragraph (2) of this Regulation, at the request of the Licensee, the Commission may, if it considers it appropriate to do so, amend the Licence by adding to, deleting from or altering the radio frequency spectrum specified in the Licence (within the scope of the radio spectrum assigned under the Decision of 2008 and the Decision of 2009) on which the Apparatus may be used; any such amendment shall be effected by notice in writing from the Commission specifying the amendment and given to the Licensee or sent to the Licensee at the address specified in the Licence or notified to the Commission pursuant to the Licence.

(4) A Licence may be suspended or withdrawn by the Commission in accordance with the Authorisation Regulations and where the timescale is exceeded in Regulation 6 (22).

Annual Licence Fees

8. (1) The Licensee shall pay an annual fee of €2,300 per Earth Station, Base Station, whether temporary or fixed.

(2) The fees specified in paragraph (1) of this Regulation shall be payable by the Licensee on commencement of or prior to the grant of a Licence.

(3) The fees specified in paragraph (1) of this Regulation shall be paid to the Commission of Communications Regulation by way of banker's draft or such other means and on such terms (including terms as to the place of payment) as the Commission may decide. Where the date of payment falls on a Saturday, a Sunday or a public holiday payment shall be made on or before the last working day before the date of payment.

(4) An amount payable by a person in respect of a fee under these Regulations may be recovered by the Commission from the person as a simple contract debt in any court of competent jurisdiction.

(5) If a Licence is surrendered, withdrawn, suspended or revoked, the Licensee shall not be entitled to be repaid any part of the fee paid by the Licensee under these Regulations but shall still be liable to pay any sums (including interest) outstanding.

(6) Where payment is not made in due time, then interest shall be payable by the Licensee at the rate per annum standing specified for the time being in section 26 of the Debtors (Ireland) Act, 1840 (1840 c.105), on the fee or part thereof in respect of the period between the date when such fee or part fell due and the date of payment of such fee or part.

Licensee to satisfy all Legal Requirements

9. Licences granted pursuant to these Regulations do not grant to the Licensee any right, interest or entitlement other than the right to keep and have possession of, install, and maintain, and for Licences other than a Mobile Satellite Service Complementary Ground Component Licence, to work and use, at a specified location or locations in the State, Apparatus for wireless telegraphy for terrestrial systems capable of providing Electronic Communications Services.

SCHEDULE

WIRELESS TELEGRAPHY ACT, 1926
WIRELESS TELEGRAPHY (MOBILE SATELLITE SERVICE WITH COMPLEMENTARY GROUND COMPONENT) REGULATIONS 2017
Mobile Satellite Service with Complementary Ground Component Licence, granted under section 5 of the Wireless Telegraphy Act 1926

The Commission for Communications Regulation, in exercise of the powers conferred on it by section 5 of the Wireless Telegraphy Act, 1926 (No. 45 of 1926), hereby grants the following licence to _____ of _____.

The Licensee is hereby authorised to keep, have possession of, install, maintain, work and use apparatus as specified in Part 1 of this Licence subject to the terms and conditions set out in the Wireless Telegraphy (Mobile Satellite Service with Complementary Ground Component) Regulations 2017 (S.I. No.XXX of 2017), including but not limited to, the following:

1. **The Licensee shall ensure that it complies with the conditions as to geographical location, technical conditions, Licensed frequencies and Rollout Plan set out in Parts 1 to 4 inclusive of this Licence; and**
2. **The Licensee shall ensure that it makes payment of all fees as detailed in the Regulations under which this Licence is issued.**

This Licence shall come into effect on DD/MM/YYYY (the "Licence Commencement Date") and subject to revocation, suspension or withdrawal, expires on 13/05/2027

Signed:_____

For and on behalf of the Commission for Communications Regulation

Date of Issue:_____

Part 1 Apparatus to which this Licence applies

Index	Manufacturer	Description (Base Station, Temporary Base Station or Earth Station	Equipment Reference

Part 2 Geographical Location of Apparatus.

Equipment Reference	Easting	Northing

Part 3 Technical Conditions

Base station block edge mask out-of-block EIRP limits per antenna

Frequency range of out-of-block emissions	**Maximum mean out-of-block EIRP**	**Measurement bandwidth**
–10 to –5 MHz from lower block edge	11 dBm	5 MHz
–5 to 0 MHz from lower block edge	16.3 dBm	5 MHz
0 to +5 MHz from upper block edge	16.3 dBm	5 MHz
+5 to +10 MHz from upper block edge	11 dBm	5 MHz
Other blocks	9 dBm	5 MHz

EIRP: Equivalent Isotropically Radiated Power

An in-block power limit of 62 dBm / 5 MHz and 55 dBm / MHz will apply.

A 300 kHz guard band must be inserted at 1980 MHz.

Part 4 Licensed Frequencies (delete as appropriate)

Inmarsat: 1980 – 1995 MHz (Uplink) & 2170 – 2185 MHz (Downlink)

EchoStar: 1995 – 2010 MHz (Uplink) & 2185 – 2200 MHz (Downlink)

GIVEN under the official seal of the Commission for Communications Regulation, this

[-] day of [-] 2017

Gerry Fahy

For and on behalf of the Commission for Communications Regulation

The Minister for Communications, Energy and Natural Resources consents to the making of the foregoing Regulations.

GIVEN under the Official Seal of the Minister for Communications, Climate Action and Environment, this

[-] day of [-] 2017

DENIS NAUGHTEN

Minister for Communications, Climate Action and Environment.

EXPLANATORY NOTE

(*This note is not part of the Instrument and does not purport to be a legal interpretation.)*

These Regulations provide for the issue of licences for apparatus for wireless telegraphy for the provision of a mobile satellite service with a complementary ground component, for the regulation of such apparatus and for the payment of fees by persons granted licences for that apparatus. These Regulations are in accordance with relevant provisions of Decision No. 626/2008/EC of the European Parliament and of the Council of 30 June 2008 on the selection and authorisation of systems providing mobile satellite services, and with relevant provisions of related Decisions.

BAILE ÁTHA CLIATH ARNA FHOILSIÚ AG OIFIG AN tSOLÁTHAIR Le ceannach díreach ó FOILSEACHÁIN RIALTAIS, 52 FAICHE STIABHNA, BAILE ÁTHA CLIATH 2 (Teil: 01 - 6476834 nó 1890 213434; Fax: 01 - 6476843) nó trí aon díoltóir leabhar. ————————

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