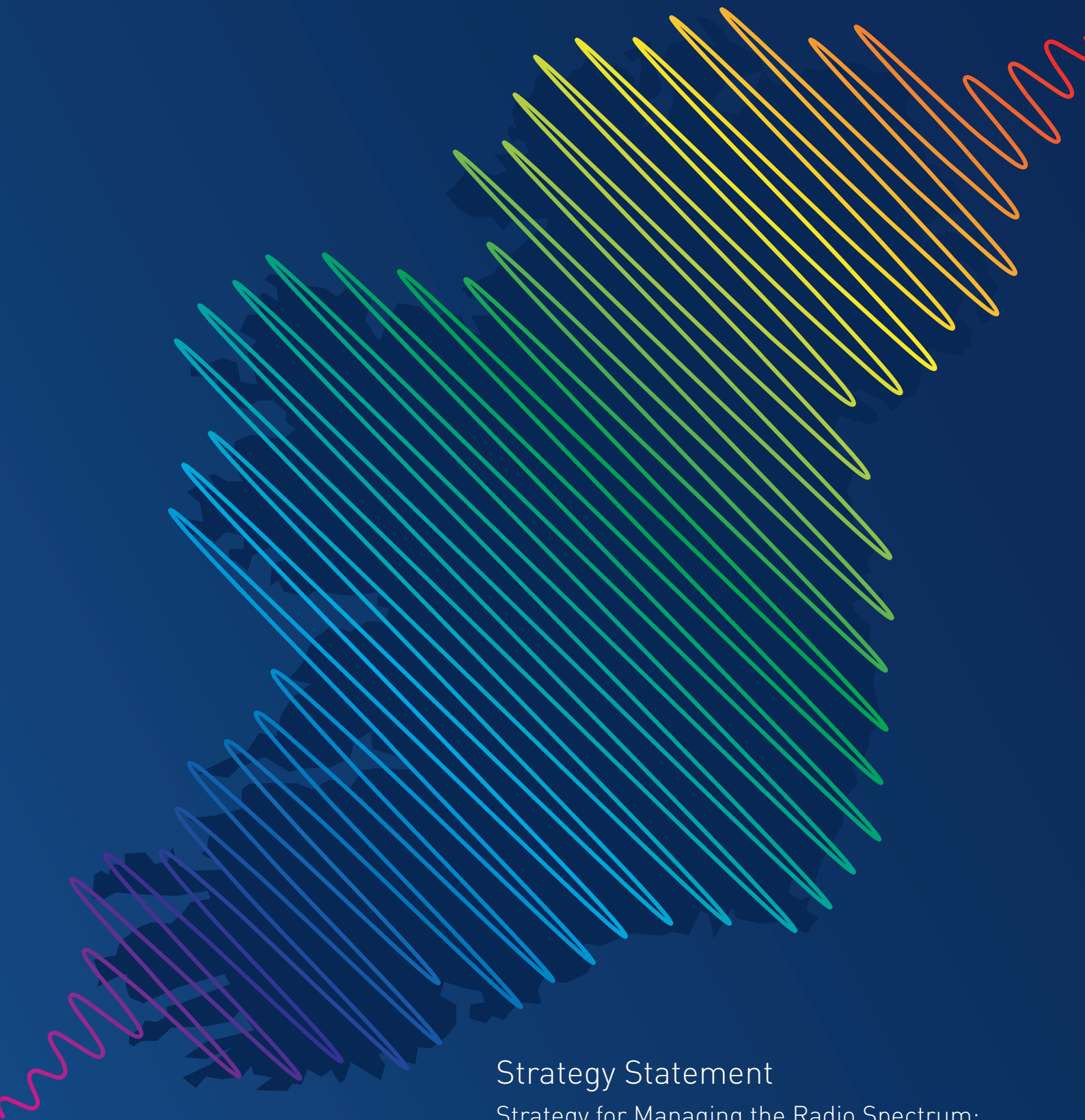
Commission for
Communications Regulation



Strategy Statement

Strategy for Managing the Radio Spectrum: 2011 – 2013

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Contents

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1. Foreword

Radio frequency spectrum is a valuable national resource, underpinning important economic, social and communications activities. These range from the 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 strategy statement we expect to see significant developments affecting the use of the radio spectrum. These include the release of the 800 MHz digital dividend band for next generation services as part of a proposed multi-band auction, a process which will also lead to the full liberalisation of the 900 MHz GSM and 1800 MHz GSM bands. 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 this Strategy Statement, ComReg has taken into account its role, its statutory objectives, all relevant obligations as well as all the material submitted in response[1] to the preceding pubic consultation[2]. 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.

Alex Chisholm
Chairperson

Mike Byrne
Commissioner

Kevin O'Brien
Commissioner

1. ComReg Document 11/28s - Submissions to Consultation - Review of the Period 2008 – 2010 & Proposed Strategy for 2011-2013 - 9 September 2011 and ComReg Document 11/87 – Further Submissions to Consultation - Review of the Period 2008 – 2010 & Proposed Strategy for 2011-2013 – 22 November 2011.
2. ComReg Document 11/28 –Review of the period 2008 – 2010 & proposed strategy for managing the radio spectrum: 2011 – 2013 - 12 April 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 strategy for managing the use of the radio spectrum in Ireland over the period from 2011 – 2013 ("Strategy Statement"). 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 (the most up to date available date) 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.

Since the publication of Consultation 11/28 in April 2011 there have been a number of recent developments that ComReg has taken into account in finalising its Strategy Statement. These include:

- the finalisation of the revision of the Common European Framework and the transposition of this framework into Irish legislation;
- the release of a number of spectrum bands across Europe, mostly through some form of auction process; and
- technology developments as evidenced by announcements made by manufacturers and the publication of new standards.

A number of key drivers have been identified which have informed ComReg's spectrum management 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 Strategy Statement 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 and a summary list of potential spectrum opportunities;
- 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 spectrum management 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.

3.Introduction and Opportunities

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 broadcasting, public safety, national security and health care;
- promoting competition, contributing to the development of the internal market and promoting the interests of citizens of the European Union; 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 encourage the efficient use and ensure the effective management of the radio spectrum within the bounds of spectrum constraints and technology developments. The regulatory process of encouraging 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.

3.1 ComReg's Role

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

The Communications Regulation Act 2002-2010 (as amended) (the "2002 Act"), the Framework and Authorisation Regulations (S.I. No. 333 of 2011 and S.I. No. 335 of 2011 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.

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.

Apart from licensing apparatus for wireless telegraphy (and making regulations in relation to licences) or exempting apparatus from licensing under the 1926 Act, 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:

- ensure that measures taken are proportionate in ensuring the efficient management and use of the radio spectrum;
- have regard to international developments in relation to the radio frequency spectrum.;
- have regard to policy statements, published by or on behalf of the Government or a Minister of the Government and notified to ComReg, in relation to the economic and social development of the State; and
- comply with policy directions given to ComReg by the Minister as he or she considers appropriate to be followed by the Commission in the exercise of its functions.

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 International Telecommunication Union (ITU), while regional regulatory functions lie with the European Union (EU) and the European Conference of Postal and Telecommunications Administrations (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 of ComReg Consultation Document 11/28 ("Consultation 11/28").

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.

ComReg has also given give due consideration to the recent Spectrum Policy Statement published by the DCENR[4]. 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 2002 Act to encourage the efficient use and ensure the effective management of the radio spectrum in Ireland. ComReg is also obliged to ensure that all radio equipment placed on the market is in compliance with the R&TTE[5] and EMC[6] Directives, and ensure that the possession and use of apparatus for wireless telegraphy complies with the obligations under the 1926 Act.

4. Spectrum Policy Statement, Department of Communications, Energy and Natural Resources, September 2010.
5. 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.
6. 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.

3.Introduction and Opportunities
continued

The evolution of wireless technologies has resulted in an increase in the type of interference investigations undertaken by ComReg. 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 an appropriate licence under the 1926 Act. 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.

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 Gross Domestic Product (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[7]. 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, radio plays a major role in enabling the Defence Forces to carry out their duties both at home and overseas and the value of broadcasting goes beyond its economic contribution in terms of fostering civil society, cultural diversity and media pluralism, hence its importance as a public policy goal. Radio spectrum is also 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 radio 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.[8] 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 A of this document.

3.2.1 The Contribution of Radio Spectrum to GDP

Figure 1 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 is a conservative estimate of the overall performance of the sector and in addition this estimation does not include satellite operations due to the unavailability of financial information relating to the Irish economy from these firms.

7. These conservative estimates understate the total contribution of spectrum as it was not possible to value all services because of lack of meaningful data.
8. 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.

Figure 1: Contribution of Radio Spectrum to GDP: 2005 – 2009

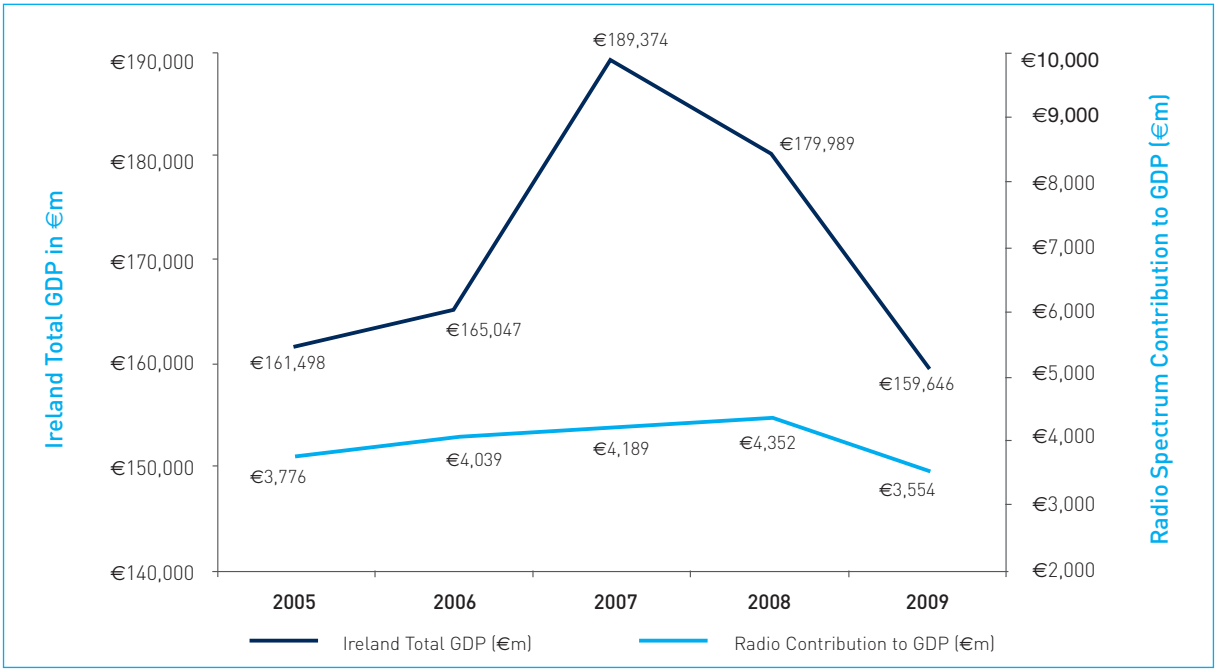

Table 1 provides a breakdown of the GDP contribution by sector[9].

Table 1: GDP Contribution by Sector

Contribution to GDP	2005	2006	2007	2008	2009
Broadcasting	270	256	353	360	293
Mobile	639	978	935	762	743
Aviation	1931	1858	2264	2646	1798
FWALA	2	12	20	30	6
Mobile Sector Support	146	153	54	21	12
Mobile retail	5	9	14	20	8
Radio technology	4	7	19	20	19
Low power devices	437	399	148	97	352
Total	**3435**	**3672**	**3808**	**3956**	**3231**
Economic multiplier	**3776**	**4039**	**4189**	**4352**	**3554**
Ireland Total GDP	**161498**	**165047**	**189374**	**179989**	**159646**
% Contribution of Radio	**2.34**	**2.45**	**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[10].

9. This estimation does not include satellite operations due to the unavailability of financial information relating to the Irish economy from these firms.
10. 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. Introduction and Opportunities
continued

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**

3.2.2 The Contribution of Radio Spectrum to Employment

In Table 2 above, 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.

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 Ireland

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[11].

This licensing programme makes it straightforward for users to access Ireland's radio spectrum for test and trial purposes and 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.

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.

ComReg is working to improve Test & Trial Ireland and, 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.

3.4 Spectrum Opportunities

This section provides a summary list of the frequency bands that ComReg has identified for release during the period covered by the Strategy Statement. It is noted that some of the bands identified are part of ongoing consultation processes and these are mentioned here for completeness[12]. There are a number of factors beyond ComReg's control, including technological change and demand and developments at a European or global level. In addition, results of public consultations as well as resource constraints that can affect the release of spectrum rights.

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. The absence of any specific 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 this Strategy Statement. 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.

11. See www.testandtrial.ie – ComReg's Test & Trial Ireland website.
12. While ComReg will endeavour to make specific bands available for release we cannot guarantee that this will be done in every case.

3.Introduction and Opportunities
continued

Table 3: Potential Spectrum Opportunities

Spectrum Band	Timing / potential for Release	Notes
800 MHz Digital Dividend	Consultation ongoing	ComReg Doc 11/60 refers
880 – 892.8 MHz paired with 925 – 937.8 MHz	Consultation ongoing	ComReg Doc 11/60 refers
1452 – 1492 MHz	Release subject to EU harmonisation measures being finalised	Significant interest expressed for the release of this band.
1710 – 1785 MHz paired with 1805 – 1880 MHz	Consultation ongoing	ComReg Doc 11/60 refers
1900 – 1905 MHz & 1915 – 1920 MHz	Not under consideration	Insufficient demand
2010 – 2025 MHz	Potential to release this band on its own or as part of a multi-band award.	Limited interest expressed
2300 – 2400 MHz	For consideration following finalisation of CEPT/EU harmonisation work.	Considerable interest expressed in this band.
2500 – 2690 MHz	Limited options during this strategy period due to incumbent licensee rights	Considerable interest expressed in this band.
26 GHz (24.7 – 25.2 GHz paired with 25.7 – 26.2 GHz)	Potential for further release of National Block Licences once issues raised concerning technical restrictions are resolved.	Interest in acquisition of block licences.
28 GHz (27.5 – 29.5 GHz)	Potential new fixed link band	Considerable interest expressed in this band.
31/32 GHz band (31-31.3 GHz paired with 31.5 – 31.8 GHz as well as 31.8 – 33.4 GHz)	Potential new fixed link band	Considerable interest expressed in this band.
40 GHz band (40.5 – 43.5 GHz)	Potential new fixed link band – longer priority that the release of 28 GHz and 31/32 GHz.	Considerable interest expressed in this band.

4.Current Spectrum Management Issues

4.1 ComReg's Position on the Use of Spectrum Rights Auctions

ComReg does not favour any specific approach for awarding spectrum rights, but prefers to consider each award on its merits. In all cases the selection criteria must be objective, transparent, non-discriminatory, proportionate, and consistent with ComReg's statutory objectives and duties. In making such an assessment ComReg balances, amongst other things, the size and scale of the Irish market, public policy considerations, social considerations, economic and market considerations, legal factors and, where relevant, expected demand and use in order to determine the most appropriate allocation method to deliver an efficient allocation outcome.

In recent years Comreg has found it beneficial to use auctions as an award mechanism for certain bands where the number of licences to be awarded was limited and it seemed to it that demand could exceed supply. Auctions have proved to be a quick, fair and transparent method for assigning spectrum rights. ComReg considers that a suitably designed auction is equally appropriate in both 'greenfield' and 'brownfield' settings, as appropriate design can address matters germane to the circumstance. In that regard, ComReg considers that auctions can provide the necessary flexibility to address situations where there are issues relating to continuity of supply or disruption to consumer services (through potential loss of access to spectrum rights). For instance, an auction with open rounds can allow firms to better check their valuations on business continuity and to update this in light of the information generated in the auction. Such a mechanism may also provide benefits to all participants where there may be significant common value uncertainty regarding the appropriate pricing of particular spectrum rights.

ComReg makes the following observations in regard to its greater use of auction mechanisms, particularly in circumstances where, for instance, spectrum rights of are likely to be 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 abroad to be a fast, fair, effective and transparent assignment mechanism. One reason which may explain this is that they avoid any perceived subjective element that must 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
- 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 ComReg's Position on the Secondary Trading / Transfer of Spectrum Rights

Following the recent revisions to the Common Regulatory Framework and with a view to ensure harmonisation across the EU, the EC is seeking to identify spectrum bands for which spectrum rights may be transferred or leased between undertakings (other than bands used for broadcasting).

ComReg has initiated a project team tasked with establishing the procedures and measures required to implement spectrum trading in Ireland and ComReg will issue a consultation on such matters during the time period of this Strategy Statement in due course. ComReg notes that any implementation of same is required to be done in a manner which furthers the achievement of ComReg's statutory objectives, including the promotion of competition and contributing to the development of the internal market.

4. Current Spectrum Management Issues *continued*

In this regard, and without prejudice to the work of the project team, ComReg has made the following observations:

- given the advantages associated with incumbency, there is the potential concern, 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 purpose or effect of precluding potential market entry);
- as such, a spectrum trading regime will need 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[13];
- 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 believes that experience abroad in relation to spectrum usage rights shows that allowing for automatic rights of renewal or indefinite licences with long notice periods for revocation change the balance of property rights and could lead to a situation where the spectrum manager finds it very difficult to impose a harmonised approach to the important EU wide bands.

In conclusion, ComReg sees spectrum trading as an important right that spectrum rights holders should have. It should, in many circumstances, lead to market-based exchanges that increase the welfare not just of the parties to the trade but society generally. Trading activity in relation to highly valuable bands that are co-ordinated at an EU level is unlikely to happen very often, the frequency of trading being a decision that rights holders will make. ComReg does not believe that a regime of trading within the notion of renewable or long lived spectrum rights of use would be in the best interests of society in relation to bands that are co-ordinated at an EU wide level. Such bands will always likely continue to have a centralised EU wide approach taken which can be undermined by individual undertaking incentives to hold up change if the decision on these bands is decentralised to licence holders.

ComReg is cognisant that, under the provisions of the Common Regulatory Framework, Member States may decide to extend secondary trading and the transfer of rights to other spectrum bands not identified by the European Commission under article 9b(3) of the Framework Directive.

13. 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.

At this time ComReg is satisfied that, in general, due to our geographic position and relatively low usage of spectrum there is not a scarcity of spectrum in Ireland other than in bands which are likely to be specified by the European Commission in accordance with Article 9b(3) of the Framework Directive. In those circumstances, undertakings wishing to acquire rights of use of spectrum in other bands can on a first come first served basis apply to ComReg. It is difficult to see how there would be a viable secondary market to facilitate spectrum trading in those bands. ComReg will, nevertheless, keep the situation under review and if it sees a need to extend trading or leasing to bands other than those specified by the European Commission at some time in the future will do so. It does not intend, at this time, to specify any other bands in which it will provide for transfer or leasing of rights to use radio spectrum.

4.3 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.

In ComReg's view, licences of finite duration allow a spectrum manager to seamlessly maintain the co-ordination of the most important bands because they:

- ensure that Member States can implement any future major allocation and harmonisation changes made by the EC to bands in order to exploit the advantages arising from the internal market and to prevent any significant delays to the deployment of new services which could have serious consequences for consumer welfare; and
- alleviate ComReg's concerns that indefinite licences (or licences that are automatically renewed) could potentially lead to strategic behaviour whereby one or more firms resist the bands being co-ordinated in perhaps different manner with a view to obtaining some of the higher rents from a new potential use.

ComReg considers the arguments regarding the uncertainty associated with periodic re-release of spectrum to be overstated and not to accord with the likely economic incentives of incumbent operators facing such a situation and, in this regard, observes that:

- reducing investment may actually encourage outside firms to enter on the basis that the incumbent firms appear to believe that their substantial advantages of incumbency are not sufficient to allow them to outbid their likely competitors in an auction;
- moreover, incumbent firms are competing with each other on the retail market and any loss in network quality (arising from non-investment) could translate to worse outcomes on the retail market. Hence, they will be strongly motivated to maintain their network quality or risk losing valuable customers (and customer groups that value network quality highly); and
- with indefinite licences there would not be the same incentive to fear new entry and hence investment rates would likely fall, once a stable market equilibrium emerges[14].

Notwithstanding, and as demonstrated previously, ComReg would not ignore evidence if it emerged that what was at one time looked like an optimal licence duration was affected by an unexpected development.

4.4 ComReg's Position on 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.

ComReg is of the view that spectrum sharing and pooling can, in principle, bring benefits such as reduced costs and improved quality of service. At the same time, ComReg is aware of the potential policy concerns, particularly in relation to competition. In addition, it is not possible for ComReg to give blanket assurances that spectrum sharing and pooling agreements will be permitted because

14. Trading would not undermine this market situation as in the most valuable bands trading (or even leasing) would likely not occur. ComReg is of the view that, absent a distress sale, within a market trading is actually not likely to occur for strategic reasons. Even if a firm has valuable spectrum that it is currently not using intensively it may well choose to maintain this position in order to be able to react to growth in demand etc. that it had not previously predicted. Selling such spectrum to a rival is an irreversible decision that they may come to regret later. Similar concerns also surround leasing to a rival even if there comes a time when the spectrum reverts to the original licence holder.

4. Current Spectrum Management Issues *continued*

the benefits and disadvantages arising from any particular agreement will depend on the specifics of the arrangement and the application of relevant telecommunications and competition law to those specifics.

That said, interested parties will be aware that ComReg's examination of a collaboration proposal will, of course, occur within the context of its statutory functions, objectives and duties and, given this, interested parties should be in a position to identify for themselves the types of potential issues and concerns that could be raised by collaboration. For example, potential issues and concerns, such as in relation to:

- competition issues arising from proposed collaboration between actual and potential competitors;
- the impact of collaboration proposals on efficient spectrum use and effective spectrum management; and/or
- whether any potential restriction on competition (and other potential draw backs) would be more than compensated for by the cost savings and other benefits that would be passed on to final consumers.

Given that the nature and extent of such issues will clearly depend on the specifics of the proposed collaboration, ComReg cannot be said to have a firm view on the issue of spectrum rights sharing (or pooling) other than that it would look more favourably on agreements that do not overly restrict competition and deliver demonstrable benefits that are shared with final consumers.

Finally, ComReg expects that licences that it will issue will permit an undertaking contemplate any form of collaboration that it may wish to consider. Clearly, however, ComReg will need to satisfy itself that collaboration proposals are not objectionable having regard to its statutory functions, objectives and duties and that the said proposals are compatible with competition law.

4.5 ComReg's Position on the Use of Spectrum Caps in Competitions

A key objective in relation to its spectrum management role is the promotion of competition, both for spectrum rights and, consequently, on related downstream markets.

In a spectrum competition, the nature and level of a spectrum cap are important considerations as they can influence the level of demand that may be expressed for spectrum in the competition which can, in turn, influence the degree of competition in relevant downstream market(s). In particular, setting a spectrum cap too tightly could prevent bidders from obtaining sufficient spectrum in line with their business plans whilst, on the other hand, setting an overly relaxed cap could facilitate the hoarding of spectrum and have adverse effects on competition in the relevant markets concerned. As such, spectrum caps are an important measure by which to ensure that competition is not harmed or stifled by the auction process itself.

For this reason, ComReg continues to favour the use of spectrum caps in auctions that ensure that spectrum rights auctions are used to promote competition when appropriate, noting that:

- it presently only envisages the use of spectrum caps during spectrum assignment competitions;
- its approach is to use the spectrum cap in an auction is to prevent significantly adverse effects on competition in the market[15];
- absent a previously stated and justified concern in relation to the level of competition in a market, ComReg would not normally consider reserving spectrum for new entrants; and
- spectrum caps would not stop an operator from acquiring more spectrum from other operators on a lease/share or sale basis (subject to the normal controls on competition and spectrum management).

15. Additionally, the level of a spectrum cap should ensure that the distribution of spectrum would be decided by the spectrum assignment competition and would not be dictated by the spectrum caps on the amount of spectrum that individual bidders could be awarded.

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[16] following consultation. This strategy statement is a forward-looking document which serves as a framework for action by the organisation.

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.

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.

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).

16. ComReg 10/47 – ComReg's Strategy Statement 2010 – 2012 – 1 July 2010.

5 Radio Spectrum Management Strategy *continued*

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 a challenging 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 Programme for Government[17] and the statements therein regarding infrastructure investment.

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 now 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.

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 MHz, 900 MHz, 1800 MHz, 2600 MHz, and 3600 MHz) are now subject to EC harmonisation decisions. via various bodies including the 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.

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.

17. See - http://www.taoiseach.gov.ie/eng/Publications/Publications_2011/Programme_for_Government_2011.pdf

Mission

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

High Level Goals

Consumer

- To inform, empower and protect consumers, both residential and business
- To ensure the availability of a universal telecommunications service

Competition

- 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

Innovation

- To promote innovation by providing a predictable regulatory framework which supports investment in communications infrastructure and services, for the benefit of the digital economy

Organisation

- 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 Radio Spectrum Management Strategy *continued*

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[18] 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 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;
- 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; and
- support DCENR in its implementation of the National Broadband Policy.

18. Wireless Access Policy for Electronic Communications Services

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 details ComReg's spectrum management strategy for each radio 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[19] shows that at the end of June 2011 there were 5,377,188 mobile subscriptions in Ireland (including Mobile Broadband subscriptions), penetration was 117.4% including Mobile Broadband and 104.6% excluding Mobile Broadband.

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 ComReg's 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 future of the 800 MHz, 900 MHz and 1800 MHz bands.

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 2012 World Radiocommunications Conference, 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[20] on the future of the 2.6 GHz band and has recently published a consultation[21] on the future use of this band. This consultation has taken into account the rights of current licensee(s) as well as considered the inputs received to date[22].

In additional ComReg intends to:

- continue to monitor and publish the results of quality of service surveys to ensure compliance with licence conditions;
- continue its involvement in appropriate European fora to develop appropriate sharing criteria between different potential users of similar or diverse technologies;

19. ComReg 11/66 - Irish Communications Market: Key Data Report – Q2 2011 (Section 4) – 14 September 2011.
20. ComReg 10/38 – Information Notice - Call for input on potential uses and licensing options of the 2.6 GHz spectrum band -14th May 2010
21. ComReg 11/80 – Consultation –Future of the 2.6 GHz radio spectrum band – 2nd November 2011
Also see ComReg 11/80a – Consultant's Report – Future use of 2.6 GHz radio spectrum band – 2nd November 2011
22. ComReg 10/58s – Information Notice - Call for input on potential uses and licensing options of the 2.6 GHz spectrum band -27th July 2010

- review the future use and licensing of the 400 MHz and 900 MHz bands currently licensed for Wideband Digital Mobile Data Services, noting the expiry of these licences in December 2015; 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 reduce.

6.2 Broadcasting Services

Broadcasting is a major user of the radio frequency spectrum. As reported in ComReg's quarterly review, there are almost 1.59 million TV households in Ireland which represents a 97% penetration rate of all households.

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 ComReg's Strategy for Broadcasting Services

ComReg's strategy for broadcasting over the period 2011 – 2013 is to:

- facilitate the roll-out of DTT in UHF Bands IV and V below 790 MHz;
- facilitate analogue switch-off (ASO) in October 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 2012 World Radiocommunications Conference, 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;
- examine the current licence fee structure for all broadcast services (commercial, community and public), both radio and TV to ascertain if the licence fees are in line with ComReg's statutory objectives and if any changes are required; and
- ensure operator compliance and protect authorised services from illegal use of spectrum.

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.

In considering which new bands to open for the provision of fixed link services, ComReg will adopt the following principles:

- for a new band to be opened it should have been released in other EU Member States and it should have an ERC/ECC or ITU-R band plan;
- when opening a new band, this should be done in a manner that facilitates both the licensing of individual links as well as national block licences, if not at the same time then at some future date; and
- when opening a new band, channel bandwidths of 56 MHz should be considered.

6.3.1 ComReg's 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 Links can facilitate the early development of infrastructure and competition in the provision

6. Strategy for Specific Radio Services *continued*

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.

ComReg's strategy for terrestrial fixed services includes:

- conducting a survey to gauge the experiences of licensees with a view to revising the current engineering guidelines. This includes assessing the possibility of making 56 MHz bandwidth channels available in current and new fixed link bands and examining the current 26 GHz resolving the issues raised concerning the 26 GHz band;
- implementing mandatory dual polarisation for all new fixed link applications where more than one link is required on the same path from 1 October 2012;
- prioritising the opening of the 28 GHz and 31/32 GHz fixed link bands in line with ComReg's principles, subject to ComReg's normal consultation procedures;
- as a secondary priority to open the 40 GHz fixed link band in line with ComReg's principles, subject to ComReg's normal consultation procedures;
- continuing to encourage licensees to use the latest technology and higher order modulation schemes in line with ensuring the efficient use of spectrum, which includes the use of Adaptive Coding Modulation; and
- following the resolution of technical issues in the use of the 26 GHz band, to consider the release of further spectrum in this 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). Traditionally WBS has provided 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. This traditional use of WBS is now being complemented in some spectrum bands by the offering of mobility in line with EC Harmonisation actions.

6.4.1 ComReg's Strategy for Wireless Broadband Services

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

- finalising the legislative framework to introduce mobility into the 3.6 GHz band and to make the subsequent changes to the current code of practise on domestic frequency co-ordination;
- conducting a review of the FWALA scheme towards the end of this strategy period;
- the winding down of the FWALA forum; and
- following expiry of Eircom's transitional licenses in the 3.6 GHz band, to release all the available spectrum in the band including appropriate guard bands.

6.5 Licence-Exempt Services and 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.

In Ireland, SRDs are licence-exempt subject to meeting certain technical criteria such as maximum power levels and reference standards. The technical criteria for the operation of SRDs in Ireland are set out in ComReg Document 02/71R[23] (as identified in S.I. No. 405 of 2002[24]). In addition, all SRDs placed on the market are required to comply with the R&TTE Directive[25].

23. ComReg 02/71R5 – "Permitted Short Range Devices in Ireland" – last revision published 23 December 2010.
24. S.I. No. 405 of 2002 – Wireless Telegraphy Act, 1926 (Section 3) (Exemption of Short Range Devices) Order – 30 July 2002
25. 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

6.5.1 ComReg's Strategy for Licence-Exempt services and Short Range Devices

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;
- to consider the most appropriate means by which to authorise use of the band 5150 – 5250 MHz for Broadband Disaster Relief (BBDR) applications, including licence exemption;
- to consider the most appropriate means by which to authorise use of the frequency band 5875 – 5905 MHz (designated for Intelligent Transport Systems (ITS) road safety applications within Ireland), on a non-exclusive basis, for such applications in line with EC Decision (2008/671/EC)[26];
- while recognising that a number of the radio services operating in the frequency bands covered by Ultra Wideband Ground- and Wall- Probing Radar (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;
- to 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;
- taking into account a new EC Decision that has been proposed by CEPT on Emerging industrial Level Probing Radar (LPR) applications to 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;
- ComReg will actively contribute to ongoing discussions, within CEPT and the EU, on the possible designation of spectrum for Medical Body Area Networks (MBANs);
- consider the designation of the band 30 – 35 MHz for licence exempt databuoy telemetry applications (i.e. equipment which has been designed for telemetry purposes in a maritime environment);
- explore the potential to extend the usage of the band 57 – 66 GHz (designated for wideband transmission applications in Ireland) for non-specific SRDs;
- consider the effect of emissions from SRD on radiocommunication services under agenda item 1.18 of the 2012 World Radiocommunications Conference, 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).

26. 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)

6. Strategy for Specific Radio Services *continued*

6.6.1 ComReg's Strategy for Maritime Services

ComReg's strategy for the duration of this period 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 2012 World Radiocommunications Conference, 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. 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.

6.7.1 ComReg's Strategy for Aeronautical Services

ComReg's strategy for Aeronautical Services for the duration of this strategy period 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; and
- considering the introduction of new aeronautical mobile (R) services under agenda item 1.4 of the 2012 World Radiocommunications Conference, 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 ComReg's Strategy for Satellite Services

ComReg's 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 Mobile Satellite Service (MSS) with a Complementary Ground Component (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 2012 World Radiocommunications Conference, 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.

6.9.1 ComReg's Strategy for Business Radio Services

ComReg's 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[27];
  - seek to provide a licencing regime for spot frequencies for the specific use of tracking and asset tracing systems on a national basis;
  - provide flexibility to licence business radio on a temporary basis; and,
  - provide flexibility for ComReg to licence miscellaneous technologies[28];
- 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;
- consult on a regulatory framework for the possible introduction of a new licence regime for Telemetry and telecommand services; and
- consider the worldwide/regional harmonisation of spectrum for electronic news gathering (ENG) systems under agenda item 1.5 of the 2012 World Radiocommunications Conference, taking into account the CEPT position, in line with Ireland's national position.

6.10 Radio Amateur Services

The Amateur Service[29] 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.

6.10.1 ComReg's Strategy for the Amateur Radio Services

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

- considering the allocation of three further channels in the 5 MHz band, on a secondary basis, to the Amateur service, following consultation with current users of that spectrum;
- consider an increase in the power permitted in the 10 MHz band after consultation with current users; and
- implement ECA footnote EU17[30] in the next revision of the national table of frequency allocations.

27. Commission Decision of 20 December 2005 on the harmonisation of the 169.4 – 169.8125 MHz frequency band in the community (2005/928/EC).
28. 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)
29. Within this document reference to the Amateur Service should, unless indicated otherwise be regarded as including the Amateur Satellite Service.
30. In the sub-bands 3400 - 3410 MHz, 5660 - 5670 MHz, 10.36 - 10.37 GHz, 10.45 - 10.46 GHz the amateur service operates on a secondary basis. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these sub-bands in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.

6. Strategy for Specific Radio Services *continued*

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 satellite and meteorological aids, earth exploration-satellite services (EESS), space research and space operation services. Scientific usage of spectrum has significant social and economic benefits.

6.11.1 ComReg's Strategy for the Science Services

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

- continuing liaison with Met Éireann[31] 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[32] of the ITU Radio regulations;
- developing an appropriate licensing mechanism to license apparatus used for the gathering of meteorological information – i.e. radiosondes; and
- 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 2012 World Radiocommunications Conference, 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. 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.

For the period of this strategy statement 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;
- continue to liaise with the Irish Defence Forces as required to resolve issues of mutual concern; and
- explore with the relevant authorities opportunities to further enhance spectrum efficiency.

6.13 Implementation of European Decisions and Recommendations

In addition to the EC's spectrum-related decisions, which Member States are required to implement, the ECC[33] 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 plays a significant role in harmonising spectrum use in Europe.

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.

During the period of this strategy statement, ComReg proposes to implement 20 decisions or recommendations (these are listed in Appendix E of ComReg Document 11/28). It is expected that the ECC will develop further new decisions and recommendations which ComReg may implement during the period of this strategy statement.

31. 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.
32. 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, 100-1 02 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.
33. The ECC (Electronic Communications Committee) is one of the three committees of the CEPT (see www.cept.org/eco)

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 Strategy Statement and that ComReg must continue to ensure spectrum is an enabler and not a constraint on service provision. 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.

7.1 Spectrum Efficiency Measures

The effective management of radio spectrum requires more than a purely technical consideration of spectrum efficiency. Functional and economic considerations must also be taken into account, 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.

7.1.1 Annual Usage Fees

In ComReg's view, to ensure that annual spectrum usage fees continue to incentivise efficient spectrum use during the licence term it will become increasingly important for such fees to be updated on an annual basis to account for the general rate of inflation. Such indexation will keep the value of these usage fees constant in real terms and, as such, 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)

Spectrum licensing regimes should provide incentives to all licence holders, and across all spectrum bands, to continually consider whether it should continue to hold its spectrum usage rights subject to the terms of its licence. AIP is a mechanism that can be used to promote more intensive spectrum use through an annual administratively set fee.

ComReg believes that firms that obtained spectrum usage rights in a non-competitive situation could be subject to AIP as such licensees should be given incentives both to use it efficiently and to consider whether there were other potential users who may value the right more than they do.

ComReg would not generally envisage applying AIP to spectrum rights which have been allocated by auction, as the upfront spectrum fees obtained via such auctions would have been submitted in light of the terms and conditions of the auction, which would have set out the annual spectrum usage fee associated with the duration of the fixed term licence.

7. Medium Term Outlook (3-5 Year Period) *continued*

Overall ComReg will continue to consider the merits of applying AIP to various spectrum bands and licence types as it is one of several instruments at ComReg's disposal to encourage the efficient use of spectrum.

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 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 and the UK, 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 wireless communications.

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.

With this in mind, 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[34] and the CEPT has published a report on Cognitive Radio[35].

ComReg will keep appraised of developments and will continue to contribute at EU level in the realisation of these technological advances.

7.2 A Second Digital Dividend

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.

ComReg believes that it is essential that any additional digital dividend spectrum that might become available be harmonised across Europe. ComReg is obliged to ensure sufficient spectrum is available to meet Ireland's broadcasting needs and will need to take this into account before making any such second digital dividend available. Taking into account the current status of work in the CEPT and the EC on this issue ComReg does not envisage the availability of a second digital dividend within the time frame of this strategy statement.

34. See EC CORDIS website - http://cordis.europa.eu/fp7/home_en.html
35. 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.

7.3 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.

The ECC has initiated a project team examining the future use of this band and so it is conceivable that there will be significant developments on the use of this band within the time frame of this strategy statement – see Table 3.

7.4 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[36], 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.

Power Line Carrier appears to be the technology of choice in mainland Europe for Smart Metering while a wireless radio frequency mesh solution appears to be the preferred option in North America. 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. 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 in a manner consistent with its statutory obligations.

36. 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

Appendix A – 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:

GDP contribution = Operating profit + Staff payments + [Depreciation – Capex]

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[37] 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' 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.

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

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