Commission for
Communications Regulation

Consultation Paper

Liberalising the Use of the 900 MHz and 1800 MHz Spectrum Bands

Liberalisation of the GSM Spectrum Bands & Options for the Release of Spectrum in these Bands

Document No:	**08/57**
Date:	**17 July 08**

All responses to this consultation should be clearly marked:
"Reference: Submission re ComReg 08/57" as indicated above, and sent by post, e-mail or on-line at www.comreg.ie (current consultations), to arrive on or before 5 pm, 11 September, 2008 to:

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

Contents

1 Foreword

Radio spectrum is a valuable and finite resource which underpins mobile communications. Without spectrum there simply would not be any mobile services and no access for consumers to so many areas of commerce that have become a vital part of how business, entertainment and personal communications interact. The widespread use of mobile phones is fundamental to how Irish society communicates. This is evidenced by the extent of mobile use in Ireland, with penetration now at circa 120%. In the last year we have seen the take up of mobile broadband intensify and currently 19% of all broadband subscribers are supplied by mobile broadband services, an increase of 46% over the last quarter.[1]

ComReg's Spectrum Strategy Statement conservatively estimated that the direct contribution of the radio spectrum to the Irish economy in 2006 was 1.67% of total GDP.[2] The mobile sector alone accounted for 51% of this contribution, representing a total of €1.4 billion. Furthermore, these estimates do not take into account the contribution made by consumers through the exercise of mobile communications or the utility of these services to a variety of diverse users.

It is critical that ComReg, as the national authority with responsibility for ensuring the effective and efficient use of the radio spectrum, ensures that the best use is made of this valuable but finite natural resource and this is reflected in the proposals set out in this consultation.

First, ComReg is proposing to lift restrictions on the technology and services that can be provided in the GSM bands (i.e. 900 MHz and 1800 MHz). This proposal will provide existing and future licensees with the opportunity to introduce new innovative services and is in keeping with the trend across Europe.

Second, ComReg is proposing to increase the amount of spectrum available to users. This proposal will make 30% more spectrum available in the 900 MHz band and has the potential to encourage more competition in the market.

Third, ComReg is setting out three options in relation to the award of new licences following the expiry of current licences in these bands.

This consultation addresses matters of considerable importance and so I encourage all interested parties to respond.

Mike Byrne,
Commissioner.

[1] ComReg (2008) Quarterly Key Data Report, June 2008, ComReg Document 08/43.

[2] ComReg (2008) Spectrum Management Strategy: 2008 – 2010, 1st July 2008, ComReg Document 08/50.

2 Executive Summary

This consultation document sets out ComReg's proposed policies on the future of the spectrum bands used to provide GSM mobile services. The 900 MHz and 1800 MHz bands are fundamental to the provision of mobile services throughout Ireland and ComReg is seeking views from interested parties on their future use.

Two events have influenced the timing of this consultation. The first is the approaching expiry of the existing GSM licences, in 2011 and 2015, and the desire to provide stakeholders with visibility of the market after those licences expire. The second event is the forthcoming adoption of the draft European Commission Decision on harmonisation of these bands, which will facilitate widespread deployment of third generation (3G) services in these bands (or "liberalisation"). The introduction of other technologies into these bands promises many benefits for both consumers and operators alike.

ComReg also plans to make additional spectrum available in the 900 MHz band. This will facilitate migration to newer innovative technologies and create opportunities for new players to enter the market, which should be to the benefit of consumers.

Three mobile operators are currently licensed to offer GSM services in these bands. The technology that can be deployed in these bands is restricted to GSM by a European Directive[3] which is expected to be revised or repealed in late 2008. Following the removal of these restrictions at EU level, ComReg proposes to liberalise the use of these bands in Ireland. This will allow current licensed mobile operators to offer consumers new and innovative services.

ComReg also proposes to make available unused spectrum in these bands. ComReg's objective in releasing new spectrum is to promote greater choice and quality of services for consumers, by facilitating further market entry and providing existing licensees with the opportunity to gain more spectrum if they so desire.

ComReg's analysis and basis for these is in accordance with its statutory functions and objectives of ensuring the efficient management and use of the radio spectrum and promoting competition.

Given the importance of the mobile communications sector to Ireland, ComReg is cognisant of the need to minimise disruption to the efficient use of the bands and its resultant impact on the provision of consumer services. Therefore, while considering how best to realise the potential benefits of liberalising use of these bands in the medium to long term, ComReg has had regard to the importance of promoting market stability in the short term. Any transition to new technologies or services needs to be undertaken in such a manner as to cause the least inconvenience possible, while recognising that it is an important move in maintaining Ireland's competitiveness.

In the case of the 900 MHz band, ComReg would expect demand to far outweigh supply. In this context, ComReg considers that a competitive award process (auction) is likely to be the most fair and transparent means of awarding future licences. The award of future licences will be heavily influenced by the expiry dates of current licences and release of

[3] Council Directive 87/372/EEC of 25 June 1987 on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community

associated spectrum. The design of the award process is complicated by the fact that the existing 15-year GSM licences do not have a common expiry date.

Three options are proposed for the future award of spectrum in the 900 MHz band. Within each option, ComReg has made provisions for both spectrum that is currently unassigned and spectrum that will become available as existing licences expire.

Option A proposes to design three separate award processes in line with the availability of spectrum. Advantages of this option include the flexibility for participants to obtain spectrum at any of three stages between 2009 and 2015 or, in the case of existing licensees, expand their existing market presence. However, it is recognised that the nature of such a multi-stage award process would mean that current operators would have limited visibility of the future market, which could impact upon investment plans.

Option B involves a single competition for the award of the entire 900 MHz band, followed by a phased assignment process as current licences expire. This option would provide stakeholders with a clearer picture of the future of the band, and afford participants a better opportunity to acquire contiguous spectrum blocks thereby aiding spectrum efficiency.

Option C builds on option B by specifically reserving spectrum for new entrant(s) to the band. This proposal provides opportunities for new entrants to gain spectrum and could thereby lead to enhanced competition. The amount of spectrum that could be reserved remains open to discussion.

In the case of the 1800 MHz band, ComReg's understands that there is currently limited additional demand for this spectrum. ComReg therefore proposes to postpone awarding 1800 MHz spectrum until 2013, two years before current licences expire, at which juncture the entire band could be awarded in a single assignment process.

The consultation period will run for eight weeks following the date of publication of this consultation document. All responses received will be published on ComReg's website. ComReg intends to follow this consultation with a Response to Consultation Document, summarising the comments received and setting out the licence award methodology ComReg will adopt going forward.

3 Background to Consultation Document

3.1 Introduction

The Commission for Communications Regulation ('ComReg') is the statutory body and National Regulatory Authority ("NRA") responsible for the regulation of the electronic communications sector including telecommunications, radiocommunications, broadcasting transmission and the postal sector in Ireland.

ComReg is responsible for ensuring the efficient management and use of the radio spectrum, a vital but finite natural resource which provides the means to convey audio, video and data over distances ranging from a few meters to thousands of kilometres.

ComReg's responsibilities include managing, developing and implementing relevant international policies, standards, and legislation governing these sectors, as emanating from the European Union ("EU"), European Conference of Postal and Telecommunications Administrations ("CEPT"[4]), and International Telecommunication Union ("ITU"[5]). International standards and harmonised use of radio frequencies facilitate the development of sectors in an open and competitive environment and, through this, services such as third generation mobile communications ("3G") come to fruition.

This consultation has been prompted by two events. The first is that two of the three existing 900 MHz licences will expire in May 2011 with the third licence expiring in June 2015. Hence there is need to provide clarity to all stakeholders regarding what will happen when these licences expire.

The second is the expected coming into force of a binding European Commission ("EC") Decision[6] on the harmonisation of the 900 MHz and 1800 MHz frequency bands ('the draft EC Decision"). Currently, the 900 MHz and 1800 MHz bands are reserved for GSM[7] use throughout the EU. The draft EC Decision would remove this restriction on use. This would facilitate a technology and service neutral approach to existing and future authorisation regimes. It also highlights the potential use of the 900 MHz band for other terrestrial mobile network applications, which could ensure comprehensive geographic and demographic coverage, with fewer base stations and a better quality of service.

ComReg believes that it is timely to seek stakeholders' views on the future use of the 900 MHz and 1800 MHz bands in Ireland, including its proposals for the liberalisation of those bands and its options for future spectrum release. ComReg invites responses to the questions throughout this document. A full list of questions is contained at Annex B.

[4] CEPT is the coordinating body for European state telecommunications and postal organisations. Within CEPT is the Electronic Communications Committee ("ECC") which is responsible for radiocommunications and telecommunications matters. See: http://www.cept.org/.

[5] ITU is the leading United Nations agency for information and communication technologies and its membership includes 191 Member States. See http://www.itu.int/net/home/index.aspx.

[6] Proposal for a Directive of the European Parliament and of the Council of repealing Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community - COM(2007) 367 final - Brussels, 25.7.2007 - http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/com/com2007_367_en.pdf

[7] GSM refers to Global System for Mobile communications.

3.2 ComReg's function and objectives in relation to Ireland's radio frequency spectrum

The implementation of the draft EC Decision and other measures discussed in this consultation must occur within ComReg's regulatory framework.

ComReg's statutory functions and objectives are set out in sections 10 and 12 of the Communications Regulation Act 2002 ("the 2002 Act"), respectively. With respect to the radio frequency spectrum, Annex C outlines other statutory provisions relevant to this consultation. This section does not, however, purport to be an exhaustive discussion of all relevant legal provisions.

The 2002 Act sets out, amongst other things, ComReg's functions and objectives. One such function is the management of Ireland's radio frequency spectrum.[8]

ComReg's objectives[9] in carrying out this function are to:

- ensure the efficient management and use of the radio frequency spectrum in Ireland[10];
- promote competition[11];
- contribute to the development of the internal market[12]; and
- promote the interests of users within the Community[13].

In this regard, the 2002 Act requires ComReg, when exercising its functions in relation to the provision of electronic communications networks and services, to take all reasonable measures which are aimed at the promotion of competition, including:

- ensuring that users, including disabled users, derive maximum benefit in terms of choice, price and quality;
- ensuring that there is no distortion or restriction of competition in the electronic communications sector;
- encouraging efficient investment in infrastructure and promoting innovation, and
- encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources.

In addition, the 2002 Act requires ComReg, when exercising its functions in relation to the provision of electronic communications networks and services, to take all reasonable measures which are aimed at contributing to the development of the internal market, including:

[8] Section 10(1) (b) of the 2002 Act.

[9] In line with Article 9 of Regulation 23(2) of the Electronic Communities (Electronic Communications Networks and Services (Framework) Regulations 2003 (the "Framework Regulations")

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

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

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

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

- removing remaining obstacles to the provision of electronic communications networks, electronic communications services and associated facilities at Community level;
- encouraging the establishment and development of trans-European networks and the interoperability of transnational services and end-to-end connectivity;
- ensuring that, in similar circumstances, there is no discrimination in the treatment of undertakings providing electronic communications networks and services and associated facilities; and
- co-operating with electronic communications national regulatory authorities in other Member States of the Community and with the Commission of the Community in a transparent manner to ensure the development of consistent regulatory practice and the consistent application of Community law in this field.

Furthermore, the 2002 Act requires ComReg, when exercising its functions in relation to the provision of electronic communications networks and services, to take all reasonable measures which are aimed at the promotion of the interests of users within the Community, including:

- ensuring that all users have access to a universal service;
- ensuring a high level of protection for consumers in their dealings with suppliers, in particular by ensuring the availability of simple and inexpensive dispute resolution procedures carried out by a body that is independent of the parties involved;
- contributing to ensuring a high level of protection of personal data and privacy;
- promoting the provision of clear information, in particular requiring transparency of tariffs and conditions for using publicly available electronic communications services;
- encouraging access to the internet at reasonable cost to users;
- addressing the needs of specific social groups, in particular disabled users; and
- ensuring that the integrity and security of public communications networks are maintained.

In addition, ComReg is obliged to promote the harmonisation of use of radio frequencies across the European Community.[14]

In carrying out its radio frequency management function, the 2002 Act requires ComReg to, amongst other things:

- ensure that any measures taken by it are proportionate having regard to the objective of ensuring the efficient management and use of the radio frequency spectrum[15;]

[14] Regulation 23(2) of the Electronic Communities (Electronic Communications Networks and Services (Framework) Regulations 2003 (the "Framework Regulations").

[15] Section 12(3) of the 2002 Act.

- have regard to international developments with regard to electronic communications networks and electronic communications services, associated facilities, postal services, the radio frequency spectrum and numbering[16];
- take the utmost account of the desirability that the exercise of its functions aimed at achieving its radio frequency management objectives does not result in discrimination in favour of or against particular types of technology for the provision of ECS[17]; and
- comply with any policy direction given to ComReg by the Minister for Communications, Energy and Natural Resources ("the Minister") as he or she considers appropriate to be followed by ComReg in the exercise of its functions.[18]

3.3 Document Format

The remainder of this consultation document is structured as follows:

Section 4 *Current Utilisation of the 900 MHz and 1800 MHz Spectrum Bands*

This section describes the 900 MHz and 1800 MHz bands, their current use and details of existing licences.

Section 5 *Future of the 900 MHz and 1800 MHz Spectrum Bands*

This section outlines the factors driving liberalisation of the 900 MHz and 1800 MHz bands and the potential benefits that could be obtained from doing so. It also details the strict obligations that will arise from the draft EC Decision and the move towards technology and service neutrality envisaged by the draft WAPECS Recommendation.

Section 6 *Current Licences in the 900 MHz and 1800 MHz bands – Implementation of the Draft EC Decision*

This Section set out ComReg's proposals regarding current licences in the 900 MHz and 1800 MHz bands in the context of implementing the draft EC Decision.

Section 7 *Future Licensing of the 900 MHz Band*

This Section sets out ComReg's proposed licensing regime for new licences in the 900 MHz band, having regard to the draft EC Decision, the pending expiry of current 900 MHz licences, and the draft WAPECS Recommendation, all of which support the trend in Europe towards a service-neutral and technology-neutral approach to facilitating access to spectrum.

Section 8 *Consultation Options for Future Licensing of the 900 MHz Band*

[16] Section 12 (5) of the 2002 Act.

[17] Section 12 (6) of the 2002 Act.

[18] Section 13 (1). ComReg has had regard to the two policy directions made by Dermot Ahern T.D. then Minister for Communications, Marine and Natural Resources, on 21 February 2003 and 26 March 2004.

This section details the three options being considered by ComReg as part of this consultation on the proposed issue of new 900 MHz licences. Each option is considered in the context of the efficient management and use of the radio spectrum, and the promotion of competition.

Section 9 *Future Licensing of the 1800 MHz Band*

This section details the options ComReg is considering for future spectrum assignments in the 1800 MHz band.

Section 10 *Submitting Comments*

Guidelines on responding to issues raised in this consultation.

4 Current Utilisation of the 900 MHz and 1800 MHz Spectrum Bands

This section describes the 900 MHz and 1800 MHz bands, their current use and details of existing licences.

4.1 The 900 MHz Band

The 900 MHz band is comprised of the 880–915 MHz sub-band paired with the 925–960 MHz sub-band. The total amount of spectrum in the 900 MHz band is 2 x 35 MHz. Currently there are three spectrum assignments of 2 x 7.2 MHz each in this band. This means that 2 x 13.4 MHz (including guard-bands) of spectrum is currently unassigned, which includes a contiguous unassigned block of 2 x 12.8 MHz. Figure 1 below illustrates the 900 MHz band and the current spectrum assignments in this band.

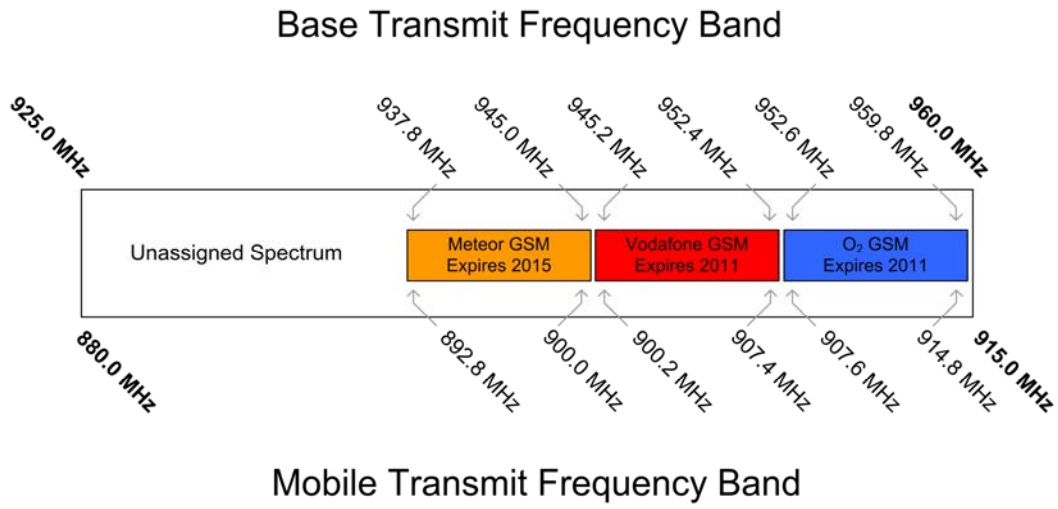


Figure 1: Current Spectrum Assignments in the 900 MHz band

The 900 MHz spectrum assignments have been issued to Vodafone Ireland Ltd ("Vodafone"), Telefónica O2 Communication Ireland Ltd ("O2") and Meteor Mobile Communication Ltd. ("Meteor"). Each of these licensees was issued a GSM licence of 15 years duration. Due to differing commencement dates, Meteor's licence expiry date is later than those of Vodafone and O2, as shown in Table 1 below.

Licensee Name	Licence Type	Spectrum Assignment	Licence Expiry Date
Vodafone	GSM Licence	900.2 – 907.4 MHz / 945.2 – 952.4 MHz	15 May 2011
O_2	GSM Licence	907.6 - 914.8 MHz / 952.6 - 959.8 MHz	15 May 2011
Meteor	GSM Licence	892.8 - 900 MHz / 937.8 - 945 MHz	18 June 2015

Table 1 Details of Current GSM licences in the 900 MHz band

4.2 The 1800 MHz Band

The 1800 MHz band is comprised of the 1710–1785 MHz sub-band paired with the 1805–1880 MHz sub-band. As shown in Figure 2 below the total amount of spectrum in the 1800 MHz band is 2 x 75 MHz. Currently there are three spectrum assignments of 2 x 14.4 MHz each in this band. This means that 2 x 31.8 MHz (including guard-bands) of spectrum is currently unassigned, including a contiguous unassigned block of 2 x 26.4 MHz.

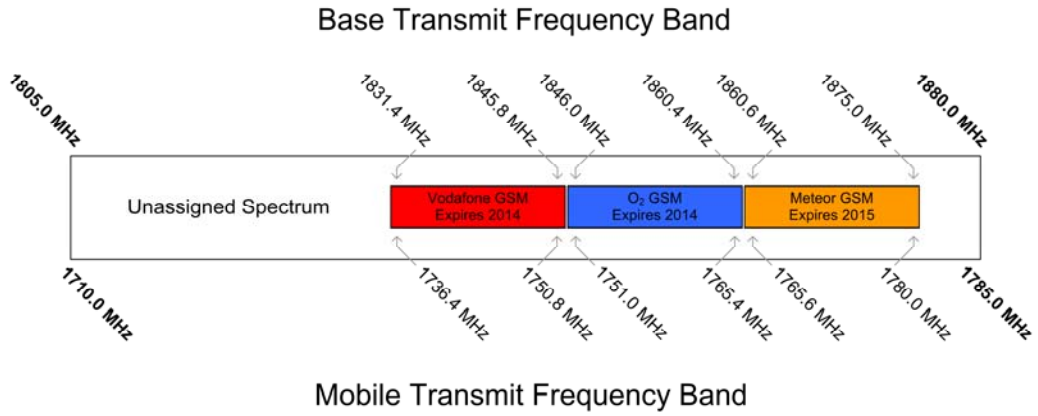


Figure 2: Current Spectrum Assignments in the 1800 MHz band

The 1800 MHz spectrum assignments have been issued to Vodafone, O_2 and Meteor. Each of these licensees has been issued a GSM licence of 15 years duration. Due to differing licence commencement dates, Meteor's licence expiry date is slightly later than that of Vodafone and O_2, as shown in Table 2 below.

Table 2: Details of Current GSM licences in 1800 MHz band

Licensee Name	Licence Type	Spectrum Assignment	Licence Expiry Date
Vodafone	GSM Licence	1736.4 - 1750.8 / 1831.4 - 1845.8 MHz	31 December 2014
O_2	GSM Licence	1751 - 1765.4 MHz / 1846 - 1860.4 MHz	31 December 2014
Meteor	GSM Licence	1765.6 - 1780 MHz / 1860.6 - 1875 MHz	18 June 2015

5 Future Use of the 900 MHz and 1800 MHz Spectrum Bands

5.1 Introduction

This Section discusses the factors driving the liberalisation of these bands, the potential benefits of liberalising these bands in Ireland, and the impact of the draft EC Decision on liberalising these bands.

The regulations covering the licensing of the 900 MHz and 1800 MHz bands in Ireland currently only permit operators to deploy GSM technology within their spectrum assignment.

5.2 Factors Driving Liberalisation of 900 MHz and 1800 MHz Bands in Ireland

The 900 MHz and 1800 MHz bands are licensed to Mobile Network Operators ("MNOs") for the provision of GSM Services. Mobile phone penetration in Ireland currently stands at 121%, which includes both GSM and 3G-based services.[19]

The current GSM Directive[20] requires Member States to exclusively reserve the 905-914 MHz and 950-959 MHz frequency bands for a public pan-European cellular digital mobile communications service using GSM technology and the whole of 890-915 and 935-960 MHz bands were to be made available to this service as soon as possible.

In relation to the 1800 MHz band, a Decision by CEPT in December 1995 designated the frequency bands 1710-1785 MHz and 1805-1880 MHz to DCS 1800, a GSM standard.[21]

Although GSM technology is efficient at providing ubiquitous voice and text services, it has limited capability to provide broadband and other services. Consumers are now seeking improved access to voice, text, broadband and even broadcasting services on a ubiquitous and converged basis via their mobile device. To meet the increased and changing consumer demand, operators upgrade existing networks or, if the technology and applications demand it, build new networks to deliver content-rich services. In addition, it is likely that these bandwidth-hungry services will place increasing demand on a finite spectrum resource.

Considerable work has been carried out both within the CEPT and at an EU level to study the effect of deploying technologies other than GSM within the 900 MHz and 1800 MHz bands. As a first step, in 2006, CEPT adopted a Decision which designates the 900 MHz and 1800 MHz bands for terrestrial IMT-2000/Universal Mobile Telecommunications ('UMTS') services.[22]

[19] ComReg (2008) Quarterly Key Data Report, June 2008, ComReg Document 08/43.

[20] Council Directive 87/372/EEC of 25 June 1987 on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community, OJ L 196, 17.7.1987, p.85 (the "GSM Directive").

[21] CEPT Decision ERC/DEC/(95)03.

[22] ECC Decision ECC/DEC/(06)13 on the designation of the bands 880-915 MHz, 925-960 MHz, 1710-1785 MHz and 1805-1880 MHz for terrestrial IMT-2000/UMTS systems. This is in line with the WAPECS concept (see Section 5.4 for further detail on WAPESC).

In addition, the draft EC Decision facilitates a technology and service neutral approach in existing and future authorisation regimes. Furthermore, it highlights that the use of the 900 MHz band for the provision of other terrestrial mobile network applications could ensure extensive geographic and demographic coverage using fewer base stations as well as providing better in-building coverage by such services. Several European countries already permit operators to deploy services other than GSM in the 900 MHz and 1800 MHz bands.[23] Further details on the draft EC Decision are contained in Section 5.5 below.

ComReg must ensure that Irish consumers benefit from the technological advances that are taking place within the electronic communications industry and supports the work by both CEPT and at the EU level to permit operators to deploy other services within their assigned spectrum.

5.3 Potential Benefits of Liberalising the 900 MHz and 1800 MHz Bands

Liberalisation of the 900 MHz and 1800 MHz bands to allow the deployment of new wireless technologies and applications could bring significant benefits to Irish consumers.

First, liberalisation has the potential to deliver improvements in the quality of new wireless technologies and applications. Due to the favourable propagation characteristics of 900 MHz spectrum and more consistent penetration inside buildings, greater coverage of rural regions is possible, compared to 3G services currently deployed in the 1900 - 2100 MHz band. This allows for greater flexibility of use as well as higher data throughput at a given user's location. Higher data rate services (such as full mobile web browsing, gaming and music downloads) are therefore more likely to be deployed.

A further benefit of liberalisation is the potential for reduced environmental costs, as deploying new wireless technologies and applications at 900 MHz rather than in higher frequency spectrum is likely to significantly reduce the number of mast sites needed to offer high quality mobile broadband services.

From the perspective of MNOs, liberalisation will enable current and future operators to benefit from lower investment and operating costs by using more favourable spectrum with which to deploy and operate high quality 3G or other high speed networks. This should result in a significant cost saving in deploying 3G infrastructure at 900 MHz compared to existing 3G spectrum at 2100 MHz. ComReg has commissioned independent analysis of the cost savings of rolling out a 3G network at 900 MHz compared to 1800 MHz and 2100 MHz. This suggests that the cost savings to be gained by an operator using 900 MHz are estimated to be 26% in the case of 1800 MHz and 35% in the case of 2100 MHz.[24] More competition in the retail mobile market should lead to more cost savings being passed on to consumers.

[23] For further information on the current status of the use of UMTS in the 900 MHz and 1800 MHz bands see Annex E and http://www.cullen-international.com/documents/cullen/prindex.cfm

[24] These figures are taken from a report produced by Vilicom which was commissioned by ComReg in 2008. ComReg is unable to publish this report due to the confidential nature of the data and information relied upon by Villicom to obtain its findings.

The potential cost savings resulting from liberalisation should encourage operators to invest in new wireless technologies and applications. Liberalisation is also likely to increase the likelihood of innovative services being offered by mobile operators.

The benefits of liberalisation will depend on the growth in demand for new wireless technologies and applications. If demand is high then the benefits of liberalisation are likely to be significant. In this regard, wireless technologies are already proving very popular in Ireland - there were 991,970 broadband subscriptions at the end of Q1 2008, of which mobile broadband accounts for 186,038 or 19%[25].

5.4 WAPECS

In June 2004 the EC requested an opinion from the Radio Spectrum Policy Group ("RSPG") on a coordinated EU spectrum policy approach concerning Wireless Access Policy for Electronic Communication Services ("WAPECS").

WAPECS is an EU-level framework for the provision of electronic communications services within a set of frequency bands to be identified and agreed between EU Member States. In these bands, it is proposed that a range of electronic communications networks and services could be offered on a technology and service neutral basis, provided that certain technical requirements are met.[26]

The WAPECS approach is designed to move away from narrowly specifying particular uses for different spectrum. Under WAPECS, technologies would be stimulated to deliver all electronic communications services within their capabilities, making use of any frequency band and network. Hence the technology deployed and the service ultimately offered by WAPECS licensees could vary greatly; for example, mobile, broadcasting and fixed services, as outlined in Figure 3 below.
Figure 3
In determining the appropriate WAPECS conditions, ComReg must take into account a number of considerations, including international agreements, national and European legislation, the requirement to limit harmful interference, the requirement to support national policy, and the requirement to operate in the best interests of the consumer.

[25] ComReg (2008) Quarterly Key Data Report, June 2008, ComReg Document 08/43.

[26] This is to avoid interference, to ensure the effective and efficient use of the spectrum and ensure the authorisation conditions do not distort competition.

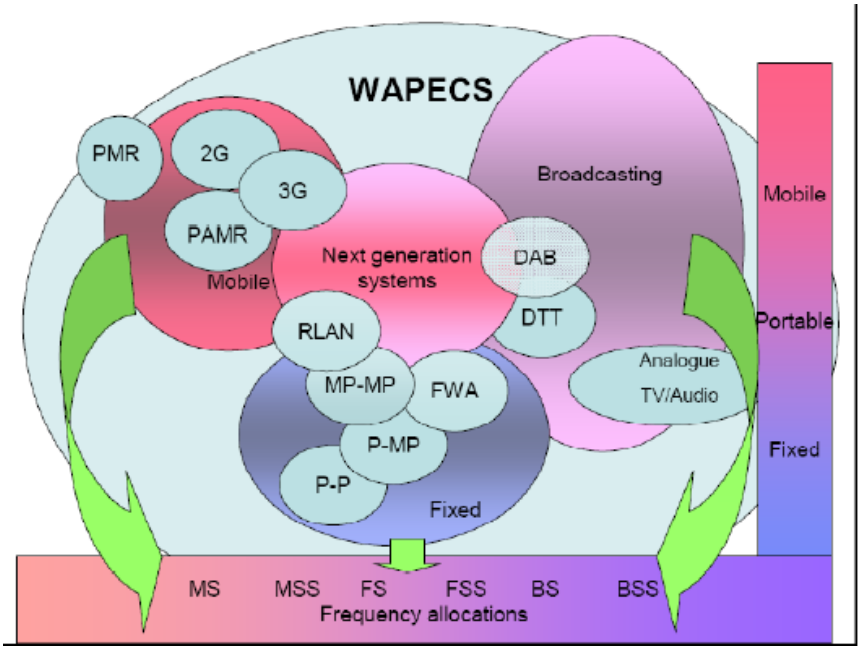


Figure 3: WAPECS Licensing

5.4.1 The Forthcoming EC WAPECS Recommendation

In March 2008, the EC's Communications Committee expressed a positive opinion on the Draft Commission Recommendation on the non-technical conditions attached to rights of use for radio frequencies under the regulatory framework for electronic communications in the context of WAPECS (the "draft WAPECS Recommendation").[27]

The draft WAPECS Recommendation concerns the coherent application of non-technical conditions attached to rights of use for radio frequencies identified in the Annex of the Recommendation, which currently lists both the 900 MHz and 1800 MHz bands. Conditions of a technical nature are not considered in the draft WAPECS Recommendation. Within the EC, this work is undertaken by the Radio Spectrum Committee, which adopted the draft EC Decision on the 900 MHz and 1800 MHz bands.

The formal adoption of the draft WAPECS Recommendation by the EC is expected shortly after some additional procedures have been undertaken, notably notification to the European Parliament. Ireland and other Member States are therefore recommended to consider the draft WAPECS recommendation when considering the non-technical conditions to be applied to rights of use in the 900 MHz and 1800 MHz bands.

[27] RSCOM08-16 http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/rsc23_public_docs/rscom08-16%20results%20wapecs%20recommendation.pdf

5.5 Draft EC Decision on the harmonisation of the 900 MHz and 1800 MHz bands

In July 2006, the EC issued a mandate to CEPT to develop the least restrictive technical conditions for frequency bands addressed in the context of WAPECS which includes the 900 MHz and 1800 MHz bands.

Based on technical investigations[28], CEPT produced a report on compatibility between UMTS and GSM systems in the 900 MHz and 1800 MHz bands. This report[29] concluded that UMTS/900/1800 networks can be deployed in urban, suburban and rural areas in co-existence with GSM900/1800 networks by using appropriate values for carrier separation.

On 22 May 2007, the EC's Radio Spectrum Committee ("RSC") approved the final draft of the EC's Decision on *the harmonisation of the 900MHz and 1800MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community*.[30]

The draft EC Decision permits Member States to designate the 900 MHz and 1800 MHz bands for use by any terrestrial system capable of providing pan-European electronic communication services on condition that it is compatible with GSM technology.

When the draft EC Decision comes into force the following provisions will apply to Member States, including Ireland:

- Member States will be required to designate and make available the 900 MHz and 1800 MHz frequency bands for GSM systems by the date of entry into force of the directive which will repeal the GSM Directive[31];

- Member States will be required to designate and subsequently make available the 900 MHz and 1800 MHz frequency bands for "other terrestrial systems capable of providing pan-European electronic communications services" as listed in the Annex of the draft EC Decision.[32] Only UMTS is currently identified in the Annex; and

- Member States will have the option to also designate and make available the 900 MHz and 1800 MHz frequency bands for "other terrestrial systems not listed in the Annex (of the draft EC Decision), provided that they can co-exist with GSM systems and the systems listed in the Annex on their own territory as well as in neighbouring Member States."[33]

ComReg understands that the text of the draft EC Decision is unlikely to change before it comes into force, although it is presently unclear when this will be, as the draft EC

[28] In particular CEPT Electronic Communications Committee's (ECC) Reports 82 and 96.

[29] http://www.erodocdb.dk/docs/doc98/official/pdf/ECCRep096.pdf .

[30] RSCOM07-04 final

http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/rsc20_public_docs/07_04%20final_900_1800.pdf .

[31] Article 3(1).

[32] Article 3(2).

[33] Article 3(3) of Draft EC Decision

Decision can only be formally adopted by the EC as soon as the repealing or amending Directive for the GSM Directive has been adopted by European Council and Parliament.

The draft EC Decision does not set a deadline for its implementation by individual Member States. ComReg considers approximately 3 years to be a reasonable timeframe for implementation of the draft EC Decision[34], once it becomes an enacted Directive. Factors informing this view include the following:

- An open-ended timescale is unlikely to be reasonable, having regard to the obligation to make available the 900 MHz and 1800 MHz spectrum for use by UMTS or compatible systems and the harmonisation objective of the draft EC Decision;

- The draft EC Decision does not stipulate immediate implementation by Member States;

- Having regard to the expiry dates of existing 900 MHz licences (2011 and 2015) and 1800 MHz licences (2014 and 2015) ComReg considers it reasonable, in order to minimise potential disruption to existing use of this spectrum, to permit the natural expiry of the two 900 MHz licences in 2011.

5.6 Summary

This section outlined the factors driving liberalisation of the 900 MHz and 1800 MHz bands and the potential benefits that could be obtained from doing so. It also detailed the strict obligations that will arise from the draft EC Decision and the move towards technology and service neutrality envisaged by the draft WAPECS Recommendation.

The following sections of this document detail ComReg's proposals for the 900 MHz and 1800 MHz bands in light of the above driving factors.

[34] The actual level of demand for spectrum bands may affect when spectrum would become available.

6 Current Licences in the 900 MHz and 1800 MHz Spectrum Bands – Implementing the Draft EC Decision

6.1 Introduction

This Section set out ComReg's proposals regarding current licences in the 900 MHz and 1800 MHz bands in the context of implementing the draft EC Decision.

This Section first outlines the steps required to implement the draft EC Decision. It then outlines ComReg's proposed licensing amendments and spectrum management issues which are consequences of the implementation of the draft EC Decision.

6.2 Implementation of the Draft EC Decision

As noted in Section 5.5, the draft EC Decision requires Member States to:

- designate and make available the 900 MHz and 1800 MHz spectrum for GSM systems; and
- designate and subsequently make available the same radio spectrum for UMTS (and any other terrestrial systems capable of providing pan-European communications services subsequently identified in the Annex).

The draft EC Decision also gives Member States the option to designate and make available this spectrum for other terrestrial systems not listed in the Annex, subject to co-existence requirements.

In relation to the requirement to designate and make available 900 MHz and 1800 MHz spectrum for GSM systems, ComReg considers that no action is necessary in relation to currently assigned 900 MHz and 1800 MHz spectrum.

As existing 900 MHz and 1800 MHz regulations and licences restrict the technology which can be used, action is required to comply with the requirement to designate and make available spectrum for UMTS.

Accordingly, ComReg proposes to:

- update the Radio Frequency Plan[35] for Ireland to designate the 900 MHz and 1800 MHz spectrum for UMTS as soon as practicable after the EC Decision comes into force; and
- vary existing regulations under which all 900 MHz and 1800 MHz licences are issued, and all current 900 MHz and 1800 MHz licences, so as to permit use by licensees of UMTS. ComReg proposes to do so as soon as practicable following the

[35] Under the 2002 Act, ComReg is obliged to publish a Radio Frequency Plan. The Radio Frequency Plan is comprised of a set of tables indicating the services to which each frequency band is allocated, or "frequency allocations". in the radio spectrum and is an essential tool for users of radio frequencies. ComReg Document 07/81R contains the Radio Frequency Plan at 30 April 2008. See: http://www.comreg.ie/radio_spectrum/table_of_frequency_allocations.496.410.html .

coming into force of the EC Decision to enable the earliest realisation of the benefits of liberalisation.

In light of the obligations that will arise from the EC Decision, and the potential benefits of liberalisation, ComReg considers that the proposed amendment to existing 900 MHz and 1800 MHz licences, so as to give effect to the EC Decision, would be justified and proportionate.

Q. 1. Do you agree with ComReg's proposal to liberalise the existing GSM licences in the 900 MHz and 1800 MHz bands as soon as practicable after the EC Decision enters into force and subject to a number of conditions (see below)? Please provide supporting arguments with your answer.

6.3 Proposed Amendments to existing 900 MHz and 1800 MHz Licences

When the draft EC Decision comes into force, 3G services would be permitted in the 900 MHz and 1800 MHz bands. However, existing GSM licensees in those bands will be required to meet their licence conditions on coverage, rollout and quality of service. ComReg has considered the implications of liberalisation of the 900 MHz and 1800 MHz bands in relation to national numbering, naming and addressing policies. Liberalisation is not considered to have any negative impact on national naming, addressing or the ongoing efficient management of Ireland's National Numbering Plan. ComReg intends to maintain all existing licence conditions until the licences expiry, with two exceptions as detailed below.

6.3.1 Service Neutrality

Taking into account the principles of WAPECS and the draft WAPECS Recommendation, ComReg is of the view that a service-neutral licensing regime should be implemented as soon as practical in the 900 MHz and 1800 MHz bands. This would allow current licensees to evolve their networks, taking into account their ongoing licence obligations.

This would mean that service suppliers could implement different technologies and thereby offer a wider range of services to consumers.

Q. 2. Do you agree with ComReg's proposal to implement a service neutral licensing regime for existing spectrum assignments in the 900 MHz and 1800 MHz bands? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

6.3.2 Revised Annual Fees for Licences

Existing 900 MHz licence holders obtained their licences on the condition that the spectrum could be used for GSM only. If the licences are liberalised, licensees could benefit from significant cost savings. A strong argument can therefore be made that liberalisation will increase the market value of the spectrum.

However, current licensees may not be able to extensively benefit from liberalisation in the short term as they will need to continue operating 2G technology in order to meet their ongoing licence obligations and to facilitate the transition of their customer base to 3G enabled phones. However ComReg expects that over time operators would begin to reap the benefits that liberalised 900 MHz spectrum has to offer in terms of lower investment and operating costs.

For these reasons, ComReg considers a review of the annual fees for 900 MHz and 1800MHz licences to be appropriate at this time.

Q. 3. Do you agree that a review of the annual licence fees is appropriate at this time to determine whether or not the fees should be adjusted to take into account the increased value associated with liberalised 900 MHz licences? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

6.4 Spectrum Management Issues

In addition to the proposed licensing amendments described above, ComReg recognises that industry would require clarity on a number of spectrum management issues such as spectrum trading and international frequency co-ordination.

6.4.1 Spectrum Trading

There are a number of studies examining the potential benefits to greater liberalisation and, in particular, of introducing trading in spectrum rights. Liberalisation of the 900 MHz and 1800 MHz bands is one of those areas which could benefit from trading in spectrum rights.

A major study commissioned by the EC[36] determined that, at a conservative estimate, the EU could gain by at least €9bn per year as a result of introducing liberalisation. ComReg has considered the potential benefits of spectrum trading for specific licence categories and has concluded that secondary markets could potentially play a role in ensuring the efficient assignment and use of the spectrum in some areas. However, it is recognised by all stakeholders that the use of spectrum trading (and other innovations in the development of rights of use) needs to be underpinned by a revision of existing primary legislation.

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

Meanwhile the EC is carrying out a review of the EU regulatory framework for electronic communications including proposals to introduce secondary trading in spectrum rights of use. It is not expected that secondary trading in spectrum rights could be introduced within the timeframe of this project.

6.4.2 International Frequency Coordination

Radio waves do not observe international boundaries and so it is often necessary for neighbouring spectrum management authorities and radiocommunications users to coordinate their use of the radio spectrum in order to minimise interference.

ComReg and the UK regulator, Ofcom, have agreed a number of Memorandum of Understandings ("MoUs") on regulatory usage parameters in the 900 MHz and 1800 MHz bands. These MoUs identify individual frequency channels as either "preferred" or "non-preferred" channels. Where use of these channels, particularly in border areas, does not exceed specific levels, the channels can be deployed by operators in either jurisdiction without the need for detailed coordination of those frequencies. This greatly facilitates frequency planning and eases the regulatory burden on operators.

If new non-GSM technologies are deployed in the 900 MHz or 1800 MHz bands it will be necessary for ComReg to negotiate a revised MoU with Ofcom, to which all licensees in the 900 MHz and 1800 MHz bands would be subject.

7 Future Licensing of the 900 MHz Band

7.1 Introduction

This Section sets out ComReg's proposed licensing regime for new licences in the 900 MHz band, having regard to the draft EC Decision, the pending expiry of current 900 MHz licences, and the draft WAPECS Recommendation, all of which support the trend in Europe towards a service-neutral and technology-neutral approach to facilitating access to spectrum.

This Section details considerations relevant to the issue of any new licences in the 900 MHz band, such as how to award new licences and potential conditions which may apply. These can be separated into technical considerations (service neutrality, licence duration) and non-technical considerations (technology neutrality, spectrum block size, in-band frequency coordination, international coordination). Firstly, the issue of the appropriate type of award format for granting new licenses is considered.

7.2 Choice of Spectrum Award Process

As set out in ComReg's Spectrum Management Strategy Statement[37], ComReg does not favour any specific approach for awarding spectrum rights, but prefers to consider each award on its own merits. ComReg balances the size and scale of the Irish market, public policy considerations, social considerations, economic and market considerations, legal factors and expected demand and use, in order to determine the most appropriate allocation method.

In recent years, ComReg has developed new licensing regimes based on first-come-first-served (e.g. FWALA), "beauty competitions" (e.g. the fourth 3G licence), and auctions (e.g. the 26 GHz National Block Licence Awards). Auctions have proven to be quick, fair and transparent and are therefore ComReg's preferred assignment method where demand for spectrum is expected to exceed supply. Underpinned by a technology-neutral approach and, where appropriate, being service-neutral, auctions are proving to be successful in facilitating the introduction of new services and greater competition in the market.

Given that a substantial portion of the 900 MHz band is currently occupied by GSM networks, ComReg expects that demand for the available spectrum will exceed supply. In view of the importance of the band for mobile services and the anticipated demand, ComReg's preference is to hold an auction for the available spectrum.

Q. 4.	**Do you agree with ComReg's proposal that an auction mechanism is the most appropriate format for granting future 900 MHz spectrum licences? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.**

[37] ComReg (2008) Spectrum Management Strategy: 2008 – 2010, 1st July 2008, ComReg Document 08/50.

7.2.1 Limit on 900 MHz Spectrum per Operator

ComReg is of the initial view that it is appropriate to cap the amount of spectrum any one licensee can hold in this spectrum band to 2 x 10 MHz. ComReg therefore intends to apply a spectrum aggregation limit on licensees.

Factors informing this view include:

- this limit reflects ComReg's current understanding of MNO's likely 900 MHz spectrum requirements;
- MNO's have other spectrum available to them (including 1800 MHz and 2100 MHz);
- spectrum holdings larger than that which is likely to be required would be unlikely to promote the most efficient use of the 900 MHz spectrum;
- ComReg is obliged to have regard to the need to facilitate the development of competition and the need to maximise benefits to users. In this regard, significant benefits could flow from having the potential for a greater number of operators with access to the 900 MHz spectrum. This analysis is contained in Annex F.

Q. 5. Do you agree with ComReg's proposal to place a cap of 2 x 10 MHz on the amount of spectrum that any one licensee can hold in this band? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

7.3 Non-technical licensing conditions

7.3.1 Service Neutrality

ComReg believes that a service-neutral licensing regime should be used when offering licenses in the 900 MHz band. This will allow new licensees to evolve their networks, at their discretion, allowing them to leverage new technologies for the benefit of consumers.

In preparing this service-neutral licensing regime, ComReg must take into consideration international agreements, national and European legislation, the need to limit harmful interference, national policy, and the best interests of consumers.

Q. 6. Do you agree with ComReg's proposal to implement a service neutral licensing regime for future 900 MHz spectrum assignments? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

7.3.2 Licence Duration

A licence should be of sufficient duration to allow operators to recoup the costs of investment in nationwide infrastructure. The longer a licence lasts, the greater the opportunity to recoup investment. However granting a long-term licence may not maximise spectrum efficiency as it could restrict innovation in the band, ultimately to the detriment of the consumer. This is particularly relevant given the rapid pace of technological change and the increasing trend towards converging services.

In the absence of a secondary market where spectrum can be traded, there is no single method to ensure that a licensee values the spectrum it holds more than any other prospective licensee, so that the spectrum is being used most effectively and efficiently. It therefore falls to ComReg to assign a licence to the entity which appears to value it most, and to set the duration of the licence so as to strike a balance between recouping investment costs and maximising spectrum efficiency.

Without a secondary market, licensees cannot aggregate or disaggregate the amount of spectrum held at any one time. Therefore it is necessary to align the expiry of licences so that when the spectrum is being reassigned, new licensees can acquire sufficient spectrum to match their requirements and where possible acquire contiguous spectrum to maximise efficiency.

ComReg is of the view that a minimum licence duration of 10 to 15 years should be applied to all new licences issued in the 900 MHz band and that ComReg should vary the duration of the 900 MHz spectrum licences issued so that all licences have a common termination date. Factors informing this view include:

- such an approach would be in line with the duration of existing mobile licences. ComReg has previously issued nationwide mobile telephony licences ranging in duration from 10 to 20 years[38];

- it recognises the level of investment required to introduce new wireless technologies in these bands; and

- by having different licence durations for different licences, it will permit the alignment of the expiry dates of new licences issued thereby facilitating more efficient licensing of this band in the future.

[38] 10 year licences were awarded in the Wideband Digital Mobile Data Systems (WDMDS) Licence award – see ComReg PR211205. A 15 year licence was awarded in the All-Island WAPECS licence competitions – see ComReg PR270407. The 3G licences were awarded for 20 years.

Q. 7. In the absence of spectrum trading, what do you consider to be the most appropriate duration for new licences issued in the 900 MHz band? Please provide supporting arguments with your answer.

Q. 8. Do you agree with ComReg's proposal that a common termination date should be applied to all new licences in the 900 MHz band? Please provide supporting arguments with your answer.

7.3.3 Coverage and Quality of Service Requirements

To ensure the most efficient use is made of spectrum and that no geographic divide emerges in the provision of consumer services utilising 900 MHz spectrum, ComReg intends to continue its practice of placing coverage and roll-out obligations within its licence conditions. It is intended that these obligations will be similar to the coverage and roll-out licence conditions in the current GSM 900 MHz licences.

To ensure that consumers can avail of a reasonable service and to ensure the efficient use of 900 MHz spectrum, ComReg also intends to continue its practice of placing Quality of Service ("QoS") obligations within its licence conditions. These would relate to voice and text services.

In both cases, the obligations would be the minimum necessary to ensure that licensees can maximise the use of the spectrum assigned to them, and that an adequate service is offered to consumers.

7.3.4 Mobile Virtual Network Operator Access

A Mobile Virtual Network Operator ("MVNO") is a licensed mobile operator with no spectrum assignment. Instead of deploying a physical radio network, an MVNO acquires capacity on the network owned and operated by an MNO to provide branded services to its own customers.

ComReg is of the view that while it is preferable that MVNO agreements are commercially concluded, in cases where agreement cannot be reached it may be justifiable to regulate MVNO access in the interest of promoting competition. ComReg has in the past included MVNO access conditions in licences awarded with larger spectrum assignments and proposes to incorporate licence conditions requiring the provision of MVNO hosting services in any licences issued following liberalisation.

Q. 9. Do you agree with ComReg's proposal to include a MVNO licence obligation in future 900 MHz spectrum licences? Please provide supporting arguments with your answer.

7.4 Technical Licensing Considerations

7.4.1 Technology Neutrality

In line with the WAPECS approach, ComReg proposes to introduce a technology-neutral licensing regime for the allocation of new licences in the 900 MHz band. This would allow licensees to take full advantage of future developments and innovations in technology and thereby provide enhanced services to consumers.

The draft EC Decision allows the 900 MHz band to be made available for a number of technologies including GSM, other terrestrial systems as listed in the Annex to the EC Decision and other terrestrial systems provided that they can co-exist with GSM and systems listed in the Annex.[39] While UMTS is the only technology currently listed in the Annex, this list may be expanded in the future.

ComReg proposes to implement a technology neutral licence approach such that the full range of technologies allowed under the draft EC Decision can be deployed. For other technologies not listed in the Annex to the draft EC Decision, ComReg proposes that the licensee must first satisfy ComReg that this technology can co-exist with GSM and UMTS (and any other technologies listed in the Annex) before ComReg will consider allowing its use in this band.

Q. 10. Do you agree with ComReg's proposal to introduce technology neutrality in the 900 MHz band? Please provide supporting arguments with your answer.

7.4.2 Spectrum Block Size

In determining the minimum appropriate spectrum block size for the future release of spectrum in the 900 MHz band, ComReg has had regard to the following factors:

- the need to make spectrum available in blocks that would not unduly limit the efficiency of wide band technologies capable of operating in the band;
- the need to make spectrum available in blocks that would not unduly limit the number of licensees in the band – thereby facilitating the development of competition and maximising the benefit for end users; and
- the benefits of keeping future competition processes simple and transparent.

In considering the minimum appropriate block size that would not adversely affect the efficient management of the radio spectrum, ComReg has focused its analysis on the systems currently identified in the draft EC decision, in particular:

- in the case of GSM technology, the minimum appropriate block size is 200 kHz or a multiple thereof; and

[39] See Annex D which reproduces the Annex of draft EC Decision.

- in the case of UMTS900, the minimum appropriate block size is 5 MHz or a multiple thereof[40].

ComReg therefore considers that assigning spectrum in blocks of 2x5MHz (or combinations of such blocks) is the optimum means to accommodate the technologies currently identified in the draft EC Decision.

In the interests of maximising the flexibility of future spectrum assignments, ComReg has also considered the implications of a range of alternative systems, not currently listed in the Annex of the draft EC Decision. Some of these systems can be deployed in channels of less than 5 MHz. However, adapting the minimum block size to these narrower bandwidths would lead to varying degrees of spectrum becoming unusable if the technologies currently listed in the Annex were to be deployed.

Similarly, some future wideband systems, currently in development, may require channels exceeding 5 MHz. Adopting a minimum spectrum block size in excess of 5 MHz would unduly limit the number of potential licensees in the band, thus reducing the potential competition for consumers (see Annex F).

The specifications of the wideband systems currently under development may be subject to further change, but analysis indicates that these systems can operate in blocks comprised of multiples of 2x5 MHz resulting in a minimum of unused spectrum.

In light of the above factors, ComReg considers allocated blocks of 2x5 MHz to be appropriate when making spectrum available in the 900 MHz band, as this size represents a reasonable balance between facilitating the maximum number of licensees in the bands and maximising the efficient use of the radio spectrum.

Q. 11. Do you agree with ComReg's proposal that the minimum spectrum block size should be 2x5 MHz for future 900 MHz spectrum assignments? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

[40] It is possible to deploy UMTS900 in channels of less than 5 MHz but ComReg understands that such solutions are proprietary.

7.5 Spectrum Management Issues

Aside from the proposed non-technical and technical licensing conditions, ComReg recognises that there are a number of spectrum management matters in relation to the issue of new 900 MHz band licences.

7.5.1 Frequency Coordination and Interference Mitigation

ComReg does not intend to issue guard-bands in any future spectrum assignments in the 900 MHz and 1800 MHz bands. Licence conditions will however include a requirement to protect against interference with operations in adjacent spectrum assignments.

This can be achieved by either provisioning the appropriate guard-band or by agreement between affected licensees. In that regard, the draft EC Decision has defined a carrier separation of 2.8 MHz or more between a UMTS network and a neighbouring GSM network.

In the case of pre-existing GSM operations in neighbouring spectrum assignments, licensees will be required to comply with this technical condition when deploying a UMTS network, and provide the guard-band from their own spectrum assignment.

Licensees wishing to deploy a network other than UMTS or GSM would be required to provide similar protection to their neighbours.

Q. 12. Do you agree with ComReg's frequency co-ordination and interference mitigation proposal in the 900 MHz bands in relation to new licences? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

7.5.2 International Coordination

As stated at paragraph 6.4.2., there are a number of MoUs between ComReg and Ofcom on radio spectrum usage in the 900 MHz band. All current and future licensees in the 900 MHz band must comply with such MoUs.

ComReg has initiated discussions with Ofcom to seek arrangements for the implementation of new non-GSM technologies being deployed in the 900 MHz with a view to finalising a revised MoU with Ofcom. It is intended that this new MoU will facilitate all combinations of GSM and non-GSM technology usage on the island of Ireland.

8 Options for Future Licensing of the 900 MHz Band

8.1 Introduction

This section details the three options being considered by ComReg as part of this consultation in relation to the issuing of new 900 MHz licences. Each option is considered in the context of the efficient management and use of the radio spectrum, and the promotion of competition. As stated in Section 7.2, ComReg is of the initial view that it is appropriate to hold a competitive award process for the issuing of any new licences in the 900 MHz band.

8.2 Relevant Factors for Assessing the Consultation Options

ComReg has given careful consideration to the most appropriate manner in which to implement the draft EC Decision. In doing so, ComReg has had the utmost regard to its statutory functions and objectives outlined in Section 3.2 along with its other statutory obligations, including those discussed in Annex C.

In determining the best means of implementing the draft EC Decision and granting future licences in the 900 MHz band, ComReg would be performing its function of ensuring the efficient management and use of the radio spectrum. This includes giving consideration to issues of technical efficiency, the likely impact upon consumers and existing licensees, and the extent to which proposals would provide regulatory certainty. In performing that function, ComReg must also have regard to the objective of promoting competition.

8.2.1 Efficient Management and Use of the Radio Spectrum

One of ComReg's primary functions is to ensure the efficient management and use of the radio spectrum. The following factors are particularly relevant in determining whether a proposed measure is likely to represent the most effective and proportionate means of ensuring the efficient management and use of the radio spectrum:

- technical efficiency;
- the implications of the options for existing 900 MHz licensees;
- the extent to which the options would provide regulatory certainty for all stakeholders; and
- overall implications of the options for competition and consumers.

These factors are, to a significant extent, inter-related. Each factor is discussed in more detail below.

8.2.1.1 Technical Efficiency

Operators having access to contiguous blocks of spectrum would represent an efficient use of spectrum as this would minimise the overall need for guard-bands. In addition, it is important to ensure that spectrum blocks do not become stranded and thus unused.

8.2.1.2 Overall Implications for Consumers

As discussed in Section 5.3, consumers are likely to benefit from the liberalisation of the 900 MHz band, as it is likely to lead to an increase in the range and quality of services.

Given the upcoming expiry of two of the three 900 MHz licences, and the proposed use of a competitive award process, there is the possibility of consumers facing some disruption to, or interruption of, their mobile services. For example this could occur if a competitive award process, held prior to the expiry of existing 900 MHz licences, resulted in an existing licensee:

- failing to acquire any 900 MHz spectrum;
- acquiring less spectrum than it currently occupies; or
- acquiring spectrum which could not be used for a period of time (due to the differing expiry dates of existing 900 MHz licences).

However, ComReg would expect the likelihood of such disruption to be limited, for the following reasons:

- existing 900 MHz licensees have access to other spectrum with which to deliver existing services. While 900 MHz spectrum provides significant propagation advantages over other spectrum, it is not a prerequisite to providing mobile services to consumers;
- there would be strong commercial incentives for existing 900 MHz licensees to ensure that consumers were not negatively affected if they did not gain new 900 MHz licences. First, as on-going concerns, they would be minded to ensure minimal disruption to their consumer franchise and brand value. In addition, an existing licensee which failed to secure sufficient spectrum to service its customer base could maintain continuity of services by, for example, seeking to negotiate an interim MVNO agreement with any of the successful competition winners with adequate network coverage thereby reducing the potential impact on consumers; and
- competing MNOs would have strong commercial incentives to offer substitute services to potentially affected customers. This process would be facilitated by the Mobile Number Portability (“MNP”) service which allows customers to

switch to an alternative mobile provider in two hours, and keep their existing number.[41]

8.2.1.3 Implications for Existing Licensees

It is also important to assess the likely impact of each option on existing licensees; not only in the context of the efficient management and use of spectrum, but also to ensure that the option chosen is fair and proportionate and that any distortions to competition are minimised.

As the expiry dates for existing 900 MHz licences are not aligned, implementation of the draft EC Decision could have different consequences for each of the existing 900 MHz licensees, and other operators.

Operators have a preference for contiguous spectrum as it reduces the scale of inter-operator interference management and allows for increased spectral efficiency. Preliminary indications from industry suggest that existing 900 MHz licensees would likely require a minimum of 2 x 10 MHz of contiguous 900 MHz spectrum with which to roll out a 3G network and maintain GSM services in the short-term (until GSM technology is eventually replaced).

It would not be possible for all three existing licensees to acquire 2 x 10 MHz of contiguous spectrum which would also include their current 2 x 7.2 MHz assignments due to the position of their current allocations within the band and the expiry dates of existing licences. For this reason, an important consideration when looking at each of the options below is the extent to which it offers the potential for contiguous 10 MHz spectrum blocks.

8.2.1.4 Providing Regulatory Certainty

In light of the upcoming expiry of two of the three 900 MHz licences, and the importance of minimising potential disruption to the efficient use of spectrum, another relevant consideration is the extent to which the options would promote regulatory certainty.

Regulatory certainty assists industry and other stakeholders in making forward-looking plans. In particular, it encourages and facilitates more efficient capital investment and industry development, particularly in terms of infrastructure, new technology and innovative services to consumers. It is therefore desirable that all interested parties have visibility of future developments in the 900 MHz band.

8.2.2 Promotion of competition

[41] The current industry agreed process for porting a mobile subscriber was designed to facilitate a reasonable volume of subscriber migration between MNOs. The capacity of this system is limited to approximately 2000 ports a day. As such, and if an existing licensee fails to acquire spectrum in a future competitive process and following expiry of its existing licence it ceases to offer services to subscribers, the current MNP system would be unlikely to meet the capacity requirements of porting such a large volume of customers to alternative mobile operators. This may result in some disruption in services associated with delays in number porting. It is envisaged that there will be a period of at least 12 months between the publication of the outcome of the licence award competition in 2009 and the expiry of the first current 900 MHz licence. This time period should provide adequate time for customers to make alternative arrangements if necessary with minimal disruption, although some change to the current mobile number portability process might be required.

The promotion of competition is a key objective of ComReg. ComReg therefore seeks to implement measures, where appropriate and proportionate, which counteract or remove barriers to market entry and support entry by new players to the market and entry into new sectors by existing players.[42] ComReg analysed the welfare effects of changes in the numbers of players in the Irish mobile market; the analysis shows that the entry of an additional player, or the exit of an existing player, could lead to significant welfare effects for consumers.[43] For this reason, ComReg intends to limit the total amount of 900 MHz spectrum that any operator would be permitted to gain spectrum rights to a maximum of 2 x 10 MHz.

By imposing this limit, the maximum amount of spectrum that could be obtained in a licence competition by the existing 900 MHz licensees is three times 2 x 10 MHz (i.e. 2 x 30 MHz). This would leave one 2 x 5 MHz block of spectrum available for new entrants to the 900 MHz band. If new entrants are successful in obtaining spectrum in the 900 MHz band, this could potentially generate greater competition benefits for consumers in terms of increased choice, lower prices, better service and the earlier introduction of new products and services. Increased competition would create greater incentives for dynamic efficiency (such as through an increased rate of innovation and earlier introduction of new products and services) than might be the case if access to liberalised 900 MHz spectrum was limited to a smaller number of operators.

8.3 Current use of the 900 MHz band

Before considering each of the options in detail, it is useful at this point to review the spectrum allocations of the existing licensees in the 900 MHz band and the expiry dates of their licenses. Vodafone and O2's 900 MHz licences will expire on 15 May 2011 and Meteor's on 18 June 2015. Figure 4 illustrates a band arrangement based on the 5 MHz minimum block size proposed in Section 7.4.2, and shows existing licensees' spectrum assignments and the year of licence expiry of each current licensee in the band.

[42] In doing so, with reference to Directions by the Minister for Communications, Marine and Natural Resources to the Commission for Communications Regulation under Section 13 of the Communications (Regulation) Act, 2002 (issued 26 march 2004) ComReg particularly focuses on *inter alia*:

- market share of new entrants;
- ensuring that the applicable margin attributable to a product at the wholesale level is sufficient to promote and sustain competition;
- price level to the end user;
- competition in the fixed and mobile markets; and
- the potential of alternative technology delivery platforms to support competition.

[43] See Annex F for further detail on why ComReg sees the promotion of competition as an important objective when considering the future of the 900 MHz band.

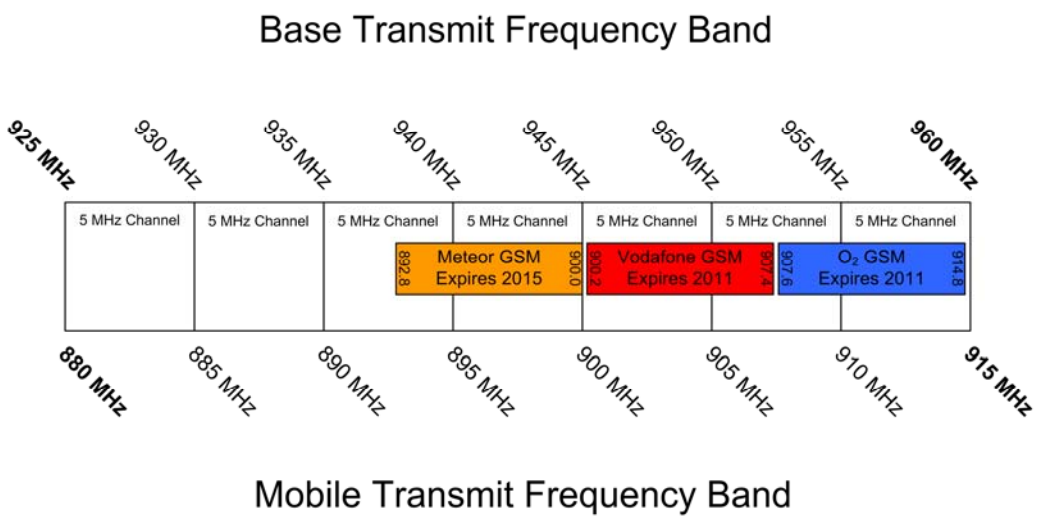


Figure 4: Proposed future spectrum blocks in the 900 MHz band and existing licence spectrum assignments

8.4 Option A: Multiple competitive award processes with corresponding assignment of spectrum

Option A would involve the 900 MHz band being divided into:

- six blocks of 5 MHz each; and
- 1 block (Block C) divided into 2 parts – Block C1 would be 2.8 MHz and Block C2 would be 2.2 MHz - see Fig. 5 below.

Three separate competitive award processes would be held, i.e. Licence Competitions 1, 2 and 3.

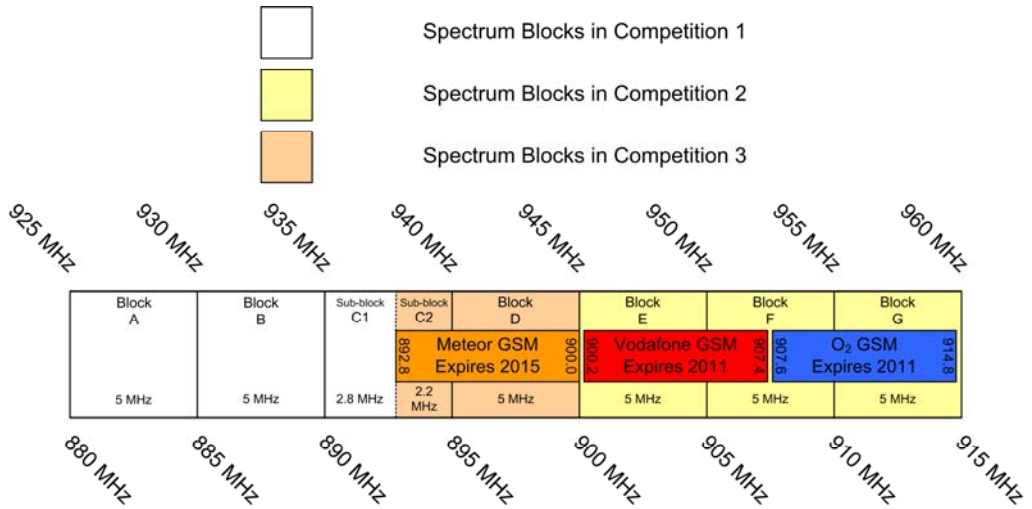


Figure 5: Option A - Licence Competitions & Related Spectrum Blocks

Licence Competition 1: Spectrum within the range 880-892.8 MHz (paired with 925-937.8 MHz) is currently unused and therefore available for licensing. As part of Licence Competition 1, the unused spectrum would be divided into three blocks. Blocks A and B would both be 5 MHz in size. Block C1 would be limited in size to 2.8 MHz due to Meteor's existing operation in spectrum above 892.8 MHz. A licence competition for Blocks A, B and C1 would be held in mid-2009, with licences being awarded to successful applicants following completion of the competitive award process.

Licence Competition 2: A further licence competition would be held soon after the completion of Licence Competition 1 for the three 5 MHz Blocks E, F and G, which would be available for use by the winners of the licence competition, following the expiry of Vodafone's and O2's licences.

Licence Competition 3: In mid-2013, a final licence competition would be held for Block D (5 MHz) and Block C2 (2.2 MHz) both of which would be available for use by the winners of the licence competition from June 2015, following the expiry of Meteor's licence.

All new licences awarded would terminate at the same date. Therefore licences assigned in Competition 1 (2009) would have a longer duration than the licences assigned in Competition 2 (2011) and Competition 3 (2015).

8.4.1 Efficient Management and Use of Spectrum

8.4.1.1 Technical Efficiency

Option A would increase the efficiency of the 900 MHz spectrum by making available currently unused 900 MHz spectrum, thus facilitating the delivery of new wireless services to consumers.

In addition, by holding Licence Competitions 2 and 3 close to the availability date of the spectrum being awarded, Option A would enable participants and other stakeholders to more closely correlate the value of spectrum blocks with the circumstances at the time of the award, given that the value of 900 MHz spectrum could change over time as a result of technology and industry developments.

Option A would provide applicants with the opportunity to obtain two contiguous 10 MHz blocks. Under Licence Competition 1, there would be the opportunity to acquire 1 x 10 MHz block of contiguous spectrum (i.e. Blocks A and B). Under Licence Competition 2, there would be the opportunity to acquire 1 x 10 MHz block of contiguous spectrum (i.e. either Blocks E and F, or Blocks F and G).

Under Licence Competition 3 there would not be the opportunity to acquire a 10 MHz block of contiguous spectrum. However, if the licensee holding Block C1 (through Licence Competition 1) also won Blocks C2 and D (through Licence Competition 3) then it would have 10 MHz of contiguous spectrum. The possibility of Option A creating three 10 MHz blocks of contiguous spectrum is therefore conditional on the outcome of the earlier licence competitions, and consequently this outcome is not assured.

8.4.1.2 Implications for Existing Licensees

Under Option A, there would be three licence competitions and therefore three separate opportunities for existing licensees to gain spectrum. However, as discussed above, there would likely be only two opportunities for existing licensees to gain contiguous 10 MHz blocks.

8.4.1.3 Providing Regulatory Certainty

ComReg recognises that holding three separate licence competitions for spectrum in the 900 MHz band, between mid-2009 and mid-2013, may cause some uncertainty for stakeholders. In particular, existing licensees will want some visibility as to the future of the band in advance of the expiry of their licences. Any uncertainty could make future planning more difficult and could cause operators to put their investment plans on hold pending the outcome of the various licence competitions, or until they have greater certainty of the likely outcome of those competitions.

8.4.2 Promotion of Competition

Option A has the potential to promote competition by providing several opportunities for new entrants to acquire liberalised 900 MHz spectrum, on the same terms as existing licensees (i.e. via the licence competitions).

In addition, by holding three separate licence competitions, Option A would provide the opportunity for new entrants to obtain spectrum at different times. This would provide potential new entrants the opportunity to observe market, industry and technological developments following previous licence competitions.

Licence Competition 1 would also provide an opportunity for new entrants to obtain 900 MHz spectrum in mid-2009 and therefore benefit from liberalisation relatively quickly following the coming into force of the EC Decision.

8.4.3 Implications for Consumers

Consumers are likely to benefit from the release of currently unused 900 MHz spectrum in mid to late 2009 which could facilitate the delivery of new wireless services. If new entrants obtain 900 MHz spectrum, and competition is thereby increased, then this could generate significant benefits for consumers in terms of lower prices, better service and the earlier introduction of new products and services.

Additionally, to the extent that holding three separate competitions at different times would decrease regulatory certainty, Option A may have the effect of deterring short-term investment by existing 900 MHz licensees prior to the expiry of their current licences. This in turn could hamper deployment of new technologies and potentially delay the benefits of liberalisation for consumers.

8.4.4 ComReg's Preliminary View of Option A

ComReg considers that the advantages of Option A are as follows:

- Making available unused spectrum would increase efficiency in use of the 900 MHz spectrum;

- Phasing the award of new licences creates the opportunity for potential entrants to participate in a competitive award process at three different times;

- It would provide applicants and other stakeholders with the ability to more closely correlate the value of the licences with circumstances at the time of the award (including commercial and technological); and

- If new entrants acquire 900 MHz spectrum then competition should increase and as a result consumers should benefit from increased choice, lower prices, better service and the earlier introduction of new products and services.

However, ComReg recognises that there may be some drawbacks to Option A, in particular:

- Holding three separate competitions at different times could create some uncertainty among stakeholders. Existing licensees may be deterred from investment as they would not know who would acquire the spectrum blocks which they currently occupy until two years before the expiry of their existing licences. This could hamper the deployment of new technologies in the 900 MHz band and delay the benefits of liberalisation for consumers.

Q. 13. Do you support Option A? Please provide supporting arguments with your answer.

8.5 Option B: Single licence competition for the entire 900 MHz band in 2009 followed by a phased assignment process

Option B would involve the entire 900 MHz band being divided into seven 2 x 5 MHz blocks (named Block A – G, as illustrated in Figure 6 below). Block C would be comprised of sub-block C1 and sub-block C2. One licence competition for the entire 900 MHz band would be held in mid-2009. The assignment of spectrum to the winners of the licence competition would occur in three phases corresponding to the different expiry dates of existing licences.

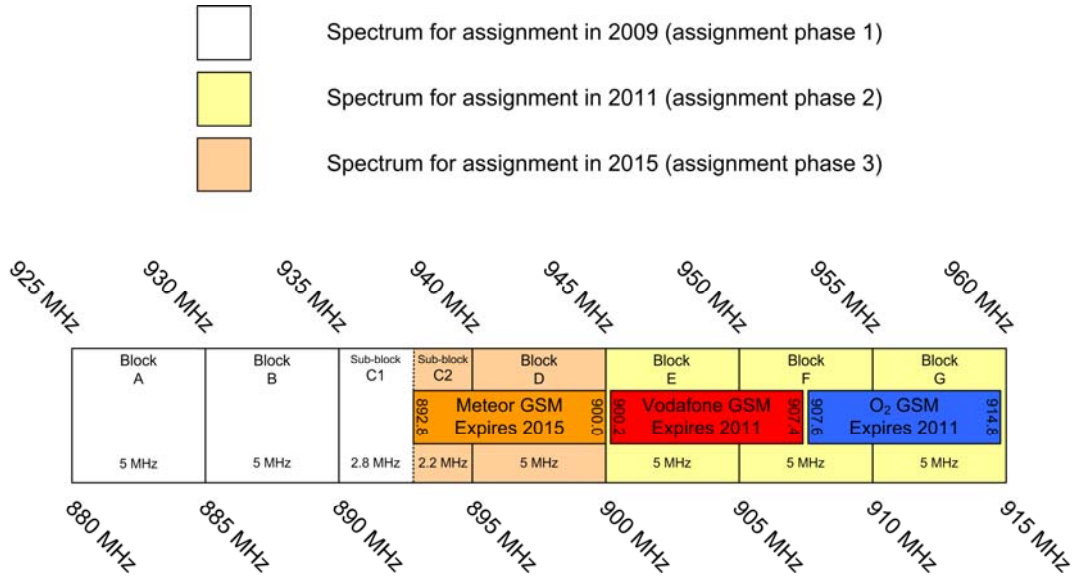


Figure 6: Option B - Spectrum Blocks & Assignment Dates

Assignment Phase 1: New licences for Blocks A, B and C would come into effect in late 2009, after the completion of the competition. However, the winner of Block C would only be permitted to use sub-block C1 at this time. Sub-block C2 would only be available for use following the expiry of Meteor's licence in June 2015.

Assignment Phase 2: In May 2011 new licences would come into effect for the winners of Blocks E, F and G.

Assignment Phase 3: In June 2015, a new licence would come into effect for Block D following the expiry of Meteor's licence. At the same time, the winner of Block C would now have access to the full 5 MHz of Block C.

All new licenses awarded would terminate at the same date. Therefore licences assigned in Phase 1 would have a longer duration than the licences assigned in Phase 2 and Phase 3.

The indicative timeframe for Option B is illustrated in Figure 7 below.

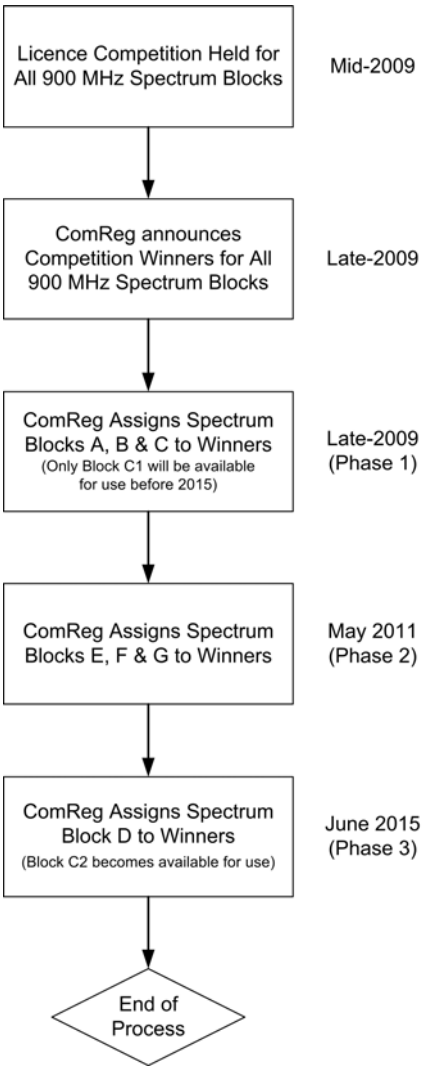


Figure 7: Indicative Timeframe for the Assignment of 900 MHz Spectrum Blocks

8.5.1 Efficient Management and Use of Spectrum

8.5.1.1 Technical Efficiency

As is the case with Option A, Option B would also increase the efficiency of the 900 MHz spectrum by making available currently unused 900 MHz spectrum, capable of facilitating the delivery of new wireless services to consumers following a competitive award process in mid-2009. By holding a single competitive award process, all spectrum blocks would be awarded simultaneously, which would aid participants in acquiring spectrum blocks when and where they value them most.

There is the potential for some inefficiency in the short-term as the successful winner of Block C would not be able to use the full 5MHz of spectrum for a number of years, until the expiry of Meteor's licence in 2015. However, in the longer term Option B would lead to an efficient outcome as there would be seven 5 MHz blocks in the 900 spectrum band. In addition, there would likely be a lower risk of stranded or unused blocks as Block C would be awarded as a 5 MHz block.

8.5.1.2 Implications for Existing Licensees

A simultaneous award process for the entire 900 MHz band offers existing 900 MHz licensees the opportunity to acquire three 10 MHz blocks of contiguous spectrum. However, the availability of these blocks will depend on, the expiry dates of the existing 900 MHz licences with the exception of blocks comprised of currently unallocated spectrum.

Since all spectrum blocks would be awarded simultaneously, operators would not have another opportunity to acquire spectrum in the 900 MHz band until all of the new licenses expire (assuming that spectrum trading is not possible over this time period).

8.5.1.3 Providing Regulatory Certainty

Existing licensees and new entrants would be made aware of future block assignments in 2009 for the full 900 MHz band, two years ahead of the expiry of existing licences in 2011. Accordingly, Option B would provide industry with a high degree of certainty regarding the future of the 900 MHz band. Awarding the usage rights for all 900 MHz spectrum in a single process would provide existing licensees with greater visibility and so facilitate efficient planning and investment.

8.5.2 Promotion of Competition

Under Option B seven 5 MHz blocks would ultimately become available in the 900 MHz band, with two 5 MHz blocks ready for immediate assignment after the licence competition in 2009. The award process would be open to both existing licensees and new entrants.

If new entrants were successful in obtaining spectrum, this could potentially generate greater competition benefits for consumers in terms of increased choice, lower prices, better service and the earlier introduction of new products and services.

8.5.3 Implications for consumers

As is the case with Option A, the implications for consumers arising from Option B are likely to be largely dependent upon the eventual outcome of the licence competition process.

Consumers should benefit from the release of unused 900 MHz spectrum which could facilitate the delivery of new wireless services. If new entrants obtain 900 MHz spectrum then this could generate significant benefits for consumers in terms of lower prices, better service and the earlier introduction of new products and services, arising from increased competition.

As all blocks would be awarded simultaneously, this would provide a high degree of visibility and certainty to all stakeholders regarding the future of the band. This would likely benefit consumers by providing existing and potential licensees with sufficient certainty with which to make efficient investment plans and thus encourage the necessary infrastructure investment necessary for 3G services sooner.

8.5.4 ComReg's Preliminary Views on Option B

ComReg considers that the advantages of Option B are as follows:

- Making available unused spectrum would increase efficiency in use of the 900 MHz band;
- It would create three contiguous 10 MHz blocks of spectrum which could be bid upon by existing and potential licensees;
- By creating 5 MHz blocks of spectrum it would minimise the risk of creating isolated and unused blocks of spectrum;
- Awarding all blocks in a single competitive process would facilitate applicants in acquiring spectrum blocks when and where they valued them most;
- It would create a high degree of visibility and certainty to both existing licensees and potential operators as the competitive award process would be completed by late 2009. All parties would then be fully aware of the outcome of the licence competition well in advance of the expiry of the first 900 MHz licences in May 2011, and the third license in June 2015. This would allow existing licensees sufficient time to make appropriate plans regarding the expiry of their existing licences; and
- If new entrants acquire 900 MHz spectrum, then competition should increase and as a result consumers should benefit from increased choice, lower prices, better service and the earlier introduction of new products and services.

However, ComReg recognises that there would be some potential drawbacks to Option B, in particular:

- The winner of Block C would not be able to use sub-block C2 (2.2 MHz in size) during the first six years of its licence and therefore would be unable to exploit the full benefits of Block C for some time. For example, Block C1 may be of limited value for the purposes of UMTS during this time (unless Meteor was the successful winner of Block C, as Meteor's current licence includes the spectrum in Block C2). ComReg notes that this potential inefficiency would be relatively short-term;
- Since all blocks would be awarded simultaneously, operators would not have subsequent opportunities to acquire additional spectrum in the 900 MHz band until the new licences expire (on the assumption that spectrum trading was not possible over this time period).[44]

Q. 14. Do you support Option B? Please provide supporting arguments with your answer.

[44] See Section 6.4.1 for further detail on spectrum trading.

8.6 Option C: Single licence competition for the entire 900 MHz band in 2009, with spectrum reserved for new entrants, followed by phased assignment

Option C would involve the entire 900 MHz band being divided into seven 2 x 5 MHz blocks (Block A – G, as illustrated in Figure 8 below). Block C would comprise sub-block C1 and sub-block C2. A single licence competition for the entire 900 MHz band would be held in mid-2009. The assignment of spectrum to the winners of the licence competition would occur in three phases, corresponding to the different expiry dates of existing licences.

Under this option, up to two blocks (Blocks A and B) could be reserved for new entrants to the 900 MHz band in the licence competition. This proposal reflects the objective of promoting competition and is informed by ComReg's analysis of the potential costs and benefits that would accrue to consumers and operators and to welfare as a whole arising from an increased number of operators in the mobile market (see Appendix F).

As noted earlier, the proposal to impose a 10 MHz limit on all new 900 MHz licensees (see Section 8.2.2) would mean that one 2 x 5 MHz block would be available for new entrants to the 900 MHz band. Option C can therefore be seen as a derivative of Option B, but where the location of this 2 x 5 MHz block (Block A), and potentially a further block (Block B), would be known in advance of the competition. By reserving Block A, and potentially Block B, for new entrants, Option C would provide the greatest opportunity for new entrants to the 900 MHz band to utilise liberalised 900 MHz spectrum quickly, as these blocks would be available for use immediately following the competition in mid-2009.

In devising this option, ComReg has not come to any view as to whether one or two blocks should be potentially reserved for new entrants or whether both blocks (if two are set aside) could be won by one new entrant.

It is perhaps important to note that Option C would provide the potential for either one or two blocks to be reserved for new entrants to the 900 MHz band. Whether or not blocks were actually reserved in a competition held under Option C would depend on the number of new entrants actually participating in the competition as follows.

If there were no new entrants in the competition then no block or set of blocks would be reserved and in essence the competition would become Option B. If there was one new entrant then Block A could be reserved and to ensure that a fair price was paid for that licence, the licence fee payable could, for example, be set as the average price of all other 900 MHz blocks awarded in the competition[45]. This would not prevent that new entrant from competing for more than the one reserved block of spectrum or indeed any other block or blocks of spectrum within the 10 MHz limit, but rather would guarantee one block of spectrum for a new entrant.

If there were two or more new entrants in the competition then Block A and potentially Block B could be reserved with similar rules as explained above. As there would be more

[45] This example of determining an appropriate licence fee is only presented for illustrative purposes. Full consideration will be given to auction design following the outcome of this consultation.

than one new entrant participating in the competition, it is likely that there would be competition for the reserved blocks and no pricing rule would be required.

A further sub-option needs to be considered, namely that if two blocks were reserved under Option C, whether a new entrant should only be permitted to obtain either Block A or Block B but not both blocks. Irrespective, new entrants would be subject to the 10 MHz cap and any new entrant who obtained Block A or B would not be precluded from bidding for any block which is not reserved for new entrants.

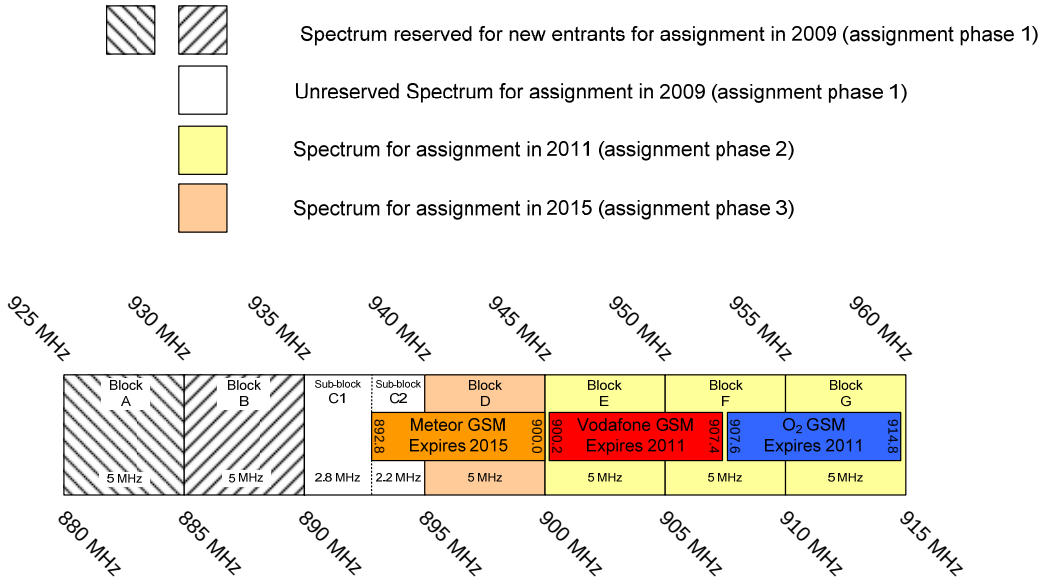


Figure 8: Option C - Spectrum Blocks & Assignment Dates

Assignment Phase 1: New licences for Blocks A, B and C would come into effect in late 2009, after the completion of the competition. The winner of Block C would not be permitted to use sub-block C2 until after the expiry of Meteor's licence in June 2015.

Assignment Phase 2: In May 2011 new licences would come into effect for the winners of Blocks E, F and G.

Assignment Phase 3: In June 2015, a new licence would come into effect for Block D following the expiry of Meteor's licence. At the same time, the winner of Block C would now have access to the full 5 MHz of Block C.

All new licenses would expire at the same date. As a result, new licenses issues in Phase 1 would have a longer duration than those issued in Phase 2 and 3.

The indicative timeframe for Option C is the same as Option B (see Figure 7 above).

8.6.1 Efficient Management and Use of Spectrum

Option C would increase the efficiency of the 900 MHz band by making available currently unused spectrum in the band. As is the case with Option B, by holding a single competitive award process, all spectrum blocks would be awarded simultaneously, which would aid applicants in acquiring spectrum blocks when and where they value them most.

As in the case with Option B, there is potential for some inefficiency in the short-term as the successful winner of Block C would potentially not be able to use the full block until the expiry of Meteor's existing licence in 2015. However, in the longer term it would lead to greater technical efficiency due to the uniform 5 MHz block size throughout the band and the reduced risk of stranded or unused spectrum.

8.6.2 Implications for Existing Licensees

By potentially reserving up to two 2 x 5MHz blocks for new entrants, this could reduce the amount of spectrum available to existing licensees. If Block A was reserved for new entrants, there would remain the opportunity for three 10 MHz blocks of contiguous spectrum to be acquired by existing licensees in the rest of the band. However, if Blocks A and B were reserved for new entrants, then this would only allow two 10 MHz blocks of contiguous spectrum to be acquired by existing licensees in the band.

Similar to Option B, all seven spectrum blocks would be awarded simultaneously and therefore all new licensees would not have subsequent opportunities to acquire spectrum in the 900 MHz band until the expiry of the new licences.

8.6.3 Providing Regulatory Certainty

By holding a single licence competition in mid-2009, existing licensees and new entrants would be made aware of future block assignments up to two years in advance of the first licence expiry dates in 2011. Accordingly, Option C would provide industry with a high degree of visibility and certainty regarding the future of the 900 MHz band and thus facilitate efficient planning and investment.

8.6.4 Promotion of Competition

The award process would be open to both existing licensees and new entrants and seven 5 MHz wide blocks would ultimately become available in the band.

By potentially reserving up to two blocks for new entrants, Option C would provide the greatest opportunity for new entrants to the 900 MHz band to utilise liberalised 900 MHz spectrum quickly, as these blocks would be available for use following the competition in mid-2009. In addition new entrants could acquire more spectrum (up to 10MHz each) in the remainder of the band during the competition.

The assignment of currently unused 900 MHz spectrum would thus facilitate new entrants in rolling out services quickly. By reserving up to two blocks specifically for new entrants, this would likely encourage greater participation in the licence competition from operators who do not currently have a 900 MHz license.

8.6.5 Implications for Consumers

As in the case with Option B all blocks would be awarded simultaneously, which would provide a high degree of visibility and certainty to all stakeholders. This would likely benefit consumers by providing existing and potential licensees with sufficient certainty with which to make efficient investment plans thus encouraging the necessary infrastructure investment necessary for 3G services sooner.

Consumers are likely to benefit from the services that could be provided by the use of currently unassigned spectrum. In the event that new entrants were successful in obtaining 900 MHz spectrum then this could generate significant benefits for consumers in terms of prices, choice and services arising from increased competition.

As a result of spectrum blocks being potentially reserved for new entrants to the 900 MHz band, it is recognised that existing licensees may not acquire any spectrum, acquiring less spectrum than presently licensed, or acquire spectrum which could not be used at the time of their current licence expiry.

8.6.6 ComReg's Preliminary Views on Option C

ComReg considers that the advantages of Option C are as follows:

- Making available unused spectrum would increase efficiency in use of the 900 MHz band;

- If Block A was to be reserved for new entrants, it would leave three contiguous 10 MHz blocks of spectrum in the rest of the band which could be bid upon by existing and potential operators. If Blocks A and B were reserved for new entrants, this would allow for two contiguous 10 MHz blocks of spectrum in the rest of the band ;

- By creating 5 MHz blocks of spectrum it would minimise the risk of creating isolated and unused blocks of spectrum;

- Awarding all blocks in a single competitive process would assist applicants in acquiring spectrum blocks when and where they valued them most;

- It would provide a high degree of visibility and certainty to both existing licensees and potential operators as the competitive award process would be completed by late 2009. All stakeholders would then be fully aware of the outcome of the licence competition well in advance of the expiry of the first 900 MHz licences in May 2011, and the third license in June 2015. This would allow existing licensees sufficient time to make appropriate plans regarding the expiry of their existing licences; and

- Option C has a greater potential to promote competition by providing applicants with no current presence in the band with the greatest opportunity to acquire 900 MHz spectrum which could be used shortly after the completion of the licence competition in 2009.

However, ComReg recognises that there would be some potential drawbacks associated with Option C. In particular:

- By potentially reserving up to two blocks for new entrants, there would be a greater possibility that existing licensees may be unsuccessful in the licence competition;

- As is the case with Option B, the winner of Block C would not be able to use sub-block C2 (2.2 MHz in size) during the first six years of its licence and therefore would be unable to exploit the full benefits of Block C during this time. For example, sub-block C1 may be of limited value for the purposes of UMTS during this time (unless Meteor was the successful winner of Block C, as Meteor's current licence includes the spectrum in sub-block C2). ComReg notes that this potential inefficiency would however be relatively short-term;

- As is the case with Option B, and since all blocks would be awarded simultaneously, operators would not have subsequent opportunities to acquire additional spectrum in the 900 MHz band until the new licenses expire (on the assumption that spectrum trading was not possible over this time period).[46].

Q. 15. Do you support Option C? Please provide supporting arguments with your answer.

Q. 16. If you agree with option C, do you have views on the number of blocks that should be potentially reserved for new entrants? Please provide supporting arguments with your answer.

8.7 ComReg's Preliminary View on the Options

All three of the options presented in this paper have the potential to promote competition to different degrees and all options would result in more liberalised 900 MHz spectrum being made available. As such, all three options would likely result in considerable benefits for consumers. In addition, all three options would increase efficiency in use of the 900 MHz spectrum by making available unused spectrum.

The key difference between Option A and Options B and C is the timing of the award process. By staggering the award process over three different licence competitions, Option A has a number of advantages. It would enable participants to more closely correlate the value of the licences with the particular circumstances at the time of the award. In addition, phasing the award of new licences creates the opportunity for applicants to participate in a competitive award process at three different times, thus enabling applicants to compete for spectrum closer to the time which may suit their circumstances.

Options B and C, on the other hand, would involve holding a single award process for the entire 900 MHz band in 2009. This approach would provide greater visibility and certainty to stakeholders and up to two years in advance of the first licence expiry dates in 2011. While some spectrum would be available for immediate use after the completion

[46] See Section 6.4.1 for further detail on spectrum trading.

of the award process, the spectrum which is occupied by the existing licensees would not be available for use until after these licences expire.

Option C, whilst similar to Option B, would potentially reserve up to two 5 MHz blocks of spectrum for applicants not currently holding a 900 MHz licence. Further, these blocks (Blocks A and B) would be available for use shortly after the licence competition in 2009. In this regard, Option C is the most advantageous option in terms of meeting the objective of promoting competition. Option C could however constrain the amount of spectrum which could be made available for current licensees.

ComReg is of the initial view that Options B and C would be more advantageous in terms of achieving the objective of efficient use and management of spectrum as:

- In the long-term the full 900 MHz spectrum would be divided into seven 5 MHz blocks whereas Option A would result in only 6 such blocks. Options B and C would therefore have a lower risk of risk of creating stranded and unused blocks of spectrum;

- Holding a single licence competition for the entire 900 MHz band would create the possibility of up to three blocks of contiguous 10 MHz of spectrum, whereas Option A would likely lead to the creation of only two such blocks; and

- A single licence competition would open up the whole band in one competition with phased assignment. This may assist participants in acquiring spectrum blocks when and where they value them most.

Option B and C would also be more advantageous in terms of visibility and certainty to stakeholders by proposing to complete the competitive award process in 2009. This would be well in advance of the expiry of the Vodafone and O2 licences (May 2011), and the expiry of Meteor's licence (June 2015). It would allow existing licensees sufficient time to make appropriate plans regarding the expiry of their existing licences.

Notwithstanding the comments above, ComReg does not have a preference for any of the three options at this stage and welcomes views from all interested parties on the relative merits of each option, and their overall preference, or whether there are other viable options that ComReg should consider.

Q. 17. Do you believe there are other viable options that ComReg should consider? If so please explain these options in detail with supportive arguments.

9 Future Licensing of the 1800 MHz Band

9.1 Introduction

This section details the options ComReg is considering for future spectrum assignments in the 1800 MHz band. Existing 1800 MHz licences do not expire until 2014 and 2015 (see Section 4.2). It is not clear at this time whether there is a demand for additional 1800 MHz spectrum. For this reason, ComReg is requesting views on the timing of any competition for new 1800 MHz licences.

9.2 Demand for 1800 MHz Spectrum and Timing of Award Process

ComReg has seen very little demand being expressed to date for spectrum in the 1800 MHz band. All 1800 MHz licences expire in 2014 and 2015 and ComReg has seen little interest expressed in deploying non-GSM systems in the 1800 MHz band before new innovative wideband systems become available (expected circa 2012).

Therefore, ComReg proposes to hold a spectrum award process circa 2013 for 1800 MHz spectrum. Spectrum assignment options for such an award process include:

a) Competition for all currently unassigned 1800 MHz spectrum in 2 x 5 MHz blocks; or

b) Competition for all spectrum in the 1800 MHz band in 2 x 5 MHz blocks.

ComReg notes that as there is significantly more spectrum available in this band a higher spectrum cap would be justifiable than that proposed for 900 MHz spectrum. If ComReg believes there is sufficient demand for 1800 MHz spectrum, as evidenced by responses to this consultation, it will hold an earlier competition than that currently planned.

Q. 18. Do you agree with ComReg's assessment that there is insufficient demand for 1800 MHz spectrum assignments to warrant holding a competitive award process at this time? Please provide supporting arguments with your answer.

Q. 19. Do you agree that the holding of a spectrum award process for 1800 MHz spectrum circa 2013 would be appropriate? Please provide supporting arguments with your answer.

Q. 20. Do you agree with ComReg's view that the minimum spectrum block size should be 2 x 5 MHz blocks for future 1800 MHz assignments? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

10 Submitting Comments

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

The consultation period will run from 17 July to 11 September, 2008 during which the Commission welcomes written comments on any of the issues raised in this paper.

Having analysed and considered the comments received, ComReg will review the subject matter and publish a report in on the consultation which will, *inter alia* summarise the responses to the consultation.

In order to promote further openness and transparency ComReg will publish all respondents' submissions to this consultation, subject to the provisions of ComReg's guidelines on the treatment of confidential information.[47] We would request that electronic submissions be submitted in an-unprotected format so that they can be appended into the ComReg submissions document for publishing electronically.

Please note

ComReg is consulting on the basis of the draft EC Decision, and potential measures which may be implemented by ComReg pursuant to it, in order to provide stakeholders with an opportunity to provide their views in anticipation of the draft EC Decision coming into force.

ComReg understands that the draft EC Decision is in final draft form. However, in the event of material differences between it and the final EC Decision, ComReg reserves the right to amend its response to this Consultation, including putting forward and adopting new or amended proposals. ComReg may also conduct further consultations where it considers it appropriate and necessary to do so.

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

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

Such information will be treated subject to the provisions of ComReg's guidelines on the treatment of confidential information.[48]

[47] See ComReg Document 05/24.

[48] Ibid.

Annex A: Glossary

Table 3 – Governmental Bodies, Regulatory and Standardisation Organisations

CEPT	European Conference of Postal and Telecommunications Administrations
CoCom	Communication Committee of the European Commission
ComReg	Commission for Communications Regulation
ECC	Electronic Communications Committee in CEPT
EC	European Commission
EU	European Union
ITU	International Telecommunication Union
NRA	National Regulatory Authority
RSC	The Radio Spectrum Committee

Table 4 - Legislation & Regulations

1926 Act	Ireland's Wireless Telegraphy Act 1926
WT 1926	Ireland's Wireless Telegraphy Act 1926
2002 Act	The Communications regulation Act 2002
Authorisation Regulations	The Electronic Communities Network & Services Authorisation Regulations 2003
Framework Regulations	The Electronic Communities Networks and Services Framework Regulations 2003
The Minister	Minister for Communications, Marine and Natural Resources
The draft EC Decision	the EC's Radio Spectrum Committee ("RSC") approved the final draft of the EC's Decision on *the harmonisation of the 900MHz and 1800MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community*.
The draft WAPECS Recommendation	Draft Commission Recommendation on the non-technical conditions attached to the rights of use for radio frequencies under the regulatory framework for electronic communications in the context of the Wireless Access Policy for Electronic Communications (WAPECS)

Table 5 - Technical Terms

GSM	Global System for Mobile communications
2G	Second generation mobile services
2.5G	Third generation mobile services
3G	Third Generation Mobile Communications
Beauty Competition or Beauty Contest	A licence award method involving comparative evaluation of applications

ECN	Electronic Communication Network
ECS	Electronic Communication Service
FWPMA	Fixed Wireless Point to Multi-Point Access
FWALA	Fixed Wireless Access Local Area Network
GDP	Gross Domestic Product
Guard-band	An unused spectrum bandwidth separating channels to prevent interference.
GSM	Global System for Mobile communications
HSDPA	High Speed Downlink Packet Access
IMT	International Mobile Telecommunications (short for IMT-2000)
LTE	Long term Evolution (short for 3GPP LTE)
MMDS	Multipoint Microwave Distribution Service
MNO	Mobile Network Operator
MNP	Mobile Network Prefix
MVNO	Mobile Virtual Network Operator (a licensed mobile operator with no spectrum assignment)
MoU	Memorandum of Understanding
PMR	Private Mobile Radio
Porting	The process of transferring customers of one service provider onto another provider.
Service Neutrality	An approach to granting of licences without specifying the service to be provided.
Technology Neutrality	An approach to granting of licences without specifying the technology to be deployed.
UMTS	Universal Mobile Telecommunication Service
WAPECS	Wireless Access Policy for Electronic Communications Services

Annex B: Consultation Questions

Q. 1. Do you agree with ComReg's proposal to liberalise the existing GSM licences in the 900 MHz and 1800 MHz bands as soon as practicable after the EC Decision enters into force and subject to a number of conditions? Please provide supporting arguments with your answer.

Q. 2. Do you agree with ComReg's proposal to implement a service neutral licensing regime for existing spectrum assignments in the 900 MHz and 1800 MHz bands? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 3. Do you agree that a review of the annual licence fees is appropriate at this time to determine whether or not these fees should be adjusted to take into account the increased value associated with liberalised 900 MHz licences? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 4. Do you agree with ComReg's proposal that an auction mechanism is the most appropriate format for granting future 900 MHz spectrum licences? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 5. Do you agree with ComReg's proposal to place a cap of 2 × 10 MHz on the amount of spectrum that any one licensee can hold in this band? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 6. Do you agree with ComReg's proposal to implement a service neutral licensing regime for future 900 MHz spectrum assignments? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 7. In the absence of spectrum trading, what do you consider to be the most appropriate duration for new licences issued in the 900 MHz band? Please provide supporting arguments with your answer.

Q. 8. Do you agree with ComReg's proposal that a common termination date should be applied to all new licences in the 900 MHz band? Please provide supporting arguments with your answer.

Q. 9. Do you agree with ComReg's proposal to include a MVNO licence obligation in future 900 MHz spectrum licences? Please provide supporting arguments with your answer.

Q. 10. Do you agree with ComReg's proposal to introduce technology neutrality in the 900 MHz band? Please provide supporting arguments with your answer.

Q. 11. Do you agree with ComReg's proposal that the minimum spectrum block size should be 2 x 5 MHz for future 900 MHz spectrum assignments? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 12. Do you agree with ComReg's frequency co-ordination and interference mitigation proposal in the 900 MHz bands in relation to new licences? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Q. 13. Do you support Option A? Please provide supporting arguments with your answer.

Q. 14. Do you support Option B? Please provide supporting arguments with your answer.

Q. 15. Do you support Option C? Please provide supporting arguments with your answer.

Q. 16. If you agree with Option C, do you have views on the number of blocks that should be potentially reserved for new entrants? Please provide supporting arguments with your answer.

Q. 17. Do you believe there are other viable options that ComReg should consider? If so please explain these options in detail with supportive arguments.

Q. 18. Do you agree with ComReg's assessment that there is insufficient demand for 1800 MHz spectrum assignments to warrant holding a competitive award process at this time? Please provide supporting argument your answer.

Q. 19. Do you agree that the holding of a spectrum award process for 1800 MHz spectrum circa 2013 would be appropriate? Please provide supporting arguments with your answer.

Q. 20. Do you agree with ComReg's proposal that the minimum spectrum block size should be 2 x 5 MHz for future 1800 MHz spectrum assignments? Please provide supporting arguments with your answer and suggest a detailed alternative if applicable.

Annex C: Legislation

Wireless Telegraphy Act 1926

The possession and use of radio equipment in Ireland is governed by the Wireless Telegraphy Act 1926, (as amended) (the "1926 Act") which stipulates that an appropriate wireless telegraphy licence must be held, unless licence exempted.

ComReg is the authority charged with the authorisation of wireless telegraphy equipment in Ireland (with the exception of ships radio licensing).

An authorisation may take the form of either a licence or a licence exemption. ComReg may issue licences, and charge a prescribed fee in relation to the grant of licences, under the 1926 Act.[49] Section 6 of the 1926 Act permits ComReg to make regulations regarding a broad number of matters in relation to licences granted.

Relevant provisions of the Common Regulatory Framework for ECN and ECS

When proposing to take measures relating to the granting, varying or revoking of licences under the 1926 Act, ComReg must also comply with various regulations contained in the Electronic Communities (Electronic Communications Networks and Services (Authorisation) Regulations 2003 (the "Authorisation Regulations") and the Framework Regulations.

Granting of licences

Regulation 23(1) of the Framework Regulations requires that ComReg ensure that the allocation and assignment of radio frequencies is based on objective, transparent, non-discriminatory and proportionate criteria.

Regulation 9 of the Authorisation Regulations requires that ComReg establish open, transparent and non-discriminatory procedures for the granting of licences under the 1926 Act. Furthermore, it requires that ComReg must not limit the number of 1926 Act licences for the provision of ECN or ECS except where necessary to ensure efficient use of radio frequencies in accordance with Regulation 11.

Regulation 11 of the Authorisation Regulations provides that where ComReg proposes to issue licences under the 1926 Act for a particular class or description of apparatus for wireless telegraphy for the provision of an ECN or ECS and considers that the number of such licences ought to be limited, it shall, amongst other things, give due weight to the need to maximise benefits for users and to facilitate the development of competition and conduct an appropriate consultation.

[49] Section 5 of 1926 Act.

Variation of licences

Regulation 15 of the **Authorisation Regulations** provides that ComReg may amend the rights, conditions and procedures concerning 1926 Act licences only in objectively justified cases and in a proportionate manner, after appropriate consultation.[50]

ComReg must also have regard to the relevant regulations, made under the 1926 Act, under which existing 900 and/or 1800 MHz licences were issued. These are:

- Statutory Instrument (SI) No. 468/1997 - Wireless Telegraphy (GSM and TACS Mobile Telephony Licence) Regulations, 1997;
- SI No. 442/1999 - Wireless Telegraphy (GSM and TACS Mobile Telephony Licence) Regulations, 1999;
- SI No. 345/2002 - Wireless Telegraphy (Third Generation and GSM Mobile Telephony Licence) Regulations, 2002; and
- SI No. 339/2003 - Wireless Telegraphy (GSM Mobile Telephony Licence)(Amendment) Regulations, 2003.

Conditions of licences

Regulation 10 of the Authorisation Regulations provides that, *inter alia*, conditions attached to a 1926 Act licence shall be: objectively justified in relation to the ECN or ECS concerned; non-discriminatory; proportionate; and transparent.

In addition, when granting a 1926 Act licence, in relation to which the harmonised usage of the radio frequencies involved in accordance with any international agreements or European Community rules apply, Regulation 12 of the Authorisation Regulations restricts ComReg from imposing any further conditions, additional criteria or procedures which would restrict, alter or delay the grant of the licence concerned, provided that all conditions which may be specified by ComReg to be complied with by the holder of the licence have been satisfied.

[50] Furthermore, before making any amendment ComReg must give notice in such manner as it considers appropriate of its intention, inviting interested parties, including users and consumers, to make representations on the proposed amendments within such period (not, except in exceptional circumstances, being less than 28 days from the date of the notice) as may be specified in the notice, and have regard to any resulting representations made to it.

Annex D: Annex of the Final draft of Commission Decision on the harmonisation of the 900 MHz and 1800 MHz frequency bands

ANNEX

List of Systems referred to in Article 3 (2)

The following technical parameters shall be applied as an essential component of conditions necessary to ensure co-existence in the absence of bilateral or multilateral agreements between neighbouring networks, without precluding less stringent technical parameters if agreed among the operators of such networks.

Systems	Technical Parameters	Date
UMTS complying with UMTS Standards, as published by ETSI, in particular EN 301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11	1) A carrier separation of 5 MHz or more between two neighbouring UMTS networks; 2) A carrier separation of 2.8 MHz or more between a neighbouring UMTS network and a GSM network.	the date of entry into force of the Directive repealing the GSM Directive

Annex E: International Developments in Refarming the 900 MHz and 1800 MHz Bands

Finland: In November 2007, the Finnish regulator, Ficora, implemented a decision allowing the 900 MHz bands to be used by UMTS services. Finland was the first EU country to implement this.[51]

France: The regulator ARCEP has approved plans to allow GSM network operators to reuse their 900 MHz bands for 3G. ARCEP also announced that any new 3G entrant (4th UMTS licence) would also have access to 900 MHz once incumbent operators have returned spectrum. This would be made available in late 2009 outside densely populated areas, and in late 2012 for the rest of France[52].

Switzerland: The Swiss Federal Communications Commission (ComCom) has decided to renew the GSM mobile telephony licences (Orange, Sunrise and Swisscom Mobile) that are due to expire at the end of May 2008 for a further 5 year term. Furthermore, the new licences allow for the operation of UMTS in the GSM spectrum.[53] ComCom is re-assigning the allocated frequencies as well so that Orange will receive additional 900 MHz spectrum, reassigned from spectrum previously assigned to Sunrise and Swisscom. This is offset in the 1800 MHz frequency range where Orange must give up frequencies to Sunrise and Swisscom Mobile.

The United Kingdom: Ofcom issued a consultation on the liberalisation of the 900 and 1800 MHz bands in Sept 2007. In this document Ofcom said that if use of the spectrum was liberalised to allow for 3G and all of the spectrum remained in the hands of Vodafone and O2, these two operators would have a competitive advantage in providing mobile broadband services. Ofcom proposed to take away 2 x 7.5 MHz of spectrum in the 900 MHz band from each of Vodafone and O2, to package it into three lots of 2 x 5 MHz and to award the spectrum to other players. For the 1800 MHz band, Ofcom also proposed to liberalise the spectrum in the hands of the current licensees. The licences would be amended in 2008 or 2009 to permit the deployment of 3G services.

Portugal: In July 2007 Anacom the Portuguese regulator, removed the requirement that the 900 MHz band be exclusively reserved for GSM services. However, the regulator specified that technology neutrality in this band would be dependent on the review of the GSM Directive. In August 2007[54] Vodafone, TMN and Optimus were authorised to carry out UMTS trials in the 900 MHz band.

Germany: In April 2008 the German Regulator BNetzA published a new frequency usage plan, which allocates all mobile bands (in particular the 900 MHz, 1800 MHz and UMTS extension bands) for "wireless network access for providing telecommunications services". All available technologies may be used in these bands. The existing individual licences still oblige MNOs to use GSM in the 900 MHz band, but licensees could apply for amendments to their licences and could thereafter deploy 3G services.

[51] Reference: http://www.ficora.fi/en/index/viestintavirasto/lehdistotiedotteet/2007/P_10.html

[52] GSM/3G Market/technology Update – information paper from the GSA, 27 June 2008

[53] Reference: http://www.bakom.admin.ch/dokumentation/medieninformationen/00471/index.html?lang=en&msg-id=11585

[54] Reference: http://www.anacom.pt/content.jsp?contentId=507214

Annex F: Measuring the Welfare Effects of Changes in the Market Structure of the Mobile Market in Ireland

Introduction

The different licensing options discussed in Section 8 have the potential to affect the numbers of firms that could gain access to 900 MHz spectrum in the future and hence affect the level of competition in the mobile market.

This Annex sets out an analysis conducted by ComReg to illustrate how different numbers of firms produce different welfare outcomes. This analysis focuses on the potential benefits and costs that could accrue to consumers and operators and to welfare as a whole as a result of changes in the number of operators in the mobile market. To do so, ComReg uses a model to estimate the economic benefits that would accrue from having an additional player in the mobile market, and the losses that would result from having one less player in the mobile market. The model that ComReg has used draws from a similar assessment of welfare implications in the UK mobile market undertaken by Ofcom in 2007.[55]

Given the significant advantage that 900 MHz spectrum has over alternative spectrum bands for the provision of 3G mobile services, it is assumed for the purpose of the model that to be an effective competitor requires an operator to have 900 MHz spectrum. Therefore it is assumed that success or failure to obtain 900 MHz spectrum will impact on the number of mobile operators in the market.

There are currently four mobile operators in Ireland: Meteor, O2, Vodafone and 3 (excluding MVNOs) but only three of these operators currently have 900 MHz spectrum. For the purpose of this analysis, we have assumed a market structure of four firms. For simplicity and logic it has been assumed that the 900 MHz band will continue to be used solely for the provision of mobile services for the period of the model.[56]

[55] Further information on Ofcom's model is contained in Annex 10 of Application of spectrum liberalisation and trading to the mobile sector which was published in November 2007.

[56] This assumption has been made to simply the analysis, however as discussed in Section 7, new licenses for the 900 MHz spectrum are likely to be granted on a service neutral basis.

How the Model works

ComReg has used a standard Cournot model to estimate the welfare implications of a change in the number of players in the Irish mobile market over a period of 15 years.[57] The model compares the benefits to consumers (consumer surplus[58]) and the benefits to operators in terms of profits (producer surplus[59]) under two different scenarios: one where a firm exits the market and one where a new firm enters the market. To determine the welfare effect of a change in the number of firms, we compare a 'factual' to a 'counterfactual' under each scenario. The factual is based on a fixed number of firms in the market, while the counterfactual considers the case where the number of firms changes at a particular point in time.

Having specified all the inputs in the two scenarios (entry and exit) under the factual and counterfactual for each of the 15 years, the consumer surplus and producer surplus produced in each equilibrium are discounted using an appropriate discount rate. The difference between the discounted welfare values of the factual and counterfactual is the welfare effect of a change in the number of players. This is illustrated in Table 6 below.

Table 6: Welfare Effects of a Change in the Number of Market Players

Scenario 1: EXIT (4 to 3 firms)		**Scenario 2: ENTRY (4 to 5 firms)**	
Factual	**Counterfactual**	**Factual**	**Counterfactual**
4 firms in the market over 15 year period	In year 4, one firm exits the market, leaving 3 firms.	4 firms in the market over 15 year period	In year 4, a new firm enters the market.
Calculate consumer surplus, producer surplus.	Calculate consumer surplus, producer surplus.	Calculate consumer surplus, producer surplus.	Calculate consumer surplus, producer surplus.
Apply discount rate.	Apply discount rate.	Apply discount rate.	Apply discount rate.
Compare difference in consumer surplus, producer surplus		Compare difference in consumer surplus, producer surplus	

For each scenario the model establishes a Cournot equilibrium in every year of the 15 year period. This requires us to model demand for mobile services and the costs incurred by operators. To do so, we need a measure of price and quantity.

The price and quantity inputs to the model are as follows:

[57] The Cournot model is discussed in more detail later along with other alternative models which were considered. A 15 year period is used for the purpose of this model. See Section 7.3.2 for further discussion on the possible duration of new licenses in the 900 MHz band.

[58] Consumer surplus is an economic term used to define the amount that consumers benefit by being able to purchase a product for a price that is less than they would be willing to pay. On a standard supply and demand diagram with a linear demand curve, consumer surplus is the triangular area above the price and below the demand curve, since intramarginal consumers are paying less for the item than the maximum that they would pay.

[59] The producer surplus is the amount that producers benefit by selling at a market price that is higher than they would be willing to sell for. On a standard supply and demand diagram with a linear demand curve, producer surplus is the triangular area below the price and above the supply curve, since that is the minimum quantity a producer can produce.

- The price variable used in the model is annual Average Revenue Per User (ARPU) as reported in ComReg's Quarterly Report. The most recent estimate for ARPU is €43.45 on a monthly basis. This equates to around €521 per annum.[60]

- The quantity variable used in the model is total mobile subscriber volumes as reported in ComReg's Quarterly Report. There are currently around 5.4 million mobile subscribers in Ireland.

The following assumptions are made (for the base case)[61]:

1) Linear demand curve;

2) Elasticity of demand of 1;

3) Subscriber volumes and ARPU values will remain constant for the 15 year period under consideration in the model;

4) Demand conditions in the market and costs are independent of the number of players,[62]

5) The change in market structure (i.e. from 4 to 3, or from 4 to 5 firms) occurs in year 4 of the model.[63]

Using the price and quantity variables as discussed above, we use the Cournot model to back out marginal cost per subscriber. Thus the marginal cost per subscriber is determined as a result of calibration for each year of the model. This then allows us to estimate the values for producer surplus, consumer surplus and total welfare which we are ultimately interested in.

[60] Other measures of price were considered such as ARPM (Average Revenue Per Minute), however ComReg is of the view that ARPU is a reasonable measure of price for the purpose of this analysis.

[61] These assumptions are discussed in more detail later in this Annex.

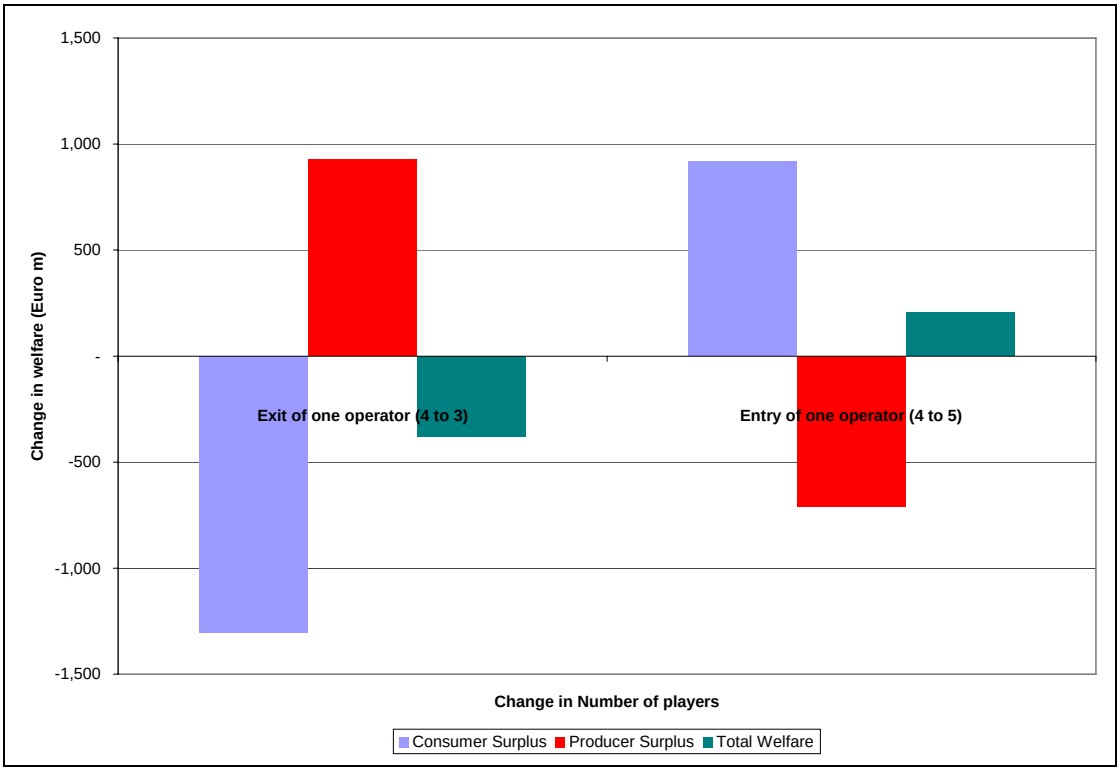
[62] This assumption is made to simplify the analysis.

[63] This was chosen at it broadly reflects the situation in Ireland whereby new licences in the 900 MHz band are likely to be awarded in this time frame.

Key Results

The key results of the model are illustrated in Figure 8 below.

Figure 8: Welfare Effects of a Change in the Number of Operators in the Mobile Market



Exit of an operator

The exit of one operator (4 to 3) results in the following effects (as illustrated by the left hand side of Figure 8):

- It is detrimental to **consumer welfare**, reflected in a loss to consumers of **€1,305 million** (shown in the blue bar);
- It is beneficial to the three remaining operators who gain **€926 million** (shown in the red bar) from the reduced competition; and
- Overall it results in a **total welfare loss** of **€379 million** (shown in the green bar).[64]

As the number of players in the market falls, consumers are left worse off as a result of higher prices, whilst firms have greater market power and make more profit.

[64] Figures are rounded to nearest million.

Entry of an operator

The entry of one new operator (4 to 5) results in the following effects (as illustrated by the right hand side of Figure 8):

- It is beneficial to **consumer welfare**, reflected in a gain to consumers of **€917 million**;
- It is detrimental to the existing operators who lose **€711 million** as a result of the greater level of competition; and
- Overall it results in a **total welfare gain** of **€206 million**.[65]

As the number of players in the market increases, consumers benefit from lower prices, whilst firms make less profit.

Assumptions

In conducting this analysis, ComReg has made the following assumptions:

1. Constant Price and Quantity

ComReg has used ARPU as a measure of price and subscriber volumes as a measure of quantity. Subscriber volumes continue to grow in Ireland although given the high penetration rate at present (121%[66]), it seems reasonable to assume that further growth is likely to be relatively low. ARPU on the other hand is falling slightly. Given the difficulty in accurately predicting how these variables will move over time, and given the fact that they may move in opposite directions, we make the assumption that subscriber volumes and ARPU values will remain constant for the 15 year period under consideration in the model.

2. Choice of Model: Cournot

ComReg has used a Cournot model for the purpose of this analysis. The Cournot model is an economic model used to describe industry structure. It makes the assumption that firms produce a homogeneous product. It is a quantity setting model in that it assumes that each firm chooses to produce a quantity of output taking the output of all other firms in the market as fixed. In other words, firms simultaneously decide what quantity to produce. The prediction of the model is that all firms will choose Nash equilibrium output levels. This means that no firm can become better off by changing their output level.

ComReg also considered alternative models in particular the differentiated Bertrand model. This assumes that firms produce differentiated products and that firms compete in price, and choose their respective prices simultaneously.

In the mobile market, firms compete on the basis of price rather than quantity. However given that there are substantial fixed costs involved in rolling out a mobile network,

[65] Figures are rounded to nearest million.

[66] See ComReg Document 08/43.

ComReg felt it was appropriate to apply a Cournot model as this takes account of the fact that firms may set capacity in the first phase, and prices in the second phase.[67]

If further evidence comes to light as a result of this consultation that suggests that a Cournot model is inappropriate in this context and that an alternative model is preferable, ComReg may consider revisiting its approach.

3. Price Elasticity of Demand = 1

Price elasticity of demand measures the effect of price changes on quantity.

- The demand for a good is relatively inelastic (between 0 and 1) when the quantity demanded does not change much with changes in price. Goods and services for which no substitutes exist are generally inelastic.

- Demand for a good is highly elastic (greater than 1) when the quantity demanded is strongly affected by changes in price. When the elasticity is greater than 1, this means buyers are highly responsive to changes in price. Higher elasticities mean there are greater numbers of substitutes for the product in question.

- When the price elasticity of demand for a good is unit elastic (equal to 1), the percentage change in quantity is equal to that in price.

There are currently no widely accepted estimates of demand elasticities for mobiles in Ireland. ComReg is of the view that assuming an elasticity of 1 is appropriate. While the elasticity of mobiles may have been higher in the past, mobiles are now generally seen as necessities, and there are limited substitutes available for consumers in terms of functionality and mobility. In addition, Ofcom also chose an elasticity of 1 in the base case of their model.

4. Linear demand curve

A linear demand curve is a common assumption used in empirical analysis primarily for reasons of simplicity. An alternative is a log linear demand curve where the elasticity of demand remains constant. ComReg is of the view that a linear demand curve is appropriate in this case.

5. ***Social discount rate = 5%***

The discount rate is a rate of return used to convert a future monetary sum into a present value. Various discount rates can be used depending on the nature of the analysis however for the purpose of this model, we have taken 5% which is the social discount rate recommended by the Department of Finance.[68]

Key sensitivities

[67] See Kreps, D., and J. Scheinkman (1983) Quantity Precommitment and Bertrand Competition Yield Cournot Outcomes. *Bell Journal of Economics* 14: 326-337.

[68] See http://www.finance.gov.ie/viewdoc.asp?DocID=1216 and

http://www.finance.gov.ie/viewdoc.asp?DocID=2968&CatID=16&m=&UserLang=GA&StartDate=01+January+2005

ComReg has undertaken a number of sensitivity checks. The results of the model are sensitive to key inputs such as the assumed elasticity of demand and the appropriate proxy for the competition impact (exit of one operator or entry of a fifth operator).

Discount rate

The base case of the model assumes a discount rate of 5%. Reducing the discount rate below 5% results in greater welfare effects. For example, if a discount rate of 2.5% is used, this results in changes to the base case as illustrated in Table 7 below.

Table 7: Sensitivity Check – Changing Discount Rate from 5% (base case) to 2.5%

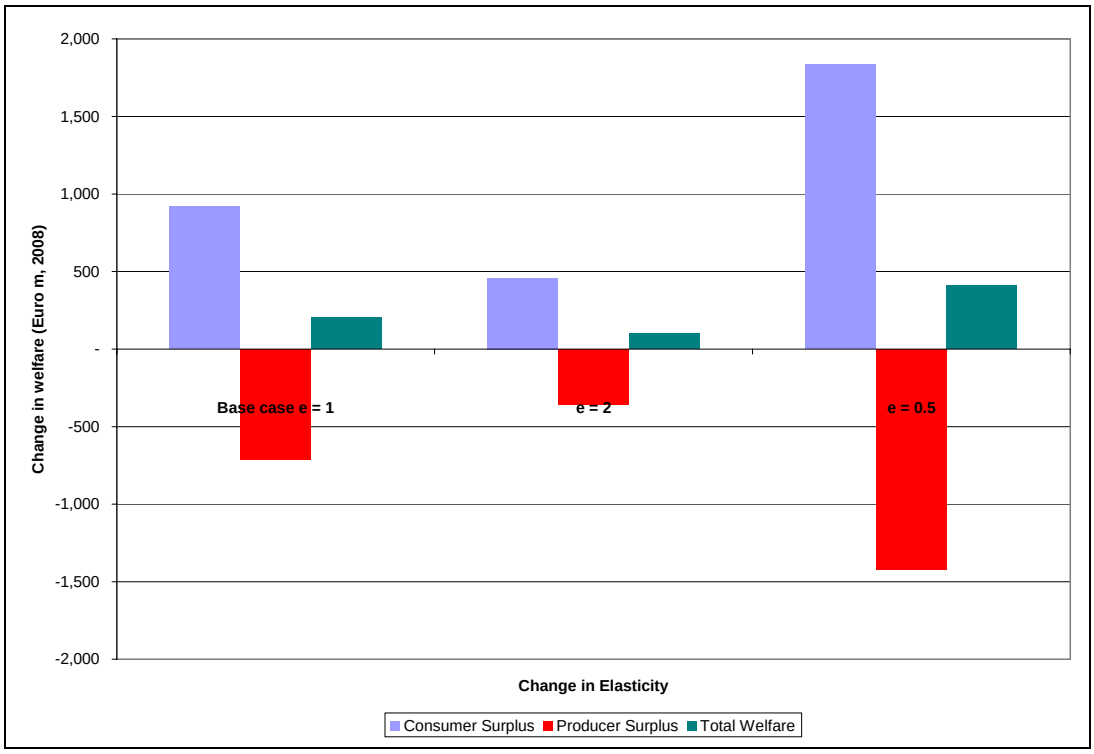
Change in Number of Operators	Discount Rate	Consumer Surplus (million)	Producer Surplus (million)	Total Welfare (million)
4 to 3	5% (base)	-€1,305	€926	-€379
	2.5%	-€1,624	€1152	-€471
4 to 5	5% (base)	€917	-€711	€206
	2.5%	€1,141	-€885	€256

Demand elasticity

The base case of the model assumes that the elasticity of demand is equal to 1. The higher the elasticity of demand, the lower the welfare effects of entry/exit. The lower the elasticity of demand, the higher the welfare effects of entry/exit.

Taking the case of the entry of a new operator (4 to 5), with a higher elasticity (say 2), this results in an overall welfare gain of €103 million, which is half the welfare gain associated with an elasticity of 1. With a lower elasticity (say 0.5), this results in significantly higher benefits to consumers, operators are worse off, and the overall welfare effect goes from €206 million to €412 million. This is illustrated in Figure 9 below.

Figure 9: Sensitivity Check – Changing Elasticity of Demand (from 4 to 5 firms)



Market structure

The base case of the model assumes that entry/exit would occur in the fourth year of the model, as a license competition of some description is due to be held around this time due to the upcoming expiry of current licences. The model can however accommodate the change in market structure occurring in any year. In the 4 to 3 case, the effect on total welfare of bringing forward the assumed exit of a player in the counterfactual to year 2 rather than year 4 results in an additional welfare loss of €88 million, on top of the €379 million welfare loss referred to above.

Dynamic Effects

Greater competition has the potential to generate both static and dynamic effects. The preceding discussion has focused on the static effects of changes in market structure. These effects are driven by changes in the level of output, and hence prices as a result of a change in the level of competition in the market. Dynamic effects on the other hand pick up the potential impact that changes in the level of competition may have on the incentives of firms in a market to innovate and improve the services they offer. Dynamic effects are more complicated to model and thus estimating the likely welfare effects associated with such dynamic effects is a difficult task. Accounting for the dynamic benefits of greater competition will result in an uplift to the consumer welfare figures presented in the 4 to 5 firm case.

Conclusion

This model demonstrates the welfare implications from a reduction in competition are difficult to estimate with confidence. The model has shown that greater competition in the mobile market can lead to increases in consumer surplus in the region of €917 million.

An issue that should be considered is whether consumer surplus and producer surplus should be given equal weight. Given ComReg's statutory objective to protect end users of spectrum, it could be argued that greater weight should be placed on consumer surplus and that a policy change that results in losses to consumer surplus should be treated very seriously but less so if they result in reductions to producer surplus.

Regardless of the value that is placed on consumer surplus vis-à-vis producer surplus, the model demonstrates that the more operators in the market, the greater the consumer surplus, and that the amounts involved are significant. Therefore the number of firms in the market is very important. As such, choosing an option which could facilitate competition and new entry into the mobile market is important hence ComReg's preference for spectrum aggregation limits. ComReg accepts that a number of assumptions have been made in developing this model but it does show that the impact on consumers is very large indeed. The model illustrates the value of pursuing an option which maximises the potential number of operators in the 900 MHz band.