Commission for
Communications Regulation

Consultation Paper

800 MHz, 900 MHz & 1800 MHz spectrum release

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All responses to this consultation should be clearly marked:- "Reference: Submission re ComReg 10/71" as indicated above, and sent by post or e-mail to arrive on or before 5pm on 15 October 2010 to:

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

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1 Introduction

In 2008, ComReg commenced a process to review and consult in relation to current and future spectrum assignments in the 900 and 1800 MHz frequency bands, as well as to accommodate both liberalisation of the use of spectrum in those bands and the issuing of new, liberalised licences following expiry of certain GSM licences in the 900 MHz band that were, and are, approaching expiry.

Following the publication of two previous consultation papers[1], in December 2009, ComReg published its response and further consultation on liberalising the future use of the 900 MHz and 1800 MHz Spectrum bands ("Document 09/99")[2]. During this consultation process[3], ComReg has consulted on and set out its views on a number of principles in implementing the release of the 900 MHz band including:

- technology and service neutral licences;
- the inclusion of licence conditions in all new liberalised licences;
- the setting of a 2 x 10 MHz spectrum cap in respect of the proposed 900 MHz competition;
- setting minimum block sizes of 2 x 5 MHz;
- establishing compatibility between new and legacy services;
- setting a finite licence duration of 15 years and shorter licences to align start dates of all 15 year licences;
- ensuring that proposed licenses would co-terminate;
- the use of a competitive process (in this case an auction) to assign spectrum rights of use;
- the use of a benchmarking methodology to establish minimum prices for spectrum rights of use; and
- the exclusion of mobile virtual network operator ("MVNO") commitments in licence conditions for new liberalised licences.

Additionally, a non-exhaustive list of the issues that have arisen in the consultation process to date are set out in Annex 1 to this document.

ComReg has further noted that a number of parties, in responding to ComReg's consultations, have called for a multiband approach to the release of spectrum as part of the 900 MHz liberalisation process, including but not limited to the Digital Dividend Spectrum at 800 MHz, the 1800 MHz band and the 2.6 GHz band.

Throughout this consultation process ComReg has acknowledged the relevance of "Digital Dividend" spectrum and, in particular, the 790 – 862 MHz sub-band ("the 800 MHz band") for the future availability of advanced mobile services and the potential for its use in tandem with the 900 MHz band. However, at the time Document 09/99 was published in December, 2009, two key factors inhibited a joint release of these bands: the lack of

[1] ComReg Documents 08/57 and 09/14.
[2] ComReg Document 09/99 - Response to Consultation 09/14 & Further Consultation - Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum bands. Published December 2009
[3] Consultation Documents 08/57, 09/14 and 09/99.

certainty regarding the date for the switch-off of analogue terrestrial television (known as Analogue Switch-Off or "ASO") in Ireland; and the requirement to provide spectrum in the 800 MHz band to a commercial digital terrestrial television ("DTT") operator in the period preceding ASO. Further, ComReg was also aware that the European Commission's roadmap for the Digital Dividend had yet to be confirmed at that point.

While preparing the response to Document 09/99, ComReg became aware of potentially significant changes concerning broadcasting services in Ireland. Firstly, the Minister for Communications, Energy and Natural Resources ("the Minister"), announced that ASO will occur during Quarter 4 of 2012 (in conjunction with analogue switchover in Northern Ireland).[4] Secondly, on 5 August 2010, the Broadcasting Authority of Ireland ("BAI") published a statement regarding the conclusion of its commercial DTT multiplex licensing process. In particular, the BAI stated that it will not be feasible to introduce commercial DTT as originally intended and certainly not in advance of ASO.[5] Accordingly, there will not be any digital broadcasting requirement for the use of the 800 MHz spectrum in advance of ASO.

It is also expected that the European Commission ("EC") will shortly publish its Radio Spectrum Policy Programme which in the call for responses[6] "invites the European Parliament and Council to consider that co-ordinated availability of the 800 MHz band for electronic communication services ("ECS") other than broadcasting should be achieved by all EU Member States by 2015".

Collectively, these announcements provide greater clarity on the timelines for the availability of spectrum in the 800 MHz band in Ireland - which ComReg currently believes to be early 2013 ("800 MHz Availability")[7]. Accordingly, ComReg believes that it is appropriate to now consider the release and assignment of rights of use of spectrum in the 800 MHz band together with the 900 MHz band (see ComReg's Information Notice 10/59 for further information)[8]. This would mean that 130 MHz of sub-1 GHz spectrum would be available on a liberalised basis, which would have the potential, amongst other things, to increase competition in the relevant mobile markets in Ireland for the benefit of consumers, and could provide opportunities for innovation in advanced mobile broadband services and/or greater availability of these services at lower costs.[9]

[4] New €70 million digital network to be built by RTÉ, including new satellite service Dublin, 29 July 2010 – available at www.dcenr.ie . See also Statutory Instrument No. 85 of 2010 on "RTÉ (National Television Multiplex) Order 2010", which specifies 31 October 2010 as the date on which the national television multiplex is required to be operational and available free-to-air to approximately 90% of the of the population.

[5] BAI Statement on Conclusion of Commercial DTT Multiplex Licensing Process – published 5 August 2010 – available at http://www.bai.ie/ .

[6] RSPG10 – 323 – Draft RSPG opinion on the Radio Spectrum policy Programme, 18 March 2010.

[7] ComReg is cognisant that the date of ASO and therefore the 800 MHz availability is contingent on factors external to it, including the widespread availability of the other television platforms to replace the analogue terrestrial television service and the awareness of consumers of these alternatives. ComReg is committed to providing as much regulatory certainty as possible on the availability of the 800 MHz band and will endeavour to keep stakeholders updated and informed on this issue, and any contingency plans to address availability delays, throughout this process.

[8] ComReg Document 10/59, Update on the Availability of Ireland's "Digital Dividend" and the 900 MHz Band Liberalisation Consultation Process, published 29 July 2010.

[9] See Chapter 2 Section 2.4.1 on "Benefits of combining the 900 and 800 MHz in to a single award process.

In light of this greater clarity, ComReg considers it necessary to conduct the consultation set out in this paper, which will assist ComReg in considering (1) the most appropriate process by which to release spectrum in both the 800 MHz and 900 MHz bands, and (2) assign rights of use[10] of same, noting that there are a number of issues that would need to be addressed in facilitating any joint release of, and assignment of rights of use in, these spectrum bands. These include arrangements to address the interim issues that would arise in the period between the expiry in May, 2011 of two existing GSM 900 MHz licences and the expected 800 MHz availability, as well as the need for arrangements that would allow all successful licensees in these bands to plan their networks and install equipment during this transitional period.

Further, and in line with its earlier statements[11] ComReg will also give consideration to the matter of the award of rights of use of spectrum in the 1800 MHz band, and this is addressed in Chapter 2 below.

ComReg sought independent economic and technical advice to inform its analysis of the various issues associated with a potential joint release of these spectrum bands. This consultation paper has been informed by this advice and the advice is contained in the supplementary reports published at the same time as this document, namely:

- DotEcon report entitled "Award of Liberalised Spectrum in the 900 MHz and other bands", dated September 2010[12] ("DotEcon Main Report");
- DotEcon report entitled "Award of 800 MHz and 900 MHz spectrum – Update report on benchmarking", dated September 2010[13] ("DotEcon Benchmarking Report"); and
- Joint report by Red-M and Vilicom entitled "Retuning and Relocating GSM900 Spectrum Assignments in Ireland", dated September 2010[14] ("Red-M/Vilicom Report").

ComReg is cognisant of, and grateful for, all the supporting material[15] and comments forwarded to date, and, to the extent that they remain applicable, intends to rely upon as much of this material as possible in the development of any combined spectrum auction. ComReg has taken all of this into account in forming its views in this consultation paper.

There are a number of consultation questions throughout this document. Responses must be received by ComReg before 5p.m. on 15 October, 2010.

[10] ComReg notes the amendments to the EC Framework Directive (as recently amended but yet to be transposed) which introduces, among other things, the trading of spectrum rights of use between undertakings in relation to particular bands that are to be agreed at an EU level. Spectrum trading is a good means of moving particular spectrum through various uses as, in theory, firms that are not exploiting their spectrum rights intensively are likely to make trades with firms that believe that they have a better use for this spectrum. This is likely to be particularly relevant for spectrum bands that are not harmonised at an EU level. ComReg has long supported spectrum trading in these circumstances subject to the introduction of an appropriate legislative framework for same and the normal competition controls.

[11] See section 6.2 of Document 09/99.

[12] DotEcon Main Report, Document number 10/71a

[13] DotEcon BenchmarkingReport, Document number 10/71b

[14] Red-M/Vilicom Report, Document number 10/71c

[15] ComReg Documents 09/14s, 09/51s, 09/73 and 10/21R.

1.1 International Updates

ComReg has continued to monitor developments relating to the re-farming/liberalisation of the 900 MHz and 800 MHz band across Europe, and a summary of relevant developments relating to the refarming/liberalisation activities in other Member States since the publication of Document 09/99 is published for information in Annex 2.

Readers will note the variation in approaches adopted in addressing the re-farming/liberalisation of the various bands, and the key issues (namely, the format adopted for the release of spectrum and spectrum rights of use, and the impact, or otherwise, of consumer disruption) are briefly summarised there.

1.2 Structure of this Document

The remainder of this document is structured as follows:

- **Chapter 2** considers Commission Decision 2010/267/EU on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union, provides more detail on the recent developments in Ireland, considers the justification and benefits of combining the award of rights of use of spectrum in both the 800 MHz and 900 MHz bands, and considers whether the 1800 MHz band should also be included in a joint award process;

- **Chapter 3** details ComReg's proposals for dealing with the issues arising from the expiry of two GSM 900 MHz licences in May 2011;

- **Chapter 4** discusses the details of ComReg's proposals for a joint award of rights of use of spectrum in the 800 MHz and 900 MHz bands and sets out ComReg's proposals in relation to a spectrum cap, the envisaged award process, auction fees and ongoing licence fees;

- **Chapter 5** examines the need, if any, for transitional arrangements following the completion of the proposed auction process, as well as the form and function of any such arrangement(s);

- **Chapter 6** provides information on the next steps envisaged by ComReg in bringing this matter to conclusion;

- **Annexes:**

  - **Annex 1** – set out a non-exhaustive list of the issues that have arisen in the consultation process to date;

  - **Annex 2 -** provides details of relevant developments relating to the re-farming/liberalisation activities in other Member States in the 800 MHz and 900 MHz bands since the publication of Document 09/99;

- **Annex 3** – provides a list of ComReg documents relevant to this consultation; and

- **Annex 4 –** provides a list of the questions contained in this consultation document.

2 Access to Digital Dividend

2.1 Introduction

This chapter considers the high-level issues surrounding the joint award of rights of use of spectrum in the 900 MHz and 800 MHz bands, and:

- provides a brief update on ComReg's work to date on the Digital Dividend in Ireland, highlighting the six high-level guiding principles consulted upon and identified by ComReg as part of Ireland's roadmap to Digital Dividend[16];
- outlines the European harmonisation measures adopted for the 800 MHz band and in light of this proposes a Frequency Division Duplex ("FDD") frequency arrangement for this band in Ireland;
- discusses the benefits and drawbacks of a joint award of rights of use in, and joint availability of, the 800 MHz and 900 MHz bands, and sets out ComReg's views in this regard; and
- considers the inclusion of the 1800 MHz band and other spectrum bands in a joint award process for rights of use in the 800 MHz and 900 MHz spectrum bands.

2.2 Guiding principles for Digital Dividend in Ireland

In March 2009 ComReg published a consultation document on the Digital Dividend in Ireland[17]. In its response to same[18], in October, 2009, ComReg set out six high-level guiding principles for ComReg to take into consideration when addressing the Digital Dividend in Ireland. These principles are:

1. Digital Dividend spectrum should be managed effectively and used efficiently in order to maximise the total benefits to Ireland, which are expected to be significant both in terms of social and economic value;
2. A "mixed approach" to spectrum allocation in the UHF band should be adopted, whereby spectrum in the band could potentially be assigned to both broadcasting and non-broadcasting uses;
3. Ireland should harmonise its Digital Dividend frequencies in the 800 MHz band with other large markets to maximise the benefits;
4. Service and technology neutrality principles should be applied to help stimulate efficient use of the Digital Dividend spectrum, resulting in a greater abundance of spectrum for services to end-users and opportunities for innovation;
5. In so far as would be practicable, delays in accessing Ireland's Digital Dividend spectrum should be minimised in order to bring the benefits to Irish consumers and citizens as soon as possible; and

[16] ComReg Consultation Document 09/81.
[17] ComReg Document 09/15.
[18] In its response to Digital Dividend Consultation (ComReg Document 09/81), ComReg stated that it "proposes to further develop its position on Ireland's digital … having regard not only to the matters raised in this paper but also to developments at a national and international level."

6. Ireland's natural advantage of a relative abundance of uncongested spectrum bands should continue to be exploited through Test and Trial Ireland[19], rather than through the reservation of Digital Dividend spectrum for experimental purposes.

In light of the recent developments referred to in Chapter 1, and given the moves to harmonise the use of this band at an EU level, the guiding principles numbered (3) and (5) above are now of particular relevance in so far as they relate to the 800 MHz band. While ComReg acknowledges that there may be additional spectrum to be realised as part of Ireland's Digital Dividend, this consultation paper focuses on the principle of making the 800 MHz band available as soon as possible and on the relationship that might appropriately be identified between the early making-available of such spectrum and ComReg's ongoing 900 MHz spectrum-use liberalisation consultation.

2.3 The 800 MHz band

2.3.1 European harmonisation activities

Across Europe there has been much debate and discussion about the realisation of the Digital Dividend and the benefits that it can bring to the economy and end-users. Arising from activities at the EU-level,[20] and following mandates by the European Commission ("EC") to the European Conference of Postal and Telecommunications Administrations ("CEPT") in relation to harmonisation options for the Digital Dividend, the EC has issued:

- A Recommendation and Communication to the European Parliament and Council on 28 October 2009 ("EC 800 MHz Recommendation") ;[21] and
- A Decision on the 800 MHz band in 2010 ("EC 800 MHz Decision").[22]

The EC 800 MHz Recommendation addressed, amongst other things, setting a target date for the switch-off of analogue TV transmissions (namely 1 January 2012), encouraging the availability of the 800 MHz band (but on a non-mandatory basis) for electronic communication services (ECS), and calling for Member States to refrain from actions that might hinder the adoption of the 800 MHz band as a harmonised band in the EU.

The EC 800 MHz Decision is the cornerstone of the EC's roadmap to the Digital Dividend and aims to harmonise the technical conditions for the 800 MHz band in the European Union. It is important to note that the EC 800 MHz Decision applies only to the 800 MHz band and not to other Digital Dividend spectrum that may become available over time. When a Member State designates or makes available the 800 MHz band for networks other than high-power broadcasting networks, the EC 800 MHz Decision obliges that member state to allow the 800 MHz band to be used for terrestrial systems capable of providing ECS in compliance with the parameters set out in the Annex to the Decision. The Annex sets out a number of technical conditions in the form of frequency arrangements and

[19] See Test and Trial Ireland at www.testandtrial.ie .

[20] European Commission study 'A European approach to the digital dividend' September 2009.

[21] http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/topics/reorg/dividend/index_en.htm

[22] EC Commission Decision 2010/267/EU: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32010D0267:EN:HTML .

block-edge masks (BEMs), and these technical conditions provide the basis for the 800 MHz technical conditions to be applied in Ireland.

2.3.2 Proposed frequency arrangements for the 800 MHz band in Ireland

The frequency arrangements for the 800 MHz band offer two principal arrangements that could be adopted: a Frequency Division Duplex (FDD) arrangement and a Time Division Duplex (TDD) arrangement. While the EC 800 MHz Decision allows a technology and service neutral approach to be adopted, the Annex and the Recitals to this Decision suggest a preference for FDD operation, but also recognises that alternative frequency arrangements can also be deployed.

This preference accords with the position of the CEPT, and the EC 800 MHz Decision takes the CEPT technical harmonisation reports into account. In this regard it is noted that CEPT Report 31[23] concludes that the preferred frequency arrangement for the 800 MHz band should be based on the FDD mode, and recital 13 to the EC 800 MHz Decision references this CEPT Report.

Additionally, ComReg is aware that a number of Member States are preparing for, or have held, competitions for the 800 MHz band and all have chosen or have proposed a FDD band plan arrangement for various reasons, including the availability of FDD equipment and harmonisation with neighbouring countries.[24] Thus, moving forward on the basis of a FDD band plan is consistent with ComReg's regulatory objective to contribute to the development of the internal market.

In light of the EC's 800 MHz Decision preference for FDD, the position taken by a number of Member States in this regard and the practical issues outlined above, ComReg therefore proposes that the duplex mode of operation for the 800 MHz band should be FDD. Figure 1 below sets out the proposed frequency arrangements.

790-791	791-796	796-801	801-806	806-811	811-816	816-821	821-832	832-837	837-842	842-847	847-852	852-857	857-862
Guard band	Downlink						Duplex gap	Uplink					
1 MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

Figure 1: The proposed frequency arrangements for the 800 MHz band in Ireland
&
The preferred frequency arrangement as set out in CEPT Report 31 and the EC Decision.

ComReg's proposal in this regard would have the following characteristics:

- A block size of 5 MHz; and

[23] Frequency (channelling) arrangements for the 800 MHz band (Task 2 of the 2nd Mandate to CEPT on the digital dividend)
[24] As outlined in Annex 2 to this paper, Denmark, France, Germany, Spain and Sweden have chosen or proposed a FDD band plan arrangement.

- Six paired blocks of 2 x 5 MHz that would be available for use.

Additionally, as any terrestrial electronic systems deployed in the 800 MHz spectrum band are required to comply with the technical conditions of the EC 800 MHz Decision, ComReg believes that the BEM set out in the EC 800 MHz Decision would be sufficient to ensure sufficient coexistence at a national level and thus there would not be a need to set aside any guard bands other than that identified in Figure 1 above.

ComReg is aware that part of the 800 MHz band (namely 854-862 MHz or Channel 69), is currently available for use by the Programme Making and Special Events (PMSE) users on a non-protected non-interference basis. In April 2010 ComReg issued a consultation on the future availability of spectrum for PMSE. [25] The response to this consultation was issued in August 2010, and this paper states that, as a replacement to Channel 69, ComReg will make Channel 38 (606 – 614 MHz) available exclusively for Wireless Microphones and In ear Microphones (IEMs) after the Digital Switchover occurs.[26]

Q. 1: ComReg proposes that new services deployed in the 800 MHz band in Ireland employ Frequency Division Duplex mode of operation. Do you agree with ComReg's proposal? Please provide reasons for your view.

Q. 2: ComReg proposes that the block edge masks proposed in the Annex to EC Decision 2010/267 (EC 800 MHz Decision) be applied to licences in the 800 MHz band in Ireland. Do you agree with ComReg's proposal? Please provide reasons for your view.

2.4 A joint award process for the 800 MHz and 900 MHz bands

As outlined in ComReg's previous 900 MHz consultation documents, ComReg has proceeded to date on the basis that the 900 MHz band should be liberalised to ensure that the benefits of the liberalised band are realised as early as possible. With the expiry of two GSM licences in mid-2011, this was seen as an appropriate time to commence new liberalised licences in the band (taking into account Meteor's later licence expiry and corresponding "early liberalisation option").

In December 2009 when Consultation document 09/99 was published, ComReg was cognisant that while the release of Digital Dividend spectrum would provide an excellent opportunity for advanced mobile services in the future, the timescales for the availability of the 800 MHz band were uncertain. No firm date for ASO had been established and the BAI process for the award of commercial DTT multiplexes was also still ongoing and thus it was envisaged that commercial DTT services may be occupying the 800 MHz band until ASO. ComReg therefore, did not regard it as appropriate to delay the release of the 900 MHz band on a liberalised basis to enable a combined award of spectrum given the uncertainty surrounding the availability of the 800 MHz band.

[25] See ComReg Document 10/37.

[26] See ComReg Document 10/68 – ComReg notes that Ofcom, the UK regulator and our nearest neighbour, has adopted a similar approach.

The developments regarding the 800 MHz band outlined in Chapter 1 have significantly changed the landscape and the context in which ComReg had been working. It is clear therefore that ComReg should take into account these recent developments in forming its decision on the appropriate scope of its proposed process for the award of liberalised spectrum. For this reason, ComReg is of the view-in-principle that it is no longer appropriate to maintain its previous position of considering the award of spectrum rights of use in the 900 MHz in isolation and is instead considering combining both the 800 and 900 MHz bands in a single award process. The following sections discuss some of the benefits and drawbacks of combining the award of the 800 MHz and 900 MHz spectrum bands that have been considered by ComReg in reaching its proposal in this regard.

2.4.1 Benefits of combining the 800 and 900 MHz into a single award process

1. Substitutability of the 800 and 900 MHz bands

The developments in relation to the 800 MHz band discussed above provide an opportunity for Ireland to utilise this band for purposes other than broadcasting. Both sub 1 GHz bands have similar radio propagation characteristics and can be used to provide terrestrial electronic communications services, including mobile voice, messaging and broadband services. Both are well suited to providing wide-area coverage and in-building penetration. Further, an important consideration in the Irish context is that the long distance propagation characteristics of both the 800 MHz and 900 MHz bands are ideal for covering sparsely populated areas. As is the case with 900 MHz, the costs involved in using 800 MHz spectrum with which to roll out a new mobile network are substantially lower than using other spectrum bands, such as 2100 MHz.[27] These cost savings relate to capital expenditure (e.g. fewer base stations, antennas and sites required to roll out a network) and operational expenditure (e.g. site rental fees, less electricity required to power fewer base stations).[28] Thus, this substitutability means that both bands can be used by operators to serve the same mobile retail markets, including mobile broadband.

In line with the move towards a service- and technology-neutral approach to licensing by regulators, spectrum in different bands can be used to provide similar services. An increasing number of bands are being harmonised for use for electronic communications across the EU (such as the 800 MHz sub-band) and equipment for providing similar services is slowly becoming available across multiple bands. For instance, there is evidence from other countries that operators are already in the process of rolling out new mobile networks (LTE or 3G) in both these bands. In the 900 MHz band, a number of

[27] A report prepared by Vilicom in 2008 for ComReg estimated that the use of 900 MHz as opposed to 2100 MHz could result in cost savings of 35% if an operator was to build a greenfield 3G network. Given the similar propagation characteristics of the 800 MHz band, similar conclusions can be drawn in relation to the cost savings achievable using the 800 MHz band. See ComReg Document 09/14a.

[28] See page 5 of Analysys Mason report at: http://www.analysysmason.com/PageFiles/14182/GSM_refarming.pdf .

operators[29] have announced plans for deploying 3G services, while in the 800 MHz band the main developments to date have occurred in Germany where Vodafone, Telefonica O2 and Deutsche Telekom (T-Mobile) have all announced plans to deploy LTE networks in the 800 MHz band.[30] Furthermore, a number of countries are carrying out tests of LTE networks in the 800 MHz band.[31]

2. *Efficient spectrum management*

As the 800 MHz and 900 MHz bands are close substitutes, given their similar propagation characteristics and suitability for the provision of similar services, and both bands are available in a relatively similar timeframe this makes them suitable for a joint award process. Combining both bands in the same award process would allow for substitution possibilities for bidders as it is quite possible that an operator over time would be willing to switch between blocks of spectrum in the 800 MHz and 900 MHz band depending on their relative price.

Awarding rights of use in the two bands separately in a sequential process would not allow bidders the same degree of substitution possibilities and the flexibility to seek different mixes of spectrum across bands. Any bids made by operators in an earlier auction would have to be based on expectations about the value of spectrum in the other band in a subsequent award process; such expectations may not be correct, and, ultimately, this could seriously inhibit substitution between the two bands and fail to encourage the efficient use and ensure the effective management of the spectrum. A joint award removes much of this uncertainty by allowing operators to bid on both bands simultaneously.

The sequential award of highly substitutable spectrum is likely to lead to inefficient outcomes. In its report[32], DotEcon refers to the situation in Switzerland where spectrum was awarded in a sequence of auctions in 2001 for WLL licences which resulted in very different prices for closely similar lots. This would suggest an inefficient outcome as

[29] http://www.fiercewireless.com/europe/story/vodafone-germany-race-deploy-rural-lte-network/2010-07-21?utm_medium=nl&utm_source=internal .
See also http://www.fiercewireless.com/europe/story/first-operational-lte-base-station-german-operator/2010-09-01?utm_medium=nl&utm_source=internal .

[30] According to a recent article in Fierce Wireless Europe, O2 has announced its plans to build a pilot LTE network in the 800 MHz band, "By the end of this year the cities of Munich and Halle will be the first to have 2.6 GHz coverage, followed by two test networks operating in the 800 MHz band located in the rural areas of Ebersberg (east of Munich) and Teutschenthal (to the west of Halle). http://www.fiercewireless.com/europe/story/o2-germany-joins-race-deploy-lte/2010-07-30?utm_medium=nl&utm_source=internal (July 30 2010). In addition, Vodafone Germany has been testing LTE over the 800 MHz band and network deployment is to begin in September 2010, extending to around 1,500 base stations during 2011; and Deutsche Telekom plans to begin a LTE trial in newly acquired 800MHz spectrum in underserved areas in Germany by the end of this year. http://www.gsacom.com/cgi/redir.pl5?url=http://www.gsacom.com/downloads/pdf/GSA_Digital_Dividend_Update.php4 .

[31] In the UK Telefonica has obtained a trial license from Ofcom to test LTE in the 800 MHz frequency band which is due to start in Q3 2010 in Carlisle (Northern England) and consumer trials of mobile broadband have been launched in Cornwall, England by Clear Mobitel using LTE deployed in 800 MHz spectrum. http://www.gsacom.com/cgi/redir.pl5?url=http://www.gsacom.com/downloads/pdf/GSA_Digital_Dividend_Update.php4 .

[32] DotEcon Main Report, Document number 10/71a

dissimilar prices for similar lots highlight that substitution on the basis of price was largely impossible due to the sequential award process.

Another issue which is relevant to the efficiency benefits of a combined auction rather than a sequence of auctions for 800 MHz and 900 MHz spectrum is the technological "roadmap" for the mobile industry. In particular, ComReg's understanding of this roadmap is that incremental upgrades of existing UMTS technology will be eventually supplanted by the next generation technology (LTE). In this context, a simultaneous release of 800 MHz and 900 MHz would allow all operators (new entrants and incumbents) to optimise their spectrum holdings in line with their long term plans, whereas a sequential release could potentially distort these plans as operators would be eager not to give up a first mover advantage at the expense of having a less than optimal holding into the future. Simultaneous release allows the sector to potentially leapfrog the current generation of technologies and move directly to LTE thereby creating long term benefits. The early facilitation of this can bring benefits to both the industry and consumers alike. A staggered move, whilst bringing forward the benefits of liberalisation somewhat, might lead the sector to a less than optimal long term outcome in terms of holdings and could lead to calls for re-allocations, which would also bring with it transitional costs.

A combined award also meets ComReg's objective of encouraging the efficient use and ensuring the effective management of the radio frequency spectrum, whereas separate and uncoordinated award processes for each band could materially inhibit the attainment of this objective.

3. Consumer and Competition benefits

Combining the award of rights of use in the two bands provides a greater opportunity for operators to gain access to spectrum that will allow them to offer advanced electronic communications services ("ECS"), including advanced mobile broadband. The joint award of two highly important spectrum bands for mobile services has the potential to deliver considerable benefits for consumers in terms of availability, choice, and price. It could lead to an improvement in mobile broadband offerings and an increase in mobile broadband penetration (currently 10.5%).[33] Further, this approach has the potential to increase competition in the mobile market in Ireland by creating greater opportunities for new entry and thus greater potential for a change in the current market structure (See, for example, Section 4.1.4 of DotEcon Main Report[34]). A unified auction of 800 MHz and 900 MHz provides a much enhanced opportunity for entrants (enhanced further if 1800 MHz were also available). Therefore, a combined award would be in line with the regulatory principle of promoting, where appropriate, infrastructure-based competition.

[33] See ComReg's Quarterly Report, ComReg Document 10/43.

[34] DotEcon Main Report, Document number 10/71a

4. Providing regulatory certainty

By providing regulatory certainty to the mobile industry regarding spectrum availability, a joint award is likely to, amongst other things, facilitate investment decisions. This benefit was adverted to by respondents to Documents 08/57 and 09/99, who supported a combined award process for 800 MHz and 900 MHz spectrum, and potentially other spectrum bands. Respondents asserted that giving clarity on different spectrum bands would allow them to make informed decisions on the future. Respondents referred in particular to the Digital Dividend spectrum, but also to the 1800 MHz, 2.3 GHz and 2.6 GHz bands (discussed further below).

ComReg considers that the recent developments mentioned earlier in this document (and, in particular, the very positive one concerning the near convergence of the timing of the availability of 800 MHz and 900 MHz spectrum) offer a timely opportunity to facilitate the joint award of rights of use in the 800 MHz and 900 MHz bands. As the 800 MHz band may now be available in early 2013, up to 130 MHz of sub 1 GHz spectrum may be available for use on a liberalised basis as early as 2013. This would more than treble the amount of sub 1 GHz spectrum available for ECS use.

5. Possibility of potential consumer disruption reduced

The possibility of customer disruption arising if ComReg adopted Modified Option 1, as set out in Document 09/99[35], and certain auction outcomes occurring, was raised and discussed in detail by a number of GSM licensees[36] in their responses. In Document 09/99, ComReg put forward its view that both the likelihood of such disruption occurring and the likely extent of same was overstated. For one thing it rested on the assumption that Vodafone and O2 would either win no spectrum rights of use at all in an auction for liberalised spectrum, or would win only small amounts that would require significant time and expense for adjustments and retuning of existing spectrum. It seemed more likely to ComReg that these operators *would* acquire 900 MHz spectrum in the then proposed auction. Further proponents of this argument assumed that there were no viable mitigating strategies open to existing holders of 900 MHz spectrum, a view not shared by ComReg.[37] Finally, a number of respondents appeared to assume that ComReg was not mindful of the need for temporary transitional or interim measures to mitigate the potential risks.

Nonetheless, ComReg is conscious that, even if existing 900 MHz licences would ordinarily expire in 2011, the circumstance that the customers of Vodafone and O2 (who, together, account for around 75% of the Irish subscriber base, and whose licences expire in May 2011,) would run a potential risk of disruption is a relevant, and potentially important, consideration for ComReg to take into account (while allowing, as noted, for ComReg's overall assessment of the likely risks of such disruption). Leaving aside the divergent

[35] Please see Section 8.2 and Section 9 of ComReg Document 09/99 for further details on Modified Option 1.
[36] See ComReg Document 10/21R.
[37] As set out in ComReg Document 09/99, ComReg is of the view that the possibility of consumer disruption occurring is very low given the proposed auction award with a spectrum cap, the incumbency advantages enjoyed by the existing mobile operators, the mitigating factors available to operators and the ability of consumers to switch operators.

views expressed regarding the likelihood of Vodafone and/or O2 failing to secure sufficient spectrum-use-rights in the then envisaged process, ComReg now considers that combining the two bands in a single award process ought further to alleviate concerns regarding the possibility of any, or any material consumer disruption arising, for the following reasons:

- By increasing the amount of substitutable spectrum available (thirteen blocks of 5 MHz paired spectrum rather than seven blocks), this would provide appreciably greater opportunities for the current licence holders as well as new entrants to gain access to spectrum. In addition, the imposition of a sub 1 GHz spectrum cap for this competition (a proposal discussed in more detail in Section 4) would ensure that competition would not be diminished by the award process.

- As new entrants who want access to sub 1 GHz spectrum do not have GSM networks or customers with GSM-only phones, they are likely to be more neutral on the question of where and in what spectrum band their licensed network equipment would be located compared to the existing licensees in the 900 MHz band. For example, new entrants to the band may well favour blocks at 800 MHz over 900 MHz, as it is a greenfield site, thus reducing demand for the seven blocks in the 900 MHz band, compared to the Modified Option 1 favoured in Document 09/99. This could mean, taking into account an appropriate spectrum cap, that the likelihood of existing licensees securing spectrum in a 900 MHz band competitive auction is increased relative to Modified Option 1, ComReg's previously preferred approach. Even if a 900 MHz incumbent MNO failed to secure 900 MHz spectrum in a future award process, it would still have the opportunity to secure 800 MHz spectrum, and the proposed interim licences / transitional arrangements and periods proposed in this document should serve to minimise consumer disruption during the migration from 900 MHz to 800 MHz that would be made necessary.

- By holding an award process in early 2011, well in advance of the commencement date of the new liberalised licences in January 2013, time would be provided for current mobile operators to plan accordingly and make necessary arrangements so as to ensure that their customers faced minimal disruption come early 2013.[38] In that regard, assuming that the results of the award process are known by mid-2011, such a time period is likely to be sufficient, having regard to independent technical advice received by ComReg and international best practice.

- Based on current migration patterns from GSM-only handsets to 3G-enabled handsets, by early 2013, 3G handset penetration should have notably increased from current levels, (even if mobile operators take no additional steps to increase migration), which will again reduce any potential for consumer disruption.

[38] See Chapter 3 for further discussion on proposed interim licences.

6. Joint awards and plans of 800 MHz and 900 MHz in other countries

As set out in Annex 2, award processes have been designed with the potential of combination of the 800 MHz and 900 MHz bands in mind, for example in Switzerland. This is in line with the complementary manner in which MNOs now use a variety of spectrum bands to provide services to their customers (including 2.1 GHz, 1800 MHz and, in other EU Member States, 2.6 GHz as well).

2.4.2 Challenges facing co-ordinated release of 800 and 900 MHz on a liberalised basis

An issue that arises from a co-ordinated release of the 800 MHz and 900 MHz band is whether or not, in light of different timing regarding availability of these bands, to make spectrum available simultaneously. This issue is addressed in Section 2.4.4 of this Chapter.

A significant challenge in a combined auction relates to the degree of complexity involved. A joint auction of spectrum in multiple bands results in additional categories of lots that will complicate the situation for bidders. In order to facilitate the maximum choices for bidders, such an award process would clearly need to allow switching of demand across different categories of lots that might be considered substitutes. The greater the number of possible combinations of spectrum that a bidder might wish to win, the greater the complexity involved in choosing what to bid for during the auction. Therefore offering greater flexibility to bidders inevitably results in greater complexity.

In addition, if a joint award is pursued, a number of aspects of the award process and design for the 900 MHz band as set out in Document 09/99, and as commented on by respondents, must be re-examined and re-consulted on (e.g. spectrum caps). (See Section 4 for further detail on these matters).

2.4.3 ComReg's assessment of the merits of combining 800 and 900 MHz in the same award process

On balance ComReg is of the view that the benefits of a joint award and availability outweigh the drawbacks. A joint award of the 800 MHz and 900 MHz band would be in line with ComReg's statutory objective to encourage the efficient use and ensure the effective management of the radio frequency spectrum; it would provide a high degree of regulatory certainty to industry stakeholders and facilitate investment decisions; the two bands are highly substitutable and ideal candidates for a joint award; this approach has been adopted by other European regulators; and, a joint award would promote competition in the provision of ECS and overcome the concerns expressed by respondents regarding possible adverse implications for consumers of a failure to secure sufficient rights of use in a 900 MHz-only award process. Proceeding with separate award processes for each of the bands would, on the other hand, ignore the current developments regarding the 800 MHz band and its availability for release on a liberalised basis; would be detrimental for the efficient use of spectrum as it would miss the opportunity to fully exploit the benefits of a

combined award of two spectrum bands which are highly substitutable and would provide less visibility for operators pondering significant investment decisions.

As a result, ComReg is now minded to proceed with an approach that would encompass the release of the 800 MHz band in tandem with that of the 900 MHz band in a coordinated award process in early 2011, with new licences coming into effect in early 2013.

In considering whether to combine the award of these spectrum bands, ComReg has had regard to relevant criteria, including its functions, objectives and duties (including relevant Policy Directions made by the Minister for Communications, Energy and Natural Resources ("the Minister") under section 13 of the 2002 Act)). These have been set out previously by ComReg (see, for example, Chapter 10 of ComReg document 09/99) and it is not proposed to repeat them here.

Q. 3 Do you agree with ComReg's proposal to proceed with a joint award of the 800 MHz and 900 MHz bands? Please provide reasons for your view.

2.4.4 Joint availability of 800 MHz and 900 MHz bands in line with Amending GSM Directive

In light of the above benefits that would be associated with a joint award of 800 MHz and 900 MHz bands and ComReg's belief that such an award would best accord with its statutory functions, objectives and duties, it is also necessary to consider whether such an award would also include joint availability of 800MHz and 900 MHz spectrum. That is, whether liberalised 800 MHz and 900 MHz spectrum, should be available for use at the same time – at this stage expected to be early 2013.

In this regard, there would appear to be a number of approaches and these are considered in the context of ComReg's statutory functions, objectives and duties (including Ministerial Policy Directions). In brief, these approaches are:

- make the entire 900 MHz band available for liberalised use shortly after the proposed joint 800/900 MHz award process in mid-2011; or
- provide for the availability for liberalised use of 800 MHz and 900 MHz spectrum commencing in early 2013.

Possible Approach 1: Make available the entire 900 MHz band immediately after joint 800 MHz and 900 MHz award (in a similar fashion to Modified Option 1 as per 09/99)[39]

It is acknowledged that the earlier availability of 900 MHz blocks compared to 800 MHz blocks could result in earlier liberalised use of this band and therefore the potential for earlier enjoyment of the benefits of liberalisation.

At the same time, ComReg recognises that, depending on the outcome of a joint award, transitional measures may be required by one or more existing GSM operators obtaining liberalised 900 MHz spectrum before it/they may be able to free up the spectrum blocks currently occupied by it/them[40]. Whilst the precise need for any transitional measures would not become known until the outcome of the joint award is known, ComReg has sought independent technical advice[41] on the likely timescales that could be involved in certain possible outcomes.

One scenario examined by ComReg's advisors, Red-M/Vilicom Report, was that each existing GSM operator would obtain 2 x 10 MHz of liberalised 900 MHz spectrum but, as a result of the auction outcome, each would be required to move ("relocate") to altogether different parts of the 900 MHz band than those which they currently occupy. In this regard, the independent study suggests that the likely timescale for the three existing operators to complete their respective band reassignment activity would be in the region of 7 months (see Section 3.4 of the Red-M/Vilicom Report).

Another scenario examined by Red-M/Vilicom Report was the unlikely scenario of an existing GSM operator acquiring only 5 MHz of 900 MHz spectrum in an auction. This scenario was based on the improbable assumption that this operator would not avail of any non-technical mitigation strategies (for example National Roaming or a handset 'swap out' programme), which ComReg continues to believe would be a likely option, but rather seek to "retune" its network to work within the constraints of this new reduced spectrum allocation. In this regard, the report concludes that, on a worst-case basis, such retuning

[39] Some relevant assumptions:
- in the event of any delay in the timing of the joint award, interim GSM-only rights of use would be granted to each of Vodafone and O2 from the expiry date of their GSM 900 MHz licences in May 2011 until the final outcome of the award was known;
- "preparatory licences" would be issued to all successful acquirers of liberalised 800 and 900 MHz spectrum (see Chapter 5); and
- Meteor early liberalisation option

[40] For example:
- if an existing operator obtained only 5MHz of 900 MHz spectrum at the award, ComReg's current understanding of the likely time required by that operator to "retune" its network to work with the constraints of this new spectrum allocation. This assumes that the operator would not avail of non-technical mitigation strategies; and/or
- if one or more existing GSM operator obtained 10 MHz of 900 MHz spectrum in a location different to its current location.

[41] Red-M/Vilicom Report, Document 10/71c

would take a maximum of 2 years (without causing undue disruption to existing consumer services)[42] (see Section 4.6 of the Red-M/Vilicom Report).

In light of these potential transitional issues, and the fact that such issues would only be known, and could therefore only be addressed, following the award outcome, there is the possibility for these activities to significantly delay the ability of winners of liberalised rights of use of 900 MHz spectrum to make immediate use of those spectrum blocks which are currently used by existing GSM operators.

An issue that arises in this approach is whether liberalised use of all blocks in the 900 MHz band should be delayed until such time that transitional measures have been carried out by all affected existing GSM operators. If one were not to adopt this approach, one would then expect considerably greater demand (from new entrants and existing GSM operators alike) for Blocks A and B, (and perhaps artificially high prices being paid for these blocks), as these blocks being presently unencumbered, would not involve potential delays to use arising from transitional issues. Moreover, to the extent that blocks A and B would be made available for use considerably earlier than other 900 MHz blocks, which would be delayed due to transitional activities, ComReg would be concerned about potential distortions to competition that could arise from one or two operators having a "first-mover" advantage in terms of earlier access to these liberalised blocks[43]. In that regard, Recital 7 of the GSM Amendment Directive states that "any spectrum made available under this Directive should be allocated …. in such a way so as to ensure no distortion of competition in the relevant market." [44]

In addition, given potential inter-operator dependencies for relocation activities, ComReg recognises the potential for operators to engage in strategic behaviour so as to achieve earliest transition for themselves, whilst seeking to delay use by competitors. In contrast, making all 900 MHz blocks available for liberalised use only after the passing of a reasonable period of time for transitional issues to be addressed would appear preferable in the circumstances, as this would avoid such issues.

A practical complication of releasing the 900 MHz band on a piecemeal basis may be the difficulty bidders might experience in estimating the likelihood of transitional issues arising, and particularly the likely level of delay that may be involved, when seeking to value the potential benefit of earlier 900 MHz access (relative to 800 MHz blocks). Finally, ComReg notes that the potentially inter-related nature of relocation activities (whereby sequenced/coordinated relocation would be required by existing GSM licensees)

[42] The precise timescale cannot be predicted in advance until the full details (i.e. site locations, identities of third parties, provision of utilities etc) are known. While the timeframe provided refers to an unlikely scenario on a worst case basis, it is reasonable to assume that if such a scenario was to unfold that the work could be well advanced by early 2013.

[43] See for example, concerns raised by the Spanish Competition Authority regarding liberalisation proposals put forward by the relevant Spanish Ministry which included the potential competitive advantage that a winner of a 900 MHz licence commencing in 2011 may have over those acquiring licences that cannot be used before 2015 (and the extension of existing 900 MHz licences to 2030, in return for the early release of spectrum, may limit competition).

[44] Other references to competitive distortions are at Recital 6, 7 and 8, and Article 2 of the GSM Amendment Directive, 2009/114/EC, available at the following,
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:274:0025:0027:EN:PDF

would seem to suggest that early release and use of Blocks A and B, in particular, should therefore be avoided.

In light of the above, ComReg is of the view that whilst early availability of the 900 MHz band may theoretically provide earlier benefits from liberalisation, there are a number of complicating factors which may not result in these benefits being realised considerably in advance of 800 MHz spectrum availability and, moreover, may involve potential distortions to competition through the asymmetric timing of access to liberalised 900 MHz spectrum.

Possible Approach 2: Joint availability of 800/900 MHz spectrum in early 2013

It is acknowledged that delaying liberalised use of the 900 MHz band to 800 MHz Availability could result in productive inefficiency and/or dynamic inefficiency[45] to the extent that it delays the provision of new services to consumers.

These potential inefficiencies should however, in ComReg's opinion, be viewed in light of the proposed issue of "preparatory licences" to all winners of liberalised 800 MHz and 900 MHz spectrum rights of use. This proposal is detailed in Chapter 5 but, in summary, would allow all such winners to plan and deploy advanced networks from the time of the proposed joint award until 800 MHz availability. In this context, ComReg queries whether there would, in substance, be any additional efficiency gain through the earlier release of the 900 MHz band (such as Blocks A and B) as winners of these blocks, be they new entrants or incumbents, would be required to spend considerable time planning and deploying network equipment until they were in a position to provide commercial services which, under ComReg's joint availability proposal, they would also be able to do.[46]

In addition and on the basis of the foregoing discussion, ComReg considers that joint availability of 800 MHz and 900 MHz spectrum in early 2013 would appear to better accord with ComReg's statutory functions, objectives and duties as it would:

- provide sufficient time for all likely transitional activities to be completed before liberalised spectrum availability so as to not adversely affect the ability of winners of liberalised rights of use of 900 MHz blocks, which are currently occupied by existing GSM operators, to make use of these blocks relative to unencumbered blocks in the 800 MHz and 900 MHz bands (see Red-M/Vilicom Report and Section 4.3.1 of DotEcon Main Report);
- avoid potential distortions to competition that could arise from asymmetric access to liberalised spectrum, and particularly by incumbent operators bidding aggressively for 900 MHz blocks (especially in relation to Blocks A and B) so as to keep new entrant/s out of the market until 800 MHz availability (see, for example, Section 4.3.1 of the

[45] Dynamic inefficiency exists where the level of innovation and investment over time is below an optimal level.

[46] Indeed, DotEcon note that only some blocks of the 900 MHz band are, in practice, likely to be available for early liberalisation due to the requirement for incumbents to run legacy GSM services for some time: See section 4.3.1 of DotEcon Main Report, ComReg Document 10/71a.

DotEcon Main Report and submissions by a number of respondents to ComReg's 900 MHz consultations);

- avoid the risk of distortions within the proposed auction mechanisms as a result of the lengths of the licences in the first time period being very different with lots in the two bands failing to be reasonable substitutes of roughly similar value (see again Section 4.3.1 of the DotEcon Main Report);
- avoid the difficulties identified above regarding appropriate pricing of earlier-released 900 MHz spectrum; and
- allow the industry to potentially leapfrog the current generation of technologies and move directly to LTE thereby creating greater long term benefits. Allowing this as a possibility would be a benefit to all players.

Accordingly, ComReg is of the view, on balance, that joint availability of 800 MHz and 900 MHz spectrum represents the better approach in light of ComReg's statutory functions, objectives and duties.

2.5 Other spectrum bands

Given the important role a joint spectrum award of both the 800 MHz and 900 MHz spectrum bands can play in shaping the future of the mobile market in Ireland, ComReg is cognisant that it may also be appropriate to consider the inclusion of other spectrum bands in such an award. ComReg is aware of the arguments in favour of spectrum award processes that include as many mobile-relevant bands as possible to allow operators to optimise their holdings across multiple bands given that MNOs now use a variety of bands in a complementary manner to provide services, and this is an increasing trend in a number of European jurisdictions. For these reasons, a number of European countries, including Germany, Switzerland and the UK have run, or plan to run auctions consisting of many mobile bands in a unitary award process. In terms of the award process, different MNOs may choose to take different spectrum strategies in line with their business plans, and ComReg wants to ensure that this is not prevented. The question therefore arises whether it is appropriate to also include other potentially complementary spectrum bands in the proposed award process.

2.5.1 1800 MHz

ComReg has previously set out its position with regard to the 1800 MHz band, most recently in Document 09/99. In essence, ComReg saw little evidence at that time that equipment for UMTS, LTE or WiMAX would be available in the near future, and was also conscious that, currently, 1800 MHz is primarily used in urban areas to support high levels of traffic and capacity in a network. However, ComReg was mindful of the pace of change in the technologies underpinning the delivery of electronic communications services and committed to revisiting the matter if circumstances materially change, for example if International Mobile Telecommunications ('IMT') equipment for the band became available (offering advanced mobile services, e.g. mobile broadband) and this led to a change in demand for access to rights of use in the band.

Two of the existing 1800 MHz licences expire at the end of 2014, and the other 1800 MHz licence in June 2015. There is currently a contiguous unassigned block of 2 x 26.4 MHz spectrum in the band, see Figure 2 below.

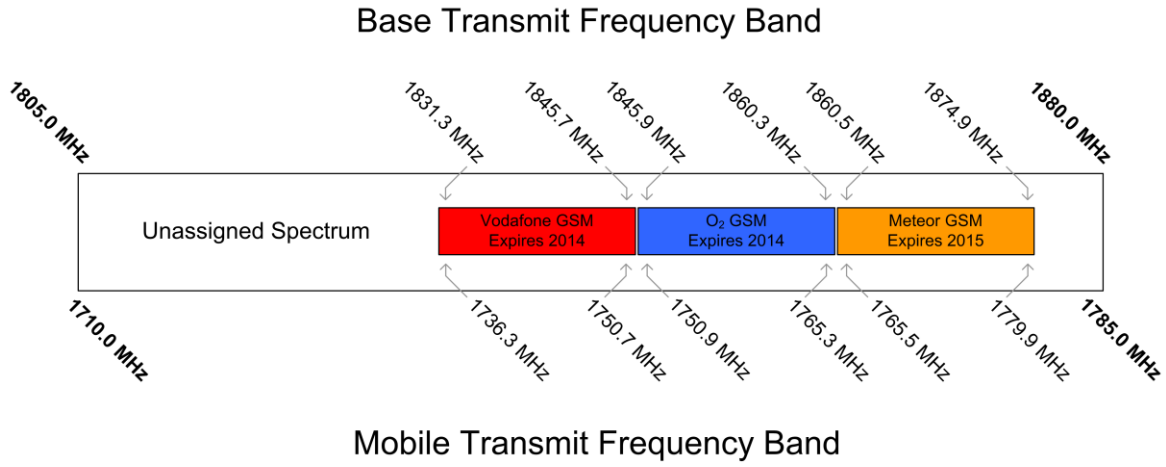

Figure 2: The current spectrum assignments in the 1800 MHz band

ComReg's view to date has been to hold a competitive award process for assignment of new liberalised licences in the 1800 MHz band in 2013, or sooner should circumstances materially change. As ComReg is now proposing issuing new liberalised licences for the 800 MHz and 900 MHz bands to commence in early 2013, this shift in timing is relevant in ComReg's view regarding the most suitable date for the award of new licences in the 1800 MHz band in so far as it might relate to the availability of UMTS, LTE or WiMAX equipment for the 1800 MHz band in the near future.

There are arguments for and against the inclusion of the 1800 MHz band in a joint award process with the 800 MHz and 900 MHz bands.

On the one hand, holding an auction for rights of use in the 800 MHz, 900 MHz and 1800 MHz bands could enhance the opportunity for new entry and structural change within the mobile industry in Ireland. Its inclusion would allow the market to explore a broad range of possible outcomes. For example, a new entrant could seek to acquire a significant holding of spectrum above and below 1GHz. According to DotEcon, an entrant with no existing spectrum may find sub-1 GHz spectrum relatively more costly to obtain due to its greater scarcity and value to incumbents and it may benefit from a mix of sub-1 GHz and higher frequency spectrum to be able to provide both wide-area coverage and capacity in urban areas. Therefore an entrant might treat sub-1 GHz and higher frequency spectrum as complements but also substitutes at the margin (i.e. it might make do with more high frequency spectrum even if it ideally would prefer low frequency spectrum).

The ability to bid for new liberalised-use licences in the 1800 MHz band at the same time as 800 MHz and 900 MHz licences are being awarded may be an attractive option for an operator who may be unsuccessful in bidding for sub 1 GHz spectrum or is unable to secure as large a quantity of sub 1 GHz spectrum as it would have wished. Also the inclusion of the 1800 MHz band would be of benefit to the existing GSM operators as they would be able to bid now to secure continuing use of 1800 MHz as a complementary band to sub 1 GHz spectrum, for areas where high traffic levels create bandwidth strain at lower

frequency levels, potentially allowing more optimal use of bands and infrastructure configuration.

In relation to equipment availability, and based on ComReg's research, LTE is being trialled in the 1800 MHz band in a number of territories, including Australia, France and Hong Kong.

- In December 2009, Bouygues Telecom in France announced that it would commence LTE trails in the 1800 MHz band in the first half of 2010.[47]
- In July 2010, it was reported that in Australia, Telstra and Huawei Technologies had successfully demonstrated LTE technology operating in 1800 MHz spectrum.[48]
- In July 2010 in Hong Kong, CSL Limited, a leading mobile network operator, announced that it would be deploying the world's first 1800 MHz/2600 MHz dual-band LTE network.[49]
- In August 2010, Orange France announced that in November 2010 it would begin trials of HSPA at 1800 MHz and it has two leading technology developers, Ericsson and Qualcomm, to participate in these trials.[50]

A number of National Regulatory Authorities ("NRAs") have included, or plan to include, the 1800 MHz band when releasing the 800 MHz and 900 MHz bands, including Germany, Spain and France.

ComReg however, remains concerned that the roadmap for 1800 MHz spectrum is not entirely clear at this time, and it appears to continue to lag developments at 800 MHz and 900 MHz and so it may be the case that auctioning this band in early 2011 could prove premature. According to DotEcon[51] the main potential concern of including 1800 MHz spectrum in the auction is that demand may be weak for 1800 MHz which could result in this band being inefficiently awarded whereby it is bid on and awarded to bidders not because they have a valuable business case requiring the spectrum but because it is cheap. If demand was very weak for 1800 MHz, the spectrum should be retained for award at a later date. The risk of awarding the spectrum to bidders who do not intend to use the spectrum can be reduced by setting the reserve price for 1800 MHz spectrum at a level that discourages frivolous bidders. Further, it could be argued that the lower level of substitutability between 1800 MHz and sub 1 GHz frequencies arising from the increased spectrum availability of these lower frequencies, may limit any efficiency to be gained from a simultaneous auction, although there are offsetting efficiencies associated with complementary spectrum usage.

The inclusion of 1800 MHz would also require further consultation regarding spectrum caps, appropriate licence fees, auction design (i.e. amendment of 800 MHz and 900 MHz

[47] Source: www.lteportal.com

[48] Source: www.telstra.com

[49] Source: www.hkcsl.com/

[50] Source: Fierce Wireless, August 4 2010.

[51] See Section 4.2.3 of DotEcon Main Report, Document number 10/71a

auction design) and licence conditions. Also, it would have to be taken into consideration that the proposed date for the availability of new liberalised licences in the 800 MHz and 900 MHz band is January 2013, which is 24-30 months in advance of the expiry of the three existing 1800 MHz licenses.

On balance, ComReg is of the view that there is merit in considering the inclusion of 1800 MHz spectrum within a joint auction of 800 MHz and 900 MHz spectrum on the grounds that it would lead to greater economic efficiency and would provide the best opportunity for entrants.

Q. 4 Should the 1800 MHz band be included in a joint auction with the 800 MHz and 900 MHz bands? Please provide reasons for your view.

2.5.2 The 2.6 GHz and 2.3 GHz bands

ComReg has commenced its review of the 2.6 GHz band, and, in May, 2010, published a request for inputs.[52] ComReg received 36 responses to its request for inputs[53] and is currently considering these inputs. Currently, the band is licensed for a Multipoint Microwave Distribution System ("MMDS") for the distribution of licensed programme television material with coverage extending to most of the State, with the exception of the major urban areas, and these MMDS licences expire in or before April, 2014. The Regulations that relate to the operation of MMDS services in the band provide for the possible renewal of these licences for a period of up to 5 years[54], potentially placing this band on very different timelines. ComReg plans to issue a public consultation on the band later this year.

In relation to the band 2300-2400 MHz ("the 2.3 GHz band"), the use of this band is yet to be harmonised across Europe and this will continue to be the case for the foreseeable future. Unlike for example the 800 MHz, 900 MHz, 1800 MHz and 2100 MHz frequency bands which are harmonised for delivery of mobile services there remains some uncertainty regarding the potential uses of this band, the equipment which can be deployed and the associated technical criteria. This lack of harmonisation in the 2.3 GHz band means that it does not enjoy the same economies of scale as the harmonised bands. Notwithstanding this, ComReg remains committed to its release and is currently seeking expert technical and economic advice in this regard. Further, ComReg is currently preparing a further consultation, following the publication of a number of previous documents in relation to this band.[55] However, given the above and as the 2.3 GHz band is neither a substitutable nor complementary spectrum band to the 800 MHz, 900 MHz, 1800 MHz and 2100 MHz bands at this time, it would be inappropriate to include it in this competition.

[52] ComReg Document 10/38

[53] ComReg Document 10/58s on "Submissions to Call for Inputs of potential future uses and licensing options for the 2.6 GHz band"

[54] Regulations 7 and 8 of Statutory Instrument No. 529 of 2003

[55] See ComReg Documents 09/49, 09/76, 09/76s and 10/30

3 Interim Licence Proposal

3.1 Introduction

For the purposes of this chapter, while it is assumed that:

- the expiry of Vodafone and O2's GSM 900 MHz licences would occur in May 2011; and
- the overall benefits of a joint award of 800 MHz and 900 MHz spectrum rights of use award in 2011 and joint availability in early 2013,

there are a number of issues that would need to be addressed in facilitating the joint release of, and assignment of rights of use in, these spectrum bands in a competitive award process in 2011.

Whereas Chapter 5 below addresses potential transitional issues arising from the outcome of any joint 800 MHz and 900 MHz spectrum award (such as the potential requirement for existing GSM operators to relocate within the 900 MHz band and/or retune networks from 7.2 MHz to 5 MHz of 900 MHz spectrum), this Chapter sets out ComReg's proposal to address the issue arising from the timing difference between the expiry of Vodafone and O2's respective GSM 900 MHz licences in May 2011 and the expected availability of liberalised 800 MHz and 900 MHz spectrum in early 2013.

ComReg considered what would happen if it allowed each of Vodafone and O2's respective existing GSM 900 MHz licences to naturally expire *without* implementation of any interim measures, but this approach has been discounted as a viable regulatory option (see analysis below). As no final decision has been made regarding ComReg's approach to the issue of new liberalised licences in the 900 MHz band, ComReg is of the view that it would be necessary to put in place interim measures to safeguard existing competition from serious deterioration and protect end users until such time as the proposed joint award and availability of 800 MHz and 900 MHz bands on a liberalised basis can occur.

Accordingly, and in light of the perceived benefits to all stakeholders of a joint award and making available of spectrum identified in Chapter 2, it would appear to ComReg that the more appropriate means by which to address the timing issue in these unique circumstances would be to maintain GSM 900 MHz spectrum rights of use for each of Vodafone and O2 in the period between May 2011 and 800 MHz and 900 MHz spectrum availability ("Interim Licensing Proposal").

3.2 ComReg's Interim Licensing Proposal

For the purposes of the following analysis, ComReg has made a number of basic assumptions regarding how spectrum rights of use would be granted under the Interim Licensing Proposal. These are as follows:

1. **GSM only interim rights of use**: Interim licences would be granted on a GSM-use-only basis. ComReg does not believe it would be appropriate for it to grant fully liberalised spectrum rights of use, even on an interim basis, as to do so would

distort competition by providing Vodafone and O2 earlier access to liberalised-use 900 MHz spectrum than the rest of the market, thereby placing existing and potential competitors at a disadvantage in terms of cost, efficiency and time.[56] In addition, ComReg does not believe that it would be proportionate to grant liberalised rights of use to address competition and consumer issues that would specifically be GSM-related. Accordingly, it is proposed that interim licences would be restricted to technology and services as currently set out in existing GSM 900 MHz licences;

2. **Licence fees for Interim Licences**: Interim licences would be granted on the basis of payments by each of Vodafone and O2 of appropriate spectrum usage fee/s. (See later in this Chapter for ComReg's proposal regarding appropriate licence fees);

3. **Licence conditions for Interim Licences:** Interim licences would have appropriate licence conditions attached. (See later in this Chapter for ComReg's proposal regarding appropriate licence conditions);

4. **Competitive award for Liberalised Licences:** It is assumed for the purposes of the following analysis that the Interim Licensing Proposal would be viewed in the context of facilitating a fully competitive award process for 800 MHz and 900 MHz spectrum. That is, there would not be any administrative grant of long term rights of use to 800 MHz and/or 900 MHz spectrum to any incumbent or other operators. The reasons for ComReg's view that a competitive award process would best accord with its statutory functions, objectives and duties have been set out at length in ComReg's 900 MHz consultation papers and it is not proposed to repeat them here; and

5. **Interim spectrum rights of use would be granted on a once-off, non-renewable basis:** ComReg would envisage implementation of the Interim Licensing Proposal by way of administrative grant of interim GSM 900 MHz Wireless Telegraphy Act licences to each of Vodafone and O2.[57] As such, interested parties are referred to Regulation 11 of the Authorisation Regulations and Article 7 of the Authorisation Directive (as amended) relating to the procedure for the grant of a limited number

[56] Interested parties are referred, in this regard, to: the relevant provisions of the GSM Amendment Directive (2009/114/EC)**;** ComReg's statutory functions, objectives and duties; and ComReg's previous 900 MHz consultation documents regarding the issue of whether or not to liberalise existing GSM 900 MHz licences.

[57] Such licences would be annually renewable as per the existing GSM 900 MHz Wireless Telegraphy Act licensing regime. For the avoidance of doubt, licences and all spectrum rights of use granted by ComReg under the Interim Licensing Proposal would fully and entirely expire one day prior to 800 MHz and liberalised 900 MHz spectrum availability (to be identified by ComReg) without any right of renewal, extension, or any other form of prolongation including issue of new GSM 900 MHz licences irrespective of whether the licensee is successful at obtaining 800 and/or 900 MHz spectrum. It is envisaged that each of Vodafone and O2 would be required to sign a statement of agreement to that or similar effect.

of licences under the Wireless Telegraphy Act for the provision of an electronic communications network or service[58].

3.2.1 Assessment of Interim Licensing Proposal in light of ComReg's functions, objectives and relevant Ministerial Directions

The following section sets out ComReg's preliminary analysis of the Interim Licensing Proposal bearing in mind relevant criteria, including its functions, objectives (including "regulatory principles" set out in the Amended Framework Directive) and duties (including relevant Policy Directions made by the Minister for Communications, Energy and Natural Resources ("the Minister") under section 13 of the 2002 Act)).

It is ComReg's view that the Interim Licensing Proposal is consistent with its relevant statutory functions, objectives and duties as set out below.

3.2.2 ComReg's statutory functions and objectives

Although involving temporarily delaying partial liberalisation of the 900 MHz band (primarily delayed access to Blocks A and B), this option would, on balance, be more likely to **maximise benefits for users** overall because:

- it would ensure continuity of GSM consumer services to the customers of Vodafone and O2, comprising some 75% of the Irish market, until 800 MHz availability (in contrast with the alternative approach of permitting natural expiry of these two GSM licences as mentioned above)[59];
- it would maintain the benefits presently enjoyed by users derived from the current level of competition between existing mobile operators by not denying Vodafone and O2's access to a key input (spectrum) in the short period up to full 800/900 MHz availability;
- in circumstances where:

[58] It is noted that there have been substantive amendments to those European Directives comprising the Common Regulatory Framework and these have yet to be incorporated into the statutory instruments which transpose these Directives. Nevertheless, ComReg is, in accordance with best practice of a forward looking *ex ante* regulator, interpreting its regulatory objectives and obligations in accordance with impending substantive amendments to those statutory instruments which transpose the Common Regulatory Framework. In ComReg's opinion, this will provide certainty for market participants by setting out clear rules in advance. ComReg also notes that Directive 2009/140 provides for its transposition into national law by 25 May 2011. Accordingly, while this may or may not be transposed before the auction contemplated herein, the State is obliged to transpose it, at the latest, in the same month in which the first of the 900 MHz GSM licences expire. In addition, ComReg is, prior to the transposition deadline, obliged under EU law to refrain from taking any measures likely to seriously compromise the attainment of the result prescribed by that directive.

[59] This position is distinct from, and without prejudice to, ComReg's general position regarding claims made by incumbent operators of significant disruption to consumer services in circumstances where an existing operator would be able to gain access to spectrum rights of use via a competition and would also have sufficient time following such an award to implement relevant technical and non-technical mitigation strategies previously discussed by ComReg in its 900 MHz consultations. In addition, ComReg notes that requiring Vodafone and O2 to engage in technical (e.g roll-out of additional 1800 MHz sites) and/or non-technical mitigation strategies (e.g roaming agreement) in the time leading up to 800 MHz availability, as a result of not issuing proposed interim spectrum rights of use, is unlikely to be an efficient outcome in circumstances where each of these operators would be likely to gain access to liberalised 800 MHz and/or 900 MHz spectrum.

- existing 900 MHz operators account for 75% of retail mobile customers and are more likely than not to maintain similar levels of market share in the short period between the expiry of the existing 900 MHz licences (May 2011) and the availability of the full 800 MHz/900 MHz spectrum (early 2013);
- the remaining 25% of the market involves: an undertaking with a licence until 2015 (Meteor); an undertaking with an established existing customer base (as well as being the designated operator for mobile broadband under the National Broadband Scheme) (H3GI); and MVNOs (some of whom also depend on existing 900 MHz operators); and
- the practical likelihood and ability of a new entrant entering the market between the expiry of the existing 900 MHz licences and full availability of the 800/900 MHz spectrum appears limited.

Accordingly, ComReg considers that the overall interests of consumers appear better served, on balance, by an interim licence.

By facilitating the joint competitive award of rights of use of spectrum in the 800 MHz and 900 MHz bands, this proposal would also **facilitate the development, promotion and/or safeguarding of competition** as it would:

- be likely to maximise benefits for users (as set out immediately above);
- maximise new entry opportunities to the mobile markets concerned;
- contribute to the effective management of radio frequencies by facilitating the joint award of liberalised-use 800 MHz and 900 MHz spectrum which, in ComReg's view, would be more likely to result in a more efficient spectrum allocation outcome than would otherwise be the case with separate releases of the 800 MHz and 900 MHz bands;
- although this proposal would clearly provide each of Vodafone and O2 with a somewhat longer period of GSM-900 MHz use than provided for under the current GSM-900 MHz licensing regime, it is ComReg's considered opinion that this is preferable to the disadvantages identified in the alternative approach of permitting natural expiry of their GSM licences to occur as mentioned above that would otherwise arise, including distortions to and/or restrictions of competition and significant consumer detriment. Furthermore, the Interim Licensing Proposal seems to ComReg to be proportionate because it does not grant existing 900 MHz operators any other rights over and above those necessary to protect consumers from the risk of potentially serious deterioration to the current nature of competition in the mobile markets concerned in the short period pending 800 MHz spectrum availability;
- not distort competition by giving Vodafone and O2 first mover advantage (as the first holders of operational sub-1 GHz liberalised spectrum) since the Interim Licensing Proposal is restricted to non-liberalised use of the spectrum;
- address the specific circumstances now presented by 800/900 MHz spectrum, without compromising on the fundamental competition principles and strategies followed by ComReg[60]; and

[60] See Section 10 of Consultation Document 09/99

- encourage the efficient use of 900 MHz spectrum by having the spectrum attached to each of Vodafone and O2's GSM 900 MHz licences used to provide GSM-services for which there is clear, existing, and substantial consumer demand.

It would **promote the internal market** by facilitating the joint release of liberalised 800 MHz and 900 MHz spectrum that would provide better and fairer opportunities for effective long-term entry by operators in other Member States; and

It would **promote regulatory predictability** by providing certainty in the market in relation to the present matter such as in relation to continuity of consumer services.

3.2.3 Ministerial Policy Directions

In addition, and in accordance with Section 12(3) of the 2002 Act, ComReg has had regard to relevant policy directions given to it by the Minister as considered by the Minister to be appropriate to be followed by ComReg in the exercise of its functions. In this regard, ComReg's analysis suggests that its Interim Licensing Proposal would be likely to be in compliance with said directions as it would:

- promote the national objective regarding broadband rollout (see Policy Direction No.3) by facilitating the joint release of 800 MHz and 900 MHz spectrum;
- avoid undue effects on the sustainability of the businesses of industry operators during the time between May 2011 and the commercial commencement date of new liberalised-use 800 MHz/900 MHz licences (see Policy Direction No.4);
- be consistent with the actions of a number of Member States which have implemented similar interim measures with a view to facilitating full and open competition for the 800 MHz and/or 900 MHz band/s. For example, see Annex 2 in relation to the Netherlands and Malta. (see Policy Direction No.7[61]); and
- take into account the interests of all users of the radio frequency spectrum by:
  - safeguarding existing competition until full 800 MHz and 900 MHz spectrum-availability by avoiding an undue reduction in Vodafone's and O2's respective abilities to compete in the mobile markets concerned;
  - ensuring continuity of GSM consumer services to the customers of Vodafone and O2 until full 800/900 MHz availability; and
  - maximising entry possibilities for potential entrants to these bands from within the State and from other Member States by facilitating the joint release of the 800 MHz and 900 MHz bands.

3.2.4 Authorisation Regulations

ComReg's Interim Licensing proposal accords with Regulation 11 of the Authorisation Regulations which requires that, when granting new licences, ComReg:

- grants licences on the basis of selection criteria which are objective, transparent, non-discriminatory and proportionate and which give due weight to the achievement of the objectives set out in section 12 of the 2002 Act; and

[61] And also section 12(5) of the 2002 Act which requires that ComReg, in carrying out its functions, have regard to international developments with regard to, amongst other things, ECN, ECS and the radio frequency spectrum.

- where it decides to use a competitive or comparative selection procedures, ensure that such procedures are fair, reasonable, open and transparent to all interested parties.

In relation to the latter bullet point, as the Interim Licensing Proposal in the present case would involve the administrative grant of spectrum rights of use (in this case, in the form of new interim licences under the Wireless Telegraphy Act, 1926), ComReg would be required, pursuant to Regulation 9 of the Authorisation Regulations, to establish open, transparent and non-discriminatory procedures for the grant of licences and to cause any such procedures to be made publicly available.

3.2.5 Non-discriminatory and Proportionate

ComReg is consulting on a proposal to administratively assign GSM-only spectrum rights of use to specific parties. Whilst some respondents may contend that this would involve the use of discriminatory selection criteria and/or procedures, ComReg considers that the Interim Licensing Proposal would not be unduly or unlawfully discriminatory as:

- the situations of existing 900 MHz operators licensed for GSM, on the one hand, and other operators (or new entrants) in other frequencies, on the other, are not appropriate comparators for purposes of considering discrimination in the present context;
- there are clear, objective reasons for treating existing 900 MHz licensed operators differently in particular as:
    - of the existing mobile operators, only Vodafone and O2 would face the prospect of not having continued access to relevant mobile spectrum prior to the availability of 800/900 MHz spectrum. In these circumstances, the Interim Licensing Proposal would avoid any consumer services issues and undue effects on the sustainability of the businesses of Vodafone and O2 during the time between May 2011 and the commercial commencement date of new liberalised-use 800 MHz/900 MHz licences;
    - in contrast, as Meteor's GSM 900 MHz licence expires in 2015, it would thus have, subject to any applicable spectrum cap and dependent on whether it chooses to avail of an early liberalisation option, the opportunity to secure liberalised sub-1 GHz spectrum at a point in time considerably in advance of expiry of its GSM 900 MHz licence so as to ensure continuity of consumer services, and a much longer period of time to address the consequences of the outcome of an 800MHz and 900 MHz full spectrum-use rights award. Accordingly, there would not appear to ComReg to be a similar objective basis for providing Meteor with such an additional period of GSM 900 MHz rights of use; and
    - similarly, ComReg notes that H3GI would continue to have access to its 2.1GHz spectrum leading up to and beyond 800 MHz spectrum availability and thus would not face any disruption to consumer services in the interim period.[62]

[62] It is also noted that H3GI was offered GSM 900 MHz spectrum as part of the ODTR's 2.1GHz licensing process but did not avail of this opportunity.

Furthermore, in light of the foregoing analysis, the selection criteria and procedures that would be associated with the Interim Licensing Proposal would, in these specific circumstances only (being to facilitate the full, competitive release of the 800 MHz and 900 MHz band and to avoid a risk of significant disruption to consumer services and undue effects on the sustainability of businesses in the short period pending such release), achieve the objectives set out in section 12 of the 2002 Act.

In addition, ComReg is of the view that the Interim Licensing Proposal represents a proportionate measure to address the temporal issue identified, as it would be operative only for so long as was necessary to facilitate the joint release of the 800 MHz and 900 MHz spectrum bands and would be on a GSM-use-only basis.

3.2.6 ComReg's assessment of the merits of the Interim Licensing Proposal

In forming its position on proposed interim measures to address the timing issue arising from the joint release and availability of 800 MHz and 900 MHz spectrum, ComReg has carefully considered and had regard to the information at its disposal, including, without limitation, responses to its previous 900 MHz consultations.

Based on its current assessment of the overall benefits of a joint award of rights of use in 800 MHz and 900 MHz spectrum and the foregoing analysis, and bearing in mind relevant criteria, including its statutory objectives and Policy Directions made by the Minister under section 13 of the 2002 Act, which in turn reflect the objectives and obligations under the EU Common Regulatory Framework, ComReg believes that the Interim Licensing Proposal would, on balance, be an objectively justified and proportionate means of addressing the temporal issue identified. In particular, by facilitating the full, competitive release of the 800 and 900 MHz band, safeguarding existing competition until full 800/900 MHz spectrum availability, avoiding undue effects on the sustainability of the businesses of Vodafone and O2 and protecting end users by avoiding what would otherwise be significant disruption to GSM consumer services in the interim period.

Bearing in mind the possibility of modification following this consultation, ComReg currently proposes to proceed with the establishment of an award process based on the Interim Licensing Proposal.

In this regard, the ensuing sections set out, in draft detail, how ComReg would propose to implement the Interim Licensing Proposal subject to any final substantive observations arising from this consultation.

3.3 Implementation of the Interim Licensing Proposal

3.3.1 Proposed Licence Conditions

Both Vodafone and O2 have a range of existing obligations under the terms of their respective GSM 900 MHz licences (and licensing regulations). These include geographical and technical conditions (Schedule 1 to 3 of the existing licences) as well as a number of commitments (Schedule 4 of existing licence) which were made by the relevant licensee in

the course of a comparative evaluation selection procedure, prior to the granting of the original GSM 900 MHz licence.[63]

In light of ComReg's belief that protecting from significant deterioration the current nature of competition in the relevant mobile markets concerned until full 800/900 MHz spectrum availability would represent the most appropriate means of addressing the temporal issue identified, ComReg proposes that the existing GSM 900 MHz licence conditions applicable to each of Vodafone and O2 would be attached to their respective interim licences granted under the Interim Licensing Proposal. Specifically:

- technology-specific criteria limiting licensees to the use of GSM-technology only (per Schedule 4 Part 2 Section 1(a) of the relevant current GSM 900 MHz licence);
- specifying all or a subset of the same 36 GSM 900 channels currently assigned to each operator (per Schedule 3(a) of the relevant current GSM 900 MHz licence); and
- the licence conditions reflecting the commitments made in the course of the original licensing procedure, which are:
    - the provision of additional services (per Schedule 4 Part 2 Section 2 of the relevant current GSM 900 MHz licence);
    - access to the emergency services (per Schedule 4 Part 3 of the relevant current GSM 900 MHz licence);
    - service quality, performance standards and obligations (per Schedule 4 Part 4 of the relevant current GSM 900 MHz licence);
    - roaming provisions (per Schedule 4 part 5 of the relevant current GSM 900 MHz licence);
    - charges to customers (per Schedule 4 Part 7 of the relevant current GSM 900 MHz licence); and
    - other applicable conditions (per Schedule 4 Part 8 of the relevant current GSM 900 MHz licence).

Given the nature and extent of these licence obligations currently in place, ComReg believes that the continued applicability of these obligations in the context of purpose and effect of the Interim Licensing Proposal, and appropriate publication of these conditions, would be objectively justified, non-discriminatory, proportionate and transparent (in accordance with Regulation 10 of the Authorisation Regulations).

It should be noted, however, that variations to these licence obligations may be required during the term of the proposed interim licences:

- as may generally be required to ensure the fulfilment of ComReg's statutory functions, objectives and duties (and in accordance with the requirements set out in Regulation 15 of the Authorisation Regulations); and/or
- as appropriate to facilitate the proposed transitional arrangements set out in Section 5 of this document (and in accordance with the requirements set out in Regulation 15 of the Authorisation Regulations).

[63] Non-confidential licence obligations for each of Vodafone and O2 can be found on ComReg's web-site at: http://www.comreg.ie/radio_spectrum/search.541.874.10003.0.rslicensing.html.

3.3.2 Options for Spectrum Usage Fees

ComReg is proposing to issue interim GSM licenses to Vodafone and O2 and to attach licence conditions that would maintain the rights and obligations contained in their respective GSM 900 MHz licences. On this basis, it might appear reasonable to set the spectrum usage fees for interim licences by reference to the licence fees paid by each of the operators for their respective existing 15 year 900 MHz licences. In this regard, it is noted[64]**;**

- **Vodafone** (previously Eircell) paid a spectrum access fee of €12,697,381 (£10 IR million) and fixed yearly spectrum fees of €25,395 (£20,000 IR) for each duplex GSM900 channel. This spectrum access fee divided by the 15 years of the licence equates to a yearly amount of €846,492, excluding the annual spectrum usage fee; and
- **O2** (previously Digicell) paid €19,046,071 (£15 IR million) in spectrum access fees and fixed yearly spectrum fees of €25,395 for each duplex GSM900 channel. This spectrum access fee divided by the 15 years of the licence equates to a yearly amount of €1,269,738, excluding the annual spectrum usage fee.

These fees are summarised in Table 1.

Current GSM Licences (issued 1996)	**Vodafone**	**O2**
Spectrum Access Fee (for 15 year licence)	€12,697,381	€19,046,071
Spectrum Access Fee per annum (pro rata)	€846,492	€1,269,738
Spectrum Usage Fees per annum (€25,395 per channel, 36 channels)	€914,220	€914,220
Total fees per annum (Access Fee per annum + Usage Fee per annum)	€1,760,712	€2,183,958

Table 1: GSM 900 MHz spectrum fees for Vodafone and O2

It should also be noted that the value of spectrum usage fees and yearly licence fees, which were established in 1996, were not inflation-linked and have not been administratively increased during the term of the current licences.

Clearly, there may be a range of different options in relation to the setting of spectrum usage fees for such interim licences. However ComReg, at this point, is primarily focusing on two approaches with respect to the setting of annual and prorated annual fees for the

[64] ComReg Document 01/96

spectrum rights of use that would be granted under the Interim Licensing Proposal. These are: [65]

- apply the spectrum usage fees (being spectrum access fee and yearly licence fee) or prorated fees for periods of less than 12 months as provided for in the respective current GSM 900 MHz licences of Vodafone and O2; or
- apply the spectrum usage fees (being spectrum access fee and yearly licence fee) or prorated fees for periods of less than 12 months as provided for in their respective current GSM 900 MHz licences of Vodafone and O2, but with both elements indexed to inflation.

In relation to the relevant criteria for assessing the options in relation to spectrum fees for Interim Licences, ComReg notes that the Authorisation Directive (as amended) provides:[66]

- usage fees may be levied for the use of radio frequencies as an instrument to ensure the optimal use of such resources (Recital 32);
- Member States may allow the relevant authority to impose fees for the rights of use for radio frequencies which reflect the need to ensure the optimal use of these resources (Article 13); and
- Member States shall ensure that such fees shall be objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose and shall take into account the objectives in Article 8 of Directive 2002/21/EC (Framework Directive) (Article 13 of the Authorisation Directive).

In relation to the relevant statutory objectives and principles in present circumstances, ComReg notes:

- *Encouraging efficient spectrum use*

Information currently available to ComReg would indicate that the relevant operators are making efficient use of their GSM 900 MHz spectrum allocations (as indicated by ComReg's long-term, ongoing, drive testing and network monitoring activities). In this context, it is open to question whether increasing spectrum usage fees, such as by indexing to inflation, would have the effect of further increasing the efficiency of spectrum use by these operators in relation to existing GSM technology.

Nonetheless, ComReg also notes that the current level of GSM 900 MHz spectrum usage fees have not greatly encouraged these operators to migrate customers to 3G services (in their 2.1 GHz spectrum assignments) towards the end of their licence terms so as to reduce

[65] Although it might be contended that an appropriate spectrum usage fee could be the opportunity cost of spectrum on a liberalised basis (e.g. such as an amount similar to that determined by DotEcon's benchmarking of 900 MHz spectrum), this would, in ComReg's opinion, appear inappropriate in the specific circumstances on the basis that the proposed interim spectrum rights of use would only be granted on an un-liberalised basis (i.e. GSM-only) and that during the interim period between May 2011 and 800 MHz spectrum availability no other party could avail of 800 and/or 900 MHz spectrum on a liberalised basis.

[66] In addition, it is noted the European Court of Justice stated, in setting out guidelines for the relevant national court in reviewing licence fees set by the national regulator in the *Connect Austria* matter (Case C-462/99), that fees should be set on an economically equivalent basis for all and should take into account:

- the size of frequency clusters allocated;
- the time when the relevant operator entered the market; and
- the importance of being able to present a full range of telecommunications services.

and/or remove altogether any reliance upon expiring GSM 900 MHz spectrum rights of use. In this context, it is arguable that increasing the spectrum usage fees payable by these operators for interim GSM 900 MHz licences could provide this incentive and also sufficiently incentivise the return of unused GSM 900 MHz spectrum over the duration of the proposed interim licences.

- *Promotion of competition – in particular, ensuring no distortion or restriction of competition*

On the one hand, it could be argued that maintaining current spectrum usage fees for these operators would not distort competition by not affecting the current level of fees paid by these operators relative to those spectrum usage fees paid by other GSM 900 MHz mobile operators, such as Meteor.

On the other hand, ComReg notes that:

- each of Vodafone and O2 will have had the full term of their respective existing GSM 900 MHz licence with which to generate a reasonable return on their capital investment;
- the Interim Licence Proposal provides Vodafone and O2 with an additional period (of around 1.5 years' duration) during which to generate revenues and profits;
- moreover, this additional period would be at the end of the investment cycle where it is quite plausible that the rate of return on this additional period would be considerably higher than in the earlier stages of the original investment cycle (as initial and ongoing capital investments are more likely to have been recouped); and
- due to Meteor's later entry into the Irish mobile market, its GSM 900 MHz licence does not expire until 2015 and, due to the proposed award of 800 MHz and 900 MHz spectrum in mid-2011, it would have the opportunity to secure liberalised sub-1 GHz spectrum at a point in time considerably in advance of its GSM 900 MHz licence expiry and, accordingly, there would not be a similar objective basis for providing Meteor with such an additional period of GSM 900 MHz rights of use.

In this context, it could be argued that the additional period for Vodafone and O2 to obtain a return on investments would provide these operators with an advantage relative to other operators - albeit one that is necessitated due to factors outside the control of the operators themselves and ComReg.[67]

In addition, the original GSM 900 MHz spectrum usage fees for Vodafone and O2 would likely have been determined having regard to the level of costs and revenues envisaged over the original 15 year period. However, such costs and revenues have moved on considerably in light of, amongst other things, the level of inflation.

In light of the above, it is arguable that:

[67] That said, it is noted that ComReg has proposed the early liberalisation option for Meteor in which it could receive a rebate on its spectrum access fee for the unused term of its GSM 900 MHz licence.

- spectrum usage fees for interim licences to Vodafone and O2 could be indexed to inflation to better reflect current levels of costs and revenues (such that spectrum usage fees are returned to their original value in real terms); and
- such indexation could offset any advantage enjoyed by these operators by having an additional period of GSM 900 MHz spectrum rights of use (including any higher rate of return that would be obtained Vodafone and O2 during this additional period).[68]

ComReg notes from its consideration of international experience on this issue that there does not appear to be a commonly adopted approach. In this regard, it is noted:

- the Maltese NRA recently decided to award several blocks in the 900 MHz and 1800 MHz simultaneously. In order to ensure a smooth migration between the different termination dates of existing licences in the 900 MHz and 1800 MHz bands, the Maltese NRA's decision stipulated that existing GSM licences would be extended by a few months until the commencement of the licences that would be awarded in accordance with the re-assignment process that is currently under way. These extensions are one-time and non-renewable and they retain the current terms and conditions and grant no additional rights to the existing licence holders; and
- following two public consultations (in 2005 and 2007), the Radiocommunications Agency of the Netherlands announced a decision to extend the duration of the two 900 MHz licences (KPN and Vodafone). In this regard, the two 900 MHz licences were extended for a period of three years (from 31 March 2010 and to 25 February 2013), so that all 900 MHz and 1800 MHz licences would co-terminate (in 2013), two years in advance of a planned auction for all 900 MHz and 1800 MHz spectrum. The two 900 MHz licences were extended for three years out of a maximum possible five year extension permitted under the relevant legislation. KPN and Vodafone paid €39M and €36M to retain their respective assignments of 11.4 MHz and 12.4 MHz and the fees were structured to reflect the opportunity cost of delaying a new operator access to 900 MHz spectrum for the duration of the licence extension (that is, the reduction of the value of the spectrum that a new operator would experience if the spectrum became available in 2013 instead of 2010).

In light of the above considerations, there would appear to be more compelling reasons for applying spectrum usage fees that would index to inflation the fees currently provided for in each of Vodafone and O2's existing GSM 900 MHz licences (being both spectrum access fees and annual spectrum usage fees).

[68] Although it may be contended that other forms of determining the level of advantage that may be enjoyed by each of Vodafone and O2 arising from the Interim Licensing Proposal would be more appropriate, ComReg notes there are likely to be many complexities and difficulties to both developing an appropriate methodology and, more importantly, obtaining reliable and independently verifiable data from these operators by which to ascertain the level of advantage. A key difficulty would be the information asymmetry faced by ComReg (and other interested parties) and the sensitivity of this data. In this context, indexation to inflation would appear to be a more straightforward basis and is put forward due to its transparency and lack of complexity.

In this regard, a method which ComReg has previously used[69] to update licence fees to reflect inflation over a certain period is to index fees against the Consumer Price Index ('CPI')[70], which is compiled by the Central Statistics Office[71] ('CSO'). Based on CSO data, over the period between May 1996 (when the relevant GSM 900 MHz licences were issued) and July 2010, there was a 42.54% rise in inflation.[72] [73]

When applied to each of Vodafone and O2's current spectrum access and spectrum usage fees, this would mean:

- *Vodafone GSM 900 MHz spectrum access fees – indexed to CPI*
  Vodafone paid £10 IR million spectrum access fees, equating to €12,697,381[74]. This equates to €846,492 per year in 1996 terms; and indexed using the 42.54% inflation rate over the period May 1996 to July 2010, the spectrum access fee would equate to €1,206,590 per year (or part thereof).

- *O2 GSM 900 MHz spectrum access fees – indexed to CPI*
  O2 paid £15 IR million spectrum access fees, equating to €19,046,071. This equates to €1,269,738 per year in 1996 terms; and indexed using the 42.54% inflation rate over the period May 1996 to July 2010, the spectrum access fee would equate to €1,809,885 per year (or part thereof).

- *Vodafone and O2 GSM 900 MHz spectrum usage fees – indexed to CPI*
  Both Vodafone and O2 currently pay annual spectrum usage fees annually for access to its 900 MHz spectrum, at a rate of €25,395 per paired 200 kHz channel. This equates to an annual spectrum usage fee for each of Vodafone and O2 of €914,200 (36 GSM 900 MHz channels x €25,395); and indexed using the 42.54% inflation rate over the period May 1996 to July 2010, the annual spectrum usage fee for each Vodafone and O2 would equate to €1,303,129 per year (or part thereof).

ComReg therefore welcomes views from all interested parties on the above proposal.

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[69] 26 GHz National Block Licences - http://www.comreg.ie/_fileupload/publications/ComReg0793R.pdf, TETRA licence -http://www.comreg.ie/_fileupload/publications/ComReg0867.pdf, *eircom* line rental - http://www.askcomreg.ie/home_phone/Universal_Service.90.LE.asp

[70] Definition: "The consumer price index is designed to measure, in index form, the change in the average level of prices paid for consumer goods and services by all private households in the country and by foreign tourists while on holiday within Ireland. It is the most widely used measure of consumer inflation. It is compiled and published every month by the Central Statistics Office. It is an accurate, objective and independent measure of price changes of consumer goods and services." http://www.cso.ie/surveysandmethodologies/surveys/prices/documents/introductiontocpi.pdf

[71] http://www.cso.ie/

[72] Information available from the following, http://www.cso.ie/px/pxeirestat/database/eirestat/Consumer%20Prices/Consumer%20Prices.asp . Note: it is envisaged that indexation would be for the relevant CPI data for May 2011.

[73] It should be noted that the goods used to calculate the basket price in 1996 and those used in 2010 are quite different and also that the CPI has undergone at least two rebases between 1996 and 2010 (2001 and 2006; another rebase should be expected in 2011). The figure for Compound Annual Growth Rate (CAGR) over the period is 2.563% per year, equating to 42.51% rise in value, extremely close in value to the CPI.

[74] All conversions from Irish pound to Euros carried out using the set exchange rate, €1 = £0.787564.

Current GSM Licence Fees (issued 1996)	**Vodafone**	**O2**
Spectrum Access Fee (for 15 year licence)	€12,697,381	€19,046,071
Spectrum Access Fee per annum (pro rata)	€846,492	€1,269,738
Spectrum Usage Fees per annum (€25,395 per channel, 36 channels)	€914,220	€914,220
Total fees per annum (Access Fee per annum + Usage Fee per annum)	€1,760,712	€2,183,958
Proposed Interim GSM Licence Fees		
Total fees per annum indexed per annum (CPI 42.54% between May 1996 and July 2010)	*€2,509,719*	*€3,113,014*

Table 2: Proposed Spectrum Fees for Interim Licensing Proposal

Q. 5 Do you agree with ComReg's Interim Licence Proposal and proposed licence conditions for same? Please provide reasons for your view.

Q. 6 Do you agree with ComReg's proposal to apply the spectrum usage fees (being spectrum access fee and yearly licence fee) as provided for in their respective current GSM 900 MHz licences of Vodafone and O2, but with both elements indexed to inflation? Please provide reasons for your view.

Q. 7 Are there any other approaches to determining appropriate spectrum usage fees for interim licences? Please provide reasons for your view, including any other options which you consider may be appropriate having regard to ComReg's statutory functions, objectives and duties.

4 Issues governing the Award of 900 MHz and 800 MHz Spectrum

4.1 Issues governing the Award of 900 MHz and 800 MHz Spectrum

As discussed in Chapter 2, ComReg's proposal is to proceed with a joint award process for spectrum rights of use in the 800 MHz and 900 MHz bands. This chapter sets out details of the proposed award process, including proposals in relation to spectrum caps, fees and licence conditions and the award process generally.

The possibility of including the 1800 MHz band into a joint 800/900 MHz award process was also discussed in Chapter 2 and readers are asked for their views on this matter. Should the 1800 MHz band be included in this award process, it would be ComReg's intention to consult on the details of the award process relating to the 1800 MHz band in advance of finalising the overall award process.

4.1.1 Proposed sub-1 GHz spectrum cap

In ComReg's 900 MHz consultations, a spectrum cap of 2 x 10 MHz in the 900 MHz band, that would apply at auction only, was considered appropriate as a means of promoting competition and there was general consensus amongst respondents on the size of this spectrum cap.

If 800 MHz spectrum rights of use are awarded in the same process as the 900 MHz band, a further six 2 x 5 MHz blocks would be offered alongside the seven 2 x 5 MHz blocks available in the 900 MHz band, once all incumbent licences expire. This would almost double the supply of sub 1GHz spectrum in the competition and would more than treble the supply of sub 1 GHz spectrum by comparison with that currently in use.

Access to sub 1 GHz spectrum is particularly important for competition in a service market such as this. Without access to sub-1GHz spectrum, an operator wishing to provide wide-area coverage would need to deploy a larger number of radio sites than otherwise required. Additionally, such an operator's in-building coverage could be reduced as the lower spectrum bands propagate further into buildings. This could be an important quality differentiator and could make it difficult to compete for particular types of customers (e.g. high-value mobile workers using data cards). Therefore, highly asymmetric distributions of sub-1GHz spectrum could be detrimental to competition downstream, and, for this reason, a number of jurisdictions have imposed sub 1 GHz caps within their auctions.

This said, perfect symmetry in sub 1 GHz holdings is not necessary to facilitate competition[75], and the distribution of holdings between the 800 MHz and 900 MHz spectrum bands is not a particular concern. In the short run, it may well be that equipment is not available simultaneously at both frequencies and there could be short-run temporary advantages or disadvantages from holding spectrum at one or other frequency band.

[75] Indeed may be inconsistent with competing business strategies between MNO's, requiring different amounts of spectrum

However, these are only short-run effects and are not sufficient cause for intervention. Moreover, in the long-run, competition may be enhanced by allowing a diverse approach to emerge in terms of holdings of frequencies in different bands and associated choices of technologies.

Given the above, ComReg believes that it is appropriate to consider setting a cap on the amount of sub1-GHz spectrum that can be obtained in the competition in order to facilitate downstream competition. Furthermore, ComReg believes that the original proposed cap of 2 x 10 MHz associated with the 900 MHz band can now be relaxed, as the amount of sub 1 GHz spectrum in the competition almost doubles in size when the 800 MHz band is included.

The division of the spectrum into 5 MHz blocks inevitably reduces the options for a spectrum cap as does the total amount of spectrum available, 2 x 65 MHz, or 13 individual blocks, which is not a neatly divisible amount. Given these restrictions, there are a limited number of options available to ComReg in setting an appropriate sub-1 GHz spectrum cap: ComReg has considered four possible options for a spectrum cap as follows:

- 2 x 15 MHz;
- 2 x 15 MHz spectrum cap that could be relaxed to 2 x 20 MHz in the event that demand proves to be less than supply in the competition.
- 2 x 20 MHz sub 1-GHz; or
- 2 x 25 MHz cap.

A 2 x 15 MHz spectrum cap would facilitate a minimum of five operators getting access to sub-1 GHz spectrum and by default a minimum of three operators getting access to the 900 MHz band. However, a 2 x 15 MHz limits demand to a maximum of three blocks of sub 1 GHz spectrum per bidder. By limiting demand to three blocks of spectrum per bidder this requires that five operators must bid for the spectrum, as otherwise one block would remain unallocated, i.e. new entry to the Irish mobile market would be required or one block would be left idle. ComReg is of the view that it would not be appropriate to impose this restriction on the award process which could result in unallocated spectrum. Therefore, a cap of 2 x 15 MHz appears to unnecessarily restrict the amount of spectrum an operator could bid for and may result in an inefficient outcome. In addition, a cap of 2 x 15 MHz could result in zero competition in the award process itself and could facilitate collusive activity between incumbent operators as a natural outcome would be for each incumbent to bid for the maximum amount of spectrum permitted under the cap.

If a 2 x 15 MHz cap is imposed which could then be relaxed to 2 x 20 MHz should there be only four operators who bid for spectrum, this again limits the amount of spectrum per bidder. Only one bidder would be in a position to win 2 x 20 MHz (if a new entrant does not participate in the auction).

A 2 x 20 MHz cap would guarantee a minimum of four operators gaining access to sub 1 GHz spectrum. There are a range of possible outcomes if such a cap is imposed. There is a risk that the outcome could be that three operators gain the maximum amount of spectrum

permitted by the cap, with a fourth operator gaining just one block of spectrum. This could create a market structure where three large operators dominate the market, with a fourth very weak competitor.

If a 2 x 25 MHz cap is set, this could result in only three operators gaining access to all sub 1 GHz spectrum. ComReg does not deem this to be an attractive outcome from a competition perspective.

Furthermore, ComReg notes that the 3GPP technical standards on LTE[76] have been specifically designed to facilitate aggregation of bandwidths across different frequency bands e.g. a 20 MHz LTE channel divided by for example 10 MHz in the 900 MHz band and 10 MHz in the 800 MHz band.

Therefore, on balance it would appear that a spectrum cap of 2 x 20 MHz for sub 1 GHz spectrum is the most appropriate cap.

DotEcon in its analysis concluded that a spectrum cap of 2 x 20 MHz for sub 1 GHz spectrum is the most suitable option available[77].

Q. 8. Do you agree with ComReg's proposal to set a sub 1 GHz cap for the competition? Please provide reasons for your view.

Q. 9. Do you agree that a 2 x 20 MHz cap is the most appropriate cap to set for a joint award of 800 MHz and 900 MHz spectrum? Please provide reasons for your view.

4.2 Proposed Award Process/Format

ComReg's previous consultations on the 900 MHz band set out ComReg's view that an auction process is the most appropriate process for assigning the frequencies in this band. This view is in line ComReg's Spectrum Management Strategy Statement which sets out ComReg's general approach for awarding spectrum rights.[78] In arriving at this view the demand for 900 MHz spectrum versus its supply was one of the issues considered by ComReg, and section 6.8 of ComReg Document 09/99 sets out ComReg's view on this issue in relation to the 900 MHz band.

[76] 3GPP 25.913 (ETSI TR 125 913) – Universal Mobile Telecommunications System (UMTS);LTE; Requirements for Evolved UTRA (E-UTRA) and Evolved UTRAN (E-UTRAN), available from www.etsi.org

[77] DotEcon Main Report, Document number 10/71a

[78] "ComReg does not at this stage favour any specific approach for awarding spectrum rights, but prefers to consider each award on its own merits. In making such an assessment 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 to deliver an efficient outcome." - Section 3.5.1 (Page 11) of ComReg (2008) Spectrum Management Strategy 2008 – 2010, 1st July 2008, ComReg Document 08/50.

While the introduction of the 800 MHz band into the award process would increase the supply of sub-1GHz spectrum in the competition, this does not necessarily mean that the supply of sub-1GHz spectrum will now be greater than the demand. This would particularly be the case where the spectrum cap was relaxed from the 2 x 10 MHz cap proposed in ComReg 09/99, and a larger spectrum cap eases the restrictions on an operator, allowing it to accumulate rights of use in a larger amount of spectrum. In the German auction, it was notable that all the operators with a 900 MHz spectrum assignment bid for 800 MHz and that two of the operators (Vodafone and T-Mobile) have each accumulated 2 x 22.4 MHz of sub 1 GHz spectrum.[79] Additionally in an Irish context, in previous consultations a number of respondents have indicated their interest in the 800 MHz bands.

In light of the above, it is ComReg's view that demand is likely to exceed supply and that a competitive process, in this case, an auction, should be used to award rights of use in this spectrum. In considering an auction, ComReg Document 09/99 set out ComReg's proposed auction format as at December 2009. This is re-evaluated in Section 4.4 below.

Q. 10. Do you agree with ComReg's proposal to hold an auction for the 800 MHz and 900 MHz bands? Please provide reasons for your view.

This section now discusses the main elements of the proposed auction process in light of a joint sub-1GHz award, and in particular:

- The two temporal lots relating to two time periods; and
- The auction format.

4.3 Temporal Lots

In ComReg Document 09/99, it was envisaged that the 900 MHz spectrum band would be made available in two temporal lots relating to two different time periods:

- 2x5MHz blocks from some start date[80] until mid-2015 (*the first time period*);
- 2x5MHz blocks from mid-2015 to a common terminal date for all licences (*the second time period*).

This temporal lot structure is particularly suited to a competition where the spectrum blocks become available at different times[81] and it provides bidders with the opportunity of aggregating the earlier and later lots together to obtain a licence over both time periods.

[79] Note, in Germany there was a 2 x 20 MHz sub 1-GHz spectrum cap, but given the fragmented nature of Vodafone and T-Mobile's existing 900 MHz assignment, an exception to this rule was implemented for these operators.

[80] ComReg Document 09/99 envisaged 2011 as the start date.

While there are a number of options for packaging the six 2 x 5 MHz blocks in the 800 MHz spectrum band, the two most practical options appear to be:

1. In two temporal lots mirroring the time periods of the 900 MHz lots;
2. In one temporal lot spanning the time period from some start date (currently this is envisaged as early 2013) to the final termination date of the 900 MHz licences (unlike the 900 MHz band the supply of 800 MHz spectrum is unchanging over this period).

The first option is somewhat more complex as it introduces a second temporal lot to the process. However it does allow the bidders to pursue more refined strategies, such as buying rights of use in additional 800MHz spectrum in the first time period to make up for the more limited availability of 900MHz spectrum in that period[82], and then switching to 900 MHz in the second time period when all 900 MHz spectrum blocks would be available. The first option provides more flexibility and choice for bidders, and overall there is little obvious downside, aside from the above mentioned complexity, to mirroring the two temporal lots of the 900 MHz spectrum band in the 800 MHz lots.

In order to realise the benefits of a combined auction including substitutable spectrum, DotEcon recommends that 800 MHz spectrum in a combined auction is offered in two distinct categories using the same time slices as the 900 MHz band[83] (i.e. pre- and post-2015).

ComReg therefore proposes to use two temporal lots for the 800 MHz band, and these temporal lots would mirror the time periods of the 900 MHz band, i.e. Option 1 above.

Q. 11. Do you agree with ComReg's proposal to use two temporal lots for the 800 MHz band and that these temporal lots should mirror the time periods of the 900 MHz band? Please provide reasons for your view.

4.4 Auction format: Open auction vs. sealed bid

The issue of the proposed auction format for the 900 MHz band was discussed in section 12 of ComReg Document 09/99. In that section ComReg considered a range of auction formats and set out its view that it was minded to proceed with a combinatorial auction format, as this allows for package bidding, thereby reducing the possibility of fragmented outcomes while eliminating the aggregation risk. In considering a joint award for the sub-1 GHz band, ComReg believes that a combinatorial auction format is still appropriate and proposes to use a two-stage auction approach similar to that set out in section 12.2.1 of Document 09/99.

Having proposed a combinatorial auction format, it was then necessary to consider the particular type of combinatorial auction and in that regard section 12.2 of ComReg

[81] In the 900 MHz band, Meteor's licence expires in mid-2015, and these two spectrum blocks would only become available then, if Meteor did not avail of its option to make these two blocks available at an earlier date. See Section 8.2 of ComReg Document 09/99 for further details.

[82] Assuming that Meteor does not exercise the early liberalisation option.

[83] See section 4.3 of DotEcon Main Report, Document number 10/71a.

Document 09/99 discussed the issue of an open format (i.e. a Combinatorial Clock Auction ("CCA")) versus a sealed-bid format. This section noted that there were advantages and disadvantages to each format and that the main difference between the two forms centred upon the issue of price discovery and whether a price discovery stage would be desirable in present circumstances. After considering the issues, a sealed bid combinatorial auction format was proposed as the auction format in ComReg document 09/99. This auction format was favoured over an open format (a CCA) for various reasons but including the presumption that the common value uncertainty was not expected to be overwhelmingly important and there was a risk of tacitly collusive outcomes. When only the 900 MHz band is made available and a spectrum cap of 2 x 10MHz (as per ComReg Document 09/99) is used, a natural outcome would likely be the award of three 2 x 10 MHz licences and one 2 x 5 MHz licence. Given the relative positions of the MNOs in terms of market shares and history, a tacitly collusive outcome might emerge in which competition is short-circuited by the weakest MNO opting for a smaller licence rather than competing for a larger one.

Subsequently, the responses to ComReg Document 09/99 have emphasised an additional important consideration in favour of a CCA format, namely that it allows incumbent operators the ability, if they choose, to bid to retain spectrum for business continuity reasons without the uncertainty that could be created by being able to make only a one-shot bid in a sealed bid auction. This arises because incumbents may have significant uncertainty about the business continuity benefits of spectrum, and an open auction allows the updating of these valuations during the auction, which a single sealed bid auction does not. The price discovery element of an open auction helps alleviate this uncertainty.

Furthermore, the addition of the 800 MHz spectrum band into the process, the scope for introducing a higher spectrum cap of up to 2 x 25 MHz and the possibility of additional bidders partaking in the auction significantly reduce ComReg's previous concerns regarding the risk of tacit collusion, as there no longer appears to be a likely natural outcome as there may have been with the 900 MHz band alone. With the addition of the 800 MHz band, there would appear to be a much wider potential range of outcomes that could occur in terms of how each operator could opt for either or both of the available bands.

DotEcon has re-evaluated its analysis on the benefits and drawbacks of the CCA as opposed to a sealed bid auction format (outlined in its previous report[84]) in light of responses to ComReg consultation 09/99. DotEcon, having considered stakeholders responses, determined that a CCA is the most appropriate format which mitigates business continuity risks and reduces incentives for tacit collusion as well as strategic demand reduction[85], with the provisos that the minimum prices shall be set correctly (see Section 4.5 below) and the detailed rules for the auction (e.g. in relation to activity rules for bidders) shall be optimised for the specific circumstances.

[84] See Section 6 of DotEcon report, 09/99c

[85] In section 2.1.3 of its Main Report (Document 10/71a), DotEcon states that incentives for both unilateral strategic demand reduction and tacit collusion within a CCA can be reduced by setting a relatively high minimum price.

For these reasons, ComReg is now of the view that an open combinatorial clock auction format is more appropriate than a sealed bid auction for this award.

Q. 12. Do you agree with ComReg's proposal to use an open combinatorial clock auction format for this auction? Please provide reasons for your view.

4.5 Proposed Auction Fees

ComReg Document 09/99 proposed a minimum price of €30 million for each single 2 × 5 MHz block of liberalised 900 MHz spectrum made available in the auction. This fee was based on the results of DotEcon's benchmarking exercise.[86] Including the 800 MHz spectrum band in the competition clearly creates a significant increment in the supply of sub-1GHz spectrum, and the auction fees issues require consideration.

ComReg determined in ComReg Document 09/99 that the following factors (in light of ComReg's statutory objective of promoting competition) should inform the determination of the minimum price for the 900 MHz award:

- the minimum price should not give rise to or increase incentives for collusive behaviour;
- the minimum price should not be set so high as to choke off demand;
- the minimum price should not be set so low that there is participation by frivolous bidders;
- the minimum price should not reflect any "social option value"; and
- the administrative costs of running the award process should be recovered from the minimum price set.

As outlined in the DotEcon Report[87] the rights of use in 800 MHz and 900 MHz spectrum could differ in value depending on the idiosyncrasies of potential bidders. While in theory the minimum price for 800 MHz should also be set according to a specific market valuation of 800 MHz spectrum and ComReg's objectives and concern for spectrum in this band, it is DotEcon's view that to date there is insufficient information and data to predict this valuation with any certainty. Indeed, only Germany has awarded 800 MHz spectrum in its auction that ended in May 2010 and this data point provides valuable information about the value of liberalised sub-1 GHz spectrum and has been taken into account in the DotEcon updated benchmarking exercise.

Given the current lack of data on the relative value of liberalised-use 900MHz spectrum and 800MHz spectrum, it is DotEcon's view[88] that it is not possible to explore the potential for differences in spectrum value across these bands. Indeed, given the very similar radio propagation characteristics, one would expect the long-run value to be similar and value

[86] See Section 13 of ComReg document 09/99.

[87] Please see DotEcon Benchmarking Report, Document Number 10/71b which is published alongside this Document.

[88] Please see Section 2 of DotEcon Benchmarking Report, Document Number 10/71b which is published alongside this Document.

differences to be limited, mainly as a result of short-run legacy issues with the 900 MHz band. It is DotEcon's view that there are therefore, good reasons to expect 800 MHz and 900 MHz spectrum to have similar market value and in any case, there is no evidence yet available to suggest a systematic value difference. This means that there is a strong case for a common minimum price for 800 MHz and 900 MHz spectrum in the upcoming auction reflecting any residual uncertainty in a slightly more conservative approach to setting the common level.

Note, this does not mean that 800 MHz spectrum would necessarily be of identical value to liberalised-use 900 MHz spectrum, nor does it suggest that the final auction outcome would yield such an outcome. Rather that, given the similarities between the two bands and simultaneously the uncertainties over relative valuation, it is sensible and practical to set a common reservation value for these spectrum bands and as long as efficient demand is not choked off at the common minimum price chosen, the auction process will determine the final values of these licences.

As the addition of the 800 MHz band increases the supply of sub-1 GHz spectrum and presents a wider range of possible outcomes for the auction there is more opportunity for bidders to compete over the amount of spectrum that they want and its distribution across the two bands. This in turn discourages collusive behaviour, as it would be more challenging to coordinate bids to forge auction outcomes that are anti-competitive. Therefore, with less of a concern over collusive behaviour in the auction, it is DotEcon's recommendation that the minimum prices be set more moderately against the estimated benchmark value range.

A more conservative minimum price lower within the estimated range would minimise the risk at which any efficient demand is choked off. This is relevant because of the greater uncertainty about valuations that the presence of the 800 MHz creates. This is both because there is uncertainty over the relative values of 800 MHz versus 900 MHz spectrum and also because the supply of sub-1 GHz spectrum is significantly increased. Thus in determining the minimum price for 800 MHz and 900 MHz spectrum for the upcoming auction, it is DotEcon's view to err on the side of caution.

The DotEcon benchmarking report has been updated in light of recent developments, and the estimated value range for 2x5 MHz of liberalized sub-1 GHz spectrum from their benchmarks is between €18m-26m. Give the considerations regarding the minimum price, DotEcon recommend a minimum value in this range.

Whilst the combination of 800 MHz and 900 MHz spectrum in a joint award will result in a larger number of potential outcomes, ComReg remains concerned about the risk of tacit collusion between bidders. Within a joint award, new entrants and existing operators could tacitly agree to avoid each other by focussing their bids on 800 MHz and 900 MHz respectively when they are bidding for single blocks. This could lead to a quick tacit understanding emerging where incumbents do not fear competition for 900 MHz and they act less aggressively with respect to 800 MHz. For this reason, ComReg is of the view that a minimum price at the upper end of the range estimated by DotEcon is appropriate. ComReg is therefore proposing a minimum price of €25 million.

Q. 13. Do you agree with ComReg's proposal to set a common minimum price for both 800 MHz and 900 MHz bands and to use the updated benchmarking exercise from DotEcon as the basis for setting this minimum price? Please provide reasons for your view.

Table 3 below presents an example whereby the minimum price is set at €25 million in terms of the up front reserve price and the annual Spectrum Usage Fees (SUFs) are based on a 50/50 split and a 10.2% discount rate[89].

Minimum price	Proportion of minimum price in SUF	Discount factor	Annual SUF	Reserve price for 2013-2015 licence (2.5 years)	Reserve price for 2015-2030 licence (15 years)
€25m	50%	10.2%	€1.5m	€5.25m	€8.5m

Table 3: Breakdown of minimum price into reserve price and SUFs for a 2x5MHz block

Note, in ComReg 09/99, ComReg also proposed that the annual SUFs would be annualised using a discount factor that reflects the cost of capital of an operator.

Q. 14 Do you have any comments on the structure of the reserve prices and spectrum usage fees? Please provide reasons for your view.

4.6 Proposed Licence Conditions

This section considers the licence conditions that could be attached to new licences issued in the 800 MHz and 900 MHz bands.

In ComReg Document 09/99, ComReg proposed a range of licence conditions that it considered appropriate to be attached to all liberalised licences issued in the 900 MHz band and asked 26 consultation questions on its proposals. ComReg has had regard to responses received and, noting that further consideration of these responses will take place, the following discussion sets out ComReg's current views on the appropriate licence conditions for these bands.

ComReg notes that amendments to the Common Regulatory Framework Directives, which have a significant bearing on the nature of licence conditions which may be attached, have yet to be transposed into Irish law. Nevertheless, ComReg's licence condition proposals have been developed having regard to these amendments (such as Quality of Service and provisions relating to the transfer or lease of individual rights to use radio frequencies).[90]

[89] See Section 13 of ComReg document 09/99 which discusses discount factors, SUFs etc.

[90] See Part B of the Annex to the Authorisation Directive (as amended) and Annex 9b of the Framework Directive.

In order to maximize the opportunity for substitution between the 800 MHz and 900 MHz bands ComReg is proposing that licence conditions be homogeneous across these bands.

4.6.1 Licence Duration

As discussed earlier in this chapter, ComReg has proposed to auction the 800 MHz band in a similar fashion to the 900 MHz band, and, in this regard, ComReg has proposed the use of two temporal lots whose time periods would mirror those of the 900 MHz band. As currently proposed, the licence duration of an 800 MHz licence would be circa 2 ½ years (2013 to mid-2015) for the first temporal lot and 15 years (2015 to 2030) for the second temporal lot.

4.6.2 Technology and Service neutrality

Having considered the responses received to Document 09/99, ComReg holds that the licence conditions proposed for the 900 MHz band should be both technology and service neutral. This is in line with the approach as espoused by the relevant Amending Directive and EC Decision on the 900 MHz band and ComReg does not propose to mandate the deployment of any particular technology or service.

ComReg proposes to take a similar approach to the 800 MHz band with the obvious exception that the technical and service neutrality conditions of the 800 MHz band should be in line with the EC Decision on the 800 MHz band. The Decision suggests a preference for FDD operation, but also recognises that alternative frequency arrangements can also be deployed. In this regard, ComReg proposes to make available the 800 MHz band for any terrestrial systems capable of providing electronic communications services in compliance with the parameters set out in the Annex to the EC Decision on the 800 MHz band[91].

4.6.3 Coverage and roll-out

Having given due regard to the responses received to Document 09/99, and to the new circumstances in relation to 800 MHz, ComReg has revised its view (as set out below) on the appropriate coverage and roll-out obligations for the 900 MHz band.

ComReg's current view is that the following coverage and rollout conditions should apply to new liberalised-use licences issued in the 800 MHz and 900 MHz bands:

- Set a symmetric coverage obligation to provide coverage to 70% of the population of Ireland and an asymmetric roll-out period to meet this coverage obligation. A 70% demographic coverage level is proposed as ComReg considers this to be a level that a new entrant to the mobile market could reasonably achieve and in this regard it is notable that the GSM and 3G licensees have all deployed networks in excess of this value. Additionally while obtaining the required coverage would be a matter for the licensee, a 70% demographic coverage obligation is sufficient to provide coverage in all the towns in Ireland with over 50 inhabitants[92]. ComReg's current view is that the rollout period would be 3 years for a licensee who has an existing mobile network (i.e.

[91] See EC Decision at the following link, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:117:0095:0101:EN:PDF

[92] This is based on CSO data which indicates that just under 70% of the population live in towns with 50 inhabitants or more.

Vodafone, O2, Meteor or 3) and 7 years for a new entrant to the Irish mobile market. A shorter timeframe is proposed for the existing mobile network operators as these operators have access to existing infrastructure and can use this infrastructure to meet the coverage obligation. A new entrant to the mobile market does not have an existing mobile network and a longer timeframe of 7 years is thus proposed.

- Allow the coverage and roll-out obligation to be met using the 800/900 MHz frequency band or the 800/900 MHz frequency band in combination with the other frequency bands that can provide a seamless service to those services provided using liberalised 800/900 MHz licences. Currently these other frequency bands are the 1800 MHz and 2100 MHz frequency bands. A minimum of 50% coverage would be required using the 800/900 MHz bands in order to ensure a minimum deployment level in these bands.
- Not allow coverage via national roaming to count towards the coverage and roll-out obligation. This is in line with ComReg's current practice. In this regard it should be noted that the higher 90% geographic coverage proposed in ComReg Document 09/99 was proposed in light of the proposal to allow national roaming to count towards the coverage obligation.
- Measure coverage with a methodology that is broadly the same as that set out in ComReg Document 09/99 with the exception that ComReg is also considering the use of the Ec/Io[93] metric in respect of the UMTS technology.

Q. 15. ComReg proposes to set a symmetric coverage obligation for 70% of the population of Ireland and an asymmetric roll-out time to meet this coverage obligation. The proposed roll-out time is 3 years for a licensee who has an existing mobile network (i.e. Vodafone, O2, Meteor or 3) and 7 years for a new entrant to the Irish mobile market.

Do you agree with ComReg's proposed coverage and roll-out obligation?

Please provide reasons for your view.

4.6.4 Quality of Service

Having given due regard to the responses received to the 09/99 consultation, ComReg has revised its view (as set out below) on the appropriate Quality of Service ("QoS") obligations for the 900 MHz band.

ComReg's current view is that the following coverage and rollout conditions should apply to new licences issued in the 800 and 900 MHz bands:

- Set a minimum QoS network standard for the availability of the network. This metric would be similar to that proposed in section 15.6.8 of ComReg Document 09/99.
- Set a minimum QoS network standard for a voice call (non-VoIP) service. This metric would be similar to that proposed in Section 15.6.6.1 of ComReg Document 09/99.
- Not set a minimum QoS network standard for a broadband service. With a broadband service, if a customer experiences problems with the quality of service they are receiving there should be no difficulties per se for this customer to establish the entity or the operator who is responsible for a poor service and take appropriate action. This is different to the voice market where the quality of service problem could relate to the

[93] Ec/Io is analogous to Carrier to Interference (C/I) ratio in GSM, and for a useable coverage Ec/Io >= -8dB.

subscriber's network or the called party's network. ComReg therefore believes that risk of market failure associated with the provision of a broadband service is less than that associated with the provision of a voice call service. However, given the evolving nature of the mobile broadband service in Ireland, ComReg believes that greater information on the actual broadband speeds being provided to consumers would be beneficial. ComReg is aware that there are a number of ways of providing this information to consumers[94] and is considering separately such measures in relation to the provision of broadband services.

- Set a minimum standard for billing. This would be in line with that proposed in section 15.6.9 of Document 09/99 and specifies paper billing as the standard unless agreed otherwise with the expressed prior written consent of the customer. However ComReg also recognises that in the future it may be more appropriate to attach a billing obligation as a condition of the general authorisation or the USO/User Rights Regulations instead of being a WT licence obligation, and ComReg will address this matter by separate consultation by December 2011, until which time the status quo will be maintained.

Q. 16. ComReg proposes to set a quality of service obligation in relation to the availability of a network, the network voice call (non-VoIP) service and billing and does not propose to set a minimum QoS network standard for a mobile broadband service. Instead ComReg is considering other measures and licence conditions to provide greater information to consumers on the actual broadband speed being provided.

Do you agree with ComReg's proposed quality of service obligations?

Are there any other conditions which ComReg should consider imposing on licences?

Please provide reasons for your view.

4.6.5 Miscellaneous conditions (including non-ionising radiation, international roaming capability and access to the emergency services)

Having due regard to the responses received to Consultation document 09/99, ComReg's current view on the appropriate "miscellaneous" conditions for the 800 MHz and 900 MHz band is include obligations that would require licensees to:

- comply with the guidelines on Non-Ionising Radiation, which may be updated from time to time. In the absence of national legislation on this matter, these guidelines are based on those issued by ICNIRP. This obligation would be in line with that proposed in section 15.7.1 of ComReg Document 09/99;

[94] For example, in Sweden the "bredbandskollen" or "broadband-check" website is a website that allows uses to check the speed of their broadband connection and this website is supported and maintained by the Swedish Regulator PTS. See www.bredbandskollen.se for more information. In the United States, the FCC has partnered with a company called SamKnows and in June 2010 the Test my ISP website was launched. This initiative sets out to provide US consumers with reliable and accurate statistics of their broadband connection. See www.testmyisp.com and http://reboot.fcc.gov/blog?entryId=521943 for more information.

- provide an international roaming capability as comprehensive as is practicable.[95] This obligation would be in line with that proposed in section 15.7.2 of ComReg 09/99; and
- provide access to the Emergency Services. This obligation would be broadly in line with that proposed in section 15.7.3 of ComReg document 09/99 with the exception that more specific wording in relation to the passing of information to the authority handling the emergency services would be included in the obligation.[96]

Additionally, and in line with the transposition of the 2009 EC Framework ComReg proposes to consult with the market before issuing any directions on the criteria for the accuracy and reliability of the location information to be provided to the emergency services. Further, ComReg recognises that in the future it may be more appropriate to attach emergency services obligations as a condition of the general authorisation or the USO/User Rights Regulations instead of being a WT licence obligation and ComReg will investigate this matter separately.

Q. 17. ComReg proposes to set miscellaneous obligations in relation to non-ionising radiation, international roaming capability and access to the emergency services.

Do you agree with ComReg's proposed miscellaneous obligations? Please provide reasons for your view.

4.6.6 Review of QoS Licence Conditions

In ComReg 09/99, ComReg stated that it was of the view that it may be appropriate to carry out a review at regular intervals to ensure that applicable QoS standards remain appropriate. Respondents to that consultation expressed concerns that such a review could introduce additional uncertainty into the licensing process.

ComReg is conscious of the pace of change in communications technologies and markets, and that one should expect that consumer experiences and preferences will continue to evolve markedly over the period ahead, stretching up to 2030 when proposed new licences would expire. In this context it would appear unduly short-sighted not to anticipate a need for review of QoS.

The review would need to take account of market developments and be justified and proportionate in the light of the circumstances then prevailing, which cannot be predicted today with any certainty. Nonetheless we can observe that the trend in mobile

[95] As varying technologies and services can be deployed in the 800 MHz and 900 MHz bands, it is not always possible to predict the actual deployment strategy of a licensee. While ComReg expects most if not all licensees to deploy a network capable of providing an international roaming service to its customers, there is always the possibility that a licensee may focus on a different set of services and not deploy a network with this capability. For example a licensee may provide services only in Ireland and it might not be practicable for this network to provide an international roaming capability.

[96] ComReg 09/99 used wording which proposed "*the passing of information to the emergency services*". A respondent to the ComReg 09/99 consultation suggested that more specific wording be used in line with the text of the 2009 EC Framework. Consequently, ComReg is now proposing to use text that states "*the passing of information to the authority handling the emergency services*".

communications in Ireland and indeed across the EU has been towards a more liberal and less interventionist regulatory regime, as increasing competition and consumer choice, abetted by technological innovation, have reduced reliance on administratively assured standards.

To guard against excessive uncertainty about regulatory intentions, ComReg would further emphasise that any variations to licence conditions would need to be proportionate and properly evidenced, including by way of public consultation, and are subject to the usual statutory safeguards. In addition, reviews would be carried out no more often than required and, in view of the extensive set of consultations that have informed the current Spectrum Liberalisation process, we would not anticipate any review being necessary for the first five years.[97]

For the reasons set out above, it is proposed that licences would contain a provision stating that ComReg may, from time to time, carry out such reviews as it considers appropriate, including with respect to QoS, and in accordance with the relevant provision of the Authorisation Regulations (as amended).

[97] This is without prejudice to ComReg's general power to review and vary conditions attached to licences under the relevant provisions of the Authorisation Regulations.

5 Transitional Arrangements

5.1 Introduction

As discussed earlier in this paper, ComReg proposes to hold a joint award process for the assignment of rights of use in both the 800 MHz and 900 MHz bands in mid-2011, and proposes a commencement date for new liberalised-use licences in these bands in early 2013. ComReg expects that the results of the award would be known by mid-2011 and at that stage the amount of spectrum awarded to each bidder and the location of each bidder within the bands will be known.

Given the timescales associated with the above award process and the fact that there are existing GSM licensees in the 900 MHz band, this chapter considers:

- the transitional issues that may be associated with the release of the 900 MHz band; and
- ComReg's proposal to facilitate the build-out of networks by winners of liberalised rights of use in 800 MHz[98] and 900 MHz spectrum, in advance of the proposed date of licence commencement in early 2013.

5.2 Transitional issues in the 900 MHz band – from proposed joint award in mid-2011 until 800 MHz availability

Currently, each of the three GSM licensees has 2 x 7.2 MHz of 900 MHz spectrum. The licence expiry associated with these licences varies from May 2011 to June 2015.[99] However, as discussed in Chapter 3, ComReg is proposing to issue interim GSM licences to Vodafone and O2. If this proposal is adopted, these GSM licensees will have access to the 900 MHz band for GSM purposes from 2011 until the date of commencement of the new liberalised-use licences in early 2013.

From the date of the spectrum award in mid 2011, Vodafone and O2 would have approximately twenty months to transition to any new liberalised-use licences obtained, with Meteor having approximately 4 years to make a similar transition assuming it does not avail of early liberalisation[100].

In order to assist ComReg with the transitional issues that could arise in relation to the existing licensees in the 900 MHz band, ComReg commissioned expert technical advice from Red-M Wireless Limited (Red-M) and Vilicom Limited (Vilicom), to detail the process steps and estimated timeframes that could be associated with various transitional scenarios[101]. This has resulted in the joint technical report, which has informed ComReg's

[98] It should be noted that currently there is no GSM compatible 800MHz User Equipment (UE) or network equipment available.

[99] Vodafone's and O2's GSM 900 MHz licences expire in May 2011 and Meteor's GSM 900 MHz licence expires in June 2105.

[100] See section 12.2.4 of ComReg Document 09/99

[101] ComReg notes that the Red-M/Vilicom Report provides an estimate of "around €55m", following a "simple cost modeling exercise", in connection with Scenario 2. This estimate has been provided by Red-M/Vilicom for the purposes of its technical analysis and on the basis so identified (noting that Scenario 2 has been assessed on a worst-case basis). As such, ComReg makes or provides no warranty, express or implied, as to the accuracy of this estimate and all parties are therefore cautioned as to relying upon, or otherwise

consideration of the issues, and is published in conjunction with this Consultation.[102] The joint technical report considers three distinct and separate scenarios:

- Scenario 1: A GSM licensee obtains 2 x 10 MHz of 900 MHz spectrum but is required to move to a different part of the 900 MHz band ("relocation");
- Scenario 2: A GSM licensee obtains 2 x 5 MHz of 900 MHz spectrum ("retuning"); and
- Scenario 3: Whilst maintaining its existing 900 MHz spectrum bandwidth of 2 x 7.2 MHz, Meteor is required to retune its network by 200 kHz in order to ensure that 'Block E' of the 900 MHz band is unencumbered for spectrum-use liberalisation.

In relation to Scenario 3, the findings outlined in the joint technical report present an independent assessment of the direct costs and timescales involved in a minor retune of the Meteor network, without any loss of spectrum to Meteor. These findings are not discussed in any further detail in this section.

In relation to scenarios 1 and 2, it should be noted that there was a wide range of variables to consider and as such some basic assumptions had to be made. Therefore the joint technical report based its results on standard cell planning techniques using the Forsk-Atoll planning tool and discounted normal traffic mitigation techniques such as Advanced Multi-Rate coding (AMR), free planning and synchronised frequency hopping. The traffic model used was derived from ComReg's quarterly data and was in excess of that presented by a particular respondent to Consultation 09/99. As such this model could be deemed to have focused on a conservative "worst case" situation for both scenarios.

While this report provides guidance to ComReg, in practice, it is highly unlikely that the worst-case scenarios discussed in the joint technical report will materialise as MNOs are likely to use all technical and non-technical means at their disposal to address any transitional issues. The report acknowledges that there are many other measures available to an operator, but for modelling reasons, the scenarios present findings in relation to the use of one technology solution only.

Furthermore, given the fact that ComReg is now proposing to hold a joint award process for the 800 MHz and 900 MHz bands, one can further question the likelihood of the scenarios studied in the joint technical report occurring. The additional spectrum in the 800 MHz band brings six additional 5 MHz paired blocks to the award and thus widens the range of spectrum assignment outcomes from such a competition.

The above notwithstanding, the findings of the joint technical report provide useful guidance to ComReg that the worst case timeframe associated with Scenario 1 (where a GSM licensee obtains 2 x 10 MHz of 900 MHz spectrum) should not exceed 7 months[103],

making use of, this estimate for purposes other than consideration of the technical matters set out in the Red-M/Vilicom Report.

[102] Red-M/Vilicom Report, Document number 10/71c

[103] Scenario 1's findings include a verification phase and are modelled for the worst case situation of three inter-dependent moves. In practice, three moves may not be required and this would result in shorter timeframes.

while the worst case timeframes associated with Scenario 2 varies from 15 months to 2 years for 90% of the required new-build.[104] Where planning and contractual issues are involved, the report highlights that a timescale of 4 years could be likely; however, it emphasises that the absence of these sites is only likely to cause minor local quality of service issues. Therefore on a network-wide basis, one could reasonably assume that any required new-build could be completed within 2 years (again, leaving aside the ability of the affected operator to avail of other technical and non-technical means).

It is important to remember that these findings are the worst-case timeframes and based on a theoretical planning model and one would expect an operator to be more efficient and complete any necessary transition steps in a shorter timeframe.

Given the expectation that Vodafone and O2 would have approximately 20 months to transition to any new liberalised licences obtained, with Meteor having approximately 4 years for a similar transition where it does not avail of the rebate, it is ComReg's view that the timeframes associated with this joint award between mid 2011 and early 2013 are sufficient for the operators to complete any necessary transitional arrangements.[105]

Notwithstanding this, ComReg is aware that in transitioning to any new liberalised-use licences, it may be necessary for ComReg to vary the terms of the existing licences to facilitate such transition in advance of the commencement date of the newly liberalised licences. For example, an existing GSM operator which obtained liberalised-use licences for blocks A and B may wish to have the terms of its GSM 900 MHz licence suitably amended in order that its 2 x 7.2 MHz spectrum assignment is contained within Blocks A and B. Such a move would assist the transitioning process, by making other spectrum blocks available for the other existing GSM operators to relocate.

Of course, ComReg is aware that such transitional arrangements are dependent on the outcome of the auction, and, therefore, ComReg would consider requested variations to existing GSM 900 MHz licences on a case-by-case basis.

Q. 18: Do you agree with ComReg's proposed approach in relation to transitional issues that may arise in the 900 MHz band in the period leading up to 800 MHz availability? Please provide reasons for your view.

[104] Scenario 2's findings are modelled for the worst case situation where an operator built 414 new greenfield 900 MHz sites. It is highly unlikely that an existing GSM operator would employ such a strategy as it has other technical and non-technical measures available its disposal. The use of these other measures would reduce the timeframes associated with this scenario. These other measures include the use of Advanced Multi-Rate (AMR) coding, the offloading of traffic onto the 1800 MHz and 2100 MHz networks, the installation of additional 900 MHz, 1800 MHz, 2100 MHz antenna on existing sites, the use of national roaming, the use of infrastructure sharing, etc.

[105] From examining approaches proposed/adopted by other administrations, such as Finland http://www.ficora.fi/ and the United Kingdom http://www.ofcom.org.uk/ , it appears that a maximum transition period of two years was considered sufficient for the operators in these countries to cope with any necessary transitioning measure and this maximum period would only be necessary where the existing licensees obtained a smaller 900 MHz spectrum assignment than the one they previous held.

5.3 Transitional issues in the 800 MHz and 900 MHz band – between "time slice 1" and "time slice 2"

There is the possibility, arising from the proposed joint award (as set out in Chapter 4 of this document and in further detail in the DotEcon report), for a situation to arise where some transition may be required by winners of liberalised spectrum relocating between the 800 MHz and 900 MHz bands between the two time slices. For instance, where an operator has won rights to use 2 x 10 MHz of 900 MHz spectrum in the period between 2013-2015 and rights to 2 x 10 MHz of 800 MHz spectrum from 2015-2030.

ComReg notes that such transitional issues would only arise in the unlikely circumstances where a package bid that would lead to such a situation was firstly made and subsequently proved successful in the auction.

In the interest of providing clarity to interested parties in the event of such transitional issues arising, ComReg's proposed position is that it would not delay availability of spectrum blocks in the second time slice to make allowance for these transition arrangements to be completed. That is, affected parties would be required to fully address such issues during the first time period. This position reflects that:

- winners of spectrum who require such transition have, in effect, created this situation for themselves as a result of their bidding strategies. In this context, it would not appear appropriate for other winners of liberalised spectrum to be adversely affected by these choices; and
- affected parties would have, assuming a joint award in mid-2011, approximately 3.5 years (until 2015) with which to prepare for and complete the necessary transitional arrangements.

In addition, ComReg's preference in these circumstances is for affected parties to co-ordinate and co-operate on a voluntary basis to effectively and efficiently address any transitional issues in the first instance, with regulatory intervention by ComReg as a last resort. This reflects ComReg's belief that affected parties should be incentivised and indeed better placed to manage and address these issues.

To facilitate an industry-led approach, ComReg therefore proposes that a pre-condition of entry to the proposed joint award would be that all prospective participants would be required to:

- enter into a Memorandum of Understanding (MoU) under which they would agree to use best efforts to co-operate with other licensees and ComReg in addressing any transitional issues arising; and
- in the event of a demonstrated failure to come to a voluntary arrangement with other affected parties, to agree to ComReg's determination on such matters.

In addition, ComReg would consider requested variations to liberalised licences as necessary to address such transitional issues on a case-by-case basis.

Q. 19: Do you agree with ComReg's proposed approach in relation to transitional issues that may arise in the 800 MHz and 900 MHz band (between time slices)? Please provide reasons for your view.

5.4 Preparatory Licences for future 800 MHz and 900 MHz liberalised licensees

Following the result of the award process, it is safe to assume that all winners of liberalised-use spectrum, regardless of whether they are located in the 800 MHz or 900 MHz band, will be preparing for service-commencement in early 2013.

To facilitate earliest service-provision, ComReg is proposing to issue to all winners of liberalised-use spectrum a 'preparatory' licence under the Wireless Telegraphy Act[106] that would enable recipients to install networks and associated equipment in the 800 MHz and 900 MHz bands (but would not allow any wireless telegraphy transmissions) and that would commence from shortly after the conclusion of the licence award process and operate until the commencement date of new liberalised-use licences.

In addition, during this period ComReg will consider and grant wherever possible 'test licences' to facilitate the testing of these networks and equipment.[107]

In ComReg's view, the issue of such preparatory licences should minimise any delay to the earliest provision of liberalised services that may otherwise arise from the joint availability of 800 MHz and 900 MHz spectrum.

Q. 20: Do you agree with ComReg's proposal to issue 'preparatory licences' to winners of liberalised spectrum rights of use in the 800 MHz and 900 MHz bands? Please provide reasons for your view.

[106] Section 5 (1) of the Wireless Telegraphy Act 1926, allows for a licence to be issued ' to keep and have possession of apparatus for wireless telegraphy' subject to 'such conditions and restrictions' as 'shall be prescribed in regard thereto by regulations' which would be made under Section 6 of same Act. Hence a licence could be issued which would allow for the lawful possession of apparatus for wireless telegraphy but which would include restrictions on use until 800 MHz and 900 MHz spectrum availability.

[107] See Test and Trial Ireland, www.testandtrial.ie .

6 Submitting Comments and Next Steps

6.1 Submitting Comments

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

Please also set out your reasoning and all supporting information for any views expressed.

The request for input period will run until 5pm on 15 October 2010, during which time ComReg welcomes written comments on any of the issues raised in this paper.

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.[108]

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.

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 website and for inspection generally, respondents to consultations are requested clearly to identify confidential material and to place confidential material in a separate annex to their response. In anticipation of any correspondence on matters relating to this document, ComReg hereby gives notice that it will publish all material correspondence received in this regard. Such information will be treated subject to the provisions of ComReg's guidelines on the treatment of confidential information.

6.2 Next Steps

Having analysed and considered the comments received, ComReg intends to publish a response to consultation that will take into account the responses to this consultation, as well as, to the extent that they remain relevant responses to Consultation 09/99, all other inputs received to date, and subject to same, amongst other things:

- detail any further national developments on the release of the Digital Dividend in Ireland;
- provide ComReg's Decision on interim licence measures, which, if positive, will be with a view to preparing a Statutory Instrument for presentation to the Minister for Communications Energy and Natural Resources for signature; and

[108] ComReg 05/24 Response to Consultation - Guidelines on the treatment of confidential information - March 2005

- provide for consultation, ComReg's draft decision and draft RIA on the future licensing of the 800 MHz, 900 MHz and possibly the 1800 MHz bands.

During this period ComReg intends to engage with Ofcom, its counterpart in the United Kingdom, seeking to establish a further Memorandum of Understanding on frequency co-ordination in the 800 MHz band between the two jurisdictions.

Annex 1 - Issues dealt with in previous 900 MHz consultations

This annex contains a non-exhaustive list of the issues that have arisen in the course of ComReg's consultation process on the liberalisation and future use of the 900 MHz and 1800 MHz bands, together with reference to the section wherein each issue has been dealt with across the three consultations (ComReg Document 08/57, 09/14 and 09/99) held to date.

Issue	Consultation 08/57	Consultation 09/14	Consultation 09/99
ComReg's functions and objectives	3.2	4.2	10
Benefits of liberalisation	5.3	5.1.3	
EC Decision	5.5	3.1.1	4.1
Service neutrality	6.3.1	6.1	15.4
Spectrum trading	6.4.1	4.6	6.4
International frequency co-ordination	6.4.2 & 7.5.2		4.3 & Annex D
Choice of award process	7.2	6.3.1.5, 6.3.1.6 & 6.3.1.7	
Spectrum cap	7.2.1	6.2.1	
Licence duration	7.3.2	6.3.1.1 & 6.3.1.2	
Common termination date	7.3.2	6.3.1.3 & 6.3.1.4	
Licence conditions	7.3.3		15.5 & 15.6
MVNO	7.3.4	7	15.8
Technology neutrality	7.4.1	6.1	15.4
Spectrum block size	7.4.2	6.2.2	
Frequency co-ordination & interference mitigation	7.5.1	6.2.3	14 & 15.9
ComReg options A, B & C	8	8.1	7.1
1800 MHz Demand and timing	9.2	6.4	6.2
ODTR statement on future renewal of GSM licences		4.1	6.5
Consumer disruption/ loss of spectrum		4.3	6.6
Market Disruption		4.4	
Regulatory certainty, efficient infrastructure investment & industry sustainability		4.5	
Promotion of competition and new entrants		4.6	
Speculative bidding		4.7	

Issue	Consultation 08/57	Consultation 09/14	Consultation 09/99
Options raised by respondents		8.2	Annex F, 7.4, 7.5 & 7.6
ComReg options 1 & 2		9	7.2
LTE			6.1
Digital Dividend		4.6	6.3
Demand for 900 MHz spectrum			6.8
NBS			6.9
Modified option 1			8 (8.2 in particular)
Draft RIA			9
Auction format			12
Licence fees including structure of fees			13

Annex 2 – International Update

Introduction

This annex sets out specific details of relevant developments relating to the refarming/liberalisation of the 900 MHz band and 800 MHz band activities in other European countries since the publication of Document 09/99.

Summary

When 900 MHz or 800 MHz spectrum has been (or is intended to be) released, such release is generally achieved through an auction (see Switzerland, Norway, Spain, Germany and Belgium). However, some countries like France and Italy have opted for a beauty contest. In Sweden, the reassignment of the 900 MHz band was achieved through the State approval of an agreement concluded between the operators although this approach has been the subject of investigation by the EC and the Swedish Competition Authority. While the Swedish competition authority cleared the Swedish regulator's (PTS) 900 MHz decision on 24 June 2010, PTS has received a challenge to its decision which will be heard in the Stockholm administrative court.

In releasing spectrum, there now appears to be a trend amongst member states towards releasing multiple spectrum bands simultaneously (e.g. German big auction). This consideration is particularly relevant when the spectrum bands are complementary or substitutes to each other and when the availability of spectrum in differing spectrum bands are somewhat close in time. DotEcon cited in its Report that when multiple frequency bands are released simultaneously, there is an increased probability that the resulting assignment across the spectrum bands and operators would be efficient. Where operators utilise spectrum in multiple bands to offer services and the multiple spectrum bands are considered at least somewhat substitutable, releasing spectrum in these multiple spectrum bands in a simultaneous competition increases certainty for the operator. This also allows operators to dynamically evaluate the price for spectrum in each band and allow it to dynamically alter its strategy and spectrum demand in each spectrum band based on current competition price.

In May 2010, the German regulator BNetzA auctioned spectrum in the 800 MHz, 1.8 GHz, 2.1 GHz and 2.6 GHz bands. Other countries considering a simultaneous competition for multiple spectrum bands include the UK (800 MHz and 2.6 GHz), Switzerland[109] (800 MHz, 900 MHz, 1.8 GHz, 2.1 GHz and 2.6 GHz) and Denmark (900 MHz and 1.8 GHz).

Focussing on a simultaneous award process for the 800 MHz and 900 MHz bands, Switzerland is the only country to date that has proposed this. However unlike Ireland, other countries do not have such a short timeframe between the availability of their 800 MHz spectrum and 900 MHz spectrum. Therefore other countries, (except Switzerland)

[109] As cited in the Swiss NRA's Report, releasing multiple spectrum bands simultaneously can give rise to a more efficient frequency allocation, increases the probability of success for potential new entrants and reduces administrative expense.

may not have had the opportunity to consider hosting a competition for 800 MHz and 900 MHz spectrum simultaneously. Germany, the only country in Europe to release 800 MHz spectrum to date has 900 MHz spectrum licences running until 2016.

In relation to assignment of 900 MHz spectrum rights, administrations in other countries have adopted various mechanisms particular to their national circumstances including, without limitation, national legislation, market conditions, level of competition in the market and available spectrum.

Detail of European Developments in the 800 MHz and 900 MHz bands

Denmark

Analogue Switch Off has already taken place in Denmark. On 22 June 2009, the national regulator authority (NITA[110]) allocated the 800 MHz spectrum band for uses other than broadcasting, paving the way for mobile services to be deployed in this band. NITA published a consultation on the 800 MHz spectrum on 17 May 2010 with a response deadline of 24 June 2010. The response to consultation has yet to be published.

In relation to the 900 MHz and 1800 MHz bands, on 23 December 2009, NITA announced its decision on the refarming of these bands. In 2011, the three incumbent operators will release a cumulative 2 x 5 MHz of 900 MHz spectrum and 2 x 10 MHz of 1800 MHz spectrum for re-award.

On 28 May 2010, the NITA launched a public consultation on this spectrum and proposed that the spectrum usage rights for this refarmed spectrum be awarded in an auction in January 2011.[111] Details on the auction procedures and the conditions of the new 900 MHz and 1800 MHz licences are yet to be published.

France

Digital Switch On (DSO) started in 2009 in France and full DSO is expected in November 2011[112]. The 800 MHz band has been allocated for mobile broadband services.

On 27 July 2010[113] the NRA, ARCEP, launched a consultation on the award of 800 MHz and 2.6 GHz bands, with a closing date of 13 September 2010. The NRA expects to award licences in the summer of 2011, just before full DSO is completed in November 2011.

[110] http://www.itst.dk/

[111] https://www.borger.dk/Lovgivning/Hoeringsportalen/Sider/Fakta.aspx?hpid=2146001628

[112] http://www.cullen-international.com/report/3796/t3371#Table_27

[113] http://www.arcep.fr/index.php?id=8571&L=1&tx_gsactualite_pi1[uid]=1298&tx_gsactualite_pi1[annee]=&tx_gsactualite_pi1[theme]=&tx_gsactualite_pi1[motscle]=&tx_gsactualite_pi1[backID]=26&cHash=13e700e099

The current consultation is refining the specifics of the spectrum release, e.g. spectrum cap specifically for the 800 MHz band and reserve price. The proposed licence conditions on licensees in the 800 MHz band will depend on the amount of spectrum assigned to each operator, i.e. more stringent requirements will be imposed on licensees with larger spectrum assignments in the band. Through consultation, the NRA defined the FDD spectrum plan as preferred in CEPT report 31.

Regarding the 900 MHz band, in November 2009 ARCEP liberalised the 900 MHz and 1800 MHz licences of Bouygues Télécom, following similar decisions taken concerning the licences of Orange and SFR.

On 12 January 2010 ARCEP assigned the fourth 3G licence to Free Mobile (Iliad). Free Mobile, which was the only applicant for the licence can now use 2 x 5 MHz of spectrum in the 2100 MHz band for 20 years. The 20 year licence cost €240m in addition to an annual fee of 1% of turnover as defined in its licence. Free Mobile must cover 27% of the population with voice services, and 20% of the population with data services by January 2012. Free Mobile will also be assigned 2 x 5 MHz of 900 MHz spectrum which will be released by incumbents in two phases between 2011 and 2013.[114]

The remaining spectrum in the 2100 MHz band was won by Orange and SFR. SFR will pay €300m for 2 x 5 MHz and Orange €282m for 2 x 4.8 MHz. In addition to the once-off fees, Orange and SFR will also pay an annual fee amounting to 1% of annual turnover. [115]

Germany

In October 2009, BNetzA announced that upon request it will liberalise individual 900 MHz and 1800 MHz licences and that liberalisation would take place after BNetzA completed a review of the German mobile market, scheduled to begin within three months of conclusion of the "big bang" auction for the 800 MHz, 1.8 GHz, 2.1 GHz and 2.6 GHz bands. The review will analyse any potential market distortions that may arise from asymmetric holdings of spectrum in the bands below 1 GHz as a result of the "big bang" auction. The NRA has started this review pursuant to Article 1 (2) of the amended GSM Directive. Due to the highly complex issues involved, the NRA decided to publish a public consultation on key questions. The "impulse paper" was published on 11 August 2010.[116]

Germany's "big bang" spectrum auction ended on 20 May 2010 after 27 days of bidding, raising a total of €4.4bn. The vast bulk of fees arose from its auction of the 800 MHz band, accounting for over 81% of the total fees, even though the 800 MHz band only accounted for one sixth of the spectrum on offer.[117] In this auction, BNetzA limited the bidding rights

[114] http://www.arcep.fr/index.php?id=8571&L=1&tx_gsactualite_pi1[uid]=1244&tx_gsactualite_pi1[annee]=&tx_gsactualite_pi1[theme]=&tx_gsactualite_pi1[motscle]=&tx_gsactualite_pi1[backID]=26&cHash=c793bcde6e

[115] http://www.arcep.fr/index.php?id=8571&L=1&tx_gsactualite_pi1[uid]=1278&tx_gsactualite_pi1[annee]=&tx_gsactualite_pi1[theme]=&tx_gsactualite_pi1[motscle]=&tx_gsactualite_pi1[backID]=26&cHash=360be91214

[116] http://www.bundesnetzagentur.de/cae/servlet/contentblob/159006/publicationFile/8292/ImpulspapierFreqVertUntersuchg_pdf.pdf

[117] http://www.cullen-international.com/report/3619

by imposing a spectrum cap, which limited the spectrum that a single operator could hold below 1 GHz to a maximum of 2 x 20 MHz. Notwithstanding, all spectrum blocks were awarded, totalling 360 MHz. The new licences are technology and service neutral and will expire in 2025.

In relation to the 800 MHz band, Telefonica O2, T-Mobile and Vodafone each succeeded in winning 2 x 10 MHz while the remaining existing mobile network operator E-Plus did not acquire any spectrum in the 800 MHz band.[118]

Malta

In relation to the 900 and 1800 MHz bands, in February 2009, the Malta Communications Authority (MCA) published a consultation outlining future licensing proposals and assignment mechanisms for the 900 and 1800 MHz bands[119]. The consultation phase was followed by a round of bilateral meetings to clarify respondents' views and on 16 July 2010 the MCA published its analysis of stakeholders' comments together with its final decision[120]. The decision addresses issues including:

- the format of the award process;
- spectrum caps;
- licence duration;
- Coverage and Roll out conditions;
- Fees; and
- interim measures to deal with differences in the existing licence expiry dates (2010 and 2011);

The MCA plans to publish a call for applications from perspective licensees later in 2010 and if there is excess demand, this will be followed by an auction based award process comprised of two-stages.

The first phase will be an abstract stage in which applicants may place package bids on lots of 2 x 5 MHz, up to a maximum of 2 x 20 MHz in the 900 MHz band and not exceeding 2 x 40 MHz across both the 900 and 1800 MHz bands.

The abstract auction stage will be followed by an assignment stage seeking to broker a negotiated outcome between all recipients of abstract lots. If all stakeholders do not agree on an assignment plan, the specific frequencies will be assigned through a lottery process.

Future licences will be 15 years in duration and holders will be required to provide national coverage within 2 years, paying €224,000 annually per 2 x 5 MHz held in the 900 and 1800 MHz bands, in addition to any fee in an auction if it was to take place.

[118] http://www2.bundesnetzagentur.de/frequenzversteigerung2010/index.html

[119] http://www.mca.org.mt/filesystem/pushdocmgmtfile.asp?id=695&source=1&pin=

[120] http://www.mca.org.mt/filesystem/pushdocmgmtfile.asp?id=895&source=1&pin=

Licensees may deploy systems listed in the Annex to the EC Decision. No services will be mandated in future licences, however MCA reserves its powers to do so pending future developments.

The licences of incumbent operators are being extended to ensure continuity of GSM services until the new licences come into effect[121]. To date the existing licences in the 900 MHz and 1800 MHz bands have different termination dates. Therefore in order to ensure a smooth migration, the July 2010 Decision stipulated that the existing GSM licences are being extended by a few months until the commencement of the licences that will be awarded in accordance with the re-assignment process that is currently underway. These extensions are one-time and non-renewable. They retain the current terms and conditions and grant no additional rights to the existing licence holders.

As of yet, Malta has not consulted on the 800 MHz band, however it is working with neighbouring countries and intends to release this spectrum as soon as possible after these discussions are concluded.

Netherlands

In January 2010, the Ministry of Economic Affairs announced that existing licences in the 1800 MHz and the E-GSM band will not be renewed when they expire in 2013. The remaining licences in the 900 MHz band (currently held by KPN and Vodafone), which were renewed in 2008, will also expire on the same date[122]. All spectrum rights in the 900 MHz and 1800 MHz bands will be awarded through an open auction, to be held one year in advance of expiry.

In relation to the 1800 MHz band, the Ministry rejected arguments for further extension on the grounds of possible consumer disruption[123], *inter-alia* noting that;

- operators can acquire alternative spectrum holdings;
- operators can migrate customers to 2100 MHz networks; and
- customers can change service provider while retaining their existing phone numbers;

It was also announced that current holders of spectrum in the 900 MHz and 1800 MHz bands can apply for a ministerial decree to liberalise these licences for their remaining term, but only after several ministerial decrees and decisions have been amended. The timing for the final amendment of the decrees and decisions is not yet known.

In relation to the 800 MHz band, the Government proposes to clear this band by 2012. On 28 July 2010, the Ministry for Economic Affairs informed Parliament that its preference

[121] http://www.mca.org.mt/filesystem/pushdocmgmtfile.asp?id=1435&source=4&pin=

[122] http://www.cullen-international.com/report/3796/t3373#Table_25

[123] Translated from

http://www.rijksoverheid.nl/documenten-en-publicaties/notas/2010/02/02/besluit-gsm-1800-vergunningen.html

was for the 800 MHz band to be allocated for mobile services[124]. A strategic note on mobile communications is expected to be published in September 2010 which will contain more information on the planning of the allocation for the band.

Norway

In 2005, licences were renewed following a consultation in which only the two 900 MHz incumbent licensees expressed demand. The regulator (NPT) has since redistributed spectrum holdings in the band to allow an additional operator access to a block of 2 x 5 MHz.

The existing 900 MHz licences are due to expire in 2013 and 2017 and there is no legislative provision to renew these licences. NPT will consult on the mechanism for the future award of spectrum in the band and pending the level of demand expressed it may adopt an auction based approach. Liberalisation of the current 900 MHz licences is expected in the coming months.

In early 2010 the Ministry received an application to assign 20 MHz of spectrum in the 1800 MHz band. Interested parties were given an opportunity to submit applications for this spectrum by 19 February. On 16 April the Ministry announced[125] that the combined demand expressed during this period exceeded the amount of spectrum available and an auction based award is now planned to take place early in 2011.

In relation to the 800 MHz band, the authorities have decided to reserve the 790-862 MHz area for mobile telecommunication and mobile broadband. According to one of the mobile operators Telenor[126], the NRA has announced that the 800 MHz band will be auctioned on a technology neutral basis, expected in 2011.

Portugal

On 31 March 2010 the NRA (ANACOM) launched a public consultation on a draft decision[127], which would combine each operators' existing rights of use issued in the 900 MHz, 1800 MHz and 2100 MHz bands into a single licence. The consultation closed on 6 May. On 8 July, the NRA adopted this decision[128].

In relation to the release of spectrum, a public consultation was due for publication in July 2010 (not published as of yet), which is expected to discuss the potential to release the 800

[124] Translated from http://www.rijksoverheid.nl/onderwerpen/frequentiebeleid/documenten-en-publicaties/kamerstukken/2010/07/28/brief-stand-van-zaken-digitaal-dividend-en-het-800-mhz-spectrum.html

[125] Translated from

http://www.regjeringen.no/nb/dep/sd/aktuelt/nyheter/2010/Ledige-frekvensressurser-i-1800-MHz-bandet-vil-bli-tildelt-ved-en-auksjon.html?id=600883

[126] http://www.telenor.com/en/investor-relations/company-facts/business-description/telenor-norway

[127] http://www.anacom.pt/render.jsp?contentId=1019850

[128] http://www.anacom.pt/render.jsp?contentId=1037520

MHz band alongside the 1.8 GHz, 2.1 GHz, 2.6 GHz and 3.4 GHz bands in an auction planned for 2010.[129]

Spain

In January 2010 the Ministry of Industry[130] published a draft law proposing to liberalise the 900 MHz and 1800 MHz licences following a review of existing spectrum holdings by Royal decree. In February 2010, a Royal Decree ordered that the band 790-862 MHz band be made available for mobile broadband. The NRA decided without stakeholder input to release 800 MHz spectrum on a paired basis.

In June 2010, the Ministry published a consultation on its proposals for refarming the 800 MHz 900 MHz, 1800 MHz and 2.6 GHz bands[131].

In relation to the 900 MHz band, the preferred option is to hold an auction in June 2011 for a block of 2 x 5 MHz released by existing 900 MHz licensees. Two more blocks of 2 x 5 MHz would be auctioned contemporaneously, but these would not be assigned until 2015[132], following the expiry of a Telefonica licence and the release of a further 1 MHz of spectrum by Vodafone.

In relation to 800 MHz, it is also proposed that 6 blocks of 2 x 5 MHz in the 800 MHz band would be auctioned in 2011, although these may not be assigned until 2015. A spectrum cap of 2 x 20 MHz would apply across the 800 MHz and 900 MHz bands.

To compensate operators for the release of 900 MHz spectrum, the expiry dates for their remaining assignments in the band would be extended to 2030. 900 MHz licensees would be granted permission to deploy other technologies, subject to certain coverage requirements, and Telefonica and Vodafone would also be subject to wholesale obligations to provide national roaming to operators not licensed in the band.

The Government proposes that upon request, 1800 MHz licensees may also be permitted to use this spectrum for alternative technologies[133] in return for the release of a block of 2 x 5 MHz or for a once-off fee. If this proposal is applied, the operators that wish to benefit from the refarming of the band 1800 MHz must present their application during 2010. If they fail to do so, the Government will not authorise the refarming until 2014.

In July the Spanish Competition Authority (CNC) raised some concerns about the Ministry's proposals[134], noting;

[129] http://www.ectaportal.com/en/REPORTS/Regulatory-Scorecards/Regulatory-Scorecard-2009/

[130] http://www.mityc.es/telecomunicaciones/es-ES/Paginas/index.aspx

[131] http://www.cullen-international.com/report/3796/t3371#Table_27

[132] http://www.cullen-international.com/report/3796/t3352#Table_26

[133] http://www.cullen-international.com/report/3796/t3352#Table_26

[134] http://www.cncompetencia.es/Inicio/Informes/Informes/tabid/166/Default.aspx

- the potential competitive advantage that the winner of a 900 MHz licence commencing in 2011 may have over those acquiring licences that cannot be used before 2015.
- the application of a 2 x 20 MHz cap to spectrum below 1 GHz implies that three operators could obtain 92% of the entire spectrum available, leaving only 2 x 5 MHz for a fourth operator.
- the extension of existing 900 MHz licences to 2030, in return for the early release of spectrum, may limit competition.

Sweden

In 2009, following a joint proposal by five MNOs for renewal of 900 MHz licences, the Swedish Post and Telecom Agency (PTS) decided to redistribute existing spectrum assignments[135], renew licences and permit the introduction of new systems into the band. As part of the decision, PTS assigned additional spectrum to Hi3G who did not previously have any 900 MHz spectrum in the band. Existing operators intending to deploy new systems in the 900 MHz band will be required to meet their existing coverage conditions until the end of 2015 and this period may be extended further.

Later in 2009 the PTS decision was investigated by the Swedish Competition Authority on foot of a complaint lodged with the EC. The Authority reached the preliminary conclusion that the joint proposal presented by five MNOs to the PTS constituted an agreement restricting competition that is prohibited under Article 81 of the EC Treaty.[136]. In June 2010, the Competition Authority concluded its investigation into the 2009 PTS decision, noting that the regulation of spectrum as a resource limited the potential for the inter-operator agreement to restrict competition in the market, and the Competition Authority closed its investigation as it determined the PTS decisions was not against competition rules.[137]

In February 2010, after consulting on another joint proposal by four MNOs for renewal of 1800 MHz licences, the PTS published its decision[138] on the future of the band. Existing licences have been extended until the end of 2012, and are permitted to deploy new mobile broadband technologies in the band. Licences for reduced spectrum assignments will be assigned for the period 2013 to 2027. The released 1800 MHz spectrum will be awarded in an auction planned later in 2010.
In relation to 800 MHz, the regulator is planning an auction which will be held in Q1 of 2011. A spectrum cap of 2 x 10 MHz would apply to all participants. PTS is considering whether some of the 800 MHz band should have coverage requirements focused on resolving the problems of the subscribers who do not have access to broadband.[139]

[135] http://www.pts.se/en-gb/News/Press-releases/2009/PTS-issues-decision-concerning-space-in-the-900-MHz-band-which-will-ensure-continued-high-coverage-for-mobile-telephony-in-Sweden/

[136] now article 101 of the TFEU

[137] http://www.kkv.se/upload/Filer/Konkurrens/2010/Beslut/08-0688.pdf

[138] http://www.pts.se/sv/Nyheter/Radio/2010/PTS-fornyar-tillstand-i-1800-MHz-bandet/

[139] http://www.pts.se/sv/Bransch/Radio/Auktioner/Ansokan-tillstand-800-MHz-bandet/

Switzerland

Existing GSM licences were extended in 2009 in order to harmonise their expiry dates[140]. The decision to extend these licences also included measures which came into effect early in 2010 allowing the regulator to redistribute spectrum in the bands. The redistribution of spectrum was completed in March 2010 and each operator now has access to at least 2 x 5 MHz of spectrum in the 900 MHz band.

The current GSM and UMTS licences will expire in 2013 and 2016 respectively and the regulator is now planning a 2011 "big bang" auction[141] of 550 MHz of spectrum in the 800 MHz, 900 MHz, 1.8 GHz, 2.1 GHz and 2.6 bands.

A consultation was published in June 2009 and in November 2009 the NRA published its report on the comments received. The report noted that the renewal of existing licences may lead to asymmetries in frequency holdings and inefficiencies in the market. The NRA favours a big bang auction of the spectrum due to the complementary nature of the different frequency bands available, the increased likelihood of a successful new entrant and the reduced administrative costs associated with a single competition.

UK

In May 2010 the UK Parliament was dissolved in advance of a general election, leading to a delay in the debate over proposals concerning the future of 2G and 3G licensing. In July the new Government issued a draft Order to Ofcom on spectrum management together with an explanatory memorandum ("Draft Order")[142].This draft order would instruct Ofcom *inter-alia* to;

- designate the 900 MHz and 1800 MHz bands for GSM and UMTS, and also varying existing 900 MHz and 1800 MHz licences to permit both GSM and UMTS systems;
- "vary each 900 MHz and 1800MHz licence to extend the period of notice for revocation for spectrum management reasons from 1 year to 5 years";
- allow the 2100 MHz licences to " continue in force unless or until revoked by Ofcom" (i.e. indefinite licences);
- "make provision to permit the transfer of all or part of the rights and obligations arising as a result of 900 MHz, 1800 MHz and 2100 MHz licences from the licensee to another person" (i.e. spectrum trading";
- review licence fees to reflect the full market value;
- launch an auction for the 800 MHz and 2.6 GHz bands (expected Q4 2011) and spectrum in other bands if appropriate; and
- conduct a review of the competition in the market after this auction;

[140] http://www.comcom.admin.ch/aktuell/00429/00457/00560/index.html?lang=en&msg-id=27081

[141] http://www.bakom.admin.ch/dokumentation/medieninformationen/00471/index.html?lang=en&msg-id=30007

[142] http://www.opsi.gov.uk/si/si2010/draft/ukdsi_9780111500767_en_1

It appears that it remains for both houses of Parliament to vote on this draft Order before it is formally issued to Ofcom and November 2011 appears to be the current finalisation date.

In May 2010, Telefonica O2 had filed an appeal to the Competition Appeal Tribunal (CAT) alleging Ofcom failed to amend its licence to permit 3G technologies in the 900 MHz and 1800 MHz bands in accordance with the EC Decision and amending Directive. While the order issued by the Government would appear to address this issue, the appeal has yet to be withdrawn.

Annex 3 – List of Relevant ComReg Documents

Document Type	Document Title	ComReg Document Number	Published
Consultation	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	08/57	17 July 2008
Submissions to Consultation 08/57	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	09/14s	10 March 2009
Response to Consultation & Further Consultation	Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum Bands & Spectrum Release Options - Response to Consultation 08/57 & Further Consultation	09/14	10 March 2009
Technical Report – Vilicom Published alongside ComReg Document 09/14	UMTS Network Design & Cost - Estimation for National UMTS900, UMTS1800 & UMTS2100 Networks	09/14a	23 March 2009
Submissions to Consultation 09/14	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	09/51s	17 June 2009
Non confidential bilateral minutes	Liberalising the Future use of the 900 MHz and 1800 MHz Spectrum bands & Spectrum Release Options – Publication of the non-confidential minutes of bilateral meetings	09/73	25 September 2009
Response to Consultation & Further Consultation	Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum Bands - Response to Consultation 09/14 and Further Consultation	09/99	21 December 2009
Economic Report	Liberalisation of spectrum in the 900MHz and 1800MHz bands	09/99c	21 December 2009
Submissions to Consultation 09/99	Liberalising the Future Use of the 900 MHz and 1800 MHz Spectrum Bands - Submissions received from respondents	10/21R	29 March 2010

Table 1: Relevant Documents thus far for 900 MHz and 1800 MHz spectrum release process

Consultation	Digital Dividend in Ireland - A new approach to spectrum use in the UHF Band	09/15	12 March 2009
Response to Consultation	Digital Dividend in Ireland - A new approach to spectrum use in the UHF Band	09/81	20 October 2009

Submission to Consultation 09/15	Digital Dividend in Ireland - A new approach to spectrum use in the UHF Band - Submissions received from respondents	09/81s	20 January 2010

Table 2: Relevant Documents thus far for 800 MHz spectrum release process

Annex 4 – Consultation Questions

List of Questions

Q. 1 ComReg proposes that new services deployed in the 800 MHz band in Ireland employ Frequency Division Duplex mode of operation. Do you agree with ComReg's proposal? Please provide reasons for your view.

Q. 2 ComReg proposes that the block edge masks proposed in the Annex to EC Decision 2010/267 (EC 800 MHz Decision) be applied to licences in the 800 MHz band in Ireland. Do you agree with ComReg's proposal? Please provide reasons for your view.

Q. 3 Do you agree with ComReg's proposal to proceed with a joint award of the 800 MHz and 900 MHz bands? Please provide reasons for your view.

Q. 4 Should the 1800 MHz band be included in a joint auction with the 800 MHz and 900 MHz bands? Please provide reasons for your view.

Q. 5 Do you agree with ComReg's Interim Licence Proposal and proposed licence conditions for same? Please provide reasons for your view.

Q. 6 Do you agree with ComReg's proposal to apply the spectrum usage fees (being spectrum access fee and yearly licence fee) as provided for in their respective current GSM 900 MHz licences of Vodafone and O2, but with both elements indexed to inflation? Please provide reasons for your view.

Q. 7. Are there any other approaches to determining appropriate spectrum usage fees for interim licences? Please provide reasons for your view, including any other options which you consider may be appropriate having regard to ComReg's statutory functions, objectives and duties.

Q. 8. Do you agree with ComReg's proposal to set a sub 1 GHz cap for the competition? Please provide reasons for your view.

Q. 9. Do you agree that a 2 x 20 MHz cap is the most appropriate cap to set for a joint award of 800 MHz and 900 MHz spectrum? Please provide reasons for your view.

Q. 10. Do you agree with ComReg's proposal to hold an auction for the 800 MHz and 900 MHz bands? Please provide reasons for your view.

Q. 11. Do you agree with ComReg's proposal to use two temporal lots for the 800 MHz band and that these temporal lots should mirror the time periods of the 900 MHz band? Please provide reasons for your view.

Q. 12. Do you agree with ComReg's proposal to use an open combinatorial clock auction format for this auction? Please provide reasons for your view.

Q. 13. Do you agree with ComReg's proposal to set a common minimum price for the both 800 MHz and 900 MHz bands and to use the updated benchmarking exercise from DotEcon as the basis for setting this minimum price? Please provide reasons for your view.

Q. 14 Do you have any comments on the structure of the reserve prices and spectrum usage fees? Please provide reasons for your view.

Q. 15. ComReg proposes to set a symmetric coverage obligation for 70% of the population of Ireland and an asymmetric roll-out time to meet this coverage obligation. The proposed roll-out time is 3 years for a licensee who has an existing mobile network (i.e. Vodafone, O2, Meteor or 3) and 7 years for a new entrant to the Irish mobile market.

Do you agree with ComReg's proposed coverage and roll-out obligation? Please provide reasons for your view.

Q. 16. ComReg proposes to set a quality of service obligation in relation to the availability of a network, the network voice call (non-VoIP) service and billing and does not propose to set a minimum QoS network standard for a mobile broadband service. Instead ComReg is considering other measures and licence conditions to provide greater information to consumers on the actual broadband speed being provided.

Do you agree with ComReg's proposed quality of service obligations? Please provide reasons for your view.

Q. 17. ComReg proposes to set miscellaneous obligations in relation to non-ionising radiation, international roaming capability and access to the emergency services.

Do you agree with ComReg's proposed miscellaneous obligations? Please provide reasons for your view.

Q. 18: Do you agree with ComReg's proposed approach in relation to transitional issues that may arise in the 900 MHz band in the period leading up to 800 MHz availability? Please provide reasons for your view.

Q.19: Do you agree with ComReg's proposed approach in relation to transitional issues that may arise in the 800 MHz and 900 MHz band (between time slices)? Please provide reasons for your view.

Q. 20: Do you agree with ComReg's proposal to issue 'preparatory licences' to winners of liberalised spectrum rights of use in the 800 MHz and 900 MHz bands? Please provide reasons for your view.