



Commission for
Communications Regulation

Consultation Paper

Consultation on Mobile Satellite Service (MSS) with Complementary Ground Component (CGC)

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1 Executive Summary

This Consultation considers the regulatory approach most appropriate to facilitate the development and deployment of a Mobile Satellite Service (MSS) with a Complementary Ground Component (CGC), following the ratification of European Commission (EC) Decisions¹ and the completion of the EC selection process². The MSS with CGC system is intended to operate in the same frequency bands which were allocated to the MSS in the 2 GHz frequency range.

Section 2 describes a typical MSS with CGC system and the regulatory approaches undertaken in other jurisdictions. ComReg's proposed approach to regulating MSS with CGC is detailed in Section 3. Questions are set out throughout the paper and are also listed together in Appendix A. All interested parties are invited to submit their views to ComReg and are requested to provide all relevant data in support of their submissions.

¹ EC Decisions 2007/98/EC, 626/2008/EC and 2009/449/EC

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2 Introduction

The Commission for Communications Regulation (ComReg) is the National Regulatory Authority (NRA) responsible for regulation of the electronic communications sector, which includes; telecommunications, radiocommunications and broadcasting transmission.

The Authorisation Regulations³ (SI no 306 of 2003) establish a general right to operate an “electronic communications network” (ECN) or provide an “electronic communications service” (ECS) in Ireland, subject to conditions. Where operation of an ECN or provision of an ECS also involves spectrum use, then the operator/provider may also require a wireless telegraphy licence granted by ComReg in accordance with the Wireless Telegraphy Act 1926. Spectrum is a State-owned resource which may be licensed to particular operators under processes that are objective, non-discriminatory and transparent. Licences are granted for fixed periods of time and may be subject to specific conditions of use, including payment of fees and non-interference with other spectrum users.

ComReg’s functions include managing, developing and implementing relevant European and international policy, standards and legislation under the aegis of the Department for Communications Energy and Natural Resources (DCENR). This includes close liaison with international bodies in this sector including the EC, CEPT⁴ and the International Telecommunication Union (ITU⁵). Development of international standards and harmonised use of radio frequencies can facilitate the development of the electronic communications sectors.

To date, MSS with CGC services have been provided in the frequency bands between 1.4 and 2.2 GHz in the Americas and Asia⁶. The adoption of the EC Decision⁷ paves the way for a seamless pan-European personal communication service, which could be capable of including rich multimedia content as well as the more usual ECS.

The proposed frequency bands for operation of MSS with CGC are: for the Earth to space (E-s) satellite segment and terrestrial Uplinks (U/L) 1980-2010MHz; and for the space to Earth (s-E) satellite segment and terrestrial Downlinks (D/L) the band 2170-2200MHz. It is important to note that currently, there are no service providers offering such a commercial product in the European market.

³ European Communities (Electronic Communications Networks and Services)(Authorisation) Regulations 2003, SI No. 306 of 2003

⁴ Conference of European Postal and Telecommunications Administrations

⁵ ITU is the leading United Nations agency for information and communication technologies. As the global focal point for governments and the private sector, ITU's role in helping the world communicate spans 3 core sectors: radiocommunication, standardization and development. ITU also organizes TELECOM events and was the lead organizing agency of the World Summit on the Information Society.

ITU is based in Geneva, Switzerland, and its membership includes 191 Member States and more than 700 Sector Members and Associates.

⁶ These include Satellite Digital Radio (SDR) services provided by Sirius/XM.

⁷ Decision No. 626/2008/EC on the selection and authorisation of systems providing mobile satellite services (MSS)

Since 2005, ComReg has actively contributed to the work on MSS with CGC, initially through the CEPT working groups but more recently through the Communications Committee (CoCom) and Radio Spectrum Committee (RSCoM) of the EC⁸. Resulting from the work undertaken in these committees in 2007, the European Commission issued EC Decision 2007/98/EC⁹ and the Communications Committee's (CoCom) Authorisation sub-committee developed a selection process for provision of a pan-European MSS with CGC service that would provide mobile communications and multimedia services within its footprint.

Applications from interested parties were announced in the Official Journal of the EU 2008/C 201/03, issued in August 2008. Four expressions of interest were received and two MSS operators, Solaris and Inmarsat, were eventually selected¹⁰; each is authorised to use 2x15 MHz of spectrum¹¹ for delivery of a MSS with CGC on a pan-European basis.

It is now appropriate to hold a consultation on how these services should be regulated on a permanent basis in Ireland.

2.1 System Description

The main elements of an 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 the 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 may typically be either handsets or other user terminals (such as mobile terminals built into vehicles).

The elements of the network (apart from any roamed coverage on partnering networks) are normally under the direct control of the network operator via the satellite segment, comprising the Earth Station and MSS satellite. It should be noted that this fully dependent operation is reflected in the relevant EC Decisions. This means that operation of the CGC in the absence of MSS network control is a matter for Member States to regulate. The frequencies to be used by the CGC should be in the same frequency band as those used by the satellite and those CGC frequencies are assigned on condition that their use is under the control of the MSS network operator.

The CGC element not only overcomes the impact of shadowing of the satellite signal by buildings, geographical features and other 'clutter' using ground-based transmitters to fill in the shadow areas but also provides for increased network capacity and subsequent decrease in latency in traffic hotspots. Thus the overall quality of service is improved. The near blanket coverage of the MSS signal also allows for the rapid deployment of temporary CGCs to disaster areas and emergency situations both within coverage 'blackspots' and in areas where the normal communications networks have failed. Furthermore, the content distributed by the MSS with CGC may be comparable to that

⁸ The progress at EC level is dealt with in detail in Section 2.2.2 of this consultation paper

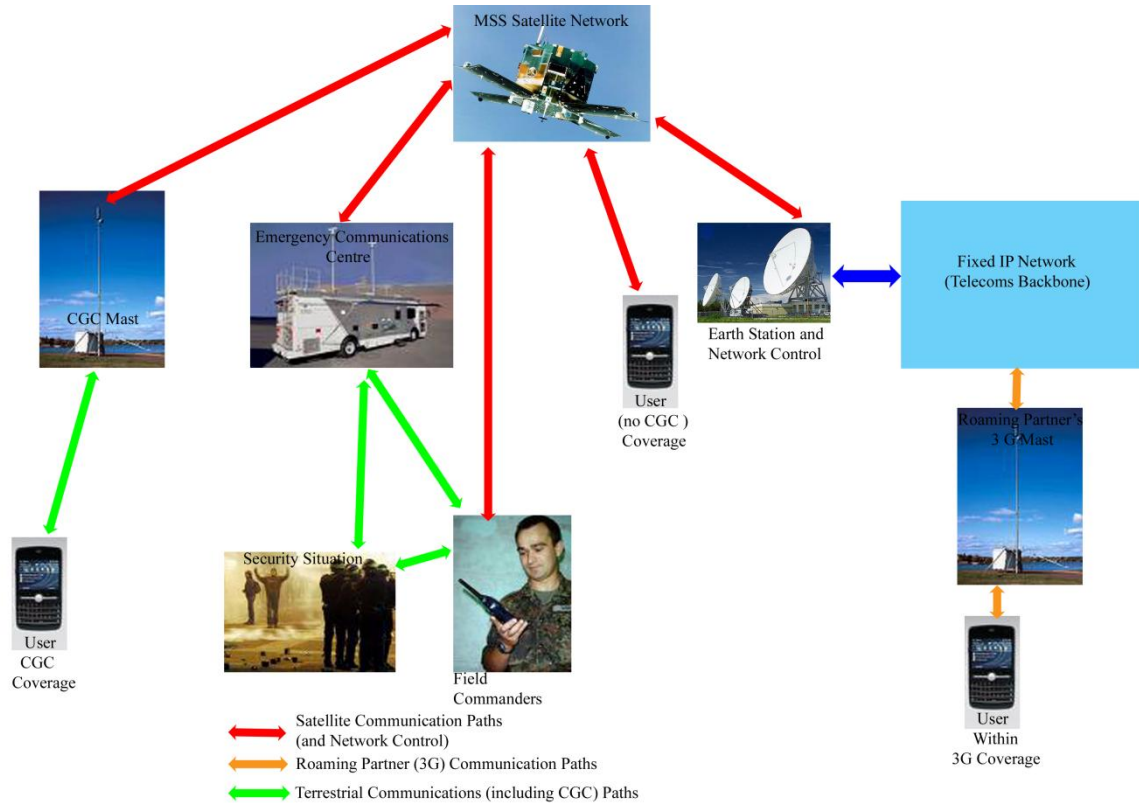
⁹ 2007/98/EC on the harmonised use of radio spectrum in the 2GHz frequency bands for the implementation of systems providing mobile satellite services.

¹⁰ The selection criteria used by the EU are presented in appendix B of this document and the Commission's conclusion is detailed EC Decision 2009/449/EC

¹¹ Inmarsat; 1980-1995MHz (E to S), 2170-2185MHz (S to E); Solaris; 1995-2010MHz (E to S) and 2185-2200MHz (S to E).

provided by other terrestrial networks and MSS with CGC handsets could have roaming capabilities with conventional mobile networks.

Figure 1; Generic Diagram of an MSS with CGC Network



2.2 International Developments

2.2.1 Developments in CEPT

Work on MSS with CGC was initiated in the CEPT ECC¹² working groups in 2004 and was supported by an EC mandate¹³ in 2005. This resulted in two key documents. The first document is CEPT Report 13, which addresses the compatibility between MSS with CGC and existing services in adjacent bands. The report includes the technical conditions to ensure compatibility with these services. The second document is an ECC Decision¹⁴ which designates the frequency bands 1980-2010MHz and 2170-2200MHz for use by systems in the MSS including those supplemented by a CGC and defined the technical conditions to be observed by such systems in order to ensure compatibility with mobile systems operating in adjacent frequency bands.

¹² Electronic Communications Committee

¹³ EC Mandate on Mobile Harmonised technical conditions for the use of the 2 GHz bands for Mobile Satellite Services in the European Union

¹⁴ ECC/DEC/(06)09 ECC Decision of 1 December 2006, amended 5 September 2007 on the designation of the bands 1980-2010MHz and 2170-2200MHz for use by systems in the Mobile Satellite Service including those supplemented by a Complementary Ground Component (CGC)

2.2.2 *Developments in the European Commission*

On 14 February 2007, the European Commission issued EC Decision 2007/98/EC¹⁵. Furthermore, CoCom's Authorisation sub-committee developed a selection process for the provision of a pan-European MSS with CGC service providing mobile communications and multimedia services within its footprint.

ComReg, on behalf of Ireland, has been an active participant at CoCom on this subject, ensuring that a greater weighting in the selection process was given to satellite coverage¹⁶ for the more geographically peripheral Member States. It should be noted that CGC systems deployed in this context are complementary and intended to prevent shadowing caused by ground-level 'clutter'; they are not intended to provide independent coverage outside of the satellite footprint.

Following publication of Decision 626/2008/EC, the call for applications from interested parties was announced in the Official Journal of the EU 2008/C 201/03, issued in August 2008. Four expressions of interest were received, and two MSS operators, Solaris and Inmarsat, were selected¹⁷. Each is authorised to use 2x15 MHz of spectrum¹⁹ for delivery of a MSS with CGC on a pan-European basis.

Further work is ongoing in CoCom at the Authorisation sub-committee to discuss enforcement and compliance strategies with the project milestones as well as ensuring subsequent coverage targets are met by the successful applicants.

2.2.3 *Developments at ETSI (European Telecommunications Standardisation Institute)*

ETSI, under mandate from the European Commission, has been tasked with developing a Harmonised European Norm EN 302 574 (Parts 1, 2 and 3). This work has been facilitated by ETSI's Satellite and Earth Station Systems (SES) Working Group. At the time of writing work has yet to be concluded on the draft standard and as such it is not yet publicly available.

2.2.4 *Advances in Other Countries*

2.2.4.1 United Kingdom

The United Kingdom NRA, Ofcom, first consulted on the issue of authorising MSS with CGC on 15 January 2008. On 3 November 2008, Ofcom issued a statement setting out

¹⁵ 2007/98/EC on the harmonised use of radio spectrum in the 2GHz frequency bands for the implementation of systems providing mobile satellite services.

¹⁶ See section 3.2.3 of this document.

¹⁷ The selection criteria used by the EU are presented in appendix B of this document and the Commission's conclusion is detailed in EC Decision 2009/449/EC

¹⁸ Two challenges to EC Decision 2009/449/EC were lodged in the European Court of First Instance. The first of these actions by Terrestar Europe Limited was rejected by the Court on 10 July 2009. The second action by ICO-Global is currently ongoing.

¹⁹ Inmarsat; 1980-1995MHz (E to s), 2170-2185MHz (s to E); Solaris; 1995-2010MHz (E to s) and 2185-2200MHz (s to E).

the high level issues and initiated a second consultation. Ofcom has also published a statement on the 'Authorisation of terrestrial mobile networks complementary to 2GHz Mobile Satellite Systems MSS'. The statement signals the regulatory model that Ofcom intends to use and it includes features such as spectrum masks to avoid interference, the applicable licence fee including AIP issues, detailed licence conditions, and the possibility of the CGC offering different content or services to those offered while still remaining under the control of the MSS network gateway.

Ofcom has further clarified its intentions by proposing to cancel the ICO-P²⁰ MSS assignments, thus effectively clearing the relevant frequency bands in the UK for use by MSS with CGC systems and eliminating the chance of intersystem interference between conventional MSS and MSS with CGC.

2.2.4.2 United States (Federal Communications Commission)

The FCC issued an order and Notice of Proposed Rulemaking²¹ in January 2003. The FCC received many comments on the proposed rulemaking and the rulemaking was subsequently adopted allowing the use of MSS with Ancillary Terrestrial Components (ATCs) in the 1.4, 1.6 and 2GHz bands.

²⁰ ICO-P is ICO's proposed Personal Satellite Communications Solution and was to operate in the 2GHz MSS bands

²¹ FCC 03-15 Notice of Proposed Rule Making; Flexibility for delivery of communications by Mobile Satellite Service providers in the 2GHz band, the L band and the 1.6/2.4GHz bands.

3 Regulatory Issues

This section sets out the technical, economic and legal issues that need to be taken into account when considering how to implement a regime that can best facilitate the operation of MSS with CGC systems within Ireland.

3.1 General Issues

Under the Policy Directions from the Minister for Communications Energy and Natural Resources²², ComReg is directed to promote ‘sustainable competition between Other Authorised Operators (OAOs) and incumbents across different technical platforms and markets’ and ‘remove barriers to market entry’.

Authorisation for the MSS component of the MSS with CGC has been performed at the European level by the EC. Two operators were selected to share the dedicated frequency band with each operator being assigned 2 x 15MHz on a pan-European basis. While the MSS component is authorised centrally, individual NRAs such as ComReg will authorise the CGC component within their respective jurisdictions. While it is expected that CGC authorisation models will be relatively similar across Europe, NRAs do 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.

3.1.1 *Obligations on Member States Arising from the EU Decision*

3.1.1.1 Authorisation

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. They also require Member States to inform selected applicants of those rights.

Decision 626/2008/EC sets out the common conditions to be incorporated into any national authorisation scheme. They are:

- (a) selected applicants shall use the assigned radio spectrum for the provision of MSS;*
- (b) selected applicants shall meet milestones six to nine set out in the Annex [of the Decision] within 24 months of the selection decision adopted pursuant to Articles 5(2) or 6(3);*
- (c) selected applicants shall honour any commitments they give in their applications or during the comparative selection procedure, irrespective of whether the combined demand for radio spectrum exceeds the amount available;*

²² Directions by the Minister for Communications Energy and Natural Resources to the Commission for Communications Regulation under Section 13 of the Communications (Regulation) Act 2002 as amended.

- (d) *selected applicants shall provide to the competent authorities of all Member States an annual report detailing the status of development of their proposed mobile satellite system;*
- (e) *any necessary rights of use and authorisations shall be granted for a duration of eighteen years from the date of the selection decision adopted pursuant to Articles 5(2) or 6(3).'*

And similarly for the CGC;

- '(a) operators shall use the assigned radio spectrum for the provision of complementary ground components of mobile satellite systems;*
- (b) 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;*
- (c) 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;*
- (d) 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.'*

3.1.1.2 Monitoring and Enforcement

The EC Decision requires that *'Member States shall ensure that rules on enforcement, including rules on penalties applicable in the event of breaches of the common conditions provided for in Article 7(2), are in accordance with Community law, in particular Article 10 of Directive 2002/20/EC. Penalties must be effective, proportionate and dissuasive. Member States shall ensure monitoring of compliance with these common conditions and take appropriate measures to address non-compliance.'* Under this Decision Member States are required to inform the Commission of the results of the monitoring on an annual basis and of the enforcement measures undertaken to deal with any non-compliance.

ComReg thus considers it appropriate to include monitoring conditions in any MSS with CGC licence that it grants. These will include conditions mandating each MSS with CGC licensee to supply ComReg on request with;

- Maps showing the planned coverage of Ireland in 6dB contours,
- At the licensee's own expense a fully operational handset and 'SIM' card to be used by ComReg for independent coverage verification.
- Each MSS with CGC licensee will also be required to undertake an annual field survey consisting of twenty measurements on radii spaced at 18° intervals centred on Mullingar²³, over the jurisdiction of Ireland. The outer test point will be at the sea-land boundary and the inner test point at that distance divided by two or the nearest practical measurement point thereto.

²³ 53.528° N, 7.358°E

Q. 1. Does the proposed methodology ensure that the MSS coverage footprint is adequately assessed?

Q. 2. Are there any other methodologies ComReg should consider?

Please provide reasons for your answers, and any relevant supporting data.

3.1.1.3 Other Systems

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.

3.2 Spectrum and Technical Issues

A key technical issue is the possibility of interference to terrestrial mobile networks in adjacent frequency bands (below 1980 MHz and between 2010 MHz and 2170 MHz) from the MSS-related transmissions, in particular from the CGC or from customers' multimode mobile terminals (User Equipment). For other technical issues please see CEPT Report 13, available at www.eco.dk.

3.2.1 Relevant Spectrum Allocations in the 2GHz Bands

At the global level;

In Article 5 of the Radio Regulations of the ITU, the frequency bands 1980-2010 / 2170-2200 MHz are allocated to the following services on a co-primary basis with other services in the same bands:

- 1980-2010 MHz: Mobile Satellite Service (Earth-to-space); Mobile Service; Fixed Service.
- 2170-2200 MHz: Mobile Satellite Service (space-to-Earth); Mobile Service; Fixed Service.

A certain number of footnotes are also referenced in these bands. The most relevant ones, as far as MSS is concerned, being No. 5.389A²⁴ which refers to ITU-R Resolution 716 dealing with coordination provisions and Fixed Service transitional arrangements and No. 5.351A²⁵ which refers to Resolution. 212 ("Implementation of IMT-2000") and Resolution. 225 ("Use of additional frequency bands for the satellite component of IMT-2000").

At the European level;

In the bands 1980-2010 MHz / 2170-2200 MHz, the following set of CEPT ERC/ECC Decisions apply:

²⁴ This allows the use of the band by MSS subject to coordination under Article 9.11A of the Radio Regulations.

²⁵ This footnote allows the continuing use of other systems which are already operational and ensures the existing Fixed Service's co-primary status.

- ERC/DEC(97)03²⁶ "
- ERC/DEC(97)05²⁷: “”.
- ECC/DEC/(06)/09²⁸
- ECC/DEC/(06)/10²⁹
- ECC/DEC/(07)/04³⁰
- ECC/DEC/(07)/05³¹

It should be noted that Ireland has implemented these CEPT ERC³² and ECC Decisions on S-PCS.

3.2.2 Interference Issues and Appropriate Band Edge Masks

The proposed bands of operation for MSS with CGC are:

- The Earth to space (E-s) satellite segment and terrestrial Uplinks (U/L) would operate in the 1980-2010MHz band
- the space to Earth (s-E) satellite segment and terrestrial Downlinks (D/L) would operate in the 2170-2200MHz band.

This could lead to a high possibility of interference into the lower adjacent 3G frequency assignments, i.e., the 1980MHz uplinks (mobile handset transmit and base station receive) and 2170MHz downlink (base station transmit and mobile handset receive). The different forms of interference that may occur are described in detail in Appendix C. ComReg considers that these various forms of interference between systems can be dealt with in different ways, including use of filters, adjusting the relative power outputs of the systems and the use of the following 3G block edge masks, which ComReg intends to stipulate in the licence.

²⁶ on the harmonised use of spectrum for Satellite Personal Communications Services (S-PCS) operating within the bands 1610 - 1626.5 MHz, 2483.5 - 2500 MHz, 1980 - 2010 MHz and 2170 - 2200 MHz

²⁷ ERC Decision on free circulation, use and licensing of mobile earth stations of satellite personal communications services (S-PCS) operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz and 2170-2200 MHz within the CEPT and should be noted that this ECC Decision will be withdrawn on 21 December 2010.

²⁸ ECC Decision of 1 December 2006 on the designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service including those supplemented by a Complementary Ground Component (CGC) (ECC/DEC/(06)09) (2007/98/EC) amended 5 September 2007

²⁹ ECC Decision of 1 December 2006 on transitional arrangements for the Fixed Service and tactical radio relay systems in the bands 1980-2010 MHz and 2170-2200 MHz in order to facilitate the harmonised introduction and development of systems in the Mobile Satellite Service including those supplemented by a Complementary Ground Component

³⁰ ECC Decision of 21 December 2007 on free circulation and use of mobile satellite terminals operating in the Mobile-Satellite Service allocations in the frequency range 1-3 GHz

³¹ ECC Decision of 21 December 2007 on exemption from individual licensing of land mobile satellite terminals operating in the Mobile-Satellite Service allocations in the frequency range 1-3 GHz

³² The (ERC) European Radiocommunications Committee was the forerunner of the ECC.

Figures 2 and 3 show the 3G handset and base station block edge masks.

Figure 2: IMT-2000 UE Spectrum Emissions Mask Requirement (UTRA FDD MS)

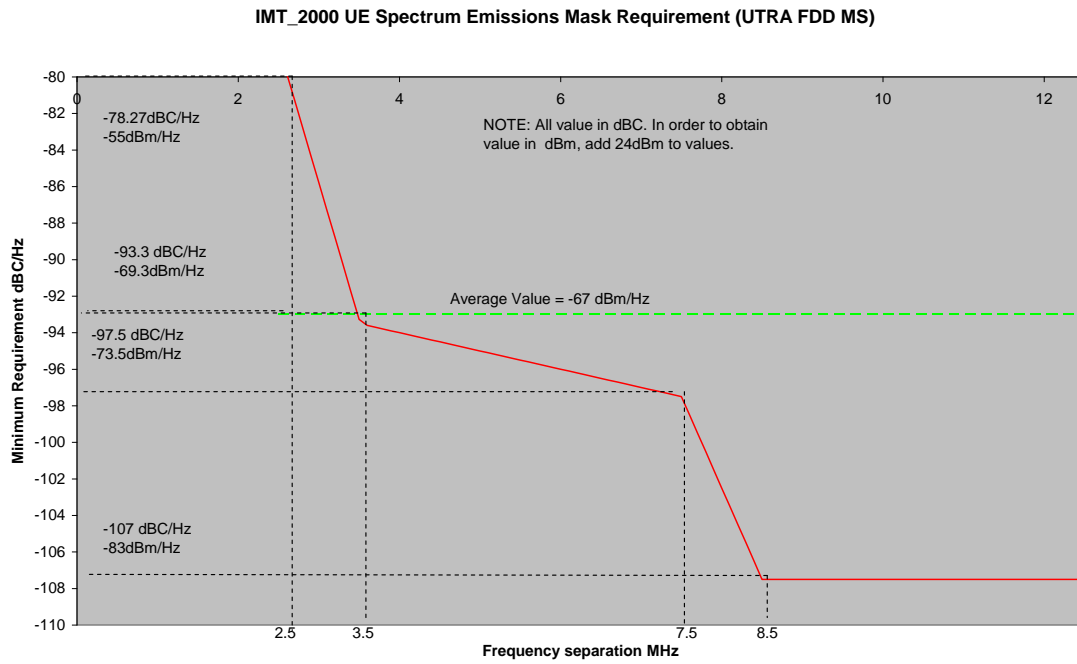
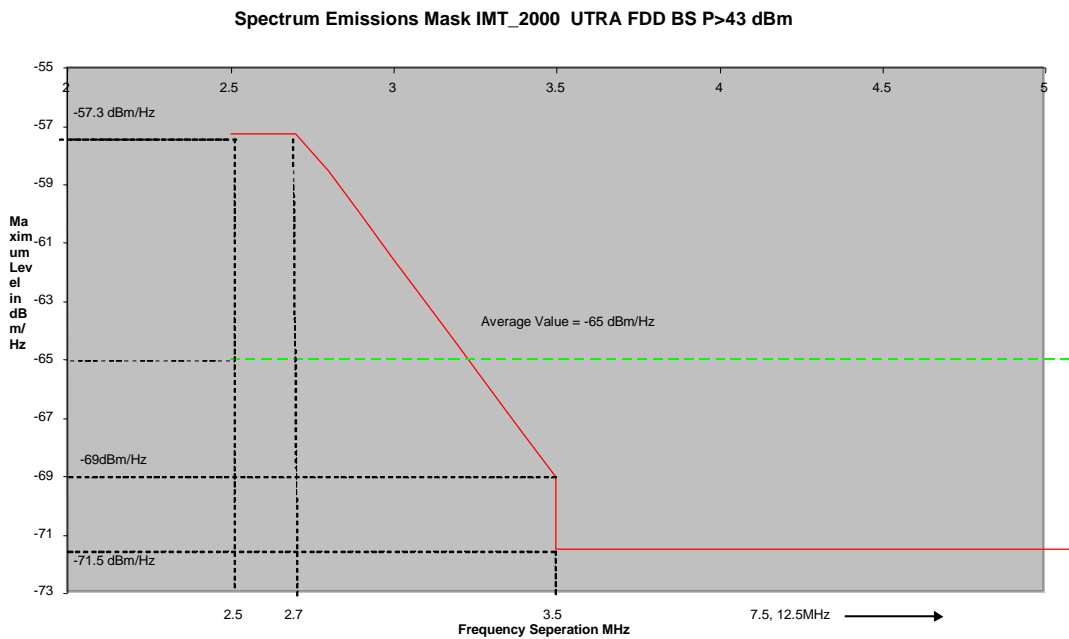


Figure 3: Spectrum Emissions Mask IMT-2000 UTRA FDD BS P>43 dBm



3.2.3 EU Roll Out (coverage) Obligations

The coverage conditions stipulated by the EU are ;

- The MSS proposed shall cover a service area of at least 60% of the aggregate land area of the Member States, from the time the provision of MSS commences and
- MSS shall be available in all Member States and to at least 50% of the population and over at least 60 % of the aggregate land area of each Member State by the time stipulated by the applicant but in any event no later than seven years from the date of publication of the Commission's decision adopted pursuant to Articles 5(2) or 6(3).

The implications for Ireland are that within seven years the MSS satellite footprint should cover no less than 42,125km² of the geographic area³³ of the State and encompass a population of 2.1199 million³⁴.

3.2.4 Spectrum Sterilisation

Spectrum Sterilisation could occur in three circumstances - launch failures, commercial failure of the service, or extensive delays in the satellite network coming into service. Without a methodology to release the spectrum, should any of these events occur the pan-European allocation presents a significant risk of preventing the re-allocation of spectrum to other potential users.

When licensing the system ComReg proposes, as per the EC Decisions, to make the use of the spectrum conditional on the EC roll-out targets being achieved within the stipulated timescales. These will form a Schedule to the License or Spectrum Rights of Use issued. Should the operator not achieve the targets set out by the EC then the ComReg will consider making the spectrum available for other services.

Q. 3. Is the methodology set out above sufficient to prevent interference to Terrestrial Mobile networks? What improvements should be made, if any? Please provide reasons for your answers, along with any relevant supporting data.

³³ <http://www.cso.ie/statistics/areabyprovince.htm>, Area of the State 70,208km²

³⁴ http://www.cso.ie/releasespublications/documents/other_releases/northsouth2008/population_andvitalstatistics.pdf, Population of the State 4.2398 million

3.2.5 Numbering Related Issues

ComReg is responsible for the effective management and administration of the National Numbering Scheme. This includes all national numbering resources used for the provision of mobile services within the State.

Given that the proposed service is to be provided on a pan-European basis, ComReg's preliminary view is that a pan-European or international numbering range would be most appropriate. ComReg anticipates that providers of MSS with CGC will first seek to obtain such numbers. International numbering resources of this kind would be similar to those already used by satellite telephony providers.

In the event that such numbers are found to be unavailable for this purpose, ComReg would carefully consider whether it is appropriate for mobile numbers, in the national format 08X XXXXXXXX, to be allocated for the provision of MSS with CGC. As numbers are a finite national resource, there needs to be a justifiable reason for issuing national numbers for these international services.

Q. 4. Do you agree with ComReg's preliminary view that a pan-European or international numbering range would be appropriate for MSS with CGC? Please provide reasons for your answers, and any relevant supporting data.

3.3 Licensing Framework

A key objective for ComReg in proposing to authorise or otherwise license MSS with CGC is to ensure that the rights of use of existing licensees are protected. This is balanced with ComReg's statutory objectives, as set down in legislation, to encourage innovation and promote competition.

ComReg's view is that if MSS with CGC systems comply with the adjacent 3G band edge mask then there should be no discernable interference to terrestrial 3G networks. As such, it is reasonable to conclude that there would appear to be little or no risk to the MNOs' existing networks in Ireland.

Q. 5. Do you agree that authorisation of MSS with CGC systems will not have any undue effect on Irish Mobile Network Operators? Please provide reasons for your answers, and any relevant supporting data.

3.3.1 Licensing Regime Structure

To ensure the successful operation of MSS with CGC systems there is a need to establish a regulatory basis, both here and internationally, to allow their use while also ensuring that interference to adjacent systems is minimised. As GSM and 3G mobile phone terminals are already exempt from licensing³⁵, it can be expected that handsets and other devices used in conjunction with the MSS with CGC service could be handled in a similar manner and furthermore it is envisaged that the MSS with CGC provider could operate under a General Authorisation, with a Spectrum Right of Use (wireless telegraphy licence) for the CGC issued under the Wireless Telegraphy Act 1926.

In terms of spectrum rights of use, ComReg considers the law to be quite clear. The owner of spectrum is the Irish State, and as the NRA ComReg administers spectrum and licences operators to use particular pieces of spectrum for the fixed duration of their licences. The fact that an operator is licensed to use a particular piece of spectrum does not imply that the operator owns that spectrum; the operator merely has the non-exclusive right of use of that spectrum, for a defined period and under certain conditions.

As outlined above there are several licensing regimes which ComReg may consider for regulation of MSS with CGC in Ireland, (including both the space and ground segments). The options are:

Option A General Authorisation³⁶,

³⁵ Wireless Telegraphy Act, 1926 (Section 3) (Exemption of Mobile Telephones)(Amendment) Order, 2003: S.I. No. 158 of 2003, Wireless Telegraphy Act, 1926 (Section 3) (Exemption of DCS 1800 Mobile Terminals) Order, 1999 (S.I. No. 107 of 1999), Wireless Telegraphy (Mobile Telephones) Exemption Order, 1997 (S.I. No. 409)

³⁶See; http://www.comreg.ie/publications/conditions_of_general_authorisation.583.101047.p.html and http://www.comreg.ie/publications/guidelines_relating_to_general_authorisations.583.101049.p.html

- Option B General Authorisation and CGC Spectrum Right of Use,
 Option C General Authorisation and CGC Spectrum Right of Use coupled with an
 Exemption Order for the Handsets (User Equipment),

Furthermore, ComReg is mindful of the work involved in licensing such a system and also notes past commercial failures which have occurred in similar areas. Therefore, in order that the spectrum is not sterilised unnecessarily, review periods may be considered as detailed below which would fit within the overall duration required by the EC decisions.

3.3.2 *Proposed Licence Duration*

As the overall duration has already been set on a pan-European basis by the Commission at 18 years, ComReg is considering how to structure the licence and its relevant review periods which are consistent with this requirement. This would be to issue a single licence of 18 years duration, with formal reviews of the licence in years three and twelve.

The results of these reviews would determine whether a licence would be renewed or otherwise terminated. In addition, ComReg would propose to reserve the right to terminate the licence prior to normal termination within 18 months of the failure of an associated space segment which provided MSS coverage of Ireland.

3.3.3 *Proposed Spectrum Access Fees*

In proposing spectrum access fees for this band, ComReg has to be cognisant of the usage of this band in terms of the services it provides, the efficiency of the technology used and the potential for the award of this spectrum to impact on competition in the market. Therefore, it is appropriate to conduct a benchmarking exercise of the spectrum charges paid by existing licensees providing similar ECS, such as GSM, 3G and Mobile TV³⁷, as this band will be capable of providing a similar range of services. Spectrum access fees must be proportionate and reflective of the opportunity costs of the spectrum.

3.3.3.1 Comparison of Licence Fee structures

In preparing its proposals ComReg has been cognisant of the fees in current 3G licences and GSM licences³⁸. A further comparison has been made with the proposed mobile TV licence fees and subsequently a formula has been used to determine what an equivalent fee would be for a MSS licence³⁹, based on an 18 year licence duration.

The fees for 3G licences are set out in the Wireless Telegraphy (Third Generation and GSM Mobile Telephony Licence)(Amendment) Regulations 2003⁴⁰. The spectrum access fees are dependent on the licence chosen by the successful applicants and reflect the obligation offered by the applicant. For example, a discount was offered to the ‘A’ licensee

³⁷ See the system description in Section 2.1

³⁸ GSM and 3G licences are national licences, i.e. for up to 100% coverage.

³⁹ 2x15MHz of Spectrum per MSS with CGC operator, as described in Section 2 of this document.

⁴⁰ S.I. No. 340 of 2003

as it had more onerous roll-out and coverage conditions and compulsory MVNO obligations in comparison to the so-called 'B' licences. Furthermore there was a deferral of fees in the first 5 years, where a bond was held on behalf of ComReg in lieu of the fees should a default in the licence occur. This was designed to allow the licensee to concentrate on the establishment of the network. The 'A' licence fees were set at €50.7M⁴¹, for the 20 year licence, with an initial payment of €12.7M on accepting the licence. Based solely on the 3G licence fees, for access to 2 x 15 MHz of spectrum each MSS with CGC operator would pay €39.111M over the 18-year licence duration proposed or equivalently €2.17M per annum⁴².

A similar exercise can be used in the case of the GSM operators. Currently these operators pay €25,395 per paired 0.2MHz channel. This would suggest a pro-rata per annum charge of approximately € 1.904M for the paired 15MHz block.

Under ComReg's proposed Mobile TV licence fee framework⁴³, a spectrum fee of €340k per annum will be charged for an 8MHz block with regional coverage. This would translate to €1.275M per annum for each MSS with CGC operator on a pro-rata basis.

Combining the results of these three comparisons, indicates that spectrum access fees in the range of €1M to €2M per annum might be appropriate for an 18 year MSS with CGC licence and ComReg is of the view that any fees charged in relation to the MSS with CGC system could be adjusted on a pro-rata basis in proportion to the percentage coverage of the State.

3.3.3.2 Deferral of Spectrum Fees

In common with 3G, and due to the size of investment required, the possibility of fee deferral could be considered for the first three years with the operator being required to institute a bond to that value, in favour of ComReg. This would result in the bond being paid to ComReg, should the operator default on either the coverage targets in the licence or its business, in turn, fail commercially.

⁴¹ for 2 x 15MHz (FDD) and an additional 5MHz of TDD spectrum

⁴² This is calculated pro rata as follows; **F = BWmss x (T/D)/BW**

F=Annual MSS with CGC Fees (€), T= 3G fees (€)

D=3G Licence Duration (years),

BW=3G Bandwidth (MHz), BWmss= MSS Bandwidth (MHz)

⁴³ <http://www.comreg.ie/fileupload/publications/ComReg0963.pdf>

Q. 6. In your view how should the licensing regime be structured, please refer to suitable review periods as outlined above? To enable analysis of responses please detail your reasoning in terms of infrastructure costs etc.

Q. 7. Comparing spectrum charges for providers of similar ECSs, what is the appropriate yearly charge for this spectrum band and are there any other benchmarks do you consider appropriate in arriving at your proposal for spectrum access fees?

Q. 8. What, in your view, is the most appropriate licensing approach based on those detailed above, i.e., Option A, B or C ? Please provide reasons for your answer.

3.4 International Issues

While ComReg will adopt the EC Decision 626/2008 and is cognisant of CEPT Report 13, the prima facie international issue that has to be considered is that of international coordination of the use of radio frequencies. This is the methodology by which adjacent administrations share the frequency spectrum along joint border areas. In general there are three basic methods: international treaties such as the Radio Regulations of the ITU, collective agreements under the auspices of regional organisations such as CEPT and finally bilateral agreements between Sovereign States.

However, in this case as the proposed band of operation⁴⁴ for MSS with CGC has been cleared on a pan-European basis, initially for S-PCS⁴⁵ in the mid to late nineties, there should be minimal disruption to other services, particularly if the UMTS spectrum mask is observed in relation to adjacent channels. Furthermore the UK's proposed decision to cancel their ICO-P MSS assignments should effectively clear the band for use by MSS with CGC. This could render the comments contained in CEPT Report 13, in regards to intersystem interoperability and protection with the ICO-P system, obsolete.

Q. 9. In regulating MSS with CGC are there other issues, not covered in the consultation that should be taken into account? If so please indicate what they are and give reasons?

⁴⁴ Earth to space (E-s) satellite segment and terrestrial Uplinks (U/L) 1980-2010MHz, the space to Earth (s-E) satellite segment and terrestrial Downlinks (D/L) would operate in the 2170-2200MHz band

⁴⁵ Satellite Personal Communications Systems

4 Submitting Comments

All comments are welcome: however it would make the task of analysing responses easier if comments were referenced to the relevant question numbers from this document.

The consultation period will run from 18 December 2009 to 08 February 2010, during which the Commission welcomes written comments on any of the issues raised in this paper.

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

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 05/24. We would request that electronic submissions be submitted in an-unprotected format so that they can be appended into the ComReg submissions document for publishing electronically.

Please note

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.

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

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

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.

Appendix A; List of Consultation Questions

Q. 1. Does the proposed methodology ensure that the MSS coverage footprint is adequately assessed?

**Q. 2. Are there any other methodologies which ComReg should consider?
Please provide reasons for your answers, and any relevant supporting data.**

Q. 3. Is the methodology set out above sufficient to prevent interference to Terrestrial Mobile networks? What improvements should be made, if any? Please provide reasons for your answers, along with any relevant supporting data.

Q. 4. Do you agree with ComReg's preliminary view that a pan-European or international numbering range would be appropriate for MSS with CGC? Please provide reasons for your answers, and any relevant supporting data.

Q. 5. Do you agree that authorisation of MSS with CGC systems will not have any undue effect on the market for Irish Mobile Network Operators? Please provide reasons for your answers, and any relevant supporting data.

Q. 6. In your view how should the licensing regime be structured, please refer to the optimal duration and suitable review periods as outlined above? To enable analysis of responses please detail your reasoning in terms of infrastructure costs etc.

Q. 7. Comparing spectrum charges for providers of similar ECSs, what is the appropriate yearly charge for this spectrum band and are there any other benchmarks do you consider appropriate in arriving at your proposal for spectrum access fees?

Q. 8. What, in your view, is the most appropriate licensing approach based on those detailed above, i.e., Option A, B or C? Please provide reasons for your answer.

Q. 9. In regulating MSS with CGC are there other issues, not covered in the consultation that should be taken into account? If so please indicate what they are and give reasons?

Appendix B; EU Selection Criteria

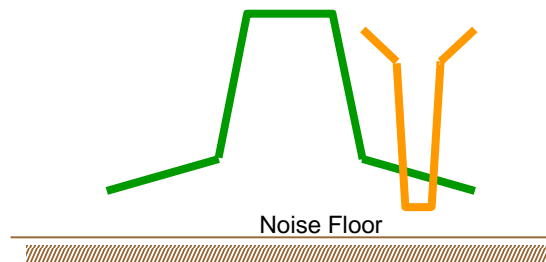
- *Consumer and competitive benefits provided (20 % weighting) comprising the following two sub-criteria:*
 - (i) *the number of end-users and the range of MSS to be provided by the date of commencement of the continuous provision of commercial MSS;*
 - (ii) *the date of commencement of the continuous provision of commercial MSS;*
- *Spectrum efficiency (20 % weighting) comprising the following two sub-criteria:*
 - (i) *the total amount of spectrum required;*
 - (ii) *the aggregated data stream capacity;*
- *Pan-EU geographic coverage (40 % weighting) comprising the following three sub-criteria:*
 - (i) *the number of Member States in which at least 50 % of the population is within the service area by the date of commencement of the continuous provision of commercial MSS;*
 - (ii) *the degree of geographical coverage, based on the service area of the aggregate land area of the Member States by the date of commencement of the continuous provision of commercial MSS;*
 - (iii) *the time stipulated by the applicant when MSS will be available in all Member States and to at least 50 % of the population and in at least 60 % of the aggregate land area of each Member State;*
- *The extent to which public policy objectives, not dealt with by the criteria referred to in the first three points are achieved (20 % weighting) in accordance with the following three equally weighted sub-criteria:*
 - (i) *the provision of public interest services contributing to the protection of health or safety and security of citizens in general or specific groups of citizens;*
 - (ii) *the integrity and security of services;*
 - (iii) *the range of services provided to consumers in rural or remote areas.*

In accordance with Article 6(2) of the Decision, the following sections set out the rules implementing the selection criteria, including the respective scores to be attributed to applicants on the basis of their commitments regarding the selection criteria.

Appendix C; Description of Interference Scenarios

The following description and diagrams explain the concept of this type of interference. Figure 4 shows how Out-of-band emissions (green) by a mobile terminal of one technology transmitting on one carrier, can impact the receiver of the other technology (amber) on another carrier by raising the receiver's noise floor.

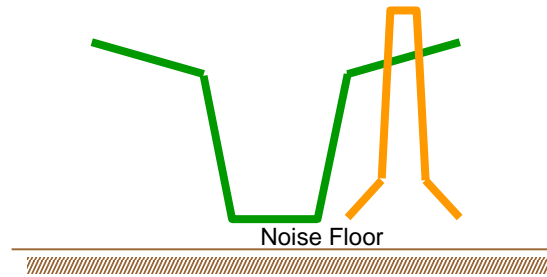
Figure 4: Out-of-band emissions impacting receiver of another technology



The result of the interference is an effective reduction in the usable receiver sensitivity, Figure 4, which will lead to a reduced link budget margin. Normally a receiver cannot do anything about this unwanted noise, however it is possible to reduce sideband emissions at the transmitter source through the use of filters or by using a band edge mask with steeper side skirts. It is also possible to accommodate this kind of interference in the system design, by adjusting the relative powers of the two systems or by changing the link budget margin requirements.

A second type of interference is caused by de-sensitisation of a receiver by a strong interferer in an adjacent channel (Fig. 5). In this case, the interfering signal can be strong enough to impact the Radio Frequency (RF) section of the 'front end' of the receiver including saturating any automatic RF gain function. This leads to a severe impact on the Intermediate Frequency (IF) performance of the receiver, if enough signal slips past the IF filters.

Figure 5: Desensitisation of a receiver by an interferer in an adjacent channel



The result of such interference, apart from overload and an increase of distortion products, is a reduction in receiver sensitivity through quieting, disabling any automatic RF gain control the receiver may have, thus preventing reception of desired signals at low levels.

However it is possible to reduce this kind of interference through the use of filters at the affected receiver or by changing the system design parameters to ensure the desired signal levels are sufficiently strong enough to overcome deterioration of receiver sensitivity. The most desirable way to limit the possibility of interference is to ensure that the new system is completely compatible with the existing system's block edge mask.