Commission for
Communications Regulation

Consultation Paper

Review of the Period 2008 – 2010 & Proposed Strategy for Managing the Radio Spectrum: 2011 – 2013.

Document No:	**11/28**
Date:	**12 April 2011**

All responses to this consultation should be clearly marked:- "Reference: Submission re ComReg 11/28" as indicated above, and sent by post or e-mail to arrive on or before 5 pm on 24 May 2011, to:

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Please note ComReg will publish all respondents submissions with the Response to this Consultation, subject to the provisions of ComReg's guidelines on the treatment of confidential information – ComReg 05/24

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1 Foreword

Radio frequency spectrum is a valuable national resource, underpinning important economic, social and communications activities. These range from use of mobile phones and mobile broadband by business and consumers, through broadcasting (sound and TV), emergency and defence communications, road, aeronautical and maritime transport and meteorological and scientific uses such as weather forecasting and monitoring the Earth's environment. All of these are reliant on appropriate and reliable access to the radio spectrum and it is, therefore, essential that this resource is managed effectively and efficiently. To help provide certainty and ensure the most efficient use is made of this scarce resource, the Commission for Communications Regulation (ComReg) develops a forward-looking spectrum management strategy.

During the period covered by this proposed strategy statement ("Proposed Strategy") we can expect to see significant developments affecting the use of the radio spectrum. These include the launch of Digital Terrestrial Television (DTT) services in spring 2011, followed by the cessation of analogue television transmissions in Ireland towards the end of 2012. This will facilitate the release of the 800 MHz band as part of the so called "Digital Dividend". Also in 2011, liberalisation of the use of the 900 MHz and 1800 MHz GSM bands will reach a key juncture with ComReg proposing to auction these bands and the 800 MHz band to facilitate the launch of next generation wireless services in these bands from the beginning of 2013[1]. These developments will lead to a transformation in the nature of consumer services such as television broadcast programming and mobile broadband over the coming years.

In drafting its Proposed Strategy, ComReg has taken into account its role, its statutory objectives and all relevant obligations. ComReg is also conscious of the development in Europe of the European Commission's Radio Spectrum Policy Programme which will impact on national spectrum policies and strategies in due course. This Proposed Strategy sets out what ComReg perceives to be the key issues needing to be addressed during the next two years. It also examines potential developments in the next 3 to 5 years with the aim of alerting users and industry to those issues. Feedback from interested parties is essential to the development of an effective and meaningful spectrum management strategy. ComReg welcomes your comments on the proposals in this document, and on what you see as the priorities in management of the radio spectrum during this period.

Alex Chisholm
Chairperson

Mike Byrne
Commissioner

[1] There may be an option for earlier release of some bands, see ComReg 11/11 Consultation – Interim Licences for the 900 MHz band – 17 February 2011.

2 Executive Summary

Radio spectrum is a medium by which information may be transmitted wirelessly over distances ranging from a few metres to thousands of kilometres. It has become essential for the continuing provision of our now-ubiquitous mobile communications and in wireless reception of broadcast services. It is fundamental to the safe operation of air and maritime transport and to the day-to-day operation of the defence forces and emergency services. Radio spectrum access is also vital to many important scientific applications. However, it is a finite natural resource and so best use must be made of it.

This document sets out ComReg's proposed strategy for managing the use of the radio spectrum in Ireland over the period from 2011 – 2013 ("Proposed Strategy"). During this period, there will be a number of important changes to spectrum allocation in Ireland. ComReg's aim is to ensure that Ireland derives the maximum benefits economically, strategically and socially from the use of the radio spectrum.

ComReg has considered the economic contribution made by the use of radio spectrum to the Irish economy and estimates that the contribution for 2009 was approximately €3.6 billion, or 2.2% of total GDP. A conservative estimate of the number of employees in Ireland whose jobs are dependent on the use of the radio spectrum was estimated at over 26,000 in respect of 2009.

A number of key drivers have been identified which have informed the Proposed Strategy, including:

- Rapidly-increasing demand from consumers for ubiquitous, high-speed internet access on both fixed and mobile devices;
- Increased demand on wireless communications services creating the risk of network congestion and reduced quality-of-service;
- The current economic climate and the challenges that poses to capital investment;
- The emergence of new radio technologies promising greater spectrum efficiency (such as Evolved High-Speed Packet Access (HSPA+), Long Term Evolution (LTE) and Cognitive Radio); and
- Increasing harmonisation of the most sought-after spectrum bands across Europe in accordance with European directives and decisions, making it critically important for ComReg to represent Ireland's interests in the development of future spectrum management policy.

The key radio spectrum related tasks arising in the 2011 – 2013 period are likely to include:

- Finalising the consultation process around the possible release, on a fully-liberalised basis, of the 800 MHz digital dividend, the 900 MHz and 1800 MHz bands;
- Facilitating the rollout of Digital Terrestrial Television (DTT) in Ultra High Frequency (UHF) bands IV and V below 790 MHz, and the switch-off of analogue television transmissions in 2012;

- Considering the release of new frequency bands for fixed links to meet market demand;
- Carrying out a review of the Fixed Wireless Access Local Area (FWALA) licensing scheme in the 3.6 GHz, 10.5 GHz and 26 GHz frequency bands;
- Considering the future use of the 2.6 GHz band taking into account the rights of current licensees as well as considering inputs received to date; and
- Carrying out a consultation on further technical and spectrum release options relating to the 2.3 GHz frequency band.

The structure of this document is as follows:

- Section 3 - which details: ComReg's role as spectrum manager; spectrum as Ireland's natural advantage; the use of the Test & Trial scheme to encourage wireless innovation; the economic and social impact that the use of spectrum has in Ireland; a summary list of potential spectrum opportunities; and a list of key licences due to expire between 2011 and 2021;
- Section 4 - which details ComReg's position on certain current spectrum management issues;
- Section 5 – which sets out ComReg's mission, high-level goals and strategic objectives, which, together with the strategy drivers identified above, underpin ComReg's proposed spectrum strategy;
- Section 6 – which details a strategy or action plan covering the next two years for each service that ComReg regulates; and
- Section 7 – which provides a medium term (three- to five-year outlook), with the aim of informing industry as to certain issues.

2.1 Submitting Comments

The consultation period on the Proposed Strategy will run until 5pm on 24 May 2011, during which time ComReg welcomes written comments on any of the matters raised in the Proposed Strategy.

ComReg welcomes input and comments from interested parties on any section of the Proposed Strategy including, in particular, on:

- Potential spectrum opportunities (see Table 3);
- Test & Trial Ireland licensing programme;
- Spectrum caps and any other factors that ComReg should consider;
- Issues relating to the opening of new fixed link bands (See Table 5); and
- FWALA channel arrangements in the 3.6 GHz band.

It would assist ComReg's analysis of submitted material if they are referenced to the relevant sections of the Proposed Strategy.

ComReg would also be grateful if respondents would clearly set out the reasoning for any views expressed, including available supporting information.

In order to promote further openness and transparency of this consultation process, ComReg will publish all submissions received to this consultation, subject to the provisions of ComReg's *Guidelines on the Treatment of Confidential Information.*[2]

It is requested that electronic submissions be submitted in an unprotected format to facilitate their publication in a compilation document.

ComReg does not expect that any of the issues raised in the Proposed Strategy would require respondents to provide confidential information. As it is ComReg's policy to make all responses available on its website and for inspection generally, however, respondents are requested to clearly identify any confidential material and, where possible, to place confidential material in a separate annex to their response.

In anticipation of any correspondence on matters relating to this document, ComReg gives notice that it will publish all material correspondence received in this regard. Such information will be treated in accordance with ComReg's *Guidelines on the Treatment of Confidential Information.*

2.2 Next Steps

Having taken into account all responses and material received in response to this consultation ComReg intends to finalise its strategy for managing the use of the radio spectrum in Ireland over the period from 2011 – 2013 and publish same.

[2] ComReg 05/24 Response to Consultation - Guidelines on the Treatment of Confidential Information - March 2005

3 Introduction: Spectrum Management in Ireland

Management of the radio spectrum involves the careful combination of administrative, regulatory and technical procedures to ensure the efficient operation of radiocommunication equipment and networks. A primary goal of spectrum management is to ensure optimal use of the radio spectrum, having regard to social, economic and technical considerations.

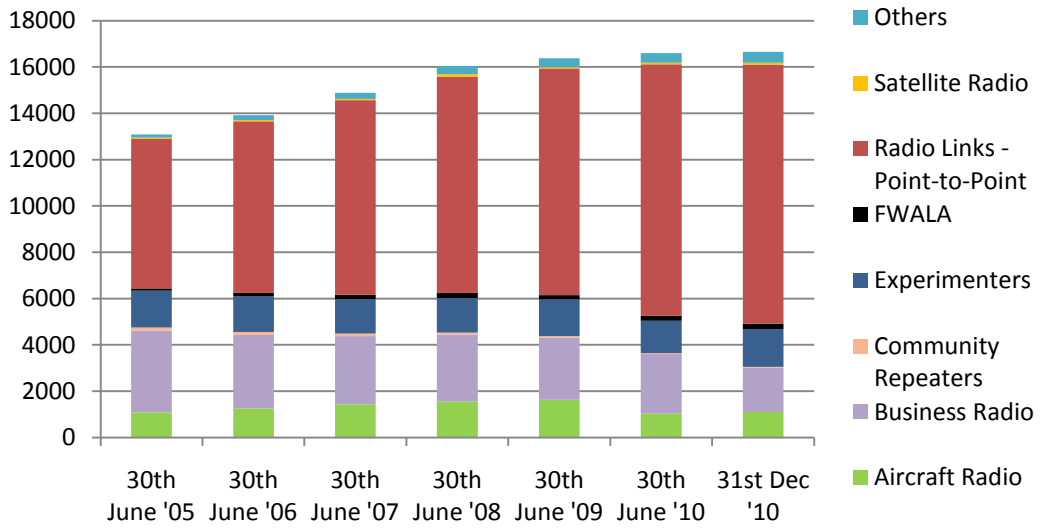
In managing the radio spectrum, ComReg must balance a range of often competing factors. These include, but are not limited to:

- ensuring that ComReg meets the requirements of all radio services and that there is a balance between commercial and public policy requirements;
- maximising social benefits arising from radio spectrum use. For example in relation to public safety, national security and health care;
- promoting competition and contributing to the development of the internal market; and
- enhancing Ireland's competitiveness by ensuring that adequate spectrum is allocated and assigned to users that will add the most value to society.

In addition, there is a need to ensure the efficient use of the radio spectrum within the bounds of spectrum constraints and technology developments. The regulatory process of ensuring the optimal use of radio spectrum is therefore required to be flexible and responsive in order to adapt to changes in technologies, demand, markets and public policy.

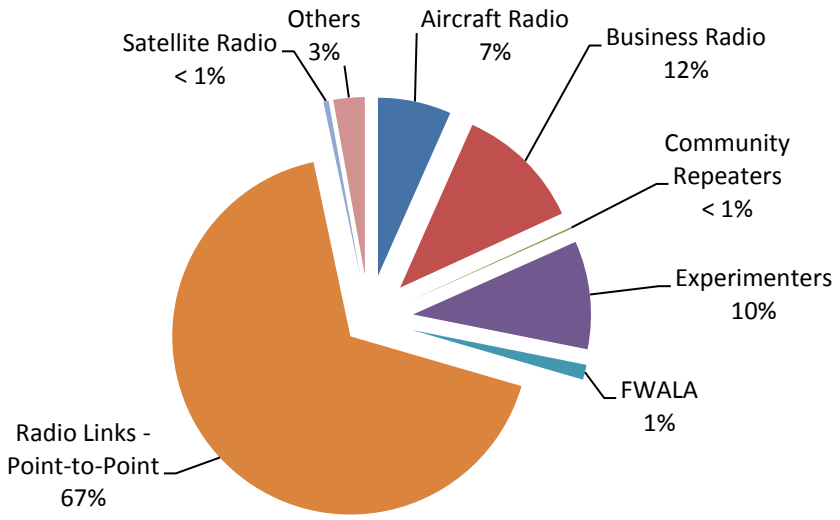
In some limited cases, it is recognised that spectrum rights may need to be set aside in order to safeguard the provision of certain public services such as safety and defence or to meet some international obligation related to spectrum use. The figure below shows the number of live/active licences excluding broadcast licences on ComReg's database since June 2005. There has been an increase of nearly 27% in total licence numbers over the five years June 2005 to June 2010.

Figure 1: Number of Active Radio Licences



A detailed breakdown by sector of the 16,656 licences active on 31 December 2010 appears in the figure below. The small number of licences under the "Others" category include 2G and 3G mobile services, which are of course major contributors to GDP. This is discussed further in section 3.2.

Figure 2: Breakdown of live licences as at 31 December 2010



3.1 ComReg's Role

As the National Regulatory Authority (NRA), ComReg is responsible for the regulation of the electronic communications sector (telecommunications, radiocommunications and broadcasting[3] transmission) in Ireland.

The Communications Regulation Act 2002 (as amended) ("the 2002 Act"), the Framework and Authorisation Regulations (S.I. No. 307 of 2003 and S.I. No. 306 of 2003 respectively), and the Wireless Telegraphy Acts, 1926 (as amended) (the "1926 Act") set out, amongst other things, functions and objectives of ComReg in relation to radio spectrum.

Apart from licensing apparatus for wireless telegraphy (and making regulations in relation to licences), these functions include the management of Ireland's radio frequency spectrum in accordance with relevant ministerial policy directions under section 13 of the 2002 Act, which ComReg is to carry out effectively, and in a manner serving to ensure that the allocation and assignment of radio frequencies is based on objective, transparent, non-discriminatory and proportionate criteria. In addition, in carrying out its role in relation to radio spectrum management ComReg must, amongst other things:

[3] In relation to broadcasting ComReg's role primarily relates to spectrum management and assignment issues. ComReg also has responsibility for regulation of broadcasting networks. Broadcast policy is decided by the Minister for Communications, Energy and Natural Resources and content issues are regulated by the BAI and the RTÉ Authority.

- ensure that measures taken are proportionate in ensuring the efficient management and use of the radio spectrum; and
- have regard to international developments in relation to the radio frequency spectrum.

Additionally, section 35 of the 2002 Act obliges ComReg to produce, publish and maintain the national Radio Frequency Plan. This plan details all radio frequency allocations in Ireland. The last complete revision took place in November 2008[4], with a number of minor revisions taking place in the interim, reflecting all relevant amendments and updates on both a national and international level applicable to Ireland[5]. The latest edition details several significant amendments that were introduced at the International Telecommunication Union (ITU) World Radiocommunication Conference held in 2007 (WRC-07), in addition to citing all required updates on national and European legislation, together with the applicable European Conference of Post and Telecommunications Administrations (CEPT) Decisions and Recommendations.

As radio frequencies naturally extend beyond national borders, spectrum management requires an in-depth knowledge of, and involvement in, European and global spectrum management developments. Much of the radio spectrum requires international planning and, in some cases, this constrains how specific frequencies or frequency bands may be used. This is particularly so in the aeronautical and maritime sectors, where, because of the global nature of these services, ships and aircraft must use specific frequencies for navigation and communication purposes. In addition, there are a number of internationally harmonised frequencies for commercial radio systems such as cellular (mobile) phones. The TV and radio broadcast bands have been harmonised for many decades, to facilitate co-ordination between neighbouring countries and the development of consumer markets.

Global regulation of the radio spectrum is primarily within the remit of the ITU, while regional regulatory functions lie with the European Union (EU) and CEPT. These bodies define the broad framework within which all spectrum users must operate, and in some cases have developed harmonised approaches to spectrum use in order to facilitate international services, open markets and minimise the risk of interference between users. The role of these international bodies and further details on the national framework for spectrum management is described in more detail in Appendix A.

To this end, ComReg plays an active role, along with the Department of Communication, Energy and Natural Resources (DCENR), in international fora to ensure that as far as possible the international allocation and regulatory framework accommodates Ireland's specific requirements. ComReg also participates in technical compatibility studies and in the development of technical standards to support more efficient and flexible use of the spectrum.

[4] ComReg 08/90 - Radio Frequency Plan for Ireland - 20 November 2008

[5] ComReg 08/90R - Radio Frequency Plan for Ireland *as revised* - 20 December 2009, ComReg 08/90R1 - Radio Frequency Plan for Ireland *as revised* - 23 December 2010.

ComReg has also given give due consideration to the recent Spectrum Policy Statement published by the DCENR[6]. This statement requires that in accordance with its functions under the 2002 Act and with due regard to the objective of ensuring the efficient management and use of the radio frequency spectrum, ComReg will manage the national radio spectrum resource in accordance with three core policy objectives and nine policy principles as detailed in that statement.

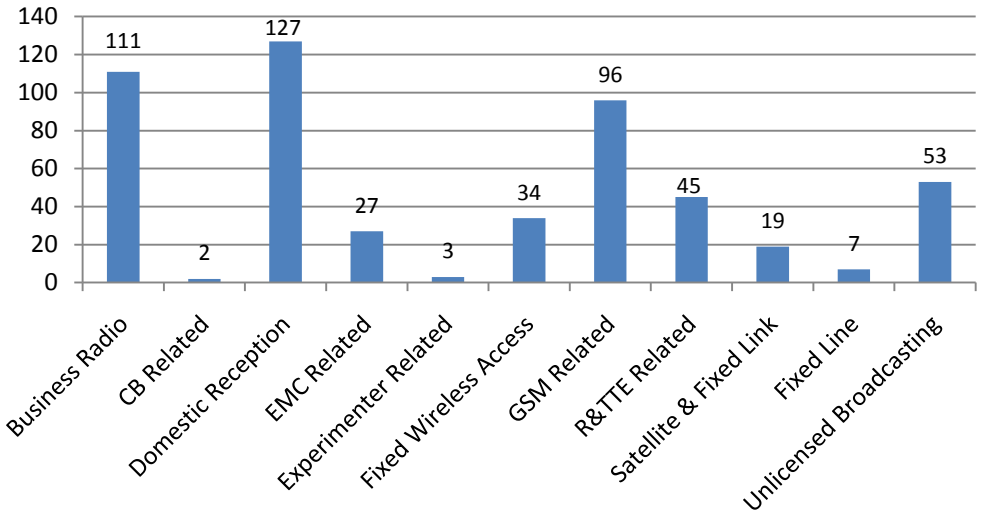
3.1.1 Compliance and Enforcement

ComReg is obliged under the Wireless Telegraphy Act and the 2002 Act to encourage the efficient use and ensure the effective management of the radio spectrum. This includes maintaining the integrity of the radio spectrum.

To this end, ComReg monitors licensed operators to ensure that they are in compliance with their licence conditions and investigates complaints of interference. ComReg also monitors the radio spectrum to ensure that there are no unauthorised operators and takes appropriate enforcement action against any person or business found unlawfully operating a radio system without a licence. To advance this role, ComReg is currently rolling out remote monitoring stations throughout the country to facilitate proactive monitoring of the radio spectrum and the investigation of cases of interference.

The evolution of wireless technologies has resulted in an increase in the type of interference investigations undertaken by ComReg. For example, during the period 2007-2010, ComReg initiated 524 compliance and enforcement investigations covering a range of services, a breakdown of which is given in Figure 3 below. Increase in the number of licences issued is likely to require an increase in compliance activities to ensure interference free operations.

Figure 3: Breakdown of enforcement actions in the period 2007 – 2010



[6] Spectrum Policy Statement, Department of Communications, Energy and Natural Resources, September 2010.

ComReg is also obliged to ensure that all radio equipment placed on the market is in compliance with the R&TTE[7] and EMC[8] Directives. Please see Appendix B for further details on ComReg's monitoring and enforcement role. ComReg is committed to ensuring that only lawful use is made of radio spectrum and will continue its enforcement programme throughout the life of this plan.

3.2 The Contribution of Radio Spectrum to Ireland's Economy

A key consideration in developing a strategy for radio spectrum management is the extent to which use of the radio spectrum contributes to the Irish economy and national competitiveness. Analysis carried out by ComReg, based on publicly available annual reports, has concluded that the total contribution to Irish GDP arising from the use of radio spectrum in 2009 was nearly €3.6 billion, or approximately 2.2 % of that year's total GDP.

Spectrum is also an important generator of employment. A conservative estimate of the number of employees in Ireland whose jobs are dependent on the use of radio spectrum was over 26 000 in 2009[9].These figures highlight the importance of radio spectrum to the Irish economy.

The social benefits arising from use of the radio spectrum are also considerable. For example, the efficient functioning of the Gardaí, fire and ambulance services depends on reliable mobile communications, while radio plays a major role in enabling the Defence Forces to carry out their duties both at home and overseas. Radio is fundamental to the safe operation of air, sea and land transport. Additionally Ireland plays a particularly important role in managing international radio traffic in the aeronautical sector, dealing with all flights between Europe and North America. Thus, it is clear that the contribution of these different sectors to society and the economy is heavily dependent on access to radio spectrum.

The use of spectrum, through its ability to facilitate the encouragement of new technologies and innovation, is also likely to have contributed strongly to general increases in productivity. While this is not measured directly, many commentators acknowledge the link between increased use of Information & Communications Technology (ICT) and greater productivity.[10] Thus, it is highly probable that the indirect effect of spectrum usage, in terms of boosting general productivity across the economy, is significant. The methodology used in calculating these figures, as well as the limitations and caveats that need to be taken into consideration are given in Appendix C.

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[7] The R&TTE Directive refers to Article 3(2) of Directive 1999/5/EC of The European Parliament and of The Council of 9 March 1999 On Radio Equipment And Telecommunications Terminal Equipment and the Mutual Recognition of Their Conformity O.J. 7.4.99 L 91/10.

[8] The EMC Directive refers to Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility O.J. L 390/24.

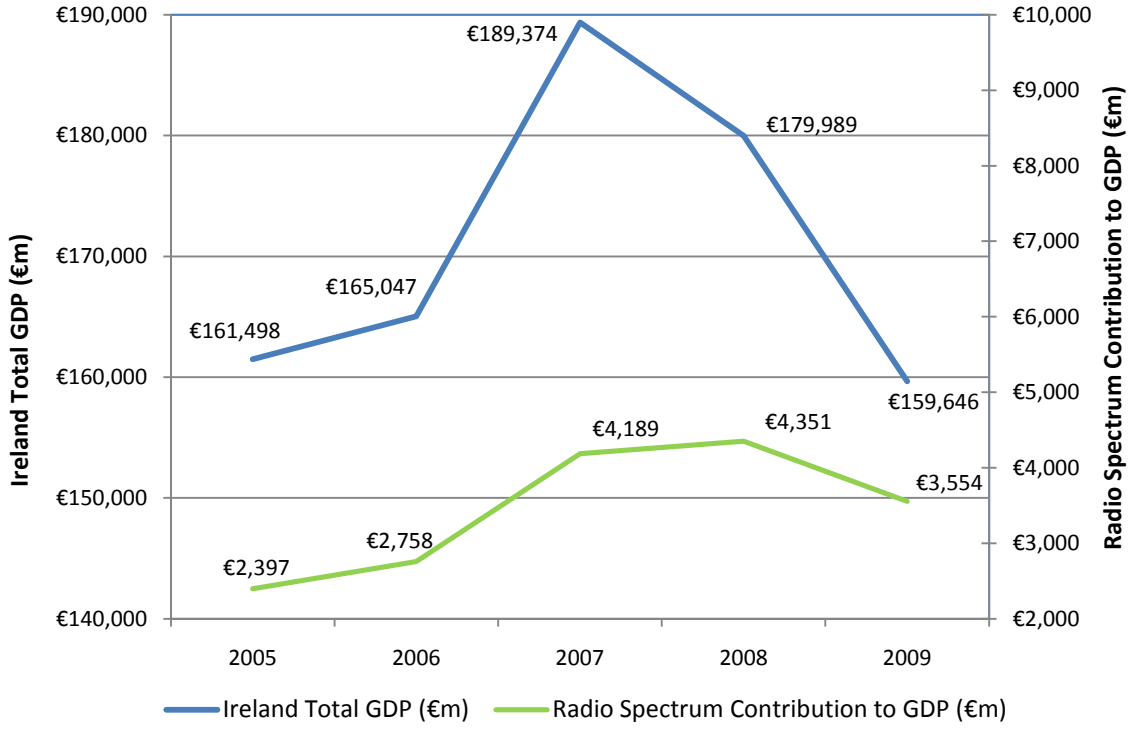
[9] These conservative estimates understate the total contribution of spectrum as it was not possible to value all services because of lack of meaningful data.

[10] Lars-Hendrik Roller, Leonard Waverman, "Telecommunications Infrastructure and Economic Development: A Simultaneous Approach,"American Economic Review, Vol. 91, No. 4 (Sep., 2001), pp. 909-923.

3.2.1 The Contribution of Radio Spectrum to GDP

Figure 4 below illustrates the relationship between Ireland's total GDP in years 2005 to 2009 with the aggregate contribution of the radio sector over the same period. The contribution of radio spectrum to GDP is conservatively determined to be €3.6 billion or 2.2% of GDP. This, along with the caveats in Appendix C, highlights the conservative estimate of the overall performance of the sector. In addition this estimation does not include satellite operations due to the unavailability of financial information relating to the Irish economy from these firms.

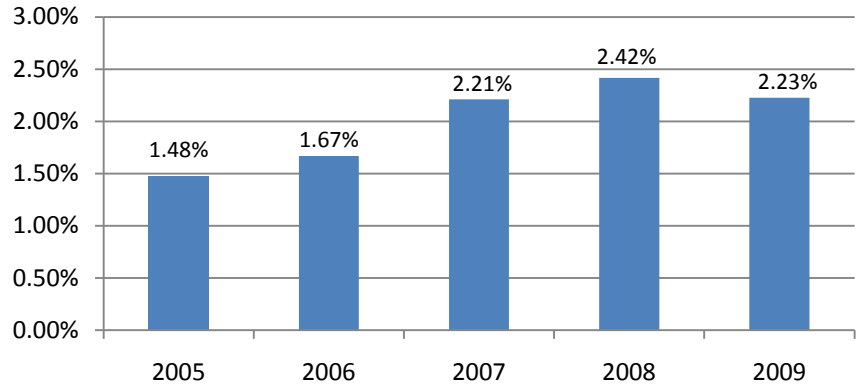
Figure 4: Contribution of Radio Spectrum to GDP: 2005 – 2009



Five Year Trend 2005-2009

Figure 5 below illustrates the relationship between Ireland's total GDP in years 2002 to 2009 with the aggregate contribution of the radio sector over the same period. As can be seen from this chart the contribution of radio services has remained relatively stable despite the contraction in the Irish economy over the last three years. Analysis suggests that the sector is performing well in the current economic climate. This can be viewed as an indication in economic terms, of the inelasticity of demand for radio services.

Figure 5: Contribution of radio spectrum usage to GDP (%) (2005 - 2009)



The following table provides a breakdown of the GDP contribution by the sector[11].

Table 1: GDP Contribution by the Sector

Contribution to GDP	2005	2006	2007	2008	2009
Broadcasting	297	282	353	360	293
Mobile	703	1232	935	762	743
Aviation	744	706	2264	2646	1798
FWALA	2	13	20	30	6
Mobile Sector Support	161	168	54	21	12
Mobile retail	6	10	14	20	8
Radio technology	4	8	19	20	19
Low power devices	481	399	148	97	352
Total	**2397**	**2758**	**3808**	**3956**	**3231**
Ireland Total GDP	**161498**	**165047**	**189374**	**179989**	**159646**
% Contribution of Radio	**1.48**	**1.67**	**2.21**	**2.42**	**2.23**

The approach taken to determine the contribution of radio spectrum to GDP was to include the direct revenue contribution of the relevant operators in each sector in conjunction with estimates of the forward and backward linkages in the economy. These were based on the value chains for spectrum using sectors. For example, for mobile services this approach included revenue generated from mobile retailing and software, security and other suppliers to the mobile sector. For broadcasting services it included revenue generated through forward links to the advertising industry. The wider impacts on the economy as a whole were estimated using a general economic multiplier of 1.1 to arrive at the final figures in the table above[12].

[11] This estimation does not include satellite operations due to the unavailability of financial information relating to the Irish economy from these firms.

[12] In economic theory, multipliers are premised on the notion that an initial spending rise can lead to even greater increase in national income as a result of indirect effects associated with the expenditure. In other words, an initial change in aggregate demand can cause a further change in aggregate output for the economy. The general economic multiplier used in this statement is reported in "The Macro-economy of Ireland," by Leddin and Walsh.

3.2.2 The Contribution of Radio Spectrum to Employment

In Table 2 below, the employment effects were estimated directly where suitable data was available (for example, from annual reports). The multiplier of 1.1 was also used in this context. Following a decrease in employment in the sector in 2007, employment figures increased again in 2009.

Table 2: Employment Figures by Sector

Employment	2005	2006	2007	2008	2009
Broadcasting	4931	4710	3494	3488	3437
Mobile	3265	3572	3578	3548	3473
Aviation	14595	15986	12329	13869	14625
FWALA	89	389	432	411	153
Mobile Sector Support	2273	2333	151	95	88
Mobile Retail	231	263	332	431	442
Radio Technology	80	127	92	101	112
Low Power Devices	3449	3012	1605	2027	1928
Total	**28912**	**30392**	**24214**	**26367**	**26684**

3.3 Spectrum – Ireland's Natural Advantage

Compared to many other countries, Ireland has a natural radio spectrum advantage. This stems from a number of factors which, when combined, result in Ireland having a high availability of clean radio spectrum. These factors include:

- Ireland's geographic location on the western edge of Europe, which results in fewer international radio spectrum co-ordination constraints;
- Ireland's relatively low use of radio spectrum for defence purposes; and
- Ireland's relatively low population density.

To make the most of this high availability of clean radio spectrum, ComReg actively promotes and supports the use of radio spectrum for the provision of wireless services. This has many benefits and can assist the earlier deployment of innovative services and increase cross-platform competition.

3.3.1 Test & Trial Licences

ComReg also promotes the use of radio spectrum for non-commercial purposes and, in particular, the testing and/or trialling of wireless devices and services. In 2005, ComReg launched the Wireless Test & Trial Licensing Programme - *Test & Trial Ireland*[13] – and this licensing programme makes it straightforward for users to access Ireland's radio spectrum for test and trial purposes.

[13] See www.testandtrial.ie – ComReg's *Test & Trial Ireland* website.

Test & Trial Ireland helps grow the indigenous wireless research base and can facilitate the development of companies that are part of the wider wireless industry. The programme includes the following features:

- All available radio spectrum bands are considered for a test or trial licence;
- Inexpensive access to radio spectrum for test and trial purposes to promote innovation;
- The ability of businesses and consumers to participate in a trial allowing companies to gain valuable consumer feedback prior to commercial launch; and
- Prompt processing of licence applications, typically within 10 days of receipt of a completed application.

Since its launch, *Test & Trial Ireland* has been used by a wide variety of organisations including many leading-edge companies, operators and research institutes. In total, over 138 licences have been issued and these licences have facilitated the development, testing and/or trialling of a wide variety of innovative services, some of which are now being provided commercially.[14] Examples of more recent *Test & Trial Ireland* licensees are set out below and highlight a growing trend towards the testing of the next generation mobile technologies (such as LTE, WiMAX), the use of wireless devices for machine to machine communications, and the development of future wireless communications technologies (such as Cognitive Radio).

- In June 2010 the first tests of the Time Division Long Term Evolution (TD-LTE) next generation mobile technology were carried out in Ireland by LM Ericsson in the 2.3 GHz band. These tests demonstrated the capability of TD-LTE to provide high speed broadband services which can be used to support services such as high definition TV, video conferencing and many others;
- ESB networks have tested and trialled a wireless mesh technology as the communications element of smart meters.[15] Similarly, the WiMAX technology has been tested as the communications element for the Smart Bay project; [16] and
- Centre for Telecommunications Value-Chain Research (CTVR) centre have tested reconfigurable software-based radio and dynamic spectrum

[14] A list of previous users is available on the Test and Trial Ireland website at: http://www.testandtrial.ie/Previous_Users/87

[15] Smart meters are the next generation of electricity meters and among other things, offer the potential for remote operation, remote meter reading, real time pricing, new tariff options and demand side management (DSM), and an interface with home area networks (HAN). http://www.esb.ie/main/sustainability/smart-meters.jsp

[16] SmartBay Galway is a national research infrastructure project. It comprises of a network of buoys, seafloor cables and other infrastructure, supporting a range of sensors, information systems, telemetry and other communication technologies. Together they provide the basis for in-situ, real time oceanographic monitoring. http://www.marine.ie/home/services/operational/SmartBay/

management techniques. This research is helping to develop communications standards and technologies of the future, such as cognitive radio[17].

ComReg is working to improve *Test & Trial Ireland* and is conscious of the challenges posed by the short term duration of the programme (up to 1 year with the possibility of renewal) and the availability of radio spectrum frequencies given competing demands. At the same time, ComReg is aware that alternative approaches, such as dedicating a particular portion of frequency band for test and trial purposes, could result in inefficient use of spectrum as such reservations may not be utilised and therefore hinder or prevent the provision of other services using that frequency band.[18]

Over the lifetime of this strategy statement, ComReg will continue to consider all spectrum bands for test and trial purposes and will monitor the demand for spectrum that cannot be met via the *Test & Trial Ireland* licensing programme. ComReg remains convinced that Ireland's high availability of clean radio spectrum gives it a natural spectrum advantage and ComReg will continue to work with other State agencies, Government, commercial organisations and research institutions in order to maximise the benefit to Ireland of this advantage.

ComReg welcomes all feedback on the Test and Trial Ireland licensing programme.

3.4 Spectrum Opportunities

This section details those frequency bands that have been identified by ComReg for possible release during the period covered by the Proposed Strategy. It is noted that some of the bands referred to are part of ongoing consultation processes and these are mentioned here for completeness[19].

Interested parties should note that the information in this section should be used as a guide only and nothing in this section should be taken to bind ComReg to any course of action. While ComReg has endeavoured to identify potentially useful frequency bands which might be considered for future assignment, the absence of any specific

[17] Cognitive radios have the potential to play an important role, not only in increasing the efficiency of spectrum usage by offering new sharing opportunities, but also in providing more versatility and flexibility to applications as a result of their ability to adapt their operations to external factors. In the longer term cognitive radio technologies may play a fundamental role in the shift from static spectrum management to dynamic spectrum management and access. Source: RADIO SPECTRUM POLICY GROUP REPORT ON "COGNITIVE TECHNOLOGIES" February 2010, RSPG10-306 Final

[18] In 2009, ComReg Document 09/15 consulted on a possible reservation of a portion of digital dividend for innovation and experiment purposes. ComReg Document 09/81 provided ComReg's response to this consultation issue and stated that:

"ComReg considers that it would be unnecessary to reserve spectrum for innovation and experimentation. ComReg also believes that even increased demand for access to spectrum by the wireless research and development community can be accommodated by Test and Trial Ireland.

ComReg will monitor developments in this area and will seek updated views from interested parties if demand for spectrum from the wireless research and development industry cannot effectively be accommodated in the current programme."

[19] While ComReg will endeavour to make specific bands available for release we cannot guarantee that this will be done in every case.

band in this document or this section in particular should not be taken to indicate that such a band will not be considered for allocation in the future or during the period covered by the Proposed Strategy. ComReg continues to monitor spectrum demand, regional, international and commercial developments and may seek to make other bands available should future circumstances warrant such a course of action.

Table 3: Potential Spectrum Opportunities

Spectrum Band	Timing / potential for Release	Notes
800 MHz Digital Dividend	Consultation ongoing	ComReg Doc 10/71 and 10/105 refers See Section 6.2
880 – 892.8 MHz paired with 925 – 937.8 MHz	Consultation ongoing	ComReg Doc 10/105 refers See Section 6.1
1452 – 1492 MHz	Release subject to market demand – 2010 / 2012	Proposals within Europe for mobile multimedia services
1710 – 1785 MHz paired with 1805 – 1880 MHz	Consultation ongoing	ComReg Doc 10/105 refers See Section 6.1
1900 – 1900 MHz & 1915 – 1920 MHz	Release subject to market demand – 2010 / 2012	No interest expressed in 2008 -2010
2010 – 2025 MHz	Release subject to justified market demand	No interest expressed in 2008 -2010 See Section 6.1.1
2300 – 2400 MHz	Process ongoing	ComReg Doc 10/30 refers See Section 6.4.2
2500 – 2690 MHz	Process ongoing	ComReg Doc 10/38 refers See Section 6.4.2
26 GHz *(24.7 – 25.2 GHz paired with 25.7 – 26.2 GHz)*	Potential Fixed Link Band for licensing under National Block Licences.	Subject to market demand See Section 6.3.2

28 GHz *(27.5 – 29.5 GHz)*	Potential Fixed Link Band for licensing under National Block Licences.	Subject to market demand See Section 6.3.2
31 GHz band *(31-31.3 GHz paired with 31.5 – 31.8 GHz as well as 31.8 – 33.4 GHz)*	Potential CCTV fixed link band and new fixed link band	Subject to market demand See Section 6.3.2

3.5 Expiring Licences

This section provides a summary list of long term licences that are due to expire within the next decade and the associated spectrum that is due to become available as a result. The information in this section should be used as a guide only and nothing in this section should be taken to bind ComReg to any course of action. While ComReg has endeavoured to identify all long term licences that are due to expire, the absence of any specific band should not be taken to indicate that ComReg has made any form of determination on the future of that spectrum.

Table 4: Licences due to expire within the period 2011 to 2021

Spectrum Band	Current Licensee (Assignments)	Expiry Date	Notes
GSM900	Telefónica O2 (907.5 – 914.7 MHz 952.5 – 959.7 MHz)	15 May 2011	ComReg Doc 09/99, 10/71 & 10/105 refers
	Vodafone (900.1 – 907.3 MHz 945.1 – 952.3 MHz)	15 May 2011	ComReg Doc 09/99, 10/71 & 10/105 refers
	Meteor Mobile Communications Ltd. (892.7 – 899.9 MHz 937.7 – 944.9 MHz)	18 June 2015	ComReg Doc 09/99, 10/71 & 10/105 refers
GSM1800	Telefónica O2 (1750.9 – 1765.3 MHz 1845.9 – 1860.3 MHz)	31 December 2014	ComReg Doc 09/99, 10/71 & 10/105 refers
	Vodafone (1736.3 – 1750.7 MHz 1831.3 – 1845.7 MHz)	31 December 2014	ComReg Doc 09/99, 10/71 & 10/105 refers
	Meteor (1765.5 – 1779.9 MHz 1860.5 – 1874.9 MHz)	12 July 2015	ComReg Doc 09/99, 10/71 & 10/105 refers

900 MHz WDMDS[20]	Digiweb (872 – 876 MHz 917 – 921 MHz)	05 December 2015	
400 MHz WDMDS[21]	Wirefree Communications (410 – 412 MHz 420 – 422 MHz)	07 December 2015	
	Wirefree Communications (412 – 414 MHz 422 – 424 MHz)	05 December 2015	
VHF/UHF TPBR[22]	Numerous	All expire by 31 December 2016	ComReg 10/101 refers
26 GHz National Block Licences	Numerous	Annually renewable until 2018	See Section 6.3
380 MHz ESDR[23]	Tetra Ireland (2×3.8 MHz) Other (2×0.7 MHz)	24 August 2018	
2.6 GHz MMDS[24]	UPC (2524 -2668 MHz)	-	ComReg 10/38 refers
3.6 GHz FWALA	Numerous	All expire by 31 July 2017	ComReg 10/29

[20] WDMDS = Wideband Digital Mobile Data Services – See ComReg 05/80.

[21] WDMDS = Wideband Digital Mobile Data Services – See ComReg 05/80.

[22] TPBR = Third Party Business Radio – See ComReg 10/101

[23] ESDR = Emergency Services Digital Radio – See ComReg 08/67

[24] MMDS = Multipoint Microwave Distribution Services – See ComReg 10/38

4 Current Spectrum Management Issues

4.1 Revised Regulatory Framework - Implications for Spectrum Management

Revisions to the Common Regulatory Framework for Electronic Communications Networks and Services ("Common Regulatory Framework") are currently being transposed into national legislation, and are expected to come into effect in May 2011.

Implications of these revisions in the context of spectrum management include:

- limits on the restrictions that can be placed on the rights of use of Electronic Communications Services (ECS), with the aim of moving to a more technology- and service-neutral licensing environment; and
- allowing for the transfer or lease of individual usage rights for radio frequencies between undertakings.

In September 2010, the first multi-annual Radio Spectrum Policy Programme (RSPP)[25] proposal was submitted by the EC to the European Parliament and Council. The RSPP proposal is part of a package of EU measures regarding broadband communications and outlines, at a strategic level, how the use of spectrum can contribute to the most important political objectives of the EU from 2011 to 2015. Various objectives are set out in the proposal, and in particular the RSPP seeks to ensure that sufficient spectrum is made available by 2013 for wireless broadband.

The RSPP proposal is currently under consideration by the European Parliament and Council and, depending on its final agreed wording, may have a bearing on ComReg's work programme over the period of the Proposed Strategy.

4.2 ComReg's Position on the Transfer or Lease of Individual Usage Rights for Radio Frequencies between Undertakings

In recent years there has been an increasing take up of market-based approaches to spectrum management, with the objective of increasing flexibility and promoting more economically efficient use of radio spectrum.

The two principal market-based mechanisms that have been developed and applied, in this regard, are auctions and secondary trading. Auctions have been used as an alternative to administrative and comparative selection procedures for awarding rights to use radio spectrum, especially where the number of spectrum rights available is limited. Secondary trading allows spectrum rights to be traded between

[25] See http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/eu_policy/rspp/index_en .htm

entities, providing a means of accessing radio spectrum via the market rather than the spectrum manager[26].

4.2.1 ComReg Position on Auctions

In the last five years ComReg has developed the use of auctions, where appropriate, to assign spectrum rights. For example:

- In December 2005, ComReg issued three 10-year national licences (two in the 400 MHz band and one in the 900 MHz band) for the provision of Wideband Digital Mobile Data Services[27]. This auction was in the format of a single sealed bid with preferences taken into account if a bidder had the highest bid on more than one licence;
- In April 2007, ComReg issued a national licence for the 1785 – 1805 MHz band[28]. This technology and service neutral licence award was in the form of a single sealed bid, second price format and the auction was the first in a two-part process involving a joint approach to licensing with the UK regulator Ofcom;
- In June 2008, ComReg issued 13 national channels to five different bidders to support national point-to-point and point-to-multipoint applications for a ten year period[29]. The format used was a sealed-bid, combinatorial auction where bids were first placed for the amount of spectrum required (across two different service types). Once this was determined, bids were accepted in a second round for the location of that spectrum within the band;
- More recently, ComReg has proposed the use of a combinatorial clock auction in order to meet the requirements of its proposed 800 MHz, 900 MHz and 1800 MHz spectrum release.[30]

In the context of granting spectrum rights for ECS/ECN (usually in the form of a licence granted under the Wireless Telegraphy Act), ComReg is obliged to, amongst other things:

- use selection criteria which are objective, transparent, non-discriminatory and proportionate and which give due weight to the achievement of the objectives set out in section 12 of the 2002 Act; and
- establish open, transparent and non-discriminatory procedures for the grant of licences and causing any such procedures to be made publicly available.

These obligations do not, of themselves, indicate a preference for any particular assignment mechanism (e.g. administrative assignment, comparative selection procedure, auction or other form). Accordingly, ComReg is obliged to choose the

[26] The spectrum manager still has a role to ensure that the traded spectrum continues to be used in an appropriate manner.

[27] ComReg Doc PR211205, ComReg Awards wideband digital licences, 21 December 2005

[28] ComReg Doc. PR270407, Personal Broadband Wins 1800 MHz Auction, 27 April 2007

[29] ComReg Doc. PR060608, ComReg announces the outcome of the 26 GHz National Block Licence Award Process, 6 June 2008.

[30] See section 4.4 pg 44 – 46 of ComReg Doc. 10/71, 800 MHz, 900 MHz & 1800 MHz spectrum release, 17 September 2010

most appropriate assignment mechanism having regard to the particular circumstances of each award and which, in ComReg's opinion, would best achieve its statutory objectives.

That said, ComReg would make the following observations regarding its preferred use of auction mechanisms, particularly in circumstances where, for instance, spectrum rights of use are scarce, there is likely to be considerable demand for particular spectrum rights and/or where access to particular spectrum rights is important to the nature and dynamic of competition in the relevant downstream retail market:

- Auctions have proven in Ireland and in many other jurisdictions to be a fast, fair, effective and transparent assignment mechanism. One reason which may explain this is that they avoid the subjective element that can be associated with comparative selection procedures, and avoid issues related to administrative assignments, especially where the spectrum manager does not have access to complete information;
- Auctions also allow firms which most value the spectrum rights to obtain access to same. By doing so, auctions promote innovation and investment in new infrastructures and contribute to the efficient use of the spectrum rights assigned by providing real economic incentives for winners to make use of the spectrum rights obtained. This also ensures that consumers and citizens derive the maximum benefit in terms of the provision of end-services using that spectrum; and
- Open auctions also promote, amongst other things, regulatory certainty, competition (both for spectrum rights and in downstream markets), and the internal market by ensuring there is no favourable treatment of particular undertakings thereby providing fair opportunities for new entry from within the State and throughout the EU.

4.2.2 ComReg Position on the Secondary Trading / Transfer of Rights

There are a number of recent studies discussing the potential benefits of introducing trading of spectrum rights. For example, a study commissioned by the EC estimated that the EU could gain by at least €9bn per year as a result of introducing liberalisation, of which secondary trading is one part.[31] As the take up of spectrum trading, where permitted, has been far less than expected, it has been difficult to correlate this claim with practice so far.

The European Commission, with a view to ensure harmonisation across the EU and via the recent revisions to the Common Regulatory Framework, is seeking to adopt appropriate implementing measures to identify spectrum bands (other than bands used for broadcasting) for which spectrum rights may be transferred or leased between undertakings. Member States are responsible for ensuring that this may occur in line with their own national procedures. In addition, the recent revisions to

[31] Study on conditions and options for introducing secondary trading of radio spectrum in the European Community, by Analysys Consulting Ltd, DotEcon Ltd and Hogan & Hartson LLP.

the Common Regulatory Framework notes that Member States may decide to extend these rights to other bands.
In Ireland, ComReg has, to date, approved the transfer of spectrum rights (of the whole quantum of spectrum initially assigned) where the transfer has involved a change of corporate ownership (or some form of corporate re-structure). For example:

- In the FWALA context, there has been some consolidation among operators and with the approval of ComReg a number of licences have been transferred in line with the new ownership arrangements; and
- Soon after the auction of two licences at 400 MHz[32], one winning party bought out the second winning party and with the approval of ComReg this licence was transferred in line with the new ownership arrangements.

In addition, ComReg has held a number of consultations in which the issue of secondary trading has been either directly or indirectly addressed both by ComReg and respondents to those consultations. ComReg does not intend to revisit these individual arguments and, for the purpose of this strategy statement, would make the following preliminary observations:

- ComReg is charged with ensuring the effective management and encouraging the efficient use of radio spectrum and achieving the relevant objectives given under national legislation and, for ECN/ECS, the Common Regulatory Framework. In discussing secondary trading in the context of ECN/ECS, two important and relevant objectives with respect to the management of radio spectrum are the *promotion of competition* and the *contributing to the development of the internal market.*

- With regard to the latter, this is to be achieved by, amongst other things, ensuring the harmonised use of radio spectrum so as to benefit consumers through better exploitation of economies of scale and the interoperability of services. ComReg is required to allocate and assign spectrum in line with the evolving EU harmonisation norms and EC Decisions and Directives. This enables the EU to exploit its size so as to ensure speedy availability of compatible equipment, for example. This, in turn, drives investment and innovation in ways that are likely to benefit the EU as a whole.

ComReg welcomes the recent revisions to the Common Regulatory Framework in relation to spectrum trading and looks forward to implementing spectrum trading in those spectrum bands to be identified by the EC. ComReg also looks forward to revisions to domestic law so as to facilitate the implementation of spectrum trading in these bands and potentially others.

Whilst research to-date would suggest there are gains to be had through the implementation of spectrum trading, ComReg notes that any implementation of same is required to be done in a manner which furthers the achievement of ComReg's other statutory objectives, including the promotion of competition. In this regard, ComReg would make the following observations at this stage:

[32] ComReg Doc PR211205, ComReg Awards wideband digital licences, 21 December 2005

- Given the inherent advantages of incumbency, there is the potential danger, where there are many spectrum bands potentially usable in the same downstream retail market, that positions on the retail market can be leveraged back into spectrum markets (i.e. where firms in the retail market acquire spectrum with the intention of hoarding it to preclude potential entry);
- As such, ComReg needs to ensure that spectrum rights do not become concentrated in too few hands such that competition in downstream markets would be restricted to a significant extent (or otherwise foreclosed). In addition to general competition law rules, the Common Regulatory Framework provides that Member States may lay down rules in order to prevent spectrum "hoarding", such as by setting out strict deadlines for the effective exploitation of the rights of use by the holder of the rights and by applying penalties, including financial penalties or the withdrawal of the rights of use in case of non-compliance with the deadlines. Other mechanisms which could be employed in this regard include: spectrum caps in auctions; controls on spectrum transfers; and potentially forcing disposals or leases of spectrum rights;
- In addition, there may be little incentive for rights holders of spectrum in harmonised bands to trade with competitor firms and initial experience to date in other jurisdictions bears this out. Absent the periodic re-release of spectrum rights, this may lead to stagnation and reduce the ability of Member States and the EC to make major allocation and harmonisation changes to such bands in order to exploit the advantages arising from the internal market.[33]
- Trading may likely have a more important role in relation to changing the uses of non-harmonised bands, when combined with the freedoms on service and technology neutrality. However trading of long lived/infinite licences in such bands may also be delayed. This can come about as individual rights holders in such spectrum bands may have an incentive to hold out so as to increase the rents that they may extract from the likely new users. This incentive could lead to considerable delays in moving non-harmonised bands into new and better uses; and
- Accordingly, for spectrum bands that are harmonised at an EU level, ComReg considers that periodic release of such spectrum in line with the expected cycle of technology and investment is compatible with the aims of the Common Regulatory Framework. In this regard, ComReg notes that periodic re-release of spectrum rights ensures that no entrenched positions develop that may be allowed to sustain themselves indefinitely, and which would be imperious to normal market pressures.

ComReg has considered the potential benefits of spectrum trading for specific licence categories and has concluded that secondary markets could potentially play a role in ensuring the efficient assignment and use of the spectrum in some areas. It is

[33] To overcome these issues under these circumstances, it would appear necessary for the rights holders of spectrum to co-ordinate their activities. Co-ordination could come in many forms. For example all rights holders of spectrum in the band may need to agree to change their spectrum assignment or usage in order to facilitate this new allocation and harmonisation change. Alternatively a single firm wishing to obtain spectrum in this band could attempt to purchase spectrum from the current users in order to use this spectrum for the new allocation. Alternatively intermediaries may enter the market in order to facilitate the necessary changes.

ComReg's continuing view that the use of spectrum trading needs to be underpinned by primary legislation which takes into account potential concerns including, but not limited to, spectrum hoarding and the distortion of competition. It is expected that such legislation will most likely follow the transposition of the new Framework into Irish law.

4.2.3 ComReg's Position on Licence Duration

In the context of spectrum rights of use for the purposes of ECN/ECS, the Common Regulatory Framework requires that where Member States grant spectrum rights of use for a limited period of time, the duration is to be appropriate for the service concerned in view of the objective pursued taking due account of the need to allow for an appropriate period for investment amortisation.

ComReg notes that a number of respondents to various ComReg consultations have sought to associate the implementation of secondary trading with indefinite licence durations.[34] In relation to the investment uncertainty argument ComReg notes that there is contrary evidence in the Irish market with three of the mobile network operators investing significantly in their networks towards the end of their licence terms.

ComReg would welcome views and empirical evidence on these issues and notes that the following points would also need to be considered when discussing the notion of indefinite licences.

Firstly, a policy of indefinite licences has the potential to reduce the ability of Member States and the EC to make major allocation and harmonisation changes to bands into the future so as to continue to exploit the advantages arising from the internal market. For instance, decentralising decisions on spectrum assignment for bands where spectrum use is likely to require co-ordination in order to implement major allocation and harmonisation changes, could create perverse incentives for hold-out (so as to expropriate a larger proportion of the expected rents from the future use). This could mean that individual trades may not occur, or would only occur, at substantially reduced prices (as economic value of the spectrum depends on the actions of third parties). In addition, the incentives for hold-out could cause greater delays, relative to term-limited usage rights, as the spectrum manager could be required to exercise any powers available to it to reclaim the assigned spectrum (which in turn would likely be resisted by rights holders). Furthermore, significant delays to the deployment of new services could have serious consequences for consumer welfare.

[34] For example, one respondent to consultation 08/57(Liberalising the Use of the 900 MHz and 1800 MHz Spectrum Bands – 17 July 2008) stated: *"If trading and liberalisation are introduced, the main purpose of imposing expiry dates falls away. Except in cases of market failure, the secondary market should facilitate efficient reallocation and reassignment of usage rights, without the need for regulatory intervention. Indeed, the presence of an expiry date may distort the market, as it creates investment uncertainty that may unduly reduce the value of usage rights towards the end of their duration."*

In addition, the trading of term-limited spectrum rights is provided for in the recent revisions to the Common Regulatory Framework. Of course, the incentives to trade term-limited licences are unlikely to be the same as with unlimited-term licences. For example, as a term-limited licence approaches its end date, the market for such a licence will diminish.

However, with co-ordination issues it is not clear that indefinite licences will produce a better welfare outcome than the periodic re-release of spectrum.

It is ComReg's view that licence terms are independent of the tradability of spectrum rights of use under the Common Regulatory Framework. As such, it is not envisaged that the ability to trade spectrum rights would necessarily involve a change to the durations of such rights.

4.3 Collaboration between Wireless Operators

ComReg notes the recent trend towards increased collaboration between operators in the provision of wireless/mobile services. There are various drivers for this, including operators' desire to reduce costs and/or provide a higher quality of service to consumers by using their combined resources. There are many forms of collaboration and the benefits and drawbacks of each type will vary depending on the specifics of the collaboration.

The simplest form of sharing is the sharing of passive infrastructure, such as sites, masts and ducts etc. This form of sharing already occurs in Ireland and presents few drawbacks. It has also been encouraged by ComReg which, in 2003 for example, introduced a Code of Practice on the sharing of radio sites.[35] It is noted that this Code of Practice has been agreed and adopted by all 3G licensees.

A more complex form of collaboration is the sharing of active infrastructure. This has many levels and can range from the sharing of the radio access network (such as antennas, base station equipment and back-haul transmission), core network elements, through to the sharing of spectrum rights.

There are benefits and drawbacks to each active infrastructure sharing level and, in general terms, the deeper the level of collaboration, the greater the potential drawbacks and benefits. For example, with increased collaboration operators could enjoy greater benefits from reduced operational and network build costs. At the same time, however, increased collaboration may result in a more significant loss of operator independence, which could have negative consequences for competition in the relevant markets concerned.

One such example in Ireland is the recent agreement announced between eircom and O2[36] to share a number of areas of their mobile networks, such as site equipment, power supply, technology and transmission sharing. ComReg is aware that additional agreements may occur in the future in Ireland and that this form of sharing

[35] ComReg 03/28R -Code of Practice on Sharing of Radio Sites – 13 December 2007

[36] See http://www.siliconrepublic.com/comms/item/21269-eircom-and-o2-in-first-iris

is already being discussed[37] and/or implemented[38] in other Member States. ComReg continues to assess the situation across the EU and more broadly ComReg remains open to considering any sharing agreement on a case-by-case basis and would welcome feedback from stakeholders on this issue.

4.4 ComReg's Position on the use of Spectrum Caps in Competitions

A spectrum cap is a mechanism that limits the amount of spectrum that an entity can obtain. It is generally considered (and possibly used) in the running of a spectrum competition, but the amount of spectrum that an entity holds can also be a relevant consideration in other circumstances, such as the merger of two or more entities.[39]

In a spectrum competition, the setting of a spectrum cap is an important consideration as it can influence the level of demand that may be expressed for spectrum in the competition. Ultimately, this can influence the degree of competition in relevant downstream market(s). Setting a cap too tightly might prevent operators from obtaining sufficient spectrum in line with their business plans whilst, on the other hand, setting an overly relaxed cap could encourage the hoarding of spectrum and have adverse effects on competition in the relevant markets concerned.

There are many factors to consider in setting a competition spectrum cap. In summary, these factors include:

- Is it appropriate to set competition spectrum caps in auctions?
- Is it appropriate to set a spectrum cap on an individual band or a multiple band basis?
- Is it appropriate for other existing spectrum holdings of licensees to count towards the spectrum cap?
- What is the appropriate level for a spectrum cap?[40] and

[37] For example, in France, in April 2009 ARCEP set a roadmap to create a framework agreement on 3G network sharing. In February 2010, the 3G licensees Bouygues Télécom, Orange and SFR signed a framework agreement for sharing 3G network installations. The remaining 3G licensee, Free Mobile, subsequently joined this agreement.

Source: ARCEP press release 24th February 2010, "Operators sign a 3G network sharing agreement that will enable full nationwide coverage by the end of 2013"

[38] For example, in the UK, the merger of T-Mobile and Orange into the joint-venture Everything Everywhere will result in the merging of their 2G and 3G networks and the joint ownership of spectrum. This merger was approved by the European Commission, subject to certain conditions being met.

Source: European Commission Press Release 1 March 2010, "Mergers: Commission approves proposed merger between UK subsidiaries of France Telecom and Deutsche Telekom, subject to conditions"

[39] For example, in the proposed merger of Orange-UK and T-Mobile-UK, in order to remove possible concern regards the joint venture's spectrum holding, it made a commitment to divest 2x15 MHz of its 1800 MHz spectrum band.

Source: "Of spectrum and radio access networks: the T-Mobile/Orange joint venture in the UK", Jocelyn Guitton, Boryana Hristova & Vera Pozzato, European Commission, Competition policy newsletter 2010-2

[40] In ComReg Consultation 10/105, ComReg proposed: An overall (i.e. 800 MHz, 900 MHz and 1800 MHz) spectrum cap of 2 x 50 MHz; and A sub-1GHz (i.e. 800 MHz and 900 MHz) spectrum cap of 2 x 20 MHz.

- Should the spectrum cap be applied as a simple fixed cap or would a weighted spectrum cap be more appropriate?

ComReg welcomes feedback on the spectrum management issues raised in this section.

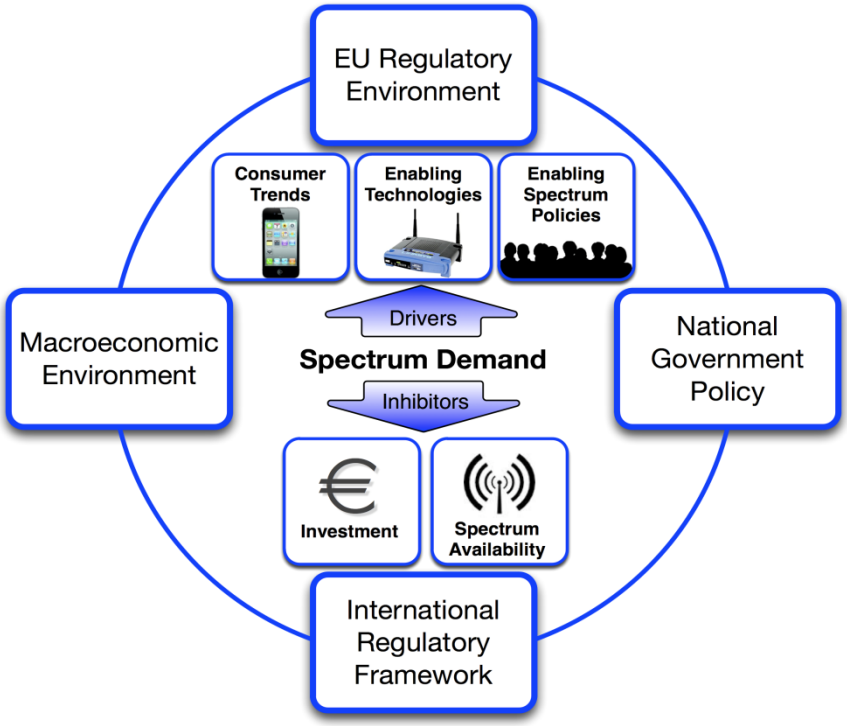
5 Radio Spectrum Management Strategy

Under section 31 of the Communications Regulation Act 2002, ComReg is required, every two years, to publish its Electronic Communications Strategy Statement[41] following consultation[42]. The strategy statement is a forward-looking document which serves as a framework for action by the organisation. The most recent strategy statement applied to the period 2010-2012. It sets out ComReg's plan for the delivery of identified key priorities and should be read in conjunction with this document focusing on the Spectrum Management Strategy for the period 2011-2013.

5.1 A Summary of Factors Driving Spectrum Management Strategy

In recent years, rapid developments in technology and applications have resulted in the acceleration of convergence of telecommunications and information technology services. These developments have created a demand for rich media content delivery for a diverse range of applications, across fixed wired and cabled networks and, increasingly, mobile wireless networks. This has resulted in the creation of an environment where the demand for radio spectrum has never been greater and where the effective management and efficient use of radio spectrum has never been more important. Consumer Trends, Inhibiting Developments, Enabling Technologies and Enabling Policy and Harmonisation are the four broad factors which are influencing strategies for management of the radio spectrum are illustrated below:

Figure 6: Summary of Factors Influencing Spectrum Management Strategy



[41] ComReg 10/47 – ComReg's Strategy Statement 2010 – 2012 – 1 July 2010.

[42] ComReg 10/31 Consultation Paper - Draft Strategy Statement 2010 – 2012 – 16 April 2010 & ComReg 10/48 Response to Consultation - Draft Strategy Statement 2010 – 2012 - 1 July 2010

5.1.1 Consumer Trends

The idea of the ubiquitous, mobile network is a growing reality for network operators and is being driven by consumer demand for access from any device in any location. This trend is supported by the proliferation of smartphones, netbooks and wireless-enabled consumer devices (cameras, game consoles etc) all of which contribute to an increasing demand being placed on operators' core and access networks. Moreover, the trend towards increasing levels of user generated content and video telephony places additional pressure on uplink capacity and operators may need to rethink such configurations. This growing demand is a challenge for operators as they need to increase overall network capacity as well as provide for significant increases in backhaul to ensure a high quality of service to consumers.

In addition to the increased demand for data access, there has also been a steady growth in mobile voice minutes as the trend towards fixed-mobile convergence and substitution continues. This overall increase in demand for services at all levels will result in operators requiring additional spectrum in all key frequency bands for wide area coverage and backhaul.

5.1.2 Inhibiting Developments

As consumer demand for wireless communications services and rich media content rises, the risk of network congestion increases. This is a significant inhibitor which can affect the quality of the user experience and the resultant take up of services. Mitigating this risk requires the release or refarming of additional spectrum resources and continued investment by operators in their networks both in terms of scale (by deploying more backhaul and configuring more uplink capacity) and in terms of innovation (by deploying more spectrum efficient network technologies).

The ideal solution for resolving network congestion is further investment in fibre for backhaul. In many areas, the economics, local topography, or timing can make this an unviable option. In such situations, operators will rely on microwave links as a cost-effective alternative which can place additional pressure on limited spectrum resources.

The current macroeconomic environment could also have a serious inhibiting impact in future years as negative market sentiment may affect investment decisions. Access to capital, both public and private, poses a real threat to network investment that will require an appropriate policy response. Of particular note is the recently published Programme for Government[43] and the statements therein regarding infrastructure investment.

[43] See - http://www.taoiseach.gov.ie/eng/Publications/Publications_2011/Programme_for_Government_2011.pdf

5.1.3 Enabling Technologies

Improvements to network technology that enable more efficient and innovative use of radio spectrum, such as the evolution from HSPA to HSPA+ and LTE and cognitive techniques or use of 'white spaces' are emerging. Other technology factors include those that may reduce demand for network and spectrum capacity such as the currently deployed solution of off-loading traffic onto Wi-Fi networks where possible, and in the future, off-loading traffic onto femto or pico cells. On the other hand the growth in machine-to-machine (M2M) communications including Radio-frequency identification (RFID) applications will increase pressure on the spectrum resource. Technology solutions will need to be more adept at sharing of spectrum efficiently between disparate users e.g. see section 7.1.4.

5.1.4 Enabling Policy and Harmonisation

European considerations play an increasing role in spectrum management policy. The most sought-after spectrum bands (in particular the 800, 900, 1800, 2600, and 3600 MHz) are now subject to EC harmonisation decisions. Member States contribute to the development of such EC decisions via various bodies including CEPT for technical issues, the Radio Spectrum Policy Group (RSPG) which advises the EC on spectrum policy issues and the Radio Spectrum and Communications committees which assist the EC in developing the decisions. It is critical that Ireland continues its active involvement within these groups to influence the development of harmonised spectrum management policy.

A "market-based" approach to spectrum management, where appropriate, should lead to more efficient spectrum usage, particularly when combined with the introduction of initiatives at policy level such as spectrum sharing, infrastructure/network sharing and spectrum trading. ComReg will facilitate the introduction of these initiatives in the coming years, where they are considered to be of benefit and legally sound, whilst also ensuring that adequate protective measures are in place to prevent anti-competitive practices.

An evolutionary approach to spectrum management would seem the most prudent strategy over the next two years. Market mechanisms such as auctions should continue to be carefully introduced along with making more licence-exempt or common areas of spectrum available where possible. The 2.4 GHz WiFi/RLAN band which also supports significant range of other short range devices is probably the most well known example of a spectrum commons in use today.

ComReg has also considered other developments and trends that are taking place and which are unlikely to have an impact over the lifetime of this strategy. Please see Section 7 for further details.

5.2 Spectrum Management Strategy in support of ComReg's High Level Goals

To assist in achieving ComReg's high level goals and having regard to emerging industry trends and the requirement to manage radio spectrum more effectively, ComReg has developed the following broad radio spectrum management strategies. These broad strategies support ComReg's strategy for specific radio services detailed in Chapter 6.

ComReg's mission is to promote competition, foster innovation and provide appropriate protection, for the benefit of all users of communications services

Mission

Consumer	***Competition***	***Innovation***	***Organisation***
High Level Goals			
• To inform, empower and protect consumers, both residential and business • To ensure the availability of a universal telecommunications service	• To drive access and investment in high-speed broadband networks through cross-platform competition • To use effective and appropriate wholesale regulation to create the opportunities for dynamic and sustainable competition	To promote innovation by providing a predictable regulatory framework which supports investment in communications infrastructure and services, for the benefit of the digital economy	To be a highly effective, innovative organisation which is a recognised centre of excellence and which plays its full part in shaping the development of a competitive communications industry
Spectrum Management Priorities			
• Drive consumer choice and access through efficient management and use of the national radio frequency spectrum • Consider the role of radio spectrum in meeting national needs for a Universal Telecommunications Service	• Ensure efficient release of radio spectrum using technology-and service-neutral mechanisms, and ensure flexible access and management of resources • Ensure that spectrum is used to promote competition and not misused to restrict or distort competition	• Continue to promote Ireland as a centre of excellence for research and innovation in spectrum • Facilitate new spectrum-based techniques, services and applications • Contribute to Ireland's 'digital dividend' and make available this valuable radio spectrum band as soon as possible following Analogue Switch Off • Promote innovation & knowledge transfer by sharing national & international best practice • Promote investment by providing regulatory certainty and appropriate licensing arrangements	• Be an effective, innovative and adaptable organisation with the appropriate systems, structures and skills for effective spectrum management • Ensure continuous performance improvement and best practice through benchmarking against international standards with regard to our Spectrum Management processes & procedures • Continue to be a centre of excellence for spectrum management providing smart, efficient and consistent regulation

5.2.1 Strategic Objectives in Support of ComReg's High Level Goals

Consumer:

- Make spectrum available in a timely manner to facilitate new and competitive wireless services;
- Investigate and pursue measures to address radio interference and unlicensed use of spectrum, and to enforce radio spectrum rights of use;
- Take into account the work of the Consumer Advisory Panel (CAP); and
- Provide technical support and surveys to ensure terminal equipment and devices meet standards and requirements set out in national and EU legislation.

Competition:

- Complete liberalisation of GSM bands in accordance with statutory objectives and European Legislation;
- Provide appropriate spectrum for broadband services in line with the Spectrum Management Strategy;
- Review and consult on existing usage of spectrum rights in advance of licence expiry, in order to facilitate more flexible use of spectrum;
- Publish and/or update supporting secondary legislation, the Radio Frequency Plan for Ireland and guidelines, as appropriate;
- Apply the WAPECS[44] principles of technology and service neutrality in the Spectrum Management Strategy and, where appropriate, in making spectrum available for wireless services;
- Implement harmonised spectrum requirements as set out in European legislation and guidelines;
- Apply appropriate competitive mechanisms, such as auctions, when making spectrum available in response to market demand; and
- Examine the scope for extending licence exemptions, where appropriate.

Innovation:

- Promote *Test & Trial Ireland* to spectrum users, technology innovators, entrepreneurs and researchers;
- Promote *Test & Trial Ireland* by engaging with relevant national and international development agencies and inward investment agencies;
- Factor in new and emerging developments in radiocommunications techniques (e.g. cognitive technologies) into the overall Spectrum Management Strategy;
- Liaise with manufacturers, researchers, international policy bodies and key spectrum users to develop insights on how radiocommunications may evolve, to inform regulatory policy making;
- Underpin ComReg's commitment to innovation through timely release of new spectrum, in line with the overall Spectrum Management Strategy;
- Engage with the BAI and RTE as to spectrum requirements and complete spectrum coordination functions to facilitate migration to Digital Terrestrial Television (DTT) and analogue switch off (ASO) by Q4 2012;

[44] Wireless Access Policy for Electronic Communications Services

- Engage with the Digital Switchover Group established by the Minister DCENR and contribute to the Ireland/UK Intergovernmental Group on DTT/ASO and other relevant fora to facilitate ASO by Q4 2012;
- Facilitate industry product and service development through initiatives such as industry fora and briefings;
- Support DCENR in its implementation of the National Broadband Policy.

Organisation:

- Continue to consult regularly, widely and appropriately on spectrum management issues to inform the decision making process;
- Optimise ComReg's stakeholder relationships for the benefit of consumers and the national interest when harmonising and co-ordinating spectrum utilisation;
- Actively participate in fora to inform and influence the development and implementation of national and international regulatory policies that could have an impact on spectrum management;
- Ensure compliance with international agreements on frequency usage and technical standards as a requirement for spectrum access, where appropriate and necessary;
- Continue to enforce legislation, pursue policies and enhance current practices in relation to unauthorised use of spectrum and non-compliance with licence conditions, ensuring that:

    - Unlicensed broadcasters and operators continue to be prosecuted under Wireless Telegraphy legislation to prevent interference to licensees;
    - Compliance with licence conditions is continuously monitored and licences are revoked if serious breaches are found;
    - Market surveillance and co-operation with other NRAs in relation to R&TTE products continues for the purpose of removing non-compliant products from the market; and
    - Market surveillance and co-operation with other NRAs in relation to products which fall within the scope of the EMC Directive continues in order to remove non-compliant products from the market;

- Continue to represent Ireland's position with regard to all radio services in the relevant fora, at both regional (European, e.g., the EU and CEPT) and global levels (the ITU);
- Continue to influence European legal and regulatory developments in relation to spectrum policy in order to ensure that Ireland's best interests are promoted and protected, and that:

    - The correct balance is achieved in the philosophy and practice of spectrum management between different sectors;
    - Sufficient flexibility is achieved to ensure that future spectrum management initiatives are not unnecessarily limited; and
    - A wide range of spectrum management tools are made available so that best practice in spectrum management can be achieved;

- Inform procedural efficiency by learning from recognised NRAs, Electronic Communications Expert Advisory Panel (ECEAP) and industry bodies;
- Promote the sharing of knowledge and expertise through the Forward-Looking Programme and market information;
- Benchmark performance against international standards to measure performance, identify gaps and pursue best practice in spectrum management; and
- Continue to work with all interested parties to ensure the efficient use of Ireland's radio spectrum resource.

6 Strategy for Specific Radio Services

Radio spectrum is available for the provision of a variety of communications services and networks. These include radio transmission networks, public access services (such as mobile telephony and broadband access networks), broadcast networks as well as radio navigation systems, business radio, ships' radio, amateur radio, consumer products and equipment used in industry, medicine and commerce. In addition, the nature of the spectrum means that certain parts of the spectrum are more suitable for particular purposes than others.

This section examines the different types of services that make use of the radio spectrum in Ireland. It reviews the demands for spectrum, the implementation of ComReg's strategy since the publication of the previous spectrum management strategy statement and considers possible future strategies for each service.

6.1 Public Mobile Services

Public Mobile Services continues to be a very important part of the Irish Telecommunication Sector. ComReg's quarterly report[45] shows, in summary, that at the end of December 2010:

- There were 5,273,313 mobile subscriptions in Ireland (excluding MVNOs Postfone and Just mobile subscriptions and including Mobile Broadband subscriptions);
- Based on a population of 4,470,700 (using a CSO April 2010 estimate) penetration was 118.0% including Mobile Broadband and 105.2% excluding Mobile Broadband;
- Post-paid subscriptions continue to increase slowly at the expense of pre-paid subscriptions with 35.6% of subscriptions now being post-paid. The ratio of pre-paid to post-paid varies considerably between Mobile Network Operators (MNOs) – see section 4.2 of ComReg 11/21 for details;
- Market share by subscription and revenue between MNOs are fairly stable with only small (≤ 1%) change since in the period;
- In this quarter, 115,216 numbers have been ported between operators and 352,140 numbers in the year to December 2010.

The key drivers of demand for public mobile spectrum are likely to be new and faster data applications, for example the delivery of audiovisual content to mobile phones, high speed access to the internet and corporate intranets and the provision of ubiquitous mobile broadband across Ireland.

6.1.1 Review of Previous Strategy Period

The 900 MHz and 1800 MHz Spectrum Bands

[45] ComReg 11/21 - Irish Communications Market: Key Data Report – Q4 2010 (Section 4) – 18 March 2011.

ComReg undertook to "conduct a comprehensive public consultation(s) on the 900MHz and 1800MHz bands starting in Q308 in order to make an informed decision. This consultation is also intended to cover the possible release of currently unassigned spectrum in 900 MHz & 1800 MHz."

ComReg has devoted considerable resources to this ongoing task. Other than noting the possible inclusion of the band 790-862 MHz (the Digital Dividend) in this process, ComReg does not intend to rehearse any of the issues raised, noting there are a number of ongoing consultations, and interested parties are referred to the list of publications in Appendix D.

Developing Radio Spectrum Sharing Criteria

Increased reliance is being made on the development of sharing criteria to increase the utilisation of the radio spectrum by facilitating the interference free sharing of the spectrum resource by different technologies. This includes co-channel sharing as well as the protection of adjacent band users. ComReg has been actively involved in developing appropriate sharing criteria between different users of the public mobile bands in European fora, in particular within Project Team 1 of the Electronic Communications Committee[46] (ECC PT1). ComReg has contributed (amongst other things) to appropriate sharing criteria between different users in:

- CEPT Reports 40[47], 41[48] and 42[49] on the 900 MHz and 1800 MHz frequency bands; and
- CEPT Report 30[50] on the 800 MHz Digital Dividend band.

Quality of Service Surveys

Each GSM and 3G licence issued by ComReg has a number of licence obligations attached to it. These obligations include, to varying degrees obligations to ensure a minimum quality of service to consumers as well as a minimum coverage requirement that needs to be achieved by each licence holder. ComReg evaluates achievement of these obligations in a variety of ways, including the use of drive-testing of network. In this regard, ComReg has contracted a specialist company to survey the quality of GSM and 3G services across Ireland. In the last two years, this contractor has covered 3,500 km per bi-annual survey with approximately 250,000 measurements made per operator per mobile network to ensure compliance with quality of service and coverage obligations.

ComReg can confirm that all MNO's are currently meeting their respective licence conditions relating to coverage and quality of service. These licence conditions are available on ComReg's website[51].

[46] See ECC PT1 on www.ero.dk

[47] CEPT Report 40; Compatibility study for LTE and WiMAX operating in the 900/1800 MHz bands.

[48] CEPT Report 41; Compatibility between LTE nad WiMAX operating in the 900/1800 MHz bands and systems operating in adjacent bands.

[49] CEPT Report 42; Compatibility between UMTS and existing and planned systems above 960 MHz.

[50] CEPT Report 30; The identification of common and minimal (least restrictive) technical conditions doe the digital dividend in the European Union.

Wireless Technology Trials

Using *Test & Trial Ireland*, ComReg has facilitated a number of tests and trials in the public mobile bands. For example in June 2010 the first tests of the Time Division Long Term Evolution (TD-LTE) next generation mobile technology were carried out in Ireland by LM Ericsson in the 2.3 GHz band – a list of these licences, which also includes the use of bands other than the public mobile bands, is available on ComReg's website[52].

The 2.6 GHz Band (2500 – 2690 MHz)

In considering the future usage of the 2.6 GHz band in Ireland, it is necessary to consider that the band is not a "green field" spectrum band. The majority (144 MHz out of a total of 190 MHz) of the 2.6 GHz band is currently licensed for Multipoint Microwave Distribution Systems (MMDS) for the distribution of licensed programme services[53]. ComReg has issued ten licenses for the use of this band under the 2003 Regulations, all of which are due to expire in April 2014 at the latest. All ten licences are currently held by a single entity UPC (Ireland) Ltd. The 2003 Regulations provide that ComReg may renew the licences for a period of up to 5 years and this provision will have a bearing on the availability of the band for future licensing. ComReg undertook to consult on the future of this band and the MMDS licenses currently in this band during 2010. Interested parties are referred to ComReg's position on this band as given in Section 5.2.1 of ComReg document 08/50.

In May 2010, ComReg published a call for input[54] on the future of the 2.6 GHz band and published the 36 responses received[55] in July 2010.

The inputs received represented a wide and often conflicting set of views on the best approach for the future use of the 2.6 GHz band. The breadth and depth of views received indicates to ComReg, among other things, that the future use of the 2.6 GHz band is viewed as being particularly important to a variety of interested parties.

6.1.2 Proposed ComReg Strategy for Public Mobile Services

The 800 MHz, 900 MHz and 1800 MHz Spectrum Bands

ComReg's highest priority in relation to public mobile services is to finalise the consultation process on the future, of the 800 MHz, the 900 MHz and 1800 MHz bands. As part of this task, ComReg is seeking to finalise a number of new

[51] Please see http://www.comreg.ie/radio_spectrum/search.541.874.10003.0.rslicensing.html.

[52] Please see http://www.comreg.ie/radio_spectrum/search.541.874.10025.0.rslicensing.html.

[53] Statutory Instrument Number 529 of 2003 (S.I. No 529/2003) - WIRELESS TELEGRAPHY (Multipoint Microwave Distribution System) REGULATIONS 2003 – 13 November 2003.

[54] ComReg 10/38 – Information Notice - Call for input on potential uses and licensing options of the 2.6 GHz spectrum band - 14th May 2010

[55] ComReg 10/58s – Inputs received on potential uses and future licensing options of the 2.6 GHz spectrum band Submissions received from respondents - 27th July 2010

memorandum of understanding (MoU) with Ofcom, the regulator and competition authority for the UK communications industries. These new MoUs will facilitate the operation and co-ordination of liberalised public mobile services in border areas between operators. ComReg's view is that these MoUs should permit optimum operation of services in all border areas as far as possible.

A further task is to consider the results of sharing studies between mobile services and other services in the band 790-862 MHz in Regions 1 and 3, to ensure the adequate protection of services to which this frequency band is allocated, under agenda item 1.17 of the WRC-12[56], taking into account the CEPT view, in line with Ireland's national position.

The 2.6 GHz Band (2500 – 2690 MHz)

ComReg is carefully considering the wide range of views received to its call for input[57] on the future of the 2.6 GHz band and intends to publish a consultation on the future use of this band. This consultation will take into account the rights of current licensee(s) as well as consider the inputs received[58] to date.

The Band 2010 – 2025 MHz

In 1998, the European Parliament and Council harmonised[59] the introduction of a third-generation mobile and wireless communications system in the Community utilising the spectrum bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz for terrestrial Universal Mobile Telecommunications System (UMTS) applications. To date, ComReg has also issued four 3rd generation (3G) or International Mobile Telecommunications (IMT)/UMTS licences in the 1900 – 1980 MHz, and 2110 – 2170 MHz bands.

When consulting on possible spectrum opportunities[60] in March 2008, ComReg noted the availability of the band 2010 – 2025 MHz but responses received indicated only limited interest in the band. While ComReg indicated that it intended to consult with a view to releasing this band, the lack of interest did not justify giving the band a notable priority in ComReg's work plans.

While ComReg notes that there has been little interest in the use of this band across Europe, it may review its position if interest emerges.

[56] See section A.3.2

[57] ComReg 10/38 – Information Notice - Call for input on potential uses and licensing options of the 2.6 GHz spectrum band -14th May 2010

[58] ComReg 10/58s – Information Notice - Call for input on potential uses and licensing options of the 2.6 GHz spectrum band -27th July 2010

[59] DECISION No 128/1999/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 December 1998 on the coordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community.

[60] ComReg Document 08/20 - Proposed Strategy for Managing the Radio Spectrum:2008 – 2010 – 6 March 2008.

ComReg is seeking expressions of interest (See* Table 3*) in the future use of the 2010 – 2025 MHz band.

Sharing Criteria between Different Users and Technologies

Given the importance of having appropriate sharing criteria between different potential users of similar or diverse technologies, ComReg intends to continue its involvement in appropriate European fora to develop these sharing criteria.

The DECT Guard Band (1780 – 1785 MHz/1875 – 1880 MHz)

ComReg has received several expressions of interest in the use of the band which is known as the DECT (Digitally Enhanced Cordless Telecommunications) guard band. The 3.3 MHz band at 1876.7 – 1880 MHz was established to form a guard band to protect GSM 1800 systems against interference to or from DECT systems. However, based on the conclusions of the ERC Report 100[61] ("Evaluation of DECT/GSM 1800 compatibility"), a 3.3 MHz guard band between GSM 1800 and DECT is no longer considered necessary. The 1781.7 – 1785 MHz is currently unassigned.

Ofcom (UK) released this band in May 2006 and licensed 12 parties. The RA (Netherlands) adopted a different approach and, in January 2009, designated the spectrum as unlicensed for low-power private GSM networks. In the Netherlands, operators intending to use this spectrum are simply required to register location of operation on the regulator's website. This allows a degree of co-ordination among various spectrum users to avoid any interference. Since the adoption of this approach, the RA has registered over 50 MVNOs for a population of 16 million.

This 5 MHz block is now part of ComReg's spectrum liberalisation process (see Annex A, in particular document 10/105), precluding it from separate consideration for low-power usage as undertaken in the Netherlands. This does not however preclude any interested party or consortium of interested parties from bidding to use this spectrum (or indeed any other spectrum being released as part of the liberalisation process) for low power usage.

Additional Proposals

ComReg proposes to:

- Continue to monitor and publish the results of quality of service surveys to ensure compliance with license conditions; and
- Accommodate requirements for trials of wireless technologies noting that as more spectrum is licensed that the availability of suitable spectrum for test and trial purposes will be diminished.

[61] ERC Report 100 - EVALUATION OF DECT / GSM 1800 COMPATIBILITY – Naples, February 2000 - http://www.erodocdb.dk/Docs/doc98/official/pdf/REP100.PDF

6.2 Broadcasting Services

Broadcasting is a major user of the radio frequency spectrum. As reported in ComReg's quarterly review[62] there are almost 1.593 million TV households in Ireland which represents a 96% penetration rate of all households. Of further relevance is that during the period January 2009 and January 2011:

- homes which receive Irish terrestrial TV channels only have declined by 8.2% in this period;
- multi-terrestrial TV homes declined over this period, by approximately 31.3%;
- analogue cable/satellite TV homes declined over the period by approximately 54.6% [63];
- Pay TV homes (cable and satellite TV homes) continue to increase at the expense of terrestrial free to air TV homes (Irish terrestrial and multi terrestrial TV homes); and
- Digital TV reception (71%) continues to increase at the expense of analogue TV reception (29%)

RTÉ, the public service broadcaster established under the Broadcasting Authority Act 1960, (as amended) provides national radio and television services. The Broadcasting Authority of Ireland (BAI), established under the Broadcasting Act 2009, is responsible for the authorisation of Irish broadcasting services other than those provided by RTÉ. The BAI is also responsible for the regulation of broadcast content within Ireland. ComReg is responsible for the allocation, assignment and licensing of the associated radio frequencies under the various Broadcasting Acts and continues to work in close cooperation with both the BAI and RTÉ on the assignment of radio spectrum to ensure efficient use of this key natural resource.

6.2.1 Review of Previous Strategy Period

Digital Television Terrestrial (DTT)

ComReg issued RTÉ with a licence for its first Digital Terrestrial Television (DTT) multiplex in late 2007[64]. RTÉ carried out a number of tests since receipt of its licence and began testing on its new DTT platform – "Saorview" - on 29 October 2010 from 24 sites, covering up to 90% of the population[65]. The BAI began a process to award three commercial DTT multiplexes in 2008. Following unproductive negotiations, the BAI announced in August 2010 that it was concluding the current process. On 5 August 2010, the BAI published a statement regarding the conclusion of its commercial DTT multiplex licensing process[66]. In particular, the BAI stated

[62] ComReg 11/21 – Irish Communications Market: Key Data Report – Q4 2010.

[63] MMDS (Microwave Multipoint Distribution Services) is included under cable/satellite.

[64] ComReg 07/90a - Response to Consultation - Licensing Digital Terrestrial Television – 9 November 2007 and ComReg 07/90a - License for Digital Terrestrial Television – 9 November 2007.

[65] Please see: http://www.rte.ie/saorview/

[66] BAI Statement on Conclusion of Commercial DTT Multiplex Licensing Process – 05/08/2010

that it will not be feasible to introduce commercial DTT as originally intended and certainly not in advance of ASO. Accordingly, there will not be any digital broadcasting requirement for the use of the 800 MHz spectrum in advance of ASO.

In August 2010, the Minister for Communications, Energy and Natural Resources announced that analogue switch-off will take place at the end of 2012 in Ireland[67]. As the immediate spectrum requirements have become clear for DTT, ComReg has ensured that spectrum is not allocated to the DTT service above 790MHz. The developments in relation to immediate spectrum requirements of DTT given by both the BAI in terms of commercial DTT and the Minister in terms of analogue switch-off presented ComReg with clarity on the availability of the 800MHz band (790MHz – 862MHz). With this clarification, ComReg set out in Document 10/71[68] its plans to consider the release and assignment of rights of use of spectrum in the 800 MHz band together with the 900 MHz band.

Digital Audio Broadcasting (DAB)

ComReg consulted in 2008[69] on the regulatory framework for the licensing of digital radio broadcasting technologies in VHF Band III. Following this consultation, a digital radio multiplex licence was issued to RTÉ, which facilitated the introduction of its DAB service in Cork, Dublin and Limerick[70].

Mobile TV

ComReg first consulted on its proposals for the licensing of spectrum rights of use for 8 MHz of Ultra High Frequency (UHF) spectrum in the five urban areas of Cork, Dublin, Galway, Limerick and Waterford ("the coverage area")[71], either on a service- and technology-neutral basis or for the provision of a broadcast mobile television (Mobile TV) service. In June 2008 as this process progressed, it became apparent that use of the identified spectrum to provide a Mobile TV service in Ireland was not of strong interest to potential operators.

After careful consideration of relevant submissions, and developments in relation to the authorisation of Mobile TV services elsewhere in Europe, ComReg sought clarification on the level of interest from potential operators by way of publication of

[67] "Minister Ryan announces switch-on of Digital Television - http://www.dcenr.gov.ie/Press+Releases/Minister+Ryan+announces+switch-on+of+Digital+Television.htm

[68] ComReg Document 10/71 - Consultation - 800 MHz, 900 MHz & 1800 MHz spectrum release – 17 September 2010.

[69] Licensing Digital Terrestrial Radio – 08/100

[70] Please see: http://www.rte.ie/digitalradio/index.html

[71] ComReg Documents 08/44, 09/63 and 10/26. The relevant submissions received were set out in ComReg Documents 09/63s and Annex 1.0 to document 10/26.

Document 10/89[72]. Having received no expression(s) of interest, ComReg will not be proceeding further with this matter[73].

Compliance Actions

During the period 2008 – 2010 ComReg undertook 50 actions against unlicensed broadcasting stations. In a number of cases these unlicensed stations were reported on the basis of their causing interference to other services – most notably air traffic control services.

6.2.2 Proposed ComReg Strategy for Broadcasting Services

Administrative Incentive Pricing

ComReg has applied Administrative Incentive Pricing (AIP) to a number of services and spectrum bands to encourage the efficient use of radio spectrum. To date, ComReg has not applied AIP in the traditional broadcast bands. ComReg intends, over the lifetime of this strategy, to examine the current licences fees of commercial, community and public broadcasters (both TV and radio services). This is to evaluate whether a reasonable licence fee is currently being charged and if any changes are required to the current licence fee structure to ensure the efficient use of the radio spectrum.

ComReg's proposed strategy for broadcasting over the period 2010 – 2013 is to:

- Facilitate the roll-out of DTT in UHF Bands IV and V below 790 MHz;
- Facilitate the Analogue Switch Off (ASO) in 2012;
- Ensure that the band 790 MHz to 862 MHz is cleared of broadcasting services and is available for non-broadcasting use following ASO;
- Consider the results of sharing studies between mobile services and other services in the band 790-862 MHz in Regions 1 and 3, to ensure the adequate protection of services to which this frequency band is allocated, under agenda item 1.17 of the WRC-12[74], taking into account the CEPT view, in line with Ireland's national position;
- Monitor the development of digital modulation techniques that have the potential to replace the analogue service with high quality broadcast services in the Very High Frequency (VHF), short wave, medium wave and long wave broadcast bands; and
- Examine the current licence fee structure for all broadcast services to encourage the efficient use of spectrum;
- Ensure operator compliance and protect authorised services from illegal use of spectrum.

[72] ComReg 10/89 – Mobile TV – Call for expressions of interest on potential award of spectrum in the UHF band for the provision of a Mobile TV service in the five urban areas of Cork, Dublin, Galway, Limerick and Waterford – 10 November 2010

[73] ComReg Document 11/01 – Discontinuation of licence award for Mobile TV in Ireland – 7 January 2011

[74] See section A.3.2

6.3 The Terrestrial Fixed Services

The bands above 1 GHz, often referred to as the microwave bands, are used predominantly for fixed point-to-point and point-to-multipoint links ('Fixed Links'). Fixed Links are commonly used for providing high bandwidth connections between two fixed points and in some circumstances, Fixed Links can provide an economic alternative to optical fibre and leased lines. There are a large variety of Fixed Link users in Ireland, including fixed and mobile operators, broadcasters, public utilities and the emergency services. There are more than 11,000 Fixed Link licences in Ireland.

Figure 7: Trend in Fixed Radio Link Licences

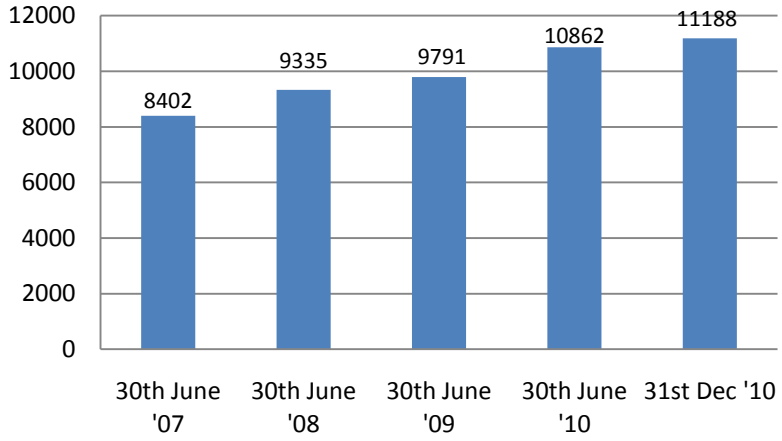


Figure 7 above shows the increase in the number of Fixed Link licences over the last three years. The year June 2009 to June 2010 saw a 10% increase in the number of live radio link licences on ComReg's database, reflecting the 80 – 100 link applications received weekly over this period. This increase reflects the investment being made by mobile network operators in upgrading their networks to reflect the demand from customers for mobile broadband and smart phone applications.

In Ireland, the majority of Fixed Link bands are shared between users and the relevant frequency bands are managed by ComReg to minimise interference to neighbouring operators. In order to encourage the efficient use of spectrum and to avoid harmful interference, ComReg has established guidelines for users which detail the application process, the frequency bands, link length policies, and the technical parameters associated with Fixed Link licensing[75].

The exception so far is to the 26 GHz (24.8 – 25.2 GHz / 25.8 – 26.2 MHz) band where ComReg has taken a multifaceted approach by dividing the band into three parts. 280 MHz of spectrum is set aside for Fixed Wireless Access (FWA) services under the FWALA licence scheme. A block of 224 MHz is currently set aside for individual licensing as per the current individual licensing scheme, and the remaining 952 MHz of spectrum has been set aside to provide 17 blocks of national

[75] See ComReg 09/89 - Guidelines to Applicants for Radio Links above 1 GHz – 27 November 2009

spectrum for users to self-manage. These 17 blocks were offered through an auction in 2008[76] and 4 blocks remain unassigned.

6.3.1 Review of Previous Strategy Period

In the previous two years, ComReg has:

- closed the 450 MHz fixed link band (450 – 470 MHz) to new applications and intends to complete the migration of the remaining 51 Fixed Links out of this band by 2012 at which time there will be no Fixed Links in operation below 1 GHz;
- Closed the lower 20 MHz of the 1.3 GHz Fixed Link band to new applications, utilising only the upper 5 MHz in 1370 – 1375 MHz paired with 1512 – 1517 MHz for new applications. The remaining 49 Fixed Links in the lower 20 MHz will be migrated out of this portion of the band by 2012. Demand for Fixed Links in the upper 5 MHz has been limited.
- Closed the upper 15 MHz of the 1.4 GHz Fixed Link band to new applications, utilising only the lower 5 MHz (1375 – 1385 MHz / 1427 – 1437 MHz) for new applications. No migration of users was required. Demand for Fixed Links in the upper 5 MHz has been limited.
- Maintained the status of the 2 GHz band (2025 – 2110 MHz / 2200 – 2290 MHz) and to date 84 links have been issued, of whose 45 Fixed Links are still active. Demand has been limited.

In December 2009, ComReg introduced changes to the licensing of Fixed Links. Including a new fee structure[77] based on the following:

- The bandwidth and frequencies in use;
- Additional charges for Fixed Radio Links within the "Congested Frequency Band Area";
- Additional charges where there are 5 or more Fixed Links on a particular path; and
- Dual Polarity Point-to-Point Links are licensed as one link to encourage the use of this technique.

In conjunction with the introduction of these revisions, ComReg upgraded its ***elicensing*** website to enable the submission of applications electronically. This electronic application process has improved turnaround time for Fixed Radio Link licences from 3 to 4 weeks to 10 to 15 working days. ComReg made further improvements to its ***elicensing*** website which has resulted in a completely paperless licensing process with the introduction of electronic signatures[78] for all Fixed Radio Link licences.

[76] See – ComReg PR290108 - 29 January 2008 and ComReg PR060608 – 6 June 2008.

[77] Wireless Telegraphy (Radio Link Licence) Regulations, 2009 (S.I. 370 of 2009)

[78] Over time ComReg intends to roll-out similar electronic licensing processes for other high demand licence types.

To encourage licensees to use the latest technology, ComReg made provision for Fixed Link operators to utilise Adaptive Coding and Modulation (ACM)[79]. ACM increases the data capacity of radio links without increasing power consumption or link bandwidth and allows operators to reduce the total number of links deployed, thus minimising equipment costs, power consumption and carbon emissions.

6.3.2 Proposed ComReg Strategy for Terrestrial Fixed Services

Fibre infrastructure remains the most appropriate platform for the interconnection of high capacity nodes and offers the most efficient means to deliver capacity for emerging broadband services. However, it is recognised that in the short to medium term Fixed Radio Links can facilitate the early development of infrastructure and competition in the provision of ECS, especially in rural areas. In this regard, ComReg's short to medium term strategy is to encourage the use of Fixed Links for infrastructure and competition development, for the maximum benefit of all licensees and in particular new market entrants. As networks develop and congestion in the Fixed Links bands grows, the strategy will be to encourage established Fixed Link licensees to migrate to fibre-based infrastructure.

Existing Frequency Bands for Fixed Links

Given the benefits identified from the use of Adaptive Coding & Modulation (ACM) in terrestrial Fixed Links, ComReg is proposing to make the deployment of ACM mandatory for all **new** fixed link applications across all fixed link frequency bands from 01 June 2012.

With a view to encouraging spectrum efficiency in congested frequency bands, ComReg is proposing to make dual polarisation mandatory for all **new** fixed link applications, where more than one link is required on the same path in the same frequency band, from 1 June 2012.

ComReg invites feedback on the two proposals above.

To date, there has been limited demand for links in the 70 GHz and 80 GHz Fixed Link bands – due to the propagation characteristics of these bands, the length of links tends to be very short (in the order of 1 – 2 km). Due to the low risk of radio interference between Fixed Radio Links in the 70 GHz and 80 GHz bands, less engineering resources may be required than those necessary to assign spectrum in the lower Fixed Radio Link frequency bands. Therefore, ComReg will explore the possibility of implementing a different assignment method, i.e. a light licensing regime or a Fixed Link registration process, which could more effectively cater for Fixed Links operating within these bands than the current licensing scheme and thus encourage the use of these bands.
As noted above, there has been a significant increase in applications for Fixed Link licences. To encourage the efficient use of the Fixed Link bands ComReg intends to review the current congested frequency band areas (as defined in ComReg

[79] ComReg 09/87 - Technical Paper - Use of Adaptive Coding and Modulation in terrestrial fixed link bands – 18 November 2009

Document 09/89[80]) to ensure that all relevant frequency bands are taken into account and all affected areas are included.

As part of the process for the auction of national block licences in the 26 GHz band[81], the results of which were announced in June 2008[82], ComReg committed to refraining from any further assignment of lots (including guard blocks) for a period of at least 18 months. As this period has expired, ComReg is now seeking expression of interests in reopening the 26 GHz block licence scheme for a further round of assignments within the next two year period - see Table 3.

Opening New Frequency Bands for Fixed Links

A number of European and internationally harmonised bands, not yet released in Ireland, could be considered for terrestrial fixed services (28 GHz, Lower 31 GHz, Upper 31 GHz, 50 GHz, 52 GHz, 55 GHz, 60 GHz and 65 GHz).

ComReg proposes to assess both the potential of, and demand for, each of the above frequency bands, with a view to developing some of these bands for new Fixed Link services and/or point to multipoint systems where appropriate. Appropriate licensing schemes will also be considered; for example, with regard to many frequency bands above 50 GHz, where interference potential is lower than in lower frequency bands, a light licensing structure may be feasible. Furthermore, block licensing will also be considered in addition to the more traditional case-by-case frequency channel licensing approach and, where appropriate, a mix of these two approaches as used in the 26 GHz band. A broad overview of the potential applications which could utilise each of the listed bands is provided in the table below:

Table 5: Potential new Fixed Link bands

Frequency Band (GHz)	Frequency Range (GHz)	Potentially Suitable for Point-to-Point Fixed Services?	Potentially Suitable for Point-to-Multipoint Fixed Services?	Channel Bandwidth Availability (MHz)
28	27.5 – 29.5	Yes	Yes	3.5, 7, 14, 28, 56, 112.
Lower 31	31.0 – 31.3	Yes	Yes	3.5, 7, 14, 28.
Upper 31	31.8 – 33.4	Yes	Yes	3.5, 7, 14, 28, 56, 112.
50	48.5 – 50.2	Yes	No	3.5, 7, 14, 28.
52	51.4 – 52.6	Yes	No	3.5, 7, 14, 28, 56.
55	55.78 – 57.0	Yes	No	3.5, 7, 14, 28, 56.

ComReg is now seeking views on the following issues related to the potential opening of new Fixed Link bands:

[80] ComReg 09/89 - Guidelines to Applicants for Radio Links Licences – 27 November 2009.

[81] ComReg 07/93R – Information Memorandum: The Award of National Block Point to Point and Point to Multipoint Assignments in the 26 GHz band – 24 January 2008

[82] ComReg PR060608 - ComReg announces the outcome of the 26 GHz National Block Licence Award Process - 6 June 2008

- equipment availability for different bands as this may determine the demand profile for each band;
- is the maximum capacity as determined by the limit of 28 MHz bandwidths in some bands a limiting factor?;
- in bands that do not have greater than 28 MHz bandwidth – should ComReg permit channel aggregation?;
- which bands are best suited for the provision of particular applications? For example, Closed Circuit Television (CCTV) services for which ComReg has received some interest in the use of the 50 GHz band.

6.4 Wireless Broadband Services

Wireless Broadband Services (WBS) refers to the delivery of broadband access services to residential or business users by terrestrial wireless networks (also known as Broadband Wireless Access). WBS provides an alternative to wired solutions such as digital subscriber line (DSL) or cable, providing competition to incumbent operators and extending broadband access in the 'last mile' to areas where wired solutions are technically or economically unviable.

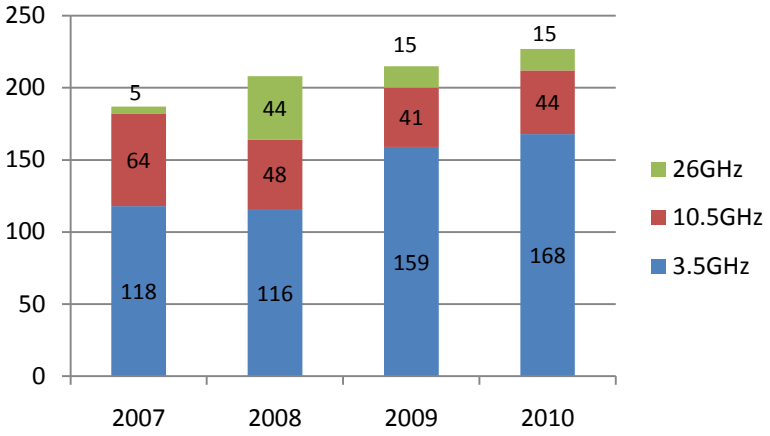
WBS were first licensed in Ireland under the Office of the Director of Telecommunication Regulation's (ODTR) Fixed Wireless Point-to-Multipoint Access (FWPMA) initiative in 1999. Following a public consultation in 2002, ComReg developed the Fixed Wireless Access Local Area (FWALA) licensing scheme. This scheme introduced a novel approach to licensing wireless broadband services by licensing on a local-area basis, providing opportunities for operators to deploy scalable networks and lowering barriers to entry. Since March 2003 the FWALA licensing scheme has been introduced in the 3.5 GHz, 10.5 GHz and 26 GHz bands. To date, 227 (168 in 3.5 GHz , 44 in 10.5 GHz and 15 in 26GHz) local area licences have been issued to 17 different operators ranging from those wishing only to provide service in their own locality to those with national roll-out aspirations. Further information relating to the FWALA licensing schemes and the locations of licensed local areas is available on the ComReg website[83].

Ireland is advanced in the use of wireless technologies for the delivery of broadband (which accounts for 7% of all broadband connections)[84]. The figure below shows the number of FWALA licences that have been issued as well as the number of FWALA operators. There has been some consolidation in the WBS sector in the past 24 months, for example, the purchase of both Irish Broadband and Clearwire by Imagine. The large decrease in the number of 26 GHz licences between 2008 and 2009 was due to one FWALA operator returning a number of 26 GHZ licences issued in the previous year.

[83] See ComReg website- http://www.comreg.ie/radio_spectrum/fwala_search.541.960.fwalasearch.html

[84] See ComReg 10/106 – Irish Communications Market - Quarterly Key Data Report – 16 December 2010

Figure 8: Active FWALA Licences over the last 3 years.



6.4.1 Review of Previous Strategy Period

The FWALA Forum

When the FWALA licensing scheme was launched in 2003, ComReg established "The FWALA Operators Forum". The objectives of the Forum include promoting WBS as a viable and reliable alternative platform for the provision of ECS. The last meeting of the FWALA Forum took place in September 2008 and is in hiatus, only being convened when inputs are received from interested parties.

The 26 GHz FWALA Band (24.6 – 24.8 GHz / 25.6 – 25.8 GHz)

There are 15 licences held by 4 operators operating in this band, predominantly in major urban centres. In late 2009, Eircom's 26 GHz FWPMA[85] licence expired releasing potential spectrum for further licences if demand was to increase for the use of this band.

The 10.5 GHz FWALA band (10.154 – 10.322 GHz / 10.504 – 10.672 GHz)

Following a consultation[86] in January 2009, ComReg made an additional 2 x 14 MHz of spectrum available in the Dublin and Cork areas and an additional 2 x 28 MHz in all other areas of Ireland.

There was limited demand for this spectrum with ComReg issuing one new licence, bringing the total number of licences in the 10.5 GHz band to 44, held by six operators.

[85] FWPMA = Fixed Wireless Point-to-Multipoint Access – S.I. 338 of 2003 -Wireless Telegraphy (Fixed Wireless Point to Multi-Point Access Licence) (Amendment) (No.2) Regulations, 2003 - 25 July 2003.

[86] ComReg 09/03 Consultation – Release of Additional Spectrum in the 10 GHz Band – 29 January 2009, ComReg 09/36 - Response to Consultation 09/03 – 5 May 2009, ComReg 09/24 – Releasing Channels E and J, and making spectrum in the 3.6 GHz – 3.8GHz band available for FWALA Licensing– 2 April 2009 and ComReg 09/93 – The Release of Channels F and G in the 10.5 GHz band for FWALA Licensing – 14 December 2009.

The 3.6 GHz FWALA Band (3410 – 3800 MHz)

Following a consultation[87], in 2009 ComReg made an additional 128 MHz of spectrum in the 3.4 – 3.8 GHz band available for licensing. There was considerable demand for this spectrum with ComReg receiving 123 applications and issuing 39 licences following a comparative evaluation process.

Existing use of the band in Ireland is on a local area basis, with licences permitting the holder to provide fixed and nomadic services within 20 km of a nominated location. In July 2010, ComReg initiated a consultation[88] on a framework to augment this scheme with mobile services in line with EC Decision 2008/411/EC[89]. The consultation included proposals on:

- The introduction of a new scheme which would also permit mobile services on a local area basis;
- A process whereby existing FWALA licensees may obtain licences to offer mobile services in their existing service areas; and
- Amendments to the power levels and code of practice applying to FWALA licences.

The responses[90] submitted by interested parties broadly welcomed ComReg's proposals and ComReg has published its response and decision on the introduction of mobility in this band.

In April 2010, ComReg published an Information Notice[91] announcing the end date of the FWALA licensing scheme in the 3.6 GHz band as 31 July 2017. Setting an end date ensures that an unfettered 3.6 GHz band would be created by 31 July 2017, in order that future licensing of the band can best facilitate the provision of fixed, nomadic and mobile wireless access services.

The 2.3 GHz BWS Band

The 2.3 GHz (2300 – 2400 MHz) band has great potential to enhance competition and capacity for mobile broadband within Ireland. Many countries of demographic significance (e.g. Russia, India) have recently released spectrum in this band, indicating that equipment is readily available for deployment.

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[87] ComReg 08/99 – FWALA licensing in the 3400 – 3800 MHz band – 12 December 2008, ComReg 09/21 – Response to Consultation - FWALA licensing in the 3400-3800 MHz band – 25 March 2009 and ComReg 09/24 – Releasing Channels E and J, and making spectrum in the 3.6 GHz 3.8GHz band available for FWALA Licensing - 2 April 2009

[88] ComReg 10/55 –The Implementation of EC Decision 2008/411/EC and Introduction of Mobility to the 3400 -3800 MHz Band – 14 July 2010.

[89] European Commission Decision 2008/411/EC, entitled "Commission Decision of 21 May 2008 on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community" ("the EC Decision").

[90] ComReg 10/85 – Submissions to Consultation 10/55 – 15 October 2010.

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

ComReg consulted on the 2.3 GHz spectrum band[92] in June 2009, to which it received twenty responses[93]. ComReg published its response to consultation[94] in October 2009, in which it set out its position in relation to certain issues, including block size, licence types and licence duration.

ComReg since held a briefing session on 1 March 2010[95] in which it invited expert speakers from different stakeholders to present on the potential for the 2.3 GHz band. This briefing session informed participants (35 participants representing 21 organisations) of network roll out and equipment developments in the 2.3 GHz band throughout the world. Participants were also given the opportunity to ask questions of the expert speakers and ComReg regarding the band. Questions and answers, as well as the presentations made on the day, are contained within the published notes from the briefing[95].

European Telecommunications Standards Institute (ETSI) has also carried out work at European level to encourage and facilitate administrations wishing to release the 2.3 GHz band. ETSI finalised and published a System Reference document ('SRDoc')[96], with input from ComReg. This SRDoc is technology neutral and agrees fundamental technical criteria for the band, which is non-binding. The report highlights regulatory issues, suggested maximum power and makes other technical recommendations. The purpose of the SRDoc is to initiate the development of guidance or recommendations for administrations wishing to assign within this spectrum band for broadband wireless access applications.

ETSI Report TR 120 837 requested the Electronic Communications Committee (ECC) to look at band arrangements, channelisation schemes and technical measures to protect users both in adjacent bands and within the band itself. In this regard, the Working Group Spectrum Engineering (WG SE) assigned SE 7 a new work item to look at sharing and compatibility issues both inter and intra band. SE 7 adopted the work item, and is currently developing the ECC report, which is looking at:

- Compatibility studies between BWS and existing services in the band 2300 – 2400 MHz and in adjacent spectrum bands; and
- Development of appropriate measures to assist administrations in border coordination.

The ECC Report is due for final publication in September 2011 and ComReg is actively involved in SE 7 contributing to the drafting of this report.

[92] ComReg 09/49 – Release of Spectrum in the 2300 – 2400 MHz Band Proposed Options & Licence Conditions. – 15 June 2009

[93] ComReg 09/76s – Release of Spectrum in the 2300 – 2400 MHz Band Submissions received from respondents – 6 October 2009

[94] ComReg 09/76 – Release of Spectrum in the 2300 – 2400 MHz Band Proposed Options & Licence Conditions – 6 October 2009

[95] ComReg 10/30 - Notes from 2.3 GHz Briefing held on 1 March 2010 – 15 April 2010

[96] ETSI Document TR 102 837 - Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference Document; Broadband Wireless Systems in the 2 300 MHz to 2400 MHz Range – 16 August 2010

ComReg has also engaged external technical experts to carry out analysis on the likelihood and potential of harmful interference between existing users of the 2.3 GHz band (Rurtel and Dáil TV use a small amount of the band) and any new broadband services, and also any interference issues between new broadband services in the 2.3 GHz band with users of the adjacent licence exempt 2.4 GHz band. This report will assist ComReg in setting technical and sharing conditions in its next consultation.

The published ECC Report together with the technical report will assist ComReg in developing its next consultation on the 2.3 GHz band. This consultation will also include economic analysis of the type of competitive award, fees, licence conditions, and so on.

6.4.2 Proposed ComReg Strategy for WBS

The FWALA Forum

Given the maturity in the WBS market and the consolidation that has happened in the last two years, ComReg is of the view that it is no longer appropriate for ComReg to run an operators forum for one particular licensing scheme. This does not mean that FWALA operators cannot form their own industry group as is the case for other licence holders. To enable closure of the FWALA Forum, ComReg intends to publish, in one aggregated form, all the documentation dealt with by the FWALA Forum.

Introduction of Mobility in the 3.6 GHz band

ComReg recently published its response and decision on the introduction of mobility[97] in the 3.6 GHz band. In Q2 of 2011, ComReg intends to:

- draft two new Statutory Instruments for approval by the Minister for Communications, Energy and Natural Resources, to establish the Broadband Wireless Access Local Area (BWALA) licensing scheme and exempt 3.6 GHz mobile terminals from the requirement to be individually licensed; and
- update the Code of Practice on domestic frequency coordination.

Review of the FWALA licensing scheme in the 3.5 GHz band

Having set the end date for the 3.5 GHz FWALA licensing scheme of 31 July 2017 and following the completion of the introduction of mobility into the 3.6 GHz band, ComReg intends to complete its the review of the FWALA licensing scheme.

This review will look at all FWALA frequency bands (3.6 GHz, 10.5 GHz and 26 GHz) and consider how these bands might be utilised in the future. ComReg is of the view that 2013 is an appropriate timeframe to consult on use of the bands post 2017. It is intended that this review will include consideration of matters such as

[97] See ComReg 11/03 - Response to Consultation 10/55 - The Implementation of EC Decision 2008/411/EC and Introduction of Mobility to the 3400 – 3800 MHz Band – 20 January 2011.

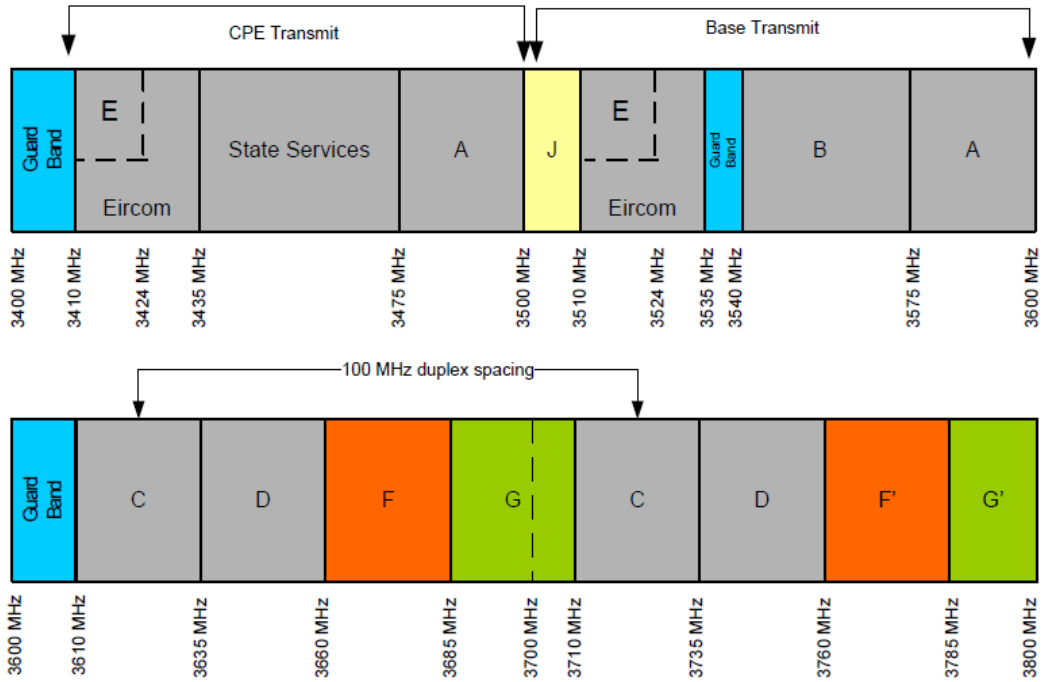
licence conditions, licence fees, frequency channel arrangements, whether channels will be licensed on a local, regional or national basis, and appropriate mechanisms for the future assignment of the 3.6 GHz spectrum band.

Additional Spectrum in the 3.6 GHz band

In 2009, ComReg made an additional 128 MHz of spectrum in the 3.5 GHz band available for licensing for which there was considerable demand (ComReg received 123 applications and issued 39 licences). The current arrangement of the band is shown in Figure 9.

In August 2010, ComReg announced[98] the expiry of Eircom's 3.5 GHz FWPMA licences (shown in the figure above) and the issue of point-to-multipoint link licences in the band to Eircom for a period not exceeding 24 months to facilitate the migration of USO customers out of the band. Eircom was also issued with a FWALA licence authorising the use of the precise amount of spectrum that is required to continue the provision of services to customers receiving WiMax/broadband services in the Black Valley area.

Figure 9: FWALA channel arrangements in the 3.6 GHz band



All of the "transitional" licences granted to Eircom in August 2010 will expire on 14 June 2012. The expiry of the Fixed Wireless Point to Multipoint Access (FWPMA) licence and the associated migration arrangements will enable ComReg to make additional spectrum available for licensing in due course. Taking into account the end date of 31 July 2017 for FWALA licences, this could facilitate new licences

[98] ComReg 10/64 – Expiry of Eircom's FWPMA licence and future spectrum availability for FWALA licensing – 12 August 2010

using up to 2×25 MHz of spectrum, limited to 5 years duration – ***ComReg is seeking expressions of interest in making this new spectrum available at this time.***

ComReg is also prepared to consider the use of existing guard bands in the 3.6 GHz band for additional bandwidth limited licences at the same time – if sufficient and justified demand is expressed by interested parties.

Release of the 2.3 GHz Band

ComReg intends to release a consultation on further technical and spectrum release options in advance of publishing its decision during the period of this strategy statement – See section 6.4.1 on 2.3 GHz BWS band for further details.

6.5 Licence Exempt Short Range Devices

Among the most prevalent radio systems in Ireland are Short Range Devices (SRDs). SRDs occupy a range of diverse frequencies in the radio spectrum, ranging from very low frequencies (kHz), to extra high frequencies (GHz). Due to their low power and localised usage, SRDs are generally regarded as having a low capability of causing interference. Consequently, they have generally been made exempt from the need for individual radio licences subject to certain technical constraints –For example, operating in frequency bands shared with other users and services on a non-interference, non-protected basis.

SRDs can be uni-directional and bi-directional low power radio transmitters, and can serve a multitude of purposes. For example, car door openers, baby alarms, wireless microphones and wireless local area networks (WLANs). SRDs are deployed in both private and commercial scenarios. Private applications range from medical implants to cordless telephones. Commercial applications include public access wireless hotspots and RFIDs used in logistics and inventory control. Additionally, SRDs are used for specialised applications such as Road Traffic and Transport Telematics (RTTT) for the management of roads and traffic (such as automatic road toll collection and traffic information).

The common position on spectrum allocations for SRDs within CEPT is outlined in ERC Recommendation 70-03 (ERC/REC/70-03) available from the ECO[99] website (www.ero.dk). This Recommendation contains the most widely accepted European position with respect to SRDs and provides a useful reference document for Member States.

In Ireland, SRDs are licence-exempt subject to meeting certain technical criteria. For example, maximum power levels and reference standards. The technical criteria for the operation of SRDs in Ireland are set as in ComReg Document 02/71R[100] (as

[99] European Communications Office (ECO) formally established on 1 July 2009 is the permanent office supporting the CEPT, its Presidency and its three Committees: the Electronic Communications Committee (ECC), the Committee for ITU Policy (Com-ITU) and the Committee for Postal Regulation (CERP).

[100] ComReg 02/71R5 – "Permitted Short Range Devices in Ireland" – last revision published 23 December 2010.

stated in S.I. No. 405 of 2002[101]). In addition, all SRDs placed on the market are required to comply with the R&TTE Directive[102].

6.5.1 Review of Previous Strategy Period

Since ComReg's previous spectrum strategy document was issued in 2008, updated Regulations applicable to SRDs have been brought into force in Ireland following the EC Decision 2006/771/EC on the harmonisation of radio spectrum for the use of SRDs[103]. In conjunction with the issuing of these updated Regulations, ComReg regularly updates ComReg Document 02/71R[104] which outlines the requirements for the operation of SRDs in Ireland. These Regulations provide the legal basis for the exemption from individual licensing of a wide range of SRDs, subject to the requirements in Document 02/71 being met.

Ireland closely follows the CEPT common position on spectrum allocations for SRDs (as outlined in ERC Recommendation 70-03 (ERC/REC/70-03)) as these allocations are made subject to demand and technical feasibility and include justification as to why existing SRD spectrum is unsuitable. In doing so, ComReg has facilitated the introduction of a number of new SRD applications to Ireland through further utilisation of spectrum for[105]:

- A number of non-specific SRD applications;
- Ultra-wideband technology (via implementation of EC Decision 2007/131/EC[106]);
- Building Materials Analysis (BMA);
- Tank Level Probing Radar (TLPR);
- Meter reading;
- Asset tracking and tracing;
- Inductive applications;
- Radio microphones;
- Assistive hearing devices; and
- Wireless applications in healthcare.

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[101] S.I. No. 405 of 2002 – Wireless Telegraphy Act, 1926 (Section 3) (Exemption of Short Range Devices) Order – 30 July 2002

[102] The Radio and Telecommunications Terminal Equipment Directive, for which further information may be obtained at: http://ec.europa.eu/enterprise/sectors/rtte/index_en.htm

[103] Commission Decision 2006/771/EC, "on harmonisation of the radio spectrum for use by short-range devices", is available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:312:0066:0070:EN:PDF.

It should be noted that the Annex to EC Decision 2006/771/EC is regularly amended to reflect further harmonised technical conditions within its Annex. The latest amending Decision, 2010/368/EU, is available at: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:166:0033:0041:EN:PDF

[104] ComReg 02/71 (currently at revision 5) - Permitted Short Range Devices in Ireland – 23 December 2010.

[105] ComReg 02/71R5 - Permitted Short Range Devices in Ireland – 23 December 2010.

[106] Commission Decision 2007/131/EC, "on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community", available at: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/l_055/l_05520070223en00330036.pdf

ComReg continues to ensure that only the minimum requirements are listed in ComReg Document 02/71 and, where appropriate, the application-specific limitations on spectrum use are removed. Further, ComReg continues to work towards ensuring that the principles of service and technology neutrality are applied wherever possible.

With regard to the debate within Europe on the possibility of developing generic power limits for a new class of generic Ultra Low Power (ULP) SRD, only limited interest has been expressed by the global SRD community. In light of this, and in line with the CEPT position, ComReg will not further investigate this topic until substantive data supporting continued exploration in this field has been received. Such data should include extensive information on the benefits for industry of a generic limit for SRDs, and take into account the work carried out on UWB to date.

6.5.2 Proposed ComReg Strategy for SRD

ComReg's strategy for the duration of this plan includes:

- Continuing to facilitate the introduction of new SRDs to Ireland by making spectrum available wherever possible, dependent upon demand and technical viability. It should be noted that additional spectrum will only be made available to SRD applications on the condition that there is a clear and demonstrable need;

- To provide regular updates, as required, of ComReg Document 02/71R. In addition to reflecting the introduction of new SRD applications or regulatory amendments to the document, ComReg will ensure that only the minimum requirements are specified and, where appropriate, the application-specific constraints to spectrum use are removed;

- To continue implementation of European Commission Decision 2006/771/EC and all associated revisions;

- Radio solutions are a key feature of public safety operations and, especially in the case of Disaster Relief (DR), are essential to the effective functioning of emergency services. There is currently a need for dedicated Broad Band Disaster Relief (BBDR) spectrum to support narrowband and wideband operational requirements. In order to meet this need, the band 5150 – 5250 MHz has been identified, within Europe as the most appropriate band for BBDR applications. In light of this, ComReg will consider the most appropriate means by which to authorise use of this band for Broadband Disaster Relief (BBDR) applications, including licence exemption;

- During the last spectrum strategy period, the 5875 – 5905 MHz band was designated for Intelligent Transport Systems (ITS) road safety applications within Ireland. Utilisation of the band for ITS applications supports the European Union eSafety initiative[107] in its goals to reduce the number of road

[107] Further information on the e-safety initiative can be found at: http://ec.europa.eu/information_society/activities/esafety/index_en.htm

fatalities and improving the efficiency of road traffic with Intelligent Vehicle Safety Systems. In the forthcoming strategy period, ComReg will consider the most appropriate means by which to authorise use of this frequency band, on a non-exclusive basis, for such applications in line with EC Decision (2008/671/EC)[108]. It is anticipated that in-vehicle ITS equipment will be exempted from individual licensing. However, for ITS roadside units, an alternative appropriate authorisation process may be necessary;

- Ultra Wideband Ground- and Wall- Probing Radar (GPR/WPR) imaging systems are used in several European countries in survey and detection applications. GPR/WPR imaging can be used to locate underground gas main leaks, sink-holes, survivors of avalanches etc. While recognising that a number of the radio services operating in the frequency bands covered by GPR/WPR are used for aviation, meteorology, etc., ComReg will explore appropriate avenues for the authorisation of GPR/WPR imaging systems, including but not limited, to licence exemption;

- ComReg will actively participate in the ongoing discussions within Europe on whether there is a need for additional spectrum bands for Radio Frequency Identification Devices (RFID) and SRDs in the UHF range or if existing spectrum bands are sufficient;

- Emerging industrial Level Probing Radar (LPR) applications have many practical industrial uses including process control, governmental legal measurements, water and other liquid monitoring, and spill prevention. The main function of LPR is to enhance reliability through the prevention of accidents, increase industrial and quality control, and improve environmental conditions in production processes. Although LPR applications utilise UWB technology, they cannot be considered a generic UWB because of their industrial focus. Consequently, a new EC Decision has been proposed by CEPT on LPR. This Decision should ensure that LPR devices are deployed under harmonised conditions within Europe. ComReg will continue to monitor the development of this Decision and actively participate in its development;

- Consider the designation of additional frequency bands for SRD devices used by Road Transport and Traffic Telematics (RTTT). Most notably, and in alignment with European developments, the 76 GHz frequency band which is under consideration for Surveillance Radar Systems part of RTTT as well as the band 24.25 – 24.50 GHz for RTTT Wideband Low Activity Mode (WLAM) Radars;

- Bedside patient health monitoring within hospitals is currently carried out using body worn sensors, connected by cable to bedside monitors, which measure vital functions such as blood pressure, temperature, blood glucose levels and cardiac activity. The development of possible alternative wireless

[108] 2008/671/EC - COMMISSION DECISION of 5 August 2008 on the harmonised use of radio spectrum in the 5 875-5 905 MHz frequency band for safety-related applications of Intelligent Transport Systems (ITS)

solutions, where medical data is communicated wirelessly between sensors worn on the body of a patient and a medical monitor, is currently being explored at a European level. Over the coming strategy period, ComReg will actively contribute to ongoing discussions, within CEPT and the EU, on the possible designation of spectrum for Medical Body Area Networks (MBANs);

- A number of databuoy telemetry applications (i.e. equipment which has been designed for telemetry purposes in a maritime environment) are currently available which utilise frequencies in the band 30-35 MHz. Such telemetry applications can be used to transmit information pertaining to, for example, wave-motion and sea surface temperature. Given this, designation of the band 30 -35 MHz for licence exempt databuoy telemetry applications will be considered in the forthcoming strategy period;

- Currently the band 57-66 GHz is designated for wideband transmission applications in Ireland. In line with its goal of providing application and technology neutrality wherever possible, ComReg will explore the potential to extend the usage of this band for non-specific SRD;

- Consider the effect of emissions from SRD on radiocommunication services under agenda item 1.18 of the WRC-12[109], taking into account the CEPT view and in line with Ireland's National position.

6.6 Maritime Services

The maritime sector is a significant spectrum user, comprising a large leisure component, an extensive fishing industry, a competitive commercial sector and a wide ranging naval presence. Due to the global nature of maritime services, the management of the radio spectrum is largely governed by national and international regulations, such as those relating to safety of life at sea (SOLAS).

In Ireland, the Maritime Radio Affairs Unit (MRAU) of the Department of Transport is responsible for marine regulation and for ensuring compliance with legislation requiring certain classes of vessels to install a radio which is to be operated by a properly qualified operator. On 1 September 2007, the responsibility for the licensing of radio communications equipment on Irish ships and associated Certificates of Competency was transferred to the MRAU. ComReg remains responsible for spectrum management issues.

6.6.1 Review of Previous Strategy Period

Personal Locator Beacons (PLBs) are portable radio transmitters, which aid the Search & Rescue (SAR) emergency services in the detection and location of persons in distress. These devices operate in a similar manner to Emergency Position Indicating Radio Beacon (EPIRBs) onboard vessels and Emergency Locator

[109] See section A.3.2

Transmitters (ELTs) onboard aircraft. ELTs and EPIRBs have been in operation for several years and are proven technologies which have resulted in many successful search and rescues missions since their inception. More recently, technological advances have enabled the construction of light-weight, hand-portable distress transmitters and hence the relatively recent emergence of PLBs onto the market.

In 2008, ComReg consulted on the use of PLB in Ireland[110] and how these devices would be regulated. This was followed by a Statutory Instrument[111] establishing exemption of such apparatus from the requirement to be licensed as long as the PLB is registered with Cospas-Sarsat in the International 406 MHz Beacon Registration Database. ComReg has developed an online portal[112] for the registration of PLB's and this was opened for applications on 18 June 2010.

ComReg has put into place a licensing regime[113] for radiodetermination[114] systems which covers land based radionavigation and radiolocation stations used by the maritime services. ComReg opened the scheme[115] for applications on 2 February 2011.

In September 2009, ComReg put into place a licensing regime[116] for maritime service systems being services provided by equipment and systems not installed on vessels, utilising apparatus for wireless telegraphy, used or intended to be used, in connection with (a) the safety, security or operation of vessels, or (b) the training of personnel in the Maritime Mobile Service, and excludes public electronic communications networks and Radiodetermination Services. ComReg opened the scheme[117] for applications on 2 February 2011.

The International Convention for the Safety of Life at Sea now requires Automatic Identification Systems (AIS) to be fitted aboard international voyaging ships of 300 or more gross tonnage, and all passenger ships regardless of size. An AIS is used by ships and Vessel Traffic Services (VTS), principally for identification and locating vessels, and is intended to assist the vessel's watch officers and allow maritime authorities to track and monitor vessel movements. AIS systems fall under the Maritime Services definition and, following the agreement of a Memorandum of

[110] ComReg 08/88 – Consultation on regularising the use of Personal Locator Beacons (PLBs) -17 November 2008, ComReg 09/35 – Response to Consultation on regularising the use of Personal Locator Beacons (PLBs) – 28 April 2009.

[111] S.I. No. 290 of 2010 – Wireless Telegraphy Act 1926 (Section 3) (Exemption of 406 MHz Personal Locator Beacons) Order 2010. – 15 June 2010

[112] Please see: http://www.comreg.ie/licensing_and_services/personal_locator_beacons.715. html

[113] S.I. 369 of 2009 - Wireless Telegraphy (Radiodetermination, Air Traffic and Maritime Services) Regulations, 2009 – 15 September 2009.

[114] "Radiodetermination" means the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves – typically a radar system.

[115] ComReg 11/07 - Radiodetermination, Air Traffic and Maritime Services Licence Guidelines – 2 February 2011, ComReg 11/07c - Radiodetermination (Radiolocation) Licence - 2 February 2011 and ComReg 11/07d - Radiodetermination (Radionavigation) Licence - 2 February 2011.

[116] S.I. 369 of 2009 - Wireless Telegraphy (Radiodetermination, Air Traffic and Maritime Services) Regulations, 2009 – 15 September 2009.

[117] ComReg 11/07 - Radiodetermination, Air Traffic and Maritime Services Licence Guidelines – 2 February 2011 and ComReg 11/07e - Maritime Services Licence - 2 February 2011.

Understanding between ComReg, the MRAU and the Irish Coast Guard, a framework is now in place to ensure the interference-free operation of AIS in Ireland and on Irish waters. ComReg opened the scheme[118] for applications on 2 February 2011.

6.6.2 Proposed ComReg Strategy for Maritime Services

ComReg's strategy for the duration of this plan includes:

- Continuing to promote Ireland's interest at international fora to ensure adequate spectrum is available for maritime services;
- Continuing to prioritise and provide protection from interference to maritime safety of life services;
- Continuing to work with the MRAU to promote the use of spectrum efficient technologies in the relevant spectrum bands, thereby maximising the spectrum available for growth and new applications; and
- To consider implementation of new digital technologies for the maritime mobile services through a revision of Appendix 17 to the Radio Regulations under agenda item 1.9 of the WRC-12[119], taking into account the CEPT position, in line with Ireland's national position.

6.7 **Aeronautical Services**

The safety and efficiency of air transport is dependent on navigation and communication services that use radiofrequencies. Since the bulk of air travel is international in nature, most of the radio spectrum that is used by the aeronautical sector is planned internationally. The ITU Radio Regulations, the International Civil Aviation Organisation (ICAO)[120], Eurocontrol[121] as well as national and European legislation all set down requirements applicable to aeronautical services. In Ireland, regulation of the aviation industry is the responsibility of the Irish Aviation Authority (IAA). ComReg's role in this area is limited to administering the issue of radio licences for equipment onboard aircraft and for ground-based aeronautical transceivers, radar and radionavigation systems.

[118] ComReg 11/07 - Radiodetermination, Air Traffic and Maritime Services Licence Guidelines – 2 February 2011 and ComReg 11/07b - Air Traffic Services Licence - 2 February 2011.

[119] See section A.3.2

[120] See http://www.icao.int/

[121] See http://www.eurocontrol.int/corporate/public/subsite_homepage/index.html

Figure 10: Trend in aircraft licences

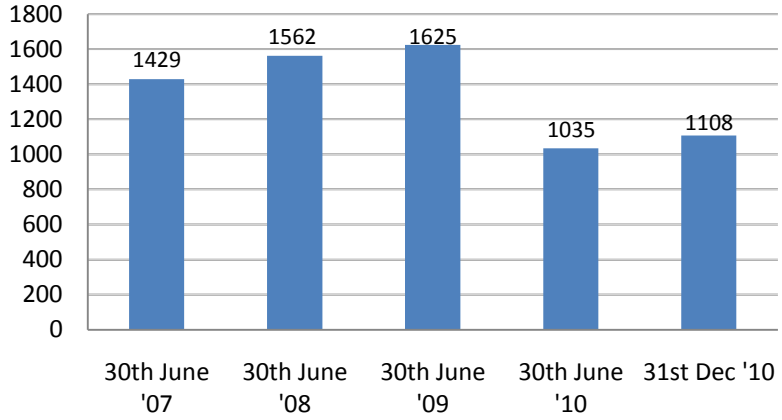


Figure 10 illustrates the number of aircraft licences currently active on ComReg's database. The significant reduction in licence numbers between June 2009 and June 2010 is due to the removal of a large number of aircraft from the Irish register and the subsequent cancellation of associated licences.

6.7.1 Review of Previous Strategy Period

In 2009, ComReg implemented new Aircraft Station Licence Regulations[122]. These Regulations established a new framework for the licensing of radio equipments on board aircraft and in particular the provision for a licence that covers the lifetime of such equipment installed on aircraft.

ComReg has put into place a licensing regime[123] for radiodetermination[124] systems which covers land-based radionavigation and radiolocation stations used by air traffic services. ComReg opened the scheme[125] for applications on 2 February 2011.

In September 2009, ComReg also put into place a licensing regime[126] for air traffic service systems being services provided by ground-based equipment and systems utilising apparatus for wireless telegraphy, used or intended to be used, in connection with the safety, security or operation of aircraft in flight or on the ground, excluding

[122] S.I. No. 193 of 2009 - Wireless Telegraphy (Aircraft Station Licence) Regulations 2009 – 22 May 2009

[123] S.I. 369 of 2009 - Wireless Telegraphy (Radiodetermination, Air Traffic and Maritime Services) Regulations, 2009 – 15 September 2009.

[124] "Radiodetermination" means the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves – typically a radar system.

[125] ComReg 11/07 - Radiodetermination, Air Traffic and Maritime Services Licence Guidelines – 2 February 2011, ComReg 11/07c - Radiodetermination (Radiolocation) Licence - 2 February 2011 and ComReg 11/07d - Radiodetermination (Radionavigation) Licence - 2 February 2011.

[126] S.I. 369 of 2009 - Wireless Telegraphy (Radiodetermination, Air Traffic and Maritime Services) Regulations, 2009 – 15 September 2009.

public electronic communications networks and radiodetermination services. ComReg opened the scheme[127] for applications on 2 February 2011.

6.7.2 Proposed ComReg Strategy for Aeronautical Services

ComReg's proposed strategy for Aeronautical Services for the duration of the Proposed Strategy includes:

- Continuing to promote Ireland's interest in relevant international fora to ensure adequate spectrum is available for aeronautical services;
- Continuing to prioritise and provide protection from interference to aeronautical safety of life services;
- Continuing to work with the IAA to promote the use of spectrum efficient technologies in the aeronautical bands, thereby maximising the spectrum available for growth and new applications;
- Considering the introduction of new aeronautical mobile (R) services under agenda item 1.4 of the WRC-12[128], taking into account the CEPT position, in line with Ireland's national position.

6.8 **Satellite Services**

Satellite networks provide a gamut of applications including mobile and fixed telecommunications (satellite phones and intercontinental telecommunications links); broadcasting services, such as Direct to Home (DTH) multichannel television and Satellite Digital Radio (SDR); satellite broadband; Satellite News Gathering (SNG), meteorological services; space research; and Earth Exploration Service (EES) applications. Additionally, satellites play a crucial role in aeronautical and maritime safety by providing services such as; the detection of Emergency Position Indicating Radio Beacons (EPIRB), radio navigation services and Global Positioning System (GPS). From the Programme for Government, ComReg has noted the intention to use satellite broadband services as one component (along with mobile broadband) to provide next generation broadband to the ten percent of home and businesses in Ireland that are not passed by a fibre network.

6.8.1 Review of Previous Strategy Period

On 14 February 2007, the EC issued a Decision[129] mandating the use of radio spectrum in the 2GHz band for the implementation of systems providing mobile satellite services (MSS) with a Complementary Ground Component (CGC). The purpose of this Decision is to harmonise the conditions for the availability and efficient use of the frequency bands 1980 – 2010 MHz (Earth-to-space) and 2170 – 2200 MHz (space-to-Earth). The Decision required Member States to designate the

[127] ComReg 11/07 - Radiodetermination, Air Traffic and Maritime Services Licence Guidelines – 2 February 2011 and ComReg 11/07b - Air Traffic Services Licence - 2 February 2011.

[128] See section A.3.2

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

band and make it available from 1 July 2007 for the use of systems capable of providing radiocommunications services between a mobile earth station and one or more space stations, or between a mobile earth station by means of one of more space stations, or between a mobile earth station and one or more complementary ground based stations at fixed locations.

The CGC of a satellite network comprises terrestrial base stations deployed at fixed locations in order to improve the availability of the mobile satellite service, in zones where the quality of communications with the space stations cannot be ensured. Typically, this may result from shielding by terrain features or buildings. The CGC is designed to operate as an integral part of the MSS and is controlled by the satellite resource and the same network management system. Furthermore, the use of the CGC will not increase the spectrum requirement of that allocated to the associated MSS.

The specific EC Decision paved the way for the EC Communications Committee's (CoCom) Authorisation sub-committee to develop 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 coverage for the more geographically peripheral Member States[130].

In December 2009, following the ratification of EC Decisions[131] and the completion of the selection process[132], ComReg published a consultation[133] on the regulatory approach most appropriate to facilitate the development and deployment of a MSS with a CGC. This consultation proposed to: authorise the space segment via the General Authorisation (GA) regime currently in place since 2003[134] and to authorise the CGC using a Spectrum Right of Use issued under Regulations made under the Wireless Telegraphy Act coupled with an Exemption Order for the Terminals (User Equipment)[135].

ComReg notes the progress made to-date on this subject, particularly at the CoCom Authorisation subcommittee, in terms of roll-out deadlines for the MSS with CGC

[130] 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.

[131] EC Decisions 2007/98/EC, 626/2008/EC and 2009/449/EC

[132] EC Decision 2009/449/EC - Four expressions of interest were received, and two MSS operators, Solaris and Inmarsat, were selected. Each operator is authorised to use 2x15 MHz of spectrum for delivery of a MSS with CGC on a pan-European basis (Inmarsat; 1980-1995MHz (E to s), 2170-2185MHz (s to E): Solaris; 1995-2010MHz (E to s) and 2185-2200MHz (s to E).

[133] ComReg 09/96 - Consultation on Mobile Satellite Service (MSS) with Complementary Ground Component (CGC) – 18 December 2009.

[134] A GA is required by an entity wishing to provide Electronic Communications Services (ECS) or an Electronic Communications Network within the State.

[135] 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. Parts 2 and 3 cover the Users Equipment (Mobile Terminals). These standards were ratified in November 2010.

operators, as stipulated by the EC. As such, ComReg intends shortly to seek further views on this matter prior to issuing the response to consultation and finalising the adoption of any permanent authorisation regime.

6.8.2 Proposed ComReg Strategy for Satellite Services

ComReg's proposed strategy for Satellite Services is to:

- respond to requests for frequency coordination involving satellite services ensuring equitable access to radio spectrum, for both satellite and terrestrial services sharing the same or adjacent frequency bands. Coordination will be based on the appropriate national regulations and international agreements in force;
- finalise (pending the outcome of EC discussions) the regulatory approach appropriate to facilitate the development and deployment of a MSS with a CGC;
- react positively to proposals for deployment of satellite-based services and CGC networks in Ireland; and
- consider possible additional allocations to the mobile-satellite service under agenda item 1.25 of the WRC-12136, taking into account the CEPT view and in line with Ireland's national position.

6.9 **Business Radio Services (including Public Safety Services)**

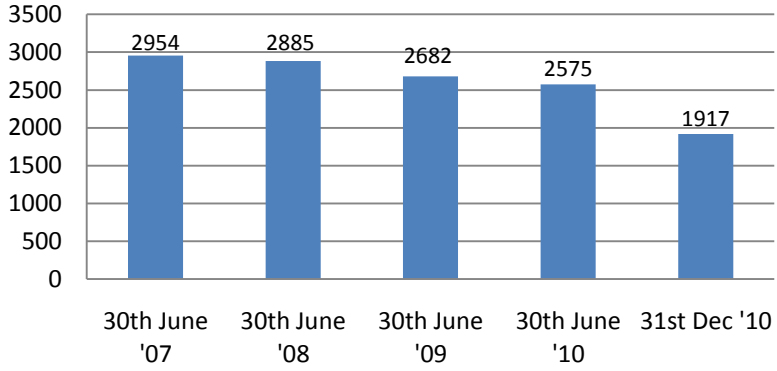
Despite the continued rapid growth of cellular telephony, business radio is still a popular communication system for applications where most traffic is between a control point and one or more mobile terminals, or where groups of mobile terminals need to communicate on a "one to all" basis. The main uses of business radio are for public safety and security (e.g. fire and ambulance emergency services), public utilities, industrial and commercial users (taxis, couriers, security etc.) as well as various voluntary organisations, all of whom need reliable means of communicating with personnel and, in particular, those on the move.

The figure below indicates the number of business radio licences on ComReg's database. There has been a 35% decline in the number of live business radio licences since 2007. The initial slow decline up to June 2010 is primarily due to the move towards Data Despatch Systems instead of traditional voice despatch controlled taxis and couriers, as well as a decline in the requirement for business radio equipment in the construction industry due to the economic downturn.

The large decline between 30 June 2010 and 31 December 2010 arises from the migration of State services, such as An Garda Síochána and the Prison Service onto the Emergency Services Digital Radio (ESDR) network. This decline is expected to increase in the next two years as a number of other emergency services (fire, ambulance, etc) move onto the new ESDR network and relinquish their business radio licences.

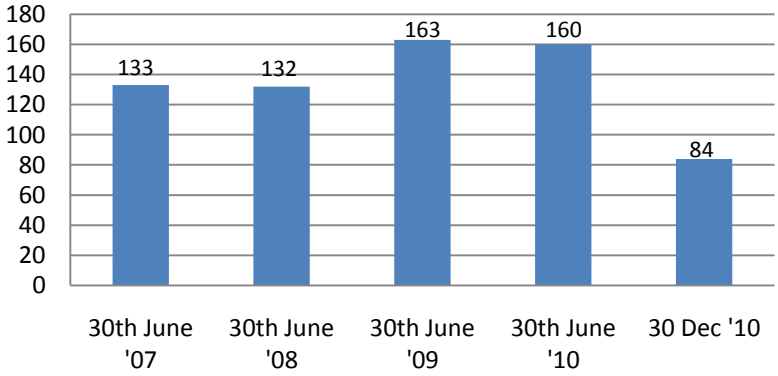
[136] See section A.3.2

Figure 11: Trend in Business Radio Licences



This movement is balanced to some degree by the number of temporary business radio licences that have been issued over the last 3 years or so. As shown below, the demand for temporary business radio licences has remained strong over the last three years[137].

Figure 12: Trend in Temporary Business Radio Licences



In order to co-ordinate the use of spectrum for short periods of time without requiring users to apply for yearly licenses, ComReg has made a temporary licensing regime available. In terms of spectrum management, this arrangement ensures that users only hold a licence for spectrum usage for the period they intend to use it and therefore not required to take yearly licences for which they have no use.

In the last five years, ComReg has issued temporary business radio licences for many different reasons. Some of the well known events that require extensive use of radio communications for successful operation include large sporting events such as the Special Olympics and the Ryder Cup, and large music festivals such as Oxegen. More routine uses include short term use of business radio, for example on construction sites, and at local car rally events.

[137] The period June to Dec 2010 reflects only half a year of issue of temporary licences and ComReg expects to meet or exceed the number of temporary licences issued in the previous full year of June 2009 to June 2010.

In the period 2007 – 2010, 111 of the 524 compliance/enforcement actions undertaken taken were against business radio services, the second highest number of actions taken against any particular service – see section 3.1.1.

6.9.1 Review of Previous Strategy Period

Third Party Business Radio

ComReg launched its Third Party Business Radio (TPBR) licensing scheme in 2005/2006[138]. These licences were for the provision of Private Mobile Radio (PMR) services to third parties. Licences were for national coverage and for a duration of five years. ComReg issued 23 such licences to nine operators. These licences expire in 2011. ComReg re-opened[139] the TPBR licensing scheme in December 2010 under the existing Wireless Telegraphy (Third Party Business Radio) Regulations 2005. To-date, 27 licences have been issued to eight operators and ComReg will grant TPBR licences until all available channels are licensed or until 31 December 2011 after which time the scheme will close[140].

Emergency Services Digital Radio (ESDR)

In 2008, ComReg introduced a licensing scheme[141] for commercially managed digital radio services for the emergency services. Following a tender process run by the Government, a licence was issued to Tetra Ireland. The regulatory framework limits the use of the Managed Digital Radio Services (MDRS) network to exclusively provide digital radio communications services to State security and emergency services and to non-commercial bodies engaged in the provision of services to State agencies. It is also permitted that the MDRS network may be used by any electricity or gas utility making essential and urgent repairs to its network, but in an emergency situation only. The national network which has been implemented under this framework is known as the Emergency Services Digital Radio (ESDR).

In order to provide clarity and full transparency regarding the permitted users of the ESDR, ComReg maintains a register[142] of permitted users and new users may only be added to the list with the prior approval of ComReg and after public consultation on any proposed changes[143]. ComReg expects the number of users to increase on this network over time.

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[138] ComReg 08/82 – Guidelines to Applicants Third Party Business Radio (TPBR) Licences – 9 November 2005, S.I. No. 646 of 2005, Wireless Telegraphy (Third Party Business Radio Licence) Regulations – 13 October 2005, ComReg PR151205a - ComReg announces outcome of phase one of its Third Party Business Radio Licensing Scheme – 15 December 2005

[139] ComReg 10/101 - Third-Party Business Radio Licensing; Reopening the Licensing Scheme - 6 December 2010

[140] ComReg 05/82R2 - Guidelines to Applicants; Third Party Business Radio Licences – 6 December 2010.

[141] ComReg 08/67 - Emergency Services Digital Radio ('ESDR') Licence - Guidance Notes & Application Form -19 August 2008; S.I. No. 324 of 2008 - Wireless Telegraphy (Use of the Band 380 - 400MHz by Emergency Services) Regulations – 19 August 2008

[142] ComReg 08/68R1 - Revised Register of Users on the Managed Digital Radio Services Network – 18 March 2009

[143] See for example ComReg 09/12 - Register of users on the Managed Digital Radio Services Network, Civil Defence Request to be included in the Register of Users – 19 February 2009.

Programme Making and Special Events (PMSE)

In April 2010, ComReg carried out a consultation[144] on the current and future use of the spectrum bands for Programme Making and Special Events (PMSE). In particular, the document discussed spectrum changes that would affect wireless cameras and wireless microphones/in-ear monitoring (IEM) systems. In addition, a number of spectrum bands were considered as a possible alternative to spectrum that would be unavailable for wireless cameras and wireless microphones/IEMs.

As a result of this consultation, ComReg adopted the following policy changes with regard to PMSE licensing[145]:

- Channel 38 (606 – 614 MHz) will be made available exclusively as a replacement to Channel 69 for Wireless Microphones and IEMs after the Digital Switchover occurs;
- The amount of interleaved spectrum available (if any) in the bands 470 – 790 MHz and 2330 – 2370 MHz will be determined in future consultations;
- In geographical areas in which RurTel services are not present, Wireless Cameras will be licenced in the band 2300 – 2330 MHz on a non-protected, non-interference basis until further notice;
- The U6(6.425 – 7.125 GHz) and L7(7.125 – 7.425 GHz) bands will be opened for Wireless Cameras (including temporary point-to-point video links) on a non-interference, non-protected basis. The use of interleaved spectrum will however be severely restricted in U6 due to the large number of existing point-to-point microwave links in this band;
- The 2010 – 2025 MHz band, designated for use by UMTS services, remains unoccupied. Therefore this band will continued to be made available for PMSE assignments until further notice;
- The bands 2025 – 2110 MHz and 2200-2300 MHz will be made available exclusively for PMSE in the greater Dublin Area. These bands will continue to be available for PMSE on a secondary basis outside of Dublin; and
- The band 10.3 – 10.5 GHz will continue to be available for Wireless Cameras pending any technological developments in the area.

Tracking, Tracing, Paging and Fees

In its previous spectrum management strategy statement, ComReg proposed, in line with an EC Harmonisation Decision[146], to license the high power element of the

[144] ComReg 10/37 – Consultation on Future Spectrum Availability For Programme Making & Special Events – 27 April 2010; ComReg 10/68 – Response to Consultation 10/37 on Future Spectrum Availability For Programme Making & Special Events – 1 September 2010; ComReg 10/68s – Submission to Consultation 10/37 on Future Spectrum Availability For Programme Making & Special Events – 1 September 2010.

[145] See ComReg 08/08R1 - Radio Licensing for Special Events and Temporary Use in Ireland – 13 December 2010.

[146] European Commission Decision of 20 December 2005 on the harmonisation of the 169.4 – 169.8125 MHz frequency band in the community (2005/928/EC).

169.6 – 169.8125 MHz band for the use of high power tracing and asset tracking systems and high power paging systems.

ComReg has, in the interim, added this allocation to the National Table of Frequency Allocations. However, as there has been no demand to access this spectrum for such systems, ComReg has refrained from adding these services to its current business radio licensing framework.

As indicated below, ComReg intends to review the business radio licensing framework, in particular to update the relevant regulations[147] and will propose to include these systems in that update.

This proposed update will also deal with the outstanding legacy issue of paging permits, the implementation of a fee structure that will take into account key criteria such as bandwidth used, exclusive usage, geographic locations and range of coverage.

GSM-R

GSM-R is a digital communications system, based on the use of GSM technology, which has been developed to replace the existing analogue VHF/UHF rail network communications system. GSM-R, in contrast to public mobile GSM, constitutes a non-public communications network for use by European railway operators. It is claimed that the implementation of digital GSM-R networks should lead to improved communications between trains and control centres, as well as improved automation of safety of life systems.

Following receipt of an expression of interest from, and subsequent discussions with, a rail network operator seeking spectrum rights of use in the GSM-R band (876-880 MHz / 921-925 MHz), ComReg published an Information Notice148 setting out ComReg's proposals for a licensing regime that would enable the future grant of a limited number of rights of use of spectrum in this band.

ComReg's response to the input received and decision will be published shortly.

Business Radio - Future Trends

As equipment suppliers begin rolling out the next generation digital Business Radio (BR) devices ComReg expects BR licensees to continue the migration from analogue to digital. This migration will increase as legacy systems reach their end of life. Currently, there are three main groups of European technologies (DMR Association[149], the dPMR[150] and TETRA civil[151]) based on digital mobile radio as

[147] S.I. No. 320 of 1949 – Wireless Telegraphy (Business Radio Licence) Regulations 1949 – 22 November 1949

[148] ComReg 10/84 – Information Notice - Proposed licensing regime for GSM for railway operations spectrum– 13 October 2010.

[149] Digital Mobile Radio (DMR) Association represents businesses, organisations and individuals that support the European Telecommunications Standards Institute's (ETSI) Digital Mobile Radio (DMR) standard. The principle benefits of DMR are that it enables a single 12.5 kHz channel to carry both voice and data information.

well as other technologies such as GSM (push to talk)[152] and 3G/IP PMR[153] , all of which have their own various advantages and disadvantages. The challenge for ComReg is to ensure that licensing of these services can be done in a technology neutral manner so that any one technology is not favoured over any other.

From a regulatory standpoint, the main incentives of implementing a fully digital mobile radio licensing regime are as follows:

- Even taking into account the reduction in the number of business radio licences being issued, some of the currently available mobile radio bands (e.g. the UHF PMR band) are reaching congestion - especially in major urban areas. ComReg needs to consider if these bands can be extended within the context of the release of a considerable amount of analogue spectrum by the emergency services. In the short to medium term analogue and digital systems will need to coexist until an all-digital environment is achieved; and

- Achieving maximum spectrum efficiency as well as providing for the future needs of BR licensees. This is where the main advantages of digital mobile radio are achieved. Instead of a single voice channel on an analogue 12.5 kHz channel, new digital systems can offer two channels (i.e. one voice and one data) within this 12.5 kHz, or offer 6.25 kHz channels separately. This will effectively double the capacity that is currently available (or viewed another way, will halve the cost of spectrum for the user).

The main advantages of migrating to digital will be for the end users/licensees who should experience the following improvements over analogue: better coverage for the same transmitter power; two channels on the same 12.5 kHz analogue assignments, improved clarity of voice (due to noise suppression techniques); increased system security with better encryption techniques; and extended battery life on hand portables. Other communications regulators (e.g. in the United States[154] and China[155]) have anticipated the growth of digital mobile devices and, as such, are only permitting digital mobile radio systems after January 2013 and 2012 respectively.

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[150] Digital Private Mobile Radio (dPMR) is a standard that has been developed by an *ETSI working group* and defines digital PMR. dPMR is a Frequency-Division Multiple Access (FDMA) system offering a spectrally efficient solution to solve spectrum shortage and efficiency requirements. dPMR uses narrowband radio channels which ore only 6.25 kHz wide compared to the standard 13.5 kHz analogue PMR.

[151] TETRA Civil is a means of providing TETRA technology to PMR users. TETRA is an acronym for Terrestrial Trunked Radio which is a digital mobile radio standard developed by ETSI for which voice and data communications are possible.

[152] GSM push to talk is a technology where the GSM handheld has the standard GSM features with the ability of a push-to-talk style communications over the GSM network. The push-to-talk feature can be used to quickly connect the user to one person or to a group of people by using a key mounted on the side of the handset.

[153] 3G/IP PMR is a technology type that allows PMR communications to be used over a 3G network facilitated by the use of mobile phone based applications.

[154] US Telecommunications regulation is the Federal Communications Commission (FCC)

[155] China Telecommunications regulations are controlled by the Ministry of Industry (MII)

Telemetry & Telecontrol Systems

ComReg has observed over the last number of years that demand for Telemetry & Telecontrol (T&T) assignments, currently licensed under the Business Radio Licensing scheme, is steadily increasing, be it for local onsite telemetry systems or on a regional/nationwide level.

The increasing popularity of T&T technology is that it is considered an ideal solution to provide operational effectiveness for a relatively low capital investment. This is compounded by the advantages that digital technology brings. Apart from the oil and gas, power and water and wastewater sectors, the food and beverage and pharmaceuticals industries are increasingly adopting telemetry systems.

This demand for T&T systems is putting pressure on existing Business Radio (BR) spectrum allocations for the following reasons:

- both mobile users (i.e. taxis, couriers, security etc) and T&T systems users (i.e. water treatment plants, local county councils, industry), which predominantly operate on fixed systems over large areas, share the same spectrum and BR licence regime. This results in different type of systems utilising the same frequency spectrum; and
- as a result, the allocation of channels becomes very difficult under the current licensing regime as the two communication systems types compete for the same channels, utilising different protection criteria and sharing conditions.

Consequently, ComReg is seeking a solution to this issue and intends, in due course, to publish a consultation that proposes to introduce a new licensing regime for T&T that utilises spectrum specifically set aside for that type of system.

6.9.2 Proposed ComReg Strategy for Business Radio Services

ComReg's proposed strategy for Business Radio Services includes:

- Reviewing current and possible future business radio frequency bands with a view to:
  - ensuring there is adequate spectrum for the introduction of new and emerging digital technologies;
  - providing a regulatory framework for all paging services operating under permits (and phasing out the issue of permits during the lifetime of the Proposed Strategy statement);
  - encouraging the development and use of new spectrally efficient technologies, including consideration of closing business radio to analogue technologies at an appropriate date;
  - best utilise the significant quantities of VHF and UHF spectrum that State agencies have already and are expected to release over the life time of this strategy;
  - implementing a fee structure that takes into account key criteria such as but not limited to bandwidth used, exclusive use, geographic location and range of coverage;

  - providing a regulatory framework for licensing the 169.6 – 169.8125 MHz band for the use of high power tracing and asset tracking systems and high power paging systems under in line with the relevant EC Harmonisation Decision[156];
  - provide flexibility to licence business radio on a temporary basis; and,
  - provide flexibility for ComReg to licence miscellaneous technologies[157];

- Continuing to support the requirements of the business radio industry and users to ensure that spectrum is available to accommodate new business radio technologies and that existing licences for analogue systems can be upgraded to digital where required;
- Continuing to monitor BR installations to ensure compliance with licence conditions;
- Implement a regulatory framework with the introduction of a possible new licence regime for T&T; and
- Consider the worldwide/regional harmonisation of spectrum for electronic news gathering (ENG) systems under agenda item 1.5 of the WRC-12[158], taking into account the CEPT position, in line with Ireland's national position.

6.10 Radio Amateur Services

The Amateur Service[159] is specifically recognised by the ITU as a service for the purpose of self-training and technical investigations and has specific spectrum allocated to it within the International Table of Frequency Allocations.

Approximately 5% of the radio spectrum is allocated to the Amateur Service of which approximately two-thirds is on a secondary basis, that is to say, sharing of some frequency bands with primary services on a non-interference basis. Currently, there are over 1600 radio amateurs licensed by ComReg.

The Irish Radio Transmitter Society[160] (IRTS) run the radio amateur examinations on behalf of ComReg. These examinations are based on the Harmonised Amateur Radio Examination Certificate (HAREC) standard as set down by CEPT. The Table below shows the continuing demand for radio amateur certification in Ireland.

[156] Commission Decision of 20 December 2005 on the harmonisation of the 169.4 – 169.8125 MHz frequency band in the community (2005/928/EC).

[157] This includes for example SonaBouys mentioned under Short Range Devices (see section 6.5) should this technology prove to be unsuitable for licence exemption and radiosondes as mentioned under Science services (see section 6.11)

[158] See section A.3.2

[159] Within this document reference to Amateur Service should, unless indicated otherwise be regarded as including the Amateur Satellite Service.

[160] See IRTS website http://www.irts.ie for more information.

Table 6: Radio Amateur Theory Exam Statistics

Exam Dates	Candidates	Pass	Fail
February 2008	15	8	7
09 July 2008	20	15	5
30 October 2008	9	6	3
30 June 2009	30	16	14
06 October 2009	14	6	8
07 July 2010	21	12	9
06 October 2010	14	9	5
7 Exams	**123**	**72**	**51**

On the other hand, take-up of the Morse code qualification has been fairly limited. This is not surprising considering the Irish Radio Amateurs no longer need the Morse code qualification to access the complete range of frequency bands available for Radio Amateur use.

6.10.1 Review of Previous Strategy Period

In June 2009, ComReg implemented new Amateur Station Licence Regulations[161] which revoked, among other things, the 2002 Experimenter Licence Regulations[162]. The new Regulations make provision for the issue of lifetime licences for both existing and new Radio Amateurs under a new fee structure.

With the introduction of these Regulations, ComReg updated its Amateur Station Guidelines document[163] and introduced a once-off, life-time fee structure for Radio Amateurs. ComReg also clarified the terms and conditions of temporary licences for visitors, special event licences, automatic station licences (by modifying the call sign format to differentiate them from personal call signs) and club licences.

During this period ComReg also:

- issued a test licence, under the Test and Trial licence scheme, to the IRTS to access the 500 kHz band for propagation and other experimentation with a view to preparing an input for the next World Radiocommunications Conference (WRC);
- permitted access to spot frequencies in the 5 MHz band;
- permitted access to the 70 MHz band (70.125-70.450 MHz); and
- reduced to three the number of bands requiring special authorisation from seven.

[161] S.I. No. 192 of 2009 - The Wireless Telegraphy (Amateur Station Licence) Regulations 2009 – 25 May 2009.

[162] S.I. No. 450 of 2002 - The Wireless Telegraphy (Experimenter Licence) Regulations 2002.

[163] ComReg 09/45 –Guidelines: Amateur Station Guidelines – May 2009

6.10.2 Proposed ComReg Strategy for Radio Amateur Services

ComReg has, in conjunction with IRTS, agreed to changes to the Radio Amateur syllabus in line with the HAREC Standard[164]. These changes reflect the changing nature of radio amateur operation away from self-build towards the use of 'off the shelf' equipment. The updated syllabus will come into effect during this strategy period.

ComReg's contract with the IRTS for the running of the radio amateur exam expires in late 2011. IRTS has very successfully run the radio amateur exam and so ComReg proposes to further this relationship with IRTS in 2011.

6.11 **Scientific Services**

The radio spectrum is used for a wide range of applications that operate under the generic description of 'science services'. These include radio astronomy, meteorological[165] satellite and meteorological aids, earth exploration-satellite services, space research and space operation services. Scientific usage of spectrum has significant social and economic benefits.

The World Meteorological Organisation (WMO)[166] has noted that the "effective and prudent management of allocated frequency bands is paramount to maintaining and enhancing the quality and accuracy of weather and weather-related predictions. The WMO have commented that *"It is essential to understand for instance that if some the frequency bands currently allocated for meteorological purposes were to be used by other radio systems that are incompatible with meteorological radio systems, then these bands could be rendered unusable for weather, climate and/or disaster prediction systems, thus making corresponding forecasts extremely difficult and sometimes impossible"*.

6.11.1 Review of Previous Strategy Period

ComReg has implemented a licensing regime[167] for radiodetermination[168] systems which covers meteorological radar systems. ComReg opened the scheme[169] for applications on 2 February 2011.

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[164] Harmonised Amateur Radio Examination Certificate - HAREC

[165] Meteorology is the interdisciplinary scientific study of the atmosphere that focuses on weather processes and short term forecasting.

[166] The World Meteorological Organization (WMO) is a specialised agency of the United Nations. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources and has a membership of 189 Member States and Territories - www.wmo.int

[167] S.I. 369 of 2009 - Wireless Telegraphy (Radiodetermination, Air Traffic and Maritime Services) Regulations, 2009 – 15 September 2009.

[168] "Radiodetermination" means the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves – typically a radar system.

The band 10.6 – 10.68 GHz is currently allocated to the Earth Exploration-Satellite Service (EESS) (passive) on a co-primary basis with, among others, fixed, mobile and radio astronomy services, at both an International and European level. The main function of these services within this spectrum band is for the measurement of rain, snow, sea state, ocean wind and soil moisture, through the deployment of passive sensors. The WRC 07 passed a Resolution[170] urging administrations to comply with the sharing criteria defined in the Resolution, in order to protect the EESS[171]4 (passive) from interference in the 10.6 – 10.68 GHz band, noting that EESS (passive) sensors provide worldwide measurements that benefit all countries, even if these sensors are not operated by their country. ComReg has included in the 10.5 GHz FWALA licensing guidelines[172] sharing conditions to allow for the fixed service, of which FWALA forms a part, to operate without undue constraints, while also providing EESS with protection against harmful interference. These sharing criteria are mandatory on all FWALA operators in the 10.6-10.68 GHz band.

6.11.2 Proposed ComReg Strategy for Science Services

ComReg's proposed strategy for the duration of this plan includes:

- Continuing liaison with Met Éireann[173] and other scientific organisations to ensure that current and future spectrum requirements of the science services are fully understood and, wherever possible, incorporated into national plans for future spectrum planning conferences;
- Continuing to offer a high degree of protection to meteorological services, in view of their use in the safeguarding of human life and property;
- Continuing to offer a high degree of protection to EESS in view of the potential impact of interference on passive and active sensors which could severely disrupt scientific research programmes;
- Protecting the science service by taking into account the provisions of footnote number 5.340[174] of the ITU Radio regulations;

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169 ComReg 11/07 - Radiodetermination, Air Traffic and Maritime Services Licence Guidelines – 2 February 2011, ComReg 11/07c - Radiodetermination (Radiolocation) Licence - 2 February 2011 and ComReg 11/07d - Radiodetermination (Radionavigation) Licence - 2 February 2011.

170 ITU-R Resolution 751 (WRC-07)

171 Earth exploration-satellite Services (EESS) (passive) and space research service (passive) are assigned frequencies 10.600 – 10.700 GHz on a primary basis. The main function of these services within this spectrum is for the measurement of rain, snow, sea state, ocean wind and soil moisture; through the deployment of passive sensors.

172 ComReg 06/17R6 - Revised Guidelines to Applicants for Fixed Wireless Access Local Area Licences – 22 April 2010

173 The main user of radiofrequency spectrum for meteorology in Ireland is by Met Éireann, the Irish National Meteorological Service, which is the leading provider of weather information and related services for Ireland with a mission to monitor, analyse and predict Ireland's weather and climate, and to provide a range of high quality meteorological and related information to customers.

174 ITU RR Footnote 5.340 All emissions are prohibited in the following bands: 1 400-1 427 MHz, 2 690-2 700 MHz, except those provided for by No. 5.422, 10.68-10.7 GHz - except those provided for by No. 5.483, 15.35-15.4 GHz - except those provided for by No. 5.511, 23.6-24 GHz, 31.3-31.5 GHz, 31.5-31.8 GHz - in Region 2, 48.94-49.04 GHz - from airborne stations 50.2-50.4 GHz, 52.6-54.25 GHz, 86-92 GHz, 100-102 GHz, 109.5-111.8 GHz, 114.25-116 GHz, 148.5-151.5 GHz, 164-167 GHz, 182-185 GHz, 190-191.8 GHz, 200-209 GHz, 226-231.5 GHz, 250-252 GHz.

- Developing an appropriate licensing mechanism to license apparatus used for the gathering of meteorological information – i.e. radiosondes;
- Considering the provision of a global primary allocation for the radiodetermination-satellite service (space-to-Earth) allocations in the band 2,483.5-2,500 MHz, under agenda item 1.18 of the WRC-12[175], taking into account the CEPT view and in line with Ireland's national position.

6.12 Defence Forces' Use of Spectrum

Defence forces have actively utilised radiocommunications from the earliest days and their use of radio spectrum is considered critical to national security. There are no specific service allocations for defence applications in the International Radio Regulations as defence communications are recognised as the prerogative of each sovereign nation.

The Irish Defence Forces, comprising the army, naval service and air corps, use radio in a variety of ways, most notably in relation to maritime and aeronautical applications. In accordance with the Wireless Telegraphy Act 1926, apparatus for wireless telegraphy kept by or in the possession of the Minister for Defence, for the purpose of the Defence Forces, do not require a licence.

6.12.1 Review of Previous Strategy Period

ComReg has established the necessary contacts, at the appropriate level, within the Irish Defence forces to ensure that matters of common interest can be discussed and issues of interference and management of spectrum can be effectively dealt with.

6.12.2 Proposed ComReg Strategy for Defence Forces Use of Spectrum

ComReg will maintain awareness of international developments, particularly in CEPT through the Civil-Military Frequency Management Forum which brings together civil and military spectrum managers across Europe to address issues of mutual interest.

ComReg will continue to liaise with the Irish Defence Forces as required to resolve issues of mutual concern.

ComReg will explore with the relevant authorities opportunities to further enhance spectrum efficiency.

6.13 Implementation of European Decisions and Recommendations

During the previous strategy period, the EC published a number of spectrum-related decisions which Member States are required to implement. These decisions have

[175] See section A.3.2

been mandated by the EC in order to facilitate the effective harmonisation of spectrum amongst Member States and that this co-ordinated approach will contribute to the development of a single market within the EU, which in turn helps leverage the associated economies of scale with respect to radio equipment manufacture. A list of Decisions implemented in the last spectrum strategy period is available in Appendix E.

The ECC[176] also adopts decisions, recommendations and reports aimed at efficient spectrum utilisation and harmonisation. While the implementation of the ECC decisions and recommendations by national administrations is on a voluntary basis, as the CEPT and ECC have no legislative power, the ECC has played a significant role in harmonising spectrum use in Europe providing, for example, a table of European frequency allocations known as the European Common Allocations[177]. The ECA is in effect a long term strategic plan for harmonisation and use of the radio spectrum throughout Europe[178].

The implementation of ECC Decisions and Recommendations by national administrations, while voluntary, is a key tool in the harmonisation of the use of the radio spectrum and provides clear information to industry and operators concerning CEPT harmonisation actions. The list of Decisions/Recommendations and their implementation status for all CEPT countries is maintained at http://www.erodocdb.dk. It is ComReg's policy to implement ECC Decisions where these are in line with national priorities, licensing regimes or part of EC harmonisation measures.

6.13.1 Review of Previous Strategy Period 2008 - 2010

During the period of the previous strategy statement, ComReg implemented ten decisions or recommendations – these are listed in Appendix D.

6.13.2 Proposed ComReg Actions for the Period 2011 – 2013.

During the period of this strategy statement, ComReg proposes to implement 20 decisions or recommendations – these are listed in Appendix E. It is expected that the ECC will develop further new decisions and recommendations which ComReg may implement during the period of this strategy statement, but which cannot be listed in Annex E at this stage.

[176] The ECC (Electronic Communications Committee) is one of the three committees of the CEPT (see section 4B.1.A.2.2)

[177] The ECA database is available at http://apps.ero.dk/eca

[178] ERC Report 025 - The European table of frequency allocations and utilisations covering the frequency range 9 kHz to 275 GHz – available at www.ero.dk.

7 Medium Term Outlook (3-5 Year Period)

It is clear that the demand for spectrum will continue to increase beyond the timeframe of this proposed strategy and that ComReg must work to ensure spectrum is an enabler and not a constraint on growth of new services. In this context ComReg is mindful of emerging trends and developments that will have a longer term impact on spectrum management strategy. Although it is unlikely that all of these trends will have a significant impact over the lifetime of this strategy statement, it is nevertheless important to highlight these issues now, at a high level, to raise awareness and stimulate debate amongst interested parties. They include:

7.1 Spectrum Efficiency Measures

The efficient management of radio spectrum requires more than a purely technical consideration of efficiency. Functional and economic considerations must also be accounted for, including the extent to which the utilisation of spectrum meets a user's specific needs and the social and economic value that can be derived from it. There are a number of key areas that ComReg proposes to focus on:

7.1.1 Annual Usage Fees

To the degree that annual usage fees are to maintain their incentive power throughout the licence term it will increasingly become important to update them on an annual basis to account for the general rate of inflation. This will keep their value constant in real terms and maintain proper incentives for firms to continually assess whether they should continue to hold particular spectrum usage rights.

7.1.2 The Evolution of Administrative Incentive Pricing (AIP)

AIP is a mechanism that is used to promote more intensive spectrum use through an annual administratively set fee. Firms holding spectrum rights of use will thus be given incentives to hand back spectrum that they are not using intensively.

AIP is not simply a mechanism to recover spectrum management costs. It provides an incentive for licensees with unused spectrum to return it or to pay additional charges. Spectrum management cost recovery charges alone may be too low to impose an appropriate level of discipline on licensees and the risk of spectrum hoarding is heightened particularly where the spectrum has a high market value.

A significant challenge in introducing AIP is assessing the appropriate opportunity cost and determining a fair price in an objective manner. AIP has been introduced in some countries already. Lessons from approaches adopted in the UK and New Zealand suggest that

- Opportunity cost estimates for particular frequency bands can be derived from valuing the cost savings from access to additional spectrum (the "least

cost alternative" approach) or from the net revenues that additional spectrum may generate;

- Value based on cost savings rather than net revenues are much easier to implement because less information on the future developments of services is required. Uncertainty over future market developments is a major problem when estimating opportunity cost from many communications services;
- Estimates of opportunity cost are necessarily approximate, and as adjustments to administratively determined prices can only be made periodically, it is necessary to consider the direction of "bias" in estimates that is likely to minimise potential economic losses;
- AIP may be applied as an annual price for spectrum that is not auctioned and/or applied to auctioned spectrum after the initial term of the licence has expired; and
- AIP needs to apply to all licensed users, both government and non-government, in bands where it is deemed that excess demand exists[179].

AIP is one of several instruments for promoting efficient spectrum use. Trading/leasing may become more important in a market-based approach to spectrum management but AIP is likely to have a long term role, particularly in respect of spectrum used by government and the defence forces.

In its last Strategy Statement, ComReg introduced AIP for radio links. Radio links facilitate the early development of infrastructure and competition in the provision of ECS, especially in rural areas. AIP was introduced to mitigate the risk of congestion on fixed link bands whilst encouraging established fixed link licensees to migrate to fibre-based infrastructure over time. Empirical evidence suggests that the application of AIP in this area has been successful in achieving those objectives.

7.1.3 Public Sector Use of Radio Spectrum

Historically, the use of radio spectrum was the preserve of State authorities for applications such as public sector broadcasting and communications for the Defence Forces and law enforcement agencies. This use of radio spectrum is considered critical to, among other things, public safety and national security. Public sector entities were typically granted rights of use to spectrum without charge. As technology developed and a commercial market for radio spectrum usage emerged demand for the remaining spectrum available increased.

There are no specific service allocations for defence applications in the International Radio Regulations as defence communications are recognised as the prerogative of each sovereign nation. Nevertheless, if there is spectrum available then there is an argument that the maximum social and economic value should be derived from it.

One spectrum efficiency measure worth considering is a market based approach which would involve charging all users, including those who currently do not pay for rights to radio spectrum. ComReg will consider how to implement relevant

[179] In Australia, The Australian Communications and Media Authority (ACMA) introduced AIP in January 2010. ACMA had utilised AIP for apparatus licensing for over 10 years and now intends to undertake a band-by-band assessment to determine the priorities for a licence fee review.

developments in this area and will continue to liaise with the Department of Defence and other relevant authorities as required to resolve issues of mutual concern.

7.1.4 Technological Advances to Improve Spectrum Efficiency

Cognitive Technology is an exciting development, particularly when applied to radiocommunications as it has the potential to deliver significant efficiency gains in the management and use of the radio spectrum. The technology holds the promise of more intelligent radios able to sense the local radio environment and, on the basis of that information, including data on the rules to be obeyed (technical operating parameters, etc) to make a decision on which frequencies to use, when to transmit and other characteristics, such as filter shaping, to be used.

The most immediate area of interest for cognitive radio, as already envisaged by developments in the USA, is the exploitation of the so-called 'white spaces'. These are the gaps between TV broadcast channels which can potentially be used for lower power systems to provide, in the case of the USA, wireless communications in rural areas. Although the laws of physics are the same on both sides of the Atlantic, the challenge in Europe, as is often the case in radiocommunications, is the higher population density and resultant greater concentration of TV broadcast transmitters leaving 'white spaces'. However, there are many other areas of the spectrum, both used and unused, where there is scope for developing new applications which, in effect, will be able to dynamically manage the spectrum resource at the local level, thus making much more efficient use than current technologies and spectrum management tools allow.

There are already some 'smart' devices and applications on the market, For example, 5GHz Wi-Fi applications in laptops which share the spectrum with other primary users such as meteorological radars, by dynamically selecting frequencies to avoid interfering with the radar systems. Software defined radios, in which parameters such as filter characteristics can be altered to suit the operational environment, are also becoming available. These are what could be termed pre-cognitive systems, as truly cognitive devices, as defined by Joseph Mitola and Gerald Maguire (the Mitola radio[180]), which can "Observe, Orient, Plan, Learn, Decide and Act" in the context of the local radio spectrum environment have yet to be fully realised.

There is a great deal of research activity on cognitive technologies with much of it in Europe being funded through the EU's Framework 7 Programme[181] and the CEPT has published a report on Cognitive Radio[182]. On an international level, ComReg needs to consider, taking into account the CEPT view and in line with Ireland's national position, international regulatory measures and their relevance, in order to

[180] Mitola, J., III and Maguire, G.Q., Jr., Royal Institute of Technology – Stockholm, Cognitive radio: making software radios more personal, IEEE Personal Communications, Vol6, issue 4, pages 13 – 18, Aug 1999.

[181] See EC CORDIS website - http://cordis.europa.eu/fp7/home_en.html

[182] ECC Report 159 – Technical and Operational Requirements for the possible operation of cognitive radio systems in the 'white spaces' of the frequency band 470-790MHz.

enable the introduction of software-defined radio and cognitive radio systems, under agenda item 1.19 of the WRC-12[183].

Also, ComReg hosted a seminar in July 2010 attended by approximately 60 people representing academia, research organisations, telecom consultants, manufacturers and operators, government and regulators. ComReg has published a report of that seminar[184].

7.1.5 A Second Digital Dividend

The Digital Dividend represents a once in a generation opportunity to make additional sub 1 GHz spectrum available to the market for uses other than broadcasting[185]. ComReg has identified the 800 MHz band as part of Ireland's Digital Dividend, and proposes that the rights of use for it be made available as part of a joint award also aimed at liberalising the 900 MHz and 1800 MHz GSM bands for next generation mobile services including wireless broadband (see 6.1.1 for more details). Realising the Digital Dividend in the 800 MHz band is significant, as it is a European harmonised band with potential opportunities for roaming of services and for economies of scale for equipment manufacture. Further, the availability of the 800 MHz band almost doubles the potential availability of sub 1 GHz spectrum for non-broadcasting services, providing a unique development opportunity for future wireless electronic communications networks and services.

Bearing in mind the importance of sub-1 GHz spectrum, ComReg intends to explore the potential for identifying additional Digital Dividend spectrum. ComReg understands that the United Kingdom has proposals for a second Digital Dividend in the 600 MHz band and it may be worthwhile initially exploring the potential of this sub-band to provide additional digital dividend spectrum for Ireland. To date in Europe however, there is no consensus on the potential for a second Digital Dividend sub-band and the 700 MHz band might emerge as the preferred second Digital Dividend sub-band in some countries. It is therefore likely that a number of scenarios will need to be explored in advance of any decision on a second Digital Dividend sub-band, if any, in Ireland. ComReg will also continue to explore options for a second Digital Dividend within the relevant European spectrum fora (e.g. the RSPG, CEPT).

7.1.6 L-Band (1.5 GHz)

With the convergence of fixed, broadcasting and mobile services over digital wireless platforms, a regulatory approach promoting flexible use of spectrum is increasingly important. Several countries that initially considered the band 1452-1492 MHz (The L-Band) for DAB services have recently begun considering a change in use of the spectrum for a range of broadcasting and multimedia applications within the international regulations and allocations. For example,

[183] See section A.3.2

[184] ComReg 10/61 – Cognitive Radio - An Opportunity for Ireland: Report of Seminar – 5 August 2010.

[185] RSPG Opinion on Digital Dividend (RSPG09-291) - 18 September 2009.

Ofcom, the U.K. regulator, has auctioned the band 1452-1492 MHz for a variety of services and technologies[186] within the allocations for broadcasting, fixed and mobile services.

The ECC Working Group on Frequency Management recently reported that it received a proposal from Qualcomm to consider the harmonisation of the L-band for downlink mobile multimedia in Europe through the adoption of a technology and service neutral harmonised band plan and associated technical rules (WAPECS).

In addition, Germany and France are proposing to allow digital multimedia technologies in addition to DAB technology. Digital multimedia broadcasting technology could accommodate a mix of one-way digital radio, video and multimedia broadband access. The prospect of a harmonised approach to permitting a range of services in the L-band, which is currently unused in Ireland, is particularly attractive and ComReg is monitoring developments carefully and contributing to CEPT work in this area. Interested parties are requested to respond to section 3.4 of this paper.

7.1.7 Machine to Machine Communications

ComReg has monitored developments in the area of Machine-to-Machine (M2M) communications in recent years and recognises that M2M technology will increasingly underpin key areas of the economy including smart metering, networked homes, healthcare in the home and transportation (e.g. the emergency eCall system for vehicles). It is expected that many of these applications will communicate over wireless networks and use licensed or licence exempt spectrum depending on the specific application, the stakeholders involved and availability of standardised equipment.

Smart Metering is an intelligent metering system that can measure the consumption of energy and can transmit consumption data using a form of electronic communication. A key feature of a smart meter is the ability to provide bidirectional communication between the consumer and supplier/operator with the aim of promoting greater energy efficiency. The EC's 3rd Energy Package[187], which must be transposed into national law in 2011, requires 80% of homes to have smart meters by 2020. ComReg recognises the social, economic and environmental benefits that smart metering will bring and is supportive of the ongoing work to date carried out by the Commission for Energy Regulation (CER) to inform the cost benefit analysis for smart metering in Ireland.

[186] See OfCom website: http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/completed-awards/award_1452/

[187] The gas and electricity directives of the third energy package, adopted in 2009, require member states to prepare a timetable for the introduction of intelligent metering systems. In the case of electricity, at least 80% of customers should be equipped with smart meters by 2020, pending a cost-assessment study. Details on the 3rd Energy Directive are available at: http://ec.europa.eu/energy/gas_electricity/third_legislative_package_en.htm

Power Line Carrier appears to be the technology of choice in mainland Europe for Smart Metering and a wireless radio frequency mesh solution appears to be the preferred option in North America, operating in the 900 MHz band. In other countries, a third party network solution has been utilised using GPRS on existing mobile operator networks. It is presently unclear as to what communications solution will be adopted for Smart Metering in Ireland. A wireless solution using dedicated radio spectrum may yet emerge as a contender, or alternatively, a third party approach utilising existing networks and services might be preferred depending on the associated capital and operational costs. ComReg will continue its engagement with the CER, ESBN and other interested parties to find the most optimal solution for smart metering communications in Ireland and it is available for dialogue regarding any alternative wireless communications solutions that might be proposed.

ComReg invites feedback on the spectrum efficiency measures detailed in this section.

Appendix A – Regulatory Framework for Spectrum Management in Ireland

A.1. The National Framework

A.1.1 Role of ComReg

During the liberalisation of the telecommunications sector across Europe in the 1990s many countries established an independent regulator to deal impartially with the sector. In Ireland, ComReg is the National Regulatory Authority (NRA) responsible for the regulation of the electronic communications sector (telecommunications, radiocommunications and broadcasting transmission) and the postal sector.

Established on 1 December 2002, ComReg was preceded by the Office of the Director of Telecommunications Regulation (ODTR).

ComReg's primary objectives in exercising its functions in the context of electronic communications are to:

- promote competition[188];
- contribute to the development of the internal market[189];
- promote the interests of users within the Community[190]; and
- ensure the efficient management and use of the radio frequency spectrum in Ireland[191];

In carrying out its functions, ComReg is required amongst other things, to:

- ensure that any measures taken by it are proportionate having regard to the objective of ensuring the efficient management and use of the radio frequency spectrum[192];
- have regard to international developments with regard to electronic communications networks and electronic communications services, associated facilities, postal services, the radio frequency spectrum and numbering[193]; and
- take the utmost account of the desirability that the exercise of its functions aimed at achieving its radio frequency management objectives does not result in discrimination in favour of or against particular types of technology for the provision of ECS[194].

[188] Section 12 (1)(a)(i) of the 2002 Act (No. 20 of 2002).

[189] Section 12 (1)(a)(ii) of the 2002 Act (No. 20 of 2002).

[190] Section 12(1)(a)(iii) of the 2002 Act (No. 20 of 2002).

[191] Section 12(1)(b) of the 2002 Act (No. 20 of 2002).

[192] Section 12(3) of the 2002 Act (No. 20 of 2002).

[193] Section 12(5) of the 2002 Act (No. 20 of 2002).

[194] Section 12(6) of the 2002 Act (No. 20 of 2002).

Separately, pursuant to the Framework Regulations, ComReg is obliged to promote the harmonisation of use of radio frequencies across the European Community[195].

Regulation 11 of the Authorisation Regulations[196] also requires ComReg to give due weight to the need to maximise benefits for users and to facilitate the development of competition, in circumstances where it proposes to issue[197] licences for a particular class or description of apparatus for wireless telegraphy for the provision of an electronic communication network or service, and considers that the number of such licences ought to be limited (emphasis added).

Section 12(4) of the 2002 Act requires ComReg to comply with any policy direction given to ComReg by the Minister for Communications, Energy and Natural Resources ("the Minister") as he or she considers appropriate to be followed by ComReg in the exercise of its functions. Section 10(1)(b) also requires ComReg, in managing the radio frequency spectrum, to do so in accordance with a direction of the Minister under Section 13 of the 2002 Act.

A.1.2 Role of the Department of Communications, Energy & Natural Resources

The Department of Communications, Energy and Natural Resources (DCENR) was established following the 2007 general election which resulted in the restructuring of a number of Government Departments. DCENR's remit brings together the communications, broadcasting and energy functions with those of marine and natural resources. The role of the Minister for Communications, Energy and Natural Resources in regard to spectrum management is to develop primary and secondary legislation, develop broadcasting policy, issue policy directions to ComReg as he considers appropriate and in accordance with international law, and to represent Ireland at international decision making bodies such as the International Telecommunication Union (the ITU), the Conference of European Post and Telecommunication Administrations (CEPT), the European Union and their affiliated bodies.

Within these international bodies ComReg is invited, at the request of the Minister, to provide specialist expertise on spectrum management issues.

ComReg also needs to give consideration to the recent Spectrum Policy Statement published by the Department of Communications, Energy and Natural Resources (DCENR)[198].

[195] Regulation 23(2) of the Electronic Communities (Electronic Communications Networks (Framework) Regulations 2003.

[196] (Without prejudice to Section 13 and 37 of the 2002 Act)

[197] (Pursuant to its powers under the Act of 1926)

[198] Spectrum Policy Statement, Department of Communications, Energy and Natural Resources, September 2010.

A.2. The Regional Framework

A.2.1 The European Union

The European Union (EU) comprises 27 Member States operating together under a series of international treaties including the Treaty on European Union that established the European Commission (EC) which is responsible for implementation of the treaties, managing EU policy and making proposals for new legislation to achieve the objectives of the various treaties.

In 2002, the framework for a concrete radio spectrum policy in the EU was launched by the 2002 regulatory framework, and the adoption of the Radio Spectrum Decision (676/2002/EC). On 20 November 2009, Directives were approved to amend the 2002 regulatory framework, and this 2009 regulatory framework in the process of being transposed into national law by the 27 member states.

On the basis of this legislative framework, the EC is able to and has used legally binding regulatory measures to achieve policy objectives, including objectives related to radio spectrum usage and management such as:

- Facilitating technological innovation and competition in radiocommunications, mobile telephony and wireless local networks;
- Pursuing Community objectives with regard to the radio spectrum within a predictable and legally certain regulatory framework;
- Ensuring an appropriate balancing of the interests of the individual Member States, of the European Community and of the different user communities; and
- Safeguarding the Community's interests in the international negotiations on the radio spectrum.

The following provides a brief explanation of the various bodies associated with the European Union which consider radio spectrum issues.

In 2002, and following the adoption of the Radio Spectrum Decision, two complementary bodies were set up to facilitate consultation and to develop and support radio spectrum policy in Europe:

- The Radio Spectrum Policy Group (RSPG) is a group of high-level representatives that advise on broad policy in the area; and
- The Radio Spectrum Committee (RSC) which assists the European Commission in developing technical implementation measures.

The work of the RSPG is organised via work programmes and the current topics include a review of spectrum use, improving broadband coverage, the economic and social value of spectrum, the collective use of spectrum and international coordination of spectrum use. ComReg actively participates and contributes to the work of the RSPG, and in 2011, ComReg Commissioner Mike Byrne is the RSPG chairperson.

In September 2010, the first proposal for a multi-annual Radio Spectrum Policy Programme (**RSPP)** was submitted by the EC to the European Parliament and Council. This followed advice from the RSPG which produced an Opinion[199] on the RSPP. The RSPP proposal is part of a package of EU measures regarding broadband communications and outlines at a strategic level how the use of spectrum can contribute to the most important political objectives of the European Union from 2011 to 2015. Various objectives are set out in the proposal, and in particular the RSPP seeks to ensure that sufficient spectrum is made available by 2013 for wireless broadband. The RSPP proposal is currently under consideration by the European Parliament and Council.

The **Radio Spectrum Committee (RSC)** looks at the specific technical issues required to implement radio spectrum policy in the EU. Its main role is the development of EC decisions with respect to the technical implementation measures required to ensure harmonised conditions across Europe for the availability and efficient use of radio spectrum.

The activities of the RSC are established in a work programme and since its inception in 2002 30 EC Decisions have been adopted by the RSC. These EC Decisions cover a variety of topics in various spectrum bands and are legally binding in Ireland.

Previous EC Decisions have covered topic such as the provision of spectrum for Electronic Communications Services, Short Range Devices, Mobile Communications on Vessels, etc., and spectrum bands such as the 800 MHz, 900 MHz, 1800 MHz, 2600 MHz, etc. have also been considered. ComReg actively participates and contributes to the work of the RSC.

The adoption of the revisions to the Common Regulatory Framework has lead to a number of changes to the European institutions and their role. Resulting from this framework, the Body of European Regulators for Electronic Communications (BEREC) was formed to replace the European Regulators Group (ERG) and the role of the EC was expanded to allow it to present a legislative proposal to the European Parliament and Council to establish a multi-annual Radio Spectrum Policy Programme (RSPP).

BEREC is body made up of a Board composed of the heads of the 27 NRAs and is assisted by an Office which is established as European Community Body. The role of BEREC is to continue the work of the ERG, developing cooperation among NRAs, and between NRAs and the EC, so as to ensure the consistent application in all Member States of the EU regulatory framework for electronic communications networks and services. The activities of BEREC are set out in a work programme and in 2011 it is focussing on three themes:

- improving harmonisation;
- emerging challenges; and

[199] RSPG10-330: RSPG Opinion on the Radio Spectrum Policy Programme (available at http://rspg.ec.europa.eu/)

- the set-up of BEREC and implementation of revisions to the Common Regulatory Framework.

ComReg actively participates and contributes to the work of the RSC, and in 2010, ComReg Commissioner John Doherty was the inaugural chairperson of BEREC.

Revisions to the Common Regulatory Framework are currently being transposed into national legislation and are due to come into effect by May 2011.

A.2.2 CEPT

The European Conference of Postal and Telecommunications Administrations (CEPT) was established in 1959 and consists of a body of policy-makers and regulators currently encompassing 48 European countries covering almost the entire geographic area of Europe (see: www.cept.org).

The CEPT, which deals exclusively with sovereign regulatory matters, has established three committees: the first on postal matters (CERP), the second dealing with radiocommunications and telecommunications issues (the Electronic Communications Committee (ECC)), and the third (Com-ITU) dealing with ITU policy. The committees handle harmonisation activities within their respective fields of responsibility, and adopt recommendations and decisions.

Under the ECC there are a number of working groups and project teams which develop and deal with radio spectrum issues for consideration by the ECC plenary meetings. The ECC also adopts Decisions, Recommendations and Reports aimed at efficient spectrum utilisation and harmonisation. While the implementation of the Decisions and Recommendations by national administrations is on a voluntary basis, as the CEPT and ECC have no legislative power, the ECC has played a significant role in harmonising spectrum use in Europe providing, for example, a table of European frequency allocations which is in effect a long term strategic plan for harmonisation and use of the radio spectrum throughout Europe.

ComReg is actively involved in the most relevant CEPT working groups, project teams and the ECC plenary sessions in order to promote and protect Ireland's interests.

A.3. The Global Framework

Ireland operates within a global economy. International markets and competition must therefore be taken into account in the development and introduction of new services. Spectrum allocation also has to take the international dimension into account. To maintain an effective and responsive regulatory structure there is an ongoing need for participation in appropriate international fora, to track and influence developments in international regulation, harmonisation of standards and new market opportunities, and to monitor developments in technologies and applications.

A.3.1 The International Telecommunication Union

The effective integration of each nation into the international community of spectrum users is required to ensure availability of interference free-services such as: international aeronautical and maritime communications supporting air and sea travel; global mobile communications; satellite communications; international broadcasting and public safety services such as search and rescue. Because radio waves do not respect international boundaries and many systems operate on a global basis, the international community has developed a structure for co-operatively managing interference between services and between nations. International co-operation in the field of telecommunications is handled through a single organisation known as the International Telecommunication Union (ITU) which through the World Radiocommunication Conferences updates and amends the International Radio Regulations.

The ITU Radio Regulations contain technical and procedural provisions related to each of the various radio services and serve as the primary international agreement covering rules and procedures for operating radio equipment, resolving and preventing interference, and contain the international frequency allocation table. While each nation remains sovereign in their use of the radio spectrum the work of the ITU forms the global framework within which regional and national planning is developed.

A.3.2 The World Radiocommunication Conference of 2012

ComReg has been a key participant in Irish delegations to International fora including the CEPT and ITU Conference Preparatory meetings to prepare for the 2012 World Radiocommunication Conference (WRC) and will also participate in the World Radiocommunication Conference itself which will be held in 2012 (WRC-12).

Demands for more spectrum have been submitted to WRC-12 by the aeronautical mobile service, the space research service (Earth-to-space), the broadcasting-satellite service, the radiodetermination-satellite service (space-to-Earth), the amateur service, the meteorological-satellite, the mobile-satellite service as well as the unmanned aircraft systems (UAS) and electronic news gathering (ENG) services.

Some of the key issues that are on the WRC-12 agenda and the current CEPT position include:

- *Spectrum requirements and regulatory actions (including allocations), in support of unmanned aircraft systems (UAS);*

CEPT supports the spectrum bandwidths demands of 34 MHz for terrestrial and 56 MHz for satellite spectrum as determined by ITU-R Report M.2177 for the provisioning of Control and Non-Payload Communications (CNPC) comprising ATC relay, command and control (C^2) and Sense-and-Avoid data (SAA). Furthermore, the CEPT view is that the communications requirements for UAS should be considered as an application of a safety service as defined in RR 1.59 and CEPT does not support any new allocation or any change to the technical constraints

of applications of existing allocations if the sharing studies with the existing services are not completed.

- *Facilitate introduction of new aeronautical mobile (R) service systems in the bands 112-117.975 MHz, 960-1 164 MHz and 5 000-5 030 MHz;*

Based on Intentional Civil Aviation Organization (ICAO) and The Radiocommunications sector of the International Telecommunications Union (ITU-R) studies, CEPT is of the opinion that no harmful interference will arise from the introduction of AM(R)S (aeronautical mobile (on-route) service) systems in the band 112-117.975 MHz into FM broadcasting receivers below 108 MHz and noted that studies are still ongoing concerning the interference from digital broadcasting sound systems into AM(R)S.

CEPT is of the opinion that sharing the 960-1164 MHz frequency band between networks in the aeronautical mobile (R) service and non-ICAO national systems in the aeronautical radionavigation service would be feasible with frequency off-set and/or distance separation subject to coordination of the AM(R)S networks with the ARNS systems and that sharing between networks in the aeronautical mobile (R) service and non-ICAO national systems in the aeronautical radionavigation service is feasible and is a matter which can be dealt with in ICAO.

Concerning the use of the band and 5 000-5 030 MHz, CEPT is of the opinion that spectrum needed to fulfil airport surface network requirements can be met in the current allocation and therefore no changes are required to Article 5 of the Radio Regulations.

- *Worldwide/regional harmonisation of spectrum for electronic news gathering (ENG) systems;*

CEPT supports the harmonisation of broad tuning ranges for frequencies for ENG to guide administrations and equipment manufacturers across the world. The frequency bands considered for the harmonisation of tuning ranges for ENG should already be allocated to the mobile and/or to the fixed and/or to the broadcasting services, at least in Region 1 and supports at most the consideration of harmonised tuning ranges within the Radio Regulations.

- *Revise frequencies and channelling arrangements of Appendix 17 to the Radio Regulations in order to implement new digital technologies for the maritime mobile service;*

CEPT supports a revision of Appendix 17 to facilitate the use of new digital communication systems, whilst maintaining sufficient provisions for remaining operational requirements involving Narrow Band Direct Printing (NBDP) within the Global Maritime Distress and Safety System (GMDSS). CEPT is of the opinion that any changes to Appendix 17 could be implemented in a transition period with a proposed end date of 1 January 2015 in order to safeguard the simultaneous use of current systems and new digital technology.

- *Consider results of sharing studies between the mobile service and other services in the band 790-862 MHz in Regions 1 and 3, to ensure the adequate protection of services to which this frequency band is allocated;*

Compatibility between mobile and broadcasting services - CEPT is of the view that there is no need to change the current provisions of the Radio Regulations (RR) in force and that the provisions of the GE-06 (Geneva- 2006) Agreement continue to apply and that these should not be questioned nor reviewed under Agenda Item 1.17.

Compatibility between mobile and aeronautical radionavigation services - CEPT is the view that RR No. 9.21 should continue to apply until 16 June 2015, concerning potential interferences from the mobile service, and that both services should be treated equally with respect to access to spectrum after that date. Noting that there is currently no regulatory provision in the RR to ensure that mobile service will not be unduly affected by interference or protection constraints from future assignments in the aeronautical radio navigation service and given the potential of interference between these two services, there is a need to develop adequate regulatory provisions, given that after 17 June 2015 both services are primary.

Compatibility between mobile and fixed services - CEPT considers that, in general, there is no specific regulatory constraint in the RR for ensuring compatibility between these two services in one band allocated with equal status and that administrations could only be encouraged to enter into bilateral coordination process.

- *Provide a global primary allocation for the radiodetermination-satellite service(RDSS)(space-to-Earth) allocations in the band 2 483.5-2 500 MHz;*

CEPT supports the extension of this existing Region 2 primary and Region 1/ Region 3 secondary RDSS allocations to become a global primary allocation provided that existing or new regulatory means ensure the protection of other services in the band and in adjacent bands. CEPT also supports that RDSS should be subject to a coordination threshold level of -129 dBW/m²/MHz enabling the protection of the existing services, except for Radiolocation Services (RLS). For the protection of RLS, another mechanism, similar to the one contained in RR No. 5.399 (i.e. based on non claiming protection nor causing harmful interference) should be considered.

- *Consider regulatory measures and their relevance, in order to enable the introduction of software-defined radio and cognitive radio systems*;

CEPT is of the view that:

- Software Defined Radio (SDR) and Cognitive Radio System (CRS) are not radiocommunication services and the definitions of SDR and CRS should not be included into the Radio Regulations;
- any radio system may implement SDR/CRS techniques within any radiocommunication service as long as it operates in accordance with the

provisions of the RR applicable for that specific service in the frequency band allocated to it;

- Software Defined Radio and Cognitive Radio Systems can either be deployed/implemented separately or they can be combined;
- frequencies or frequency bands (tuning range) for specific applications implementing CRS could be harmonized, as necessary, on worldwide basis in ITU-R Recommendations or regionally;
- the possible worldwide implementation of a Cognitive Pilot Channel (CPC) could be supported by the development of an ITU-R Recommendation, subject to proper assessment and validation of the merits of this technological approach;

- *Examine the effect of emissions from short-range devices on radiocommunication services* ;

CEPT is of the view that no decision needs to be taken at WRC-12 on short-range devices as the regulation of emissions by SRDs can be achieved via the development of ITU-R recommendations and reports, taking into account the Resolution ITU-R 54 ("studies to achieve harmonisation for short range radiocommunication devices (SRDs)").

- *Possible additional allocations to the mobile-satellite service.*

CEPT supports the allocation of a justified amount of additional spectrum to the MSS without unduly constraining existing, planned and future radio applications operated in the existing services. However, the CEPT does not support new MSS allocation in the 7/8 GHz band and is still investigating sharing possibilities in the 5 GHz, 10 GHz, 13 GHz and 15 GHz frequency bands.

Appendix B – Monitoring, Compliance and Enforcement

B.1 Monitoring

Spectrum monitoring is one of the essential tools of spectrum management and assists in promoting the efficient utilisation of the radio frequency spectrum by ensuring licence compliance supporting the spectrum management process in the frequency assignment and planning functions. ComReg has developed its spectrum monitoring techniques to ensure that technical parameters and standards for radiocommunication systems are adhered to and is developing a network of fixed monitoring stations throughout the country to provide an accurate picture of spectrum utilisation in conjunction with mobile monitoring stations used for resolving interference issues.

Currently there are remote monitoring stations located in Dublin, Limerick, Cork, Galway, Waterford and Navan with stations planned to be rolled out in Athlone, Portlaoise, Sligo, Tralee, Cavan and Castlebar by the end of Q2 2011. More stations are planned for Gorey, Kilkenny, Dundalk, Killarney, Letterkenny, Castlerea and Cashel by 2012.

Spectrum compliance is currently placing more emphasis on the area of spectrum monitoring through both increasing the capabilities of monitoring facilities and activities and by participation in the Frequency Management (FM) 22 working group on spectrum monitoring. It is envisaged that this will be an ongoing in feature in ComReg's workload.

B.1.1 Equipment Compliance and Enforcement

The basis for compliance enforcement in relation to equipment is the R&TTE and EMC Directives.

R&TTE Directive

The R&TTE Directive provides that any person, retailer, wholesaler, distributor, importer or manufacturer may not sell or use any radio or any piece of telecommunications terminal equipment, unless it complies with the essential requirements of the Directive. Investigations under the R&TTE Directive are prioritised, with consumer safety and potential interference driving the workflow. ComReg will continue to take appropriate action against suppliers of non-compliant equipment found on the Irish market up to, and including, a ban on sales or product recall and possible prosecution of persons involved.

Much work was also carried out in the 2009-10 period to ensure that ComReg was compliant with EU Decision 876/2008 on a Common Framework for the Marketing of Products, and EU Regulation 765/2008 on Accreditation and Market Surveillance were passed by the European Parliament in mid-2008. In effect these regulations made market surveillance mandatory for all regulatory authorities. ComReg has

submitted work plans and associated documents to the European Commission in line with these requirements.

EMC Directive

The EMC Directive (2004/108/EC) relates to the EMC compliance of products and covers most electronic consumer items not covered by the R&TTE Directive. Under this piece of legislation ComReg has similar powers to the R&TTE Directive and investigations are prioritised, with consumer safety and potential interference driving the workflow.

ComReg participates in the both the Administrative Co-operation working group (ADCO) and Telecommunications Conformity Assessment and Market Surveillance Committee (TCAM) working group for R&TTE and EMC. And is a regular participant in the annual EU-wide market surveillance campaigns. As part of upcoming work-streams it should be noted that a complete review is currently underway of the R&TTE Directive at an EU level with a view to replacing the existing Directive. Much of this work, including transposing the new Directive etc., is expected to take place in 2011.

B.1.2 Operations Compliance and Enforcement (Inspections of Radio Installations)

The inspection of radio installations is an effective means of regulating and ensuring compliance with licence conditions and consequently more efficient use of radio spectrum. The basis for radio installation and inspection are:

1926 Wireless Telegraphy Act – S.I. 45 of 1926

The fundamental principle of this foundation Act is that all apparatus for wireless telegraphy must be licensed unless specifically exempted. Radio users who possess/or operate such equipment without possession of an appropriate licence or operate licensed equipment outside the terms of their licence commit offence under the Act.

1988 Broadcasting and Wireless Telegraphy Act – S.I. 19 of 1988

This Act pertains to broadcasting and is the principal Act under which enforcement actions is taken against unlicensed broadcast stations. The Act prohibits the supply of licensed equipment to any person not in possession of a valid licence.

The use of sub-standard equipment, poor installation and maintenance practices can result in unlicensed broadcast stations causing interference to other licensed users including air traffic control (ATC) operations and emergency services. ComReg has seized unlicensed broadcast equipment on 35 separate occasions in 2007 - 2009. Legal proceedings have been initiated against those identified as being involved.

Communications Regulation Act 2002 (as amended) - (S.I. 20 of 2002)

Sections 39 to 46 of this Act provides for increased powers for officers of ComReg who have been designated as "authorised officers" for the purposes of the Act. The powers allow for, among other things, the inspection and testing of apparatus and for the copying and seizure of documents without the requirement for a search warrant.

B.1.3 Compliance with Conditions Relating to Non-Ionising Radiation

Non-ionising radiation (NIR) is the term given to electromagnetic radiation which has insufficient energy to cause ionisation (molecular changes) in living matter. It includes static and power frequency fields, radiofrequencies, microwaves, infra-red, visible and ultraviolet radiation. It is a condition of general authorisations and various Wireless Telegraphy licences issued by ComReg that emissions of non-ionising radiation from licensed and authorised radio transmission installations comply with the limits for public exposure set down in the latest guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)[200].

ComReg's responsibility and capacity to act in this area is solely to ensure that its licensees comply with their licence conditions relating to non-ionising radiation, such that all NIR emissions from their apparatus are within the levels set down by ICNIRP in 1998. ComReg's current practice to assess compliance with this particular condition is to survey emissions from a sample number of sites each year. The sites to be surveyed are chosen by ComReg. ComReg currently augments its own monitoring by engaging the services of a contractor to conduct most of the surveys. Since 2006, ComReg has commissioned a total of 446 surveys as follows:

Table 7: Number of NIR surveys conducted each year

Year	Number of Surveys
2006	80
2007	130
2008	76
2009	80
2010	80

The programme of site surveys is ongoing and different services and licence types are continuously coming under the scope of the surveys as they come online. In 2010 ComReg signed a three year survey contract with an external contractor to conduct 240 surveys within that period.

[200] "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)", International Commission on Non-Ionizing Radiation Protection, Published in 'Health Physics', April 1998, Volume 74, Number 4. Available from www.icnirp.de

The results of the individual site surveys are published on www.comreg.ie (a list of relevant documents is given below) as well as on www.siteviewer.ie, an on-line facility which allows the public to view details of mobile network base-station masts throughout Ireland.

The following table details all the NIR reports published during the period of 2008 - 2010.

Table 8: Published NIR Reports (2008 – 2010)

Document Number	Document Title	Date Published
08/51	Programme of Measurement of Non-Ionising Radiation Emissions: Methodology for the Conduct of Surveys to Measure Non-Ionising Electromagnetic Radiation from Transmitter Sites.	1 July 2008
08/61	2008 Programme of Measurement of Non-Ionising Radiation Emissions - Second Interim Report.	28 July 2008
08/84	2008 Programme of Measurement of Non-Ionising Radiation Emissions - Third Interim Report.	31 October 2008
09/05	2008 Programme of Measurement of Non-Ionising Radiation Emissions - Fourth Interim Report.	30 January 2009
09/33	2009 Programme of Measurement of Non-Ionising Radiation Emissions – First Interim Report.	17 April 2009
09/61	2009 Programme of Measurement of Non-Ionising Radiation Emissions - Second Interim Report.	23 July 2009
09/82	2009 Programme of Measurement of Non-Ionising Radiation Emissions - Third Interim Report.	23 October 2008
10/07	2009 Programme of Measurement of Non-Ionising Radiation Emissions - Fourth Interim Report.	28 January 2010
10/36	2010 Programme of Measurement of Non-Ionising Radiation Emissions - First Interim Report.	23 April 2010
10/57	2010 Programme of Measurement of Non-Ionising Radiation Emissions: Second Interim Report.	15 July 2010
10/90	2010 Programme of Measurement of Non-Ionising Radiation Emissions: Third Interim Report.	11 November 10

Appendix C – Calculating the Contribution of Radio Spectrum

The calculation for this strategy statement of the contribution of radio spectrum has been undertaken using the same methodology as that used in all previous spectrum management strategy documents. This methodology relies on authoritative data obtained from corporate financial statements listed with the Irish Companies Registration Office. The use of the same methodology allows direct comparison of results over a long term period.

The contribution to GDP of a given company making use of radio spectrum was determined by taking the profits generated by its operations ('operating profit') and adding it to company staff payments. Payments to staff provide an indirect contribution to the economy as a result of wages spent.

Depreciation, which denotes the notional loss of corporate assets over time, is subtracted from capital expenditure, which constitutes an addition to the assets of the corporate entity. This provides a more accurate measure of actual cash flows within the economy. The figure for capital expenditure (Capex) is taken for fixed tangible assets only and excludes disposals (assets that are sold or written off by the company).

This can also be expressed in the following way:

The estimate of GDP contribution is qualified in two important respects. First, the estimate excludes small companies to which the Companies (Amendment) Act 1986 applies[201] because such companies are exempt from filing a full set of financial accounts. As a result, some data needed to perform the GDP contribution estimate cannot be readily obtained in accordance with the above methodology. While the individual turnover amounts for small companies are relatively low, on aggregate the contribution of small wireless companies and private unlimited companies may actually be quite large but otherwise unaccounted for.

The second qualification relates to the types of companies making use of radio. Since users (and uses) of radio spectrum are not homogenous, spectrum usage was categorized as either fundamental or tangential to various different types of corporate operations. This excludes a number of profitable companies employing substantial numbers that for instance develop complex software for the operations and billing aspects of networks.

Radio spectrum is considered fundamental to the provision of mobile services for example. This is because mobile communications of this type can only be undertaken via the use of radio frequencies. This is also true for most broadcasting services provided in Ireland. Radio spectrum can also be considered 'fundamental'

[201] ss. 11, 12 Companies (Amendment) Act 1986. 'Small companies' have a have a turnover of less than €3.81m and fewer than 50 employees.

to the aviation sector, since the safe operation and volume of air traffic could only be accomplished through the use of radio. Other sectors, such as the medical device industry, make use of radio though only in a tangential way. Clearly not all medical devices produced are wireless medical devices, but it is difficult to assess the nature and extent of radio use in this industry as the equipment operates mainly in the 2.4 GHz unlicensed band.

These two qualifications result in a conservative estimate but as this has been the approach followed since the inception of these strategy stalemates provides for direct comparisons year on year and period by period.

Appendix D – List of Documents Relevant to ComReg's Consultation on the Liberalisation of the 800, 900 and 1800 MHz bands.

Doc. No.	Title	Publication Date
08/57	Consultation - Liberalising the Use of the 900 MHz and 1800 MHz Spectrum Bands	17 July 08
09/14s	Submissions to consultation: Liberalisation of the GSM Spectrum Bands & Options for the Release of Spectrum in these Bands	10 March 09
09/14	Response to Consultation 08/57 & Further Consultation - Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum Bands & Spectrum Release Options	10 March 09
09/51s	Consultation Submissions - Liberalising the use of the 900 and 1800 MHz Spectrum Bands	18 June 09
09/14a	Redacted Vilicom Report on UMTS Network Design and Cost	23 March 09
09/51	Information Notice - Publication of non-confidential responses and announcement of Bilateral meetings.	17 June 09
09/73	Information Notice – Publication of non-confidential minutes of bilateral meetings.	25 September 09
09/99	Response to Consultation 09/14 and Further Consultation- Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum Bands	21 December 09
09/99s	Information Notice - Publication of the non-confidential input and correspondence with interested parties	21 December 09
10/21R	Submissions to Consultation 09/99 - Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum Bands	29 March 10
10/59	Information Notice - Update on the Availability of Ireland's "Digital Dividend" and the 900 MHz Band Liberalisation Consultation Process	29 July 10
10/71	Consultation - 800 MHz, 900 MHz & 1800 MHz spectrum release	17 September 10
10/71a	DotEcon Report on "Award of liberalised spectrum in the 900MHz and other bands"	17 September 10
10/71b	DotEcon Report on "Award of 800MHz and 900MHz spectrum - Update report on benchmarking"	17 September 10
10/71c	Vilicom/Red-M Report on "Retuning and Relocating GSM900 Spectrum Assignments in Ireland"	17 September 10
10/79	Information Notice - GSM Liberalisation Project - Publication of non-confidential submissions, correspondence and other material provided by respondents (and ComReg written responses to same) in the period following publication of submissions to Consultation 09/99 until publication of Consultation 10/71	29 September 10
10/103R	Submissions to Consultation - 800 MHz, 900 MHz & 1800 MHz spectrum release	7 January 10
10/105	Consultation: Inclusion of the 1800 MHz Band into the Proposed joint award of 800 MHz and 900 MHz Spectrum	15 December 10
10/105a	DotEcon Report on "Inclusion of the 1800MHz band in a joint award of spectrum in the 800MHz and 900 MHz bands"	15 December 10
10/105 b	Vilicom/Red-M Report on "Retuning and Relocating GSM1800 Spectrum Assignments in Ireland"	15 December 10
11/11	Consultation - Interim Licences for the 900 MHz band	17 February 11
11/27	Interim Licences for the 900 MHz band - Response to Consultation & Correspondence	6 April 11

Appendix E – EC Decisions, ECC Decisions and ECC Recommendations

Table 9: EC Decisions implemented during 2008 – 2010 strategy period

Document Number	Document Title
2010/368/EU	Commission Decision of 30 June 2010 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices
2010/166/EU	Commission Decision of 19 March 2010 on harmonised conditions of use of radio spectrum for mobile communication services on board vessels (MCV services) in the European Union
2009/343/EC	Commission Decision of 21 April 2009 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (notified under document number C(2009) 2787)
2009/381/EC	Commission Decision of 13 May 2009 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices (notified under document number C(2009) 3710
2009/449/EC	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)
2009/766/EC	Commission Decision of 16 October 2009 on the harmonization of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community
2009/114/EC	Commission Decision of 16 October 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community

Table 10: ECC Decisions & Recommendations implemented during 2008 – 2010 strategy period

Document Number	Document Title
ECC/DEC/(10)01	ECC Decision of 12 November 2010 on sharing conditions in the 10.6-10.68 GHz band between the fixed service, mobile service and Earth exploration satellite service (passive)
ECC/DEC/(08)08	ECC Decision of 31 October 2008 on the harmonised use of GSM system on board vessels in the frequency bands 880-915/925-960 MHz and 1710-1785/1805-1880 MHz.

ECC/DEC/(08)05	ECC Decision of 27 June 2008 on the harmonisation of frequency bands for the implementation of digital Public Protection and Disaster Relief (PPDR) radio applications in bands within the 380-470 MHz range
ECC/DEC/(08)01	ECC Decision of 14 March 2008 on the harmonised use of the 5875 - 5925 MHz frequency band for Intelligent Transport Systems (ITS)
ECC/DEC/(06)13	ECC Decision of 1 December 2006 on the designation of the bands 880-915 MHz, 925-960 MHz, 1710-1785 MHz and 1805-1880 MHz for terrestrial IMT-2000/UMTS systems.
ECC/DEC/(06)12	ECC Decision of 1 December 2006 on supplementary regulatory provisions to Decision ECC/DEC/(06)04 for UWB devices using mitigation techniques. (amended 31 October 2008)
ECC/DEC/(06)05	ECC Decision of 7 July 2006 on the harmonised frequency bands to be designated for Air-Ground-Air operation (AGA) of Digital Land Mobile Systems for the Emergency Services.
ECC/REC/(08)01	On the harmonized use of the 5875 – 5925 MHz frequency band for Intelligent Transport systems
ECC/REC/(06)05	The provision of information on the progress of implementation of the Mobile Satellite Systems which are candidates to use the 1980-2010 MHz and 2170-2200 MHz MSS frequency bands
ECC/DEC/(06)04	ECC Decision of 24 March 2006 on the harmonised conditions for devices using UWB technology in bands below 10.6 GHz.

The following table details the ECC Decisions and Recommendations that are outstanding (including under study) and are under consideration by ComReg for implementation. Items in italics are draft Decisions/Recommendations that are being worked on within the ECC.

Table 11: ECC Decisions & Recommendations proposed for implementation

Document Number	Document Title
ECC/DEC/(09)03	ECC Decision of 30 October 2009 on harmonised conditions for Mobile/Fixed Communications Networks (MFCN)operating in the band 790-862 MHz
ECC/DEC/(09)03	ECC Decision of 30 October 2009 on harmonised conditions for Mobile/Fixed Communications Networks (MFCN)operating in the band 790-862 MHz
ECC/DEC/(09)02	ECC Decision of 26 June 2009 on the harmonisation of the bands 1610-1626.5 MHz and 2483.5-2500 MHz for use by systems in the Mobile-Satellite Service
ECC/DEC/(08)08	ECC Decision of 31 October 2008 on the harmonised use of GSM system on board vessels in the frequency bands 880-915/925-960 MHz and 1710-1785/1805-1880 MHz

ECC/DEC/(06)08	ECC Decision of 1 December 2006 on the use of Ground- and Wall-Probing Radar (GPR/WPR) imaging systems
ECC/DEC/(05)01	ECC Decision of 18 March 2005 on the use of the band 27.5–29.5 GHz by fixed service and uncoordinated Earth stations of the fixed-satellite service (Earth-to-space)
ECC/DEC/(02)10	ECC Decision of 15 November 2002 on exemption from individual licensing of GSM-R mobile terminals operating within the frequency bands 876-880 MHz and 921-925 MHz for railway purposes
ECC/DEC/(02)04	ECC Decision of 15 March 2002 on the use of the band 40.5 – 42.5 GHz by terrestrial (fixed service / broadcasting service) systems and uncoordinated Earth stations in the fixed satellite service and broadcasting-satellite service (space to Earth)
ECC/REC/(10)03	Harmonised CEPT examination procedures for the Long Range Certificate (LRC) for non-solas vessels
ECC/REC/(10)01	Guidelines for compatibility between Complementary Ground Components (CGC) operating in the band 2170-2200 MHz and EESS/SOS/SRS Earth stations operating in the band 2200-2290 MHz
ECC/REC/(09)01	Use of the 57-64 GHz frequency band for point-to-point Fixed Wireless Systems
ECC/REC/(08)04	The identification of frequency bands for the implementation of Broad Band Disaster Relief (BBDR) radio applications in the 5 GHz frequency range
ECC/REC/(05)02	Use of the 64-66 GHz frequency band for Fixed Service
ECC/REC/(02)02	Channel arrangements for digital fixed service systems (point-to-point and point-to-multipoint) operating in the frequency band 31.0 – 31.3 GHz
ECC/DEC/(09)04	ECC Decision of 30 October 2009 on exemption from individual licensing and the free circulation and use of transmit-only mobile satellite terminals operating in the Mobile-Satellite Service allocations in the 1613.8 - 1626.5 MHz band
ERC/REC/(01)03	Use of parts of the band 27.5-29.5 GHz for Fixed Wireless Access (FWA)
ERC/REC 12-11	Radio frequency channel arrangement for fixed service systems operating in the band 51.5 - 52.6 GHz
ECC/DEC/(11)AA	*Protection of EESS in the band 1400-1427 MHz*
ECC/DEC/(11)BB	*Industrial Level Probing Radars (LPR) operating in frequency bands 6-8.5 GHz, 24.05-26.5 GHz, 57-64 GHz and 75-85 GHz*
ECC/REC/(11)01	Guidelines for block allocation for fixed wireless systems in the bands 24.5-26.5 GHz, 27.5-29.5 GHz and 31.8-33.4 GHz