Commission for
Communications Regulation

Response to Consultation and Draft Decision

Multi-Band Spectrum Release

This document contains annexes relevant to publication 11/60

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Annex 1

Legal Framework and Statutory Objectives

A 1.1 The Communications Regulation Acts 2002-2010[1] (the "2002 Act"), the Common Regulatory Framework (including the Framework and Authorisation Directives[2] as transposed into Irish law by the corresponding Framework and Authorisation Regulations[3]), and the Wireless Telegraphy Acts[4] set out, amongst other things, powers, functions, duties and objectives of ComReg that are relevant to this response to consultation and draft decision.

A 1.2 It should be noted that the 2003 Framework and Authorisation Regulations which originally transposed the Framework and Authorisation Directives into Irish law were, on 1 July 2011, revoked and replaced by the following regulations which transpose the amended Framework and Authorisation Directives:

- the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011); and
- the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011).

A 1.3 References in this consultation document or in the appended draft decision to either the Framework or Authorisation Regulations should be understood as referring to the above 2011 regulations, unless the context suggests otherwise.

A 1.4 Apart from licensing and making regulations in relation to licences, ComReg's functions include the management of Ireland's radio frequency spectrum in accordance with ministerial Policy Directions under Section 13 of the 2002 Act, having regard to its objectives under Section 12 of the 2002 Act, Regulation 16 of the Framework Regulations and the provisions of Article 8a of the Framework Directive. ComReg is to carry out its functions effectively, and in a manner

[1] The Communications Regulation Act 2002, the Communications Regulation (Amendment) Act 2007 and the Communications Regulation (Premium Rate Services and Electronic Communications Infrastructure) Act 2010.

[2] Directive No. 2002/21/EC of the European Parliament and of the Council of 7 March 2002 (as amended by Regulation (EC) No. 717/2007 of 27 June 2007, Regulation (EC) No. 544/2009 of 18 June 2009 and Directive 2009/140/EC of the European Parliament and Council of 25 November 2009) (the "Framework Directive") and Directive No. 2002/20/EC of the European Parliament and of the Council of 7 March 2002 (as amended by Directive 2009/140/EC) (the "Authorisation Directive")

[3] The European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011) and the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011) respectively which revoke and replace S.I.307 of 2003 and S.I. 306 of 2003 respectively.

[4] The Wireless Telegraphy Acts, 1926 and 1956, the Broadcasting Authority Acts, 1960 to 1971, in so far as they amend those Acts, the Wireless Telegraphy Act 1972, Sections 2 , 9, 10,11,12,14,15,16,17 and 19 of the Broadcasting and Wireless Telegraphy Act 1988 and Sections 181 (1) to (7) and (9) and Section 182 of the Broadcasting Act 2009.

serving to ensure that the allocation and assignment of radio frequencies is based on objective, transparent, non-discriminatory and proportionate criteria.

A 1.5 This annex is intended as a general guide as to ComReg's role in this area, and not as a definitive or exhaustive legal exposition of that role. Further, this annex restricts itself to consideration of those powers, functions, duties and objectives of ComReg that appear most relevant to the matters at hand and by way of example excludes those in relation to premium rate services or market analysis.

A 1.6 All references in this annex to enactments are to the enactment as amended at the date hereof, unless the context otherwise requires.

1.1 Primary Objectives and Regulatory Principles Under the 2002 Act and Common Regulatory Framework

A 1.7 ComReg's primary objectives in carrying out its statutory functions in the context of electronic communications are to:

- promote competition[5];
- contribute to the development of the internal market[6;]
- promote the interests of users within the Community[7];
- ensure the efficient management and use of the radio frequency spectrum in Ireland in accordance with a direction under Section 13 of the 2002 Act[8]; and
- unless otherwise provided for in Regulation 17 of the Framework Regulations, take the utmost account of the desirability of technological neutrality in complying with the requirements of the Specific Regulations[9] in particular those designed to ensure effective competition[10].

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

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

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

[8]Section 12(1)(b) of the 2002 Act. Whilst this objective would appear to be a separate and distinct objective in the 2002 Act, it is noted that, for the purposes of ComReg's activities in relation to ECS and ECN, Article 8 of the Framework Directive identifies "encouraging efficient use and ensuring the effective management of radio frequencies (and numbering resources)" as a sub-objective of the broader objective of the promotion of competition. In light of this, the assessment of different regulatory options against this objective is set out in the context of the RIA contained in document 11/60.

[9] The 'Specific Regulations' comprise collectively the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011), the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011), the European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No. 334 of 2011), the European Communities (Electronic Communications Networks and Services) (Universal Service and Users' Rights) Regulations 2011 (S.I. 337 of 2011) and the European Communities (Electronic

Promotion of Competition

A 1.8 Section 12(2)(a) of the 2002 Act requires ComReg to take all reasonable measures which are aimed at the promotion of competition, including:

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

A 1.9 In so far as the promotion of competition is concerned, Regulation 16(1)(b) of the Framework Regulations also requires ComReg to:

- ensure that elderly users and users with special social needs derive maximum benefit in terms of choice, price and quality, and
- ensure that, in the transmission of content, there is no distortion or restriction of competition in the electronic communications sector.

A 1.10 Regulation 9(11) of the Authorisation Regulations also provides that ComReg must ensure that radio frequencies are efficiently and effectively used having regard to Section 12(2)(a) of the 2002 Act and Regulations 16(1) and 17(1) of the Framework Regulations. Regulation 9(11) further provides that ComReg must ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies, and, for this purpose, ComReg may take appropriate measures such as mandating the sale or the lease of rights of use for radio frequencies.

Contributing to the Development of the Internal Market

A 1.11 Section 12(2)(b) of the 2002 Act requires ComReg to take all reasonable measures which are aimed at contributing to the development of the internal market, including:

- removing remaining obstacles to the provision of electronic communications networks, electronic communications services and associated facilities at Community level;
- encouraging the establishment and development of trans-European networks and the interoperability of transnational services and end-to-end connectivity; and
- co-operating with electronic communications national regulatory authorities in other Member States of the Community and with the

Communications Networks and Services) (Privacy and Electronic Communications) Regulations 2011 (S.I. No. 336 of 2011).

[10] Regulation 16(1)(a) of the Framework Regulations.

Commission of the Community in a transparent manner to ensure the development of consistent regulatory practice and the consistent application of Community law in this field.

A 1.12 In so far as contributing to the development of the internal market is concerned, Regulation 16(1)(c) of the Framework Regulations also requires ComReg to co-operate with the Body of European Regulators for Electronic Communications (BEREC) in a transparent manner to ensure the development of consistent regulatory practice and the consistent application of EU law in the field of electronic communications.

Promotion of Interests of Users

A 1.13 Section 12(2)(c) of the 2002 Act requires ComReg, when exercising its functions in relation to the provision of electronic communications networks and services, to take all reasonable measures which are aimed at the promotion of the interests of users within the Community, including:

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

A 1.14 In so far as promotion of the interests of users within the EU is concerned, Regulation 16(1)(d) of the Framework Regulations also requires ComReg to:

- address the needs of specific social groups, in particular, elderly users and users with special social needs, and
- promote the ability of end-users to access and distribute information or use applications and services of their choice.

Regulatory Principles

A 1.15 In pursuit of its objectives under Regulation 16(1) of the Framework Regulations and Section 12 of the 2002 Act, ComReg must apply objective, transparent,

non-discriminatory and proportionate regulatory principles by, amongst other things:

- promoting regulatory predictability by ensuring a consistent regulatory approach over appropriate review periods;
- ensuring that, in similar circumstances, there is no discrimination in the treatment of undertakings providing electronic communications networks and services;
- safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition;
- promoting efficient investment and innovation in new and enhanced infrastructures, including by ensuring that any access obligation takes appropriate account of the risk incurred by the investing undertakings and by permitting various cooperative arrangements between investors and parties seeking access to diversify the risk of investment, while ensuring that competition in the market and the principle of non-discrimination are preserved;
- taking due account of the variety of conditions relating to competition and consumers that exist in the various geographic areas within the State; and
- imposing ex-ante regulatory obligations only where there is no effective and sustainable competition and relaxing or lifting such obligations as soon as that condition is fulfilled.

BEREC

A 1.16 Under Regulation 16(1)(3) of the Framework Regulations, ComReg must:

- having regard to its objectives under Section 12 of the 2002 Act and its functions under the Specific Regulations, actively support the goals of BEREC of promoting greater regulatory co-ordination and coherence; and
- take the utmost account of opinions and common positions adopted by BEREC when adopting decisions for the national market.

Other Obligations under the 2002 Act

A 1.17 In carrying out its functions, ComReg is required amongst other things, to:

- seek to ensure that any measures taken by it are proportionate having regard to the objectives set out in Section 12 of the 2002 Act;[11]
- have regard to international developments with regard to electronic communications networks and electronic communications services,

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

associated facilities, postal services, the radio frequency spectrum and numbering[12]; and

- take the utmost account of the desirability that the exercise of its functions aimed at achieving its radio frequency management objectives does not result in discrimination in favour of or against particular types of technology for the provision of ECS.[13]

Policy Directions[14]

A 1.18 Section 12(4) of the 2002 Act provides that, in carrying out its functions, ComReg must have appropriate regard to policy statements, published by or on behalf of the Government or a Minister of the Government and notified to the Commission, in relation to the economic and social development of the State. Section 13(1) of the 2002 Act requires ComReg to comply with any policy direction given to ComReg by the Minister for Communications, Energy and Natural Resources ("the Minister") as he or she considers appropriate, in the interests of the proper and effective regulation of the electronic communications market, the management of the radio frequency spectrum in the State and the formulation of policy applicable to such proper and effective regulation and management, to be followed by ComReg in the exercise of its functions. Section 10(1)(b) of the 2002 Act also requires ComReg, in managing the radio frequency spectrum, to do so in accordance with a direction of the Minister under Section 13 of the 2002 Act, while Section 12(1)(b) requires ComReg to ensure the efficient management and use of the radio frequency spectrum in accordance with a direction under Section 13.

A 1.19 The Policy Directions which are most relevant in this regard include the following:

Policy Direction No.3 on Broadband Electronic Communication Networks

A 1.20 ComReg shall in the exercise of its functions, take into account the national objective regarding broadband rollout, viz, the Government wishes to ensure the widespread availability of open-access, affordable, always-on broadband infrastructure and services for businesses and citizens on a balanced regional basis within three years, on the basis of utilisation of a range of existing and emerging technologies and broadband speeds appropriate to specific categories of service and customers.

A 1.21 ComReg is conscious that the three year objective described in this policy direction has now expired making this direction less relevant currently.

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

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

[14] ComReg also notes, and takes due account of, the Spectrum Policy Statement issued by the DCENR in September 2010.

Policy Direction No.4 on Industry Sustainability

A 1.22 ComReg shall ensure that in making regulatory decisions in relation to the electronic communications market, it takes account of the state of the industry and in particular the industry's position in the business cycle and the impact of such decisions on the sustainability of the business of undertakings affected.

Policy Direction No.5 on Regulation only where Necessary

A 1.23 Where ComReg has discretion as to whether to impose regulatory obligations, it shall, before deciding to impose such regulatory obligations on undertakings, examine whether the objectives of such regulatory obligations would be better achieved by forbearance from imposition of such obligations and reliance instead on market forces.

Policy Direction No.6 on Regulatory Impact Assessment

A 1.24 ComReg, before deciding to impose regulatory obligations on undertakings in the market for electronic communications or for the purposes of the management and use of the radio frequency spectrum or for the purposes of the regulation of the postal sector, shall conduct a Regulatory Impact Assessment in accordance with European and International best practice and otherwise in accordance with measures that may be adopted under the Government's Better Regulation programme.

Policy Direction No.7 on Consistency with other Member States

A 1.25 ComReg shall ensure that, where market circumstances are equivalent, the regulatory obligations imposed on undertakings in the electronic communications market in Ireland should be equivalent to those imposed on undertakings in equivalent positions in other Member States of the European Community.

Policy Direction No.11 on the Management of the Radio Frequency Spectrum

A 1.26 ComReg shall ensure that, in its management of the radio frequency spectrum, it takes account of the interests of all users of the radio frequency spectrum.

General Policy Direction No.1 on Competition (2004)

A 1.27 ComReg shall focus on the promotion of competition as a key objective. Where necessary, ComReg shall implement remedies which counteract or remove barriers to market entry and shall support entry by new players to the market and entry into new sectors by existing players. ComReg shall have a particular focus on:

- market share of new entrants;
- ensuring that the applicable margin attributable to a product at the wholesale level is sufficient to promote and sustain competition;

- price level to the end user;
- competition in the fixed and mobile markets;
- the potential of alternative technology delivery platforms to support competition.

1.2 Other Relevant Obligations under the Framework and Authorisation Regulations

Framework Regulations

A 1.28 Regulation 17 of the Framework Regulations governs the management of radio frequencies for electronic communications services. Regulation 17(1) requires that ComReg, subject to any directions issued by the Minister pursuant to Section 13 of the 2002 Act and having regard to its objectives under Section 12 of the 2002 Act and Regulation 16 of the Framework Regulations and the provisions of Article 8a of the Framework Directive, ensure:

- the effective management of radio frequencies for electronic communications services
- that spectrum allocation used for electronic communications services and issuing of general authorisations or individual rights of use for such radio frequencies are based on objective, transparent, non-discriminatory and proportionate criteria, and
- ensure that harmonisation of the use of radio frequency spectrum across the EU is promoted, consistent with the need to ensure its effective and efficient use and in pursuit of benefits for the consumer such as economies of scale and interoperability of services, having regard to all decisions and measures adopted by the European Commission in accordance with Decision No. 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the EU.

A 1.29 Regulation 17(2) provides that, unless otherwise provided in Regulation 17(3), ComReg must ensure that all types of technology used for electronic communications services may be used in the radio frequency bands that are declared available for electronic communications services in the Radio Frequency Plan published under section 35 of the 2002 Act in accordance with EU law.

A 1.30 Regulation 17(3) provides that, notwithstanding Regulation 17(2), ComReg may, through licence conditions or otherwise, provide for proportionate and non-discriminatory restrictions to the types of radio network or wireless access technology used for electronic communications services where this is necessary to—

(a) avoid harmful interference,

(b) protect public health against electromagnetic fields,

(c) ensure technical quality of service,

(d) ensure maximisation of radio frequency sharing,

(e) safeguard the efficient use of spectrum, or

(f) ensure the fulfilment of a general interest objective as defined by or on behalf of the Government or a Minister of the Government in accordance with Regulation 17(6).

A 1.31 Regulation 17(4) requires that, unless otherwise provided in Regulation 17(5), ComReg must ensure that all types of electronic communications services may be provided in the radio frequency bands, declared available for electronic communications services in the Radio Frequency Plan published under section 35 of the Act of 2002 in accordance with EU law.

A 1.32 Regulation 17(5) provides that, notwithstanding Regulation 17(4), ComReg may provide for proportionate and non-discriminatory restrictions to the types of electronic communications services to be provided, including where necessary, to fulfil a requirement under the International Telecommunication Union Radio Regulations.

A 1.33 Regulation 17(6) requires that measures that require an electronic communications service to be provided in a specific band available for electronic communications services must be justified in order to ensure the fulfilment of a general interest objective as defined by or on behalf of the Government or a Minister of the Government in conformity with EU law such as, but not limited to—

(a) safety of life,

(b) the promotion of social, regional or territorial cohesion,

(c) the avoidance of inefficient use of radio frequencies, or

(d) the promotion of cultural and linguistic diversity and media pluralism, for example, by the provision of radio and television broadcasting services.

A 1.34 Regulation 17(7) provides that ComReg may only prohibit the provision of any other electronic communications service in a specific radio spectrum frequency band where such a prohibition is justified by the need to protect safety of life services. ComReg may, on an exceptional basis, extend such a measure in order to fulfil other general interest objectives as defined by or on behalf of the Government or a Minister of the Government.

A 1.35 Regulation 17(8) provides that ComReg must, in accordance with Regulation 18, regularly review the necessity of the restrictions referred to in Regulations 17(3) and 17(5) and must make the results of such reviews publicly available.

A 1.36 Regulation 17(9) provides that Regulations 17(2) to (7) only apply to spectrum allocated to be used for electronic communications services, general authorisations issued and individual rights of use for radio frequencies granted after the 1 July 2011. Spectrum allocations, general authorisations and individual

rights of use which already existed on the 1 July 2011 Framework Regulations are subject to Regulation 18.

A 1.37 Regulation 17(10) provides that ComReg may, having regard to its objectives under Section 12 of the 2002 Act and Regulation 16 and its functions under the Specific Regulations, lay down rules in order to prevent spectrum hoarding, in particular by setting out strict deadlines for the effective exploitation of the rights of use by the holder of rights and by withdrawing the rights of use in cases of non-compliance with the deadlines. Any rules laid down under this Regulation must be applied in a proportionate, non-discriminatory and transparent manner.

A 1.38 Regulation 17(11) requires ComReg to, in the fulfilment of its obligations under that Regulation, respect relevant international agreements, including the ITU Radio Regulations and any public policy considerations brought to its attention by the Minister.

Authorisation Regulations

Decision to limit rights of use for radio frequencies

A 1.39 Regulation 9(2) of the Authorisation Regulations provides that ComReg may grant individual rights of use for radio frequencies by way of a licence where it considers that one or more of the following criteria are applicable:

A 1.40 it is necessary to avoid harmful interference,

(a) it is necessary to ensure technical quality of service,

(b) it is necessary to safeguard the efficient use of spectrum, or

(c) it is necessary to fulfil other objectives of general interest as defined by or on behalf of the Government or a Minister of the Government in conformity with EU law.

A 1.41 Regulation 9(10) of the Authorisation Regulations provides that ComReg must not limit the number of rights of use for radio frequencies to be granted except where this is necessary to ensure the efficient use of radio frequencies in accordance with Regulation 11.

A 1.42 Regulation 9(7) also provides that:

(a) where individual rights of use for radio frequencies are granted for a period of 10 years or more and such rights may not be transferred or leased between undertakings in accordance with Regulation 19 of the Framework Regulations, ComReg must ensure that criteria set out in Regulation 9(2) apply for the duration of the rights of use, in particular upon a justified request from the holder of the right.

(b) where ComReg determines that the criteria referred to in Regulation 9(2) are no longer applicable to a right of use for radio frequencies, ComReg must, after a reasonable period and having notified the holder of the

individual rights of use, change the individual rights of use into a general authorisation or must ensure that the individual rights of use are made transferable or leasable between undertakings in accordance with Regulation 19 of the Framework Regulations.

Publication of procedures

A 1.43 Regulation 9(4)(a) of the Authorisation Regulations requires that ComReg, having regard to the provisions of Regulation 17 of the Framework Regulations, establish open, objective, transparent, non-discriminatory and proportionate procedures for the granting of rights of use for radio frequencies and cause any such procedures to be made publicly available.

Duration of rights of use for radio frequencies

A 1.44 Regulation 9(6) of the Authorisation Regulations provides that rights of use for radio frequencies must be in force for such period as ComReg considers appropriate having regard to the network or service concerned in view of the objective pursued taking due account of the need to allow for an appropriate period for investment amortisation.

Conditions attached to rights of use for radio frequencies

A 1.45 Regulation 9(5) of the Authorisation Regulations provides that, when granting rights of use for radio frequencies, ComReg must, having regard to the provisions of Regulations 17 and 19 of the Framework Regulations, specify whether such rights may be transferred by the holder of the rights and under what conditions such a transfer may take place.

A 1.46 Regulation 10(1) of the Authorisation Regulations provides that, notwithstanding Section 5 of the 1926 Act, but subject to any regulations under Section 6 of the 1926 Act, ComReg may only attach those conditions listed in Part B of the Schedule to the Authorisation Regulations. Part B lists the following conditions which may be attached to licences:

- Obligation to provide a service or to use a type of technology for which the rights of use for the frequency has been granted including, where appropriate, coverage and quality requirements.
- Effective and efficient use of frequencies in conformity with the Framework Directive and Framework Regulations.
- Technical and operational conditions necessary for the avoidance of harmful interference and for the limitation of exposure of the general public to electromagnetic fields, where such conditions are different from those included in the general authorisation.
- Maximum duration in conformity with Regulation 9, subject to any changes in the national frequency plan.

- Transfer of rights at the initiative of the rights holder and conditions of such transfer in conformity with the Framework Directive.
- Usage fees in accordance with Regulation 19.
- Any commitments which the undertaking obtaining the usage right has made in the course of a competitive or comparative selection procedure.
- Obligations under relevant international agreements relating to the use of frequencies.
- Obligations specific to an experimental use of radio frequencies.

A 1.47 Regulation 10(2) also requires that any attachment of conditions under Regulation 10(1) to rights of use for radio frequencies must be non-discriminatory, proportionate and transparent and in accordance with Regulation 17 of the Framework Regulations.

Procedures for limiting the number of rights of use to be granted for radio frequencies

A 1.48 Regulation 11(1) of the Authorisation Regulations provides that, where ComReg considers that the number of rights of use to be granted for radio frequencies should be limited it must, without prejudice to Sections 13 and 37 of the 2002 Act:

(a) give due weight to the need to maximise benefits for users and to facilitate the development of competition, and

(b) give all interested parties, including users and consumers, the opportunity to express their views in accordance with Regulation 12 of the Framework Regulations.

A 1.49 Regulation 11(2) of the Authorisation Regulations requires that, when granting the limited number of rights of use for radio frequencies it has decided upon, ComReg does so *"…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 Regulations 16 and 17 of the Framework Regulations."*

A 1.50 Regulation 11(4) provides that where it decides to use competitive or comparative selection procedures, ComReg must, inter alia, ensure that such procedures are fair, reasonable, open and transparent to all interested parties.

Fees for spectrum rights of use/licences

A 1.51 Regulation 19 of the Authorisation Regulations permits ComReg to impose fees for a licence which reflect the need to ensure the optimal use of the radio frequency spectrum.

A 1.52 ComReg is required to ensure that any such fees are objectively justified, transparent, non-discriminatory and proportionate in relation to their intended

purpose and take into account the objectives of ComReg as set out in Section 12 of the 2002 Act and Regulation 16 of the Framework Regulations.

Amendment of rights and obligations

A 1.53 Regulation 15 of the Authorisation Regulations permits ComReg to amend rights and conditions concerning licences, provided that any such amendments may only be made in objectively justified cases and in a proportionate manner, following the process set down in Regulation 15(4).

1.3 Other Relevant Provisions

Wireless Telegraphy Acts

A 1.54 Under Section 5 of the Wireless Telegraphy Acts, ComReg may, subject to those Acts, and on payment of the prescribed fees (if any), grant to persons licences to keep and have possession of apparatus for wireless telegraphy in any specified place in the State.

A 1.55 Such licences are to be in such form, continue in force for such period and be subject to such conditions and restrictions (including conditions as to suspension and revocation) as might be prescribed in regard to them by regulations made by ComReg under Section 6.

A 1.56 Section 5(3) also provides that, where it appears appropriate to ComReg, it may, in the interests of the efficient and orderly use of wireless telegraphy, limit the number of licences for any particular class or classes of apparatus for wireless telegraphy granted under Section 5.

A 1.57 Section 6 provides that ComReg may make regulations prescribing in relation to all licences granted by it under section 5, or any particular class or classes of such licences, all or any of the matters following that is to say:

(a) the form of such licences,

(b) the period during which such licences continue in force,

(c) the manner in which, the terms on which, and the period or periods for which such licences may be renewed,

(d) the circumstances in which or the terms under which such licences are granted,

(e) the circumstances and manner in which such licences may be suspended or revoked by ComReg,

(f) the terms and conditions to be observed by the holders of such licences and subject to which such licences are deemed to be granted,

(g) the fees to be paid on the application, grant or renewal of such licences or classes of such licences, subject to such exceptions as ComReg may

prescribe, and the time and manner at and in which such fees are to be paid, and

(h) matters which such licences do not entitle or authorise the holder to do.

A 1.58 Section 6(2) provides that ComReg may make regulations authorising and providing for the granting of licences under section 5 subject to special terms, conditions, and restrictions to persons who satisfy it that they require the licences solely for the purpose of conducting experiments in wireless telegraphy.

GSM Directive (as amended)

A 1.59 In light of the rights of use of spectrum under consideration in this document, ComReg notes that the GSM Directive 87/372/EEC as transposed by S.I. 416 of 1994 and the Amending GSM Directive 2009/114/EC as transposed by S.I. 195 of 2010 are also of relevance.

A 1.60 In particular regulation 3(2) of S.I. 195 of 2010 provides that: "The Commission for Communications Regulation shall examine whether the existing assignment of spectrum in the 900 MHz band to competing mobile operators is likely to distort competition in the mobile markets in the State and, where justified and proportionate, it shall address such distortions in accordance with Regulation 15 of the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2003 (S.I. No. 306 of 2003)."[15]

Commission Decision 2009/766/EC on Harmonisation of the 900 MHz and 1800 MHz bands

A 1.61 ComReg must comply with the provisions of the above Commission Decision which is aimed at harmonising the technical conditions for the availability and efficient use of the 900 MHz band, in accordance with Directive 87/372/EEC, and of the 1800 MHz band for terrestrial systems capable of providing electronic communications services. This decision was recently amended by Commission Decision 2011/251/EU.

Commission Decision 2010/267/EU on Harmonisation of 800 MHz band

A 1.62 ComReg must comply with the provisions of the above Commission Decision which is aimed at harmonising the technical conditions for the availability and efficient use of the 800 MHz band for terrestrial systems capable of providing electronic communications services.

Article 4 of Directive 2002/77/EC (Competition Directive)

A 1.63 Article 4 of the Competition Directive provides that:

[15] Now in accordance with Regulation 15 of the 2011 Authorisation Regulations.

"Without prejudice to specific criteria and procedures adopted by Member States to grant rights of use of radio frequencies to providers of radio or television broadcast content services with a view to pursuing general interest objectives in conformity with Community law:

1. *Member States shall not grant exclusive or special rights of use of radio frequencies for the provision of electronic communications services.*
2. *The assignment of radio frequencies for electronic communication services shall be based on objective, transparent, non-discriminatory and proportionate criteria."*

Annex 2

Joining Liberalisation and Licence Expiry

A 2.1 In the course of the consultations that have taken place as part of the multi-band spectrum release, some respondents contended that ComReg was inappropriately or unnecessarily linking the matter of the implementation of the (then draft) liberalisation decision[16], on the one hand, with the expiry of existing GSM 900 MHz Licences, on the other.

A 2.2 Whilst the process has moved on, developments have taken place and the relevant facts and circumstances have changed since this issue was raised, this annex nevertheless sets out the views expressed on the matter by ComReg and by respondents in the course of the consultation process and then sets out ComReg's final views.

2.1 Summary of Respondents' Views

A 2.3 Various respondents contended that ComReg was inappropriately conflating the issues of expiry of existing GSM 900 MHz Licences and the granting of licences in respect of liberalised rights of use of 900 MHz spectrum.

A 2.4 At the time, and in the main, respondents with existing GSM 900 licences put forward the proposal that those licences should be liberalised in the hands of those operators as soon as possible, and this proposition was largely linked with their proposals for administrative assignment of new 900 MHz licences, or extensions to the duration of existing (or, as the case may be, then-existing) GSM 900 MHz licences.

A 2.5 By contrast, H3GI submitted that there should be no liberalisation of existing GSM 900 MHz Licences in the hands of the existing GSM 900 licensees as to do so would:

"[infringe] the principles of equality, the promotion of competition, the promotion of the interests of users, the development of the internal market and the efficient management and use of spectrum…"[17]

[16] This became Commission Decision 2009/766/EC on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community and has since been amended by Commission Decision 2011/251/EU.

[17] Page 8 of H3GI's submission in response to 08/57 published in ComReg Document 09/14s.

Specific Issues Raised by Respondents

Consultation 08/57

A 2.6 In its response to Consultation 08/57 Meteor stated:

"Whilst Meteor is supportive of ComReg's liberalisation proposal, Meteor vigorously disagrees with the way in which the consultation document attempts to link implementation of the Draft Liberalisation Decision to retraction of the existing 900 MHz licences and auctioning off the spectrum."[18]

"H3GI does not believe that ComReg is obliged by the Commission Decision to vary the existing 2G regulations and all current 2G licences so as to permit use by Vodafone, O2 and Meteor of UMTS in the 900 and 1800 MHz bands as soon as practicable following the coming into force of the Commission Decision."[19]

Consultation 09/14

A 2.7 ComReg responded to the above points in Consultation 09/14:[20]

"In relation to the view expressed regarding the interpretation of the Draft Radio Spectrum Decision, ComReg agrees that the Draft Decision does not link liberalisation of 900 MHz and 1800 MHz spectrum with the "compulsory release" of the 900 MHz spectrum blocks held by existing licensees. The Options proposed in the Consultation, as they related to the expiry of existing GSM licences, were put forward on the basis that, amongst other things, these licences have explicit durations and expiry dates which are set out, amongst other places, in the relevant licence regulations, and ComReg's continuing belief that demand for 900 MHz spectrum is likely to exceed supply. In such circumstances, ComReg remains of the view that open, non-discriminatory and equitable opportunities to access that spectrum, such as are provided by market mechanisms, are appropriate in this context."

Consultation 09/99

A 2.8 In Consultation 09/99 ComReg noted that it had not adopted a policy of liberalising existing GSM licences due to the potential distortions of competition that this might create[21].

A 2.9 For this and other reasons (including the promotion of competition, non-discriminatory access to spectrum rights etc), ComReg set out its view that access

[18] Page 19 of Meteor's submission in response to 08/57 published in ComReg Document 09/14s

[19] Page 8 of H3GI's submission in response to 08/57 published in ComReg Document 09/14s

[20] Consultation 09/14 – section 4.2

[21] Consultation 09/99 - section 8.1.3

to liberalised rights of use to 900 MHz spectrum should be via open competition (in this case, a full band auction).

A 2.10 In addition, given that Meteor's existing GSM 900 MHz licence expires in 2015 and, as the then proposed spectrum cap of 2 × 10 MHz would have curtailed Meteor's ability to obtain liberalised 900 MHz rights of use, ComReg, informed by the advice of DotEcon, proposed the introduction of an "early liberalisation option" for Meteor whereby it could bid for, and win, rights of use in respect of liberalised 900 MHz spectrum.

A 2.11 In its response to Consultation 09/99 BT stated:

A 2.12 "We appreciate the complexity of the situation in relation to the historical mobile spectrum assignments and the dual objectives of allowing more technology neutral use of the 900 MHz band, in accordance with the requirements of the revised GSM Directive and including consideration of the competition aspects, and the need to deal with the assignment of further spectrum and the re-assignment of spectrum beyond the current licence expiry."

A 2.13 In its response Meteor suggested that an auction was inappropriate at that time and that ComReg should adopt interim measures and defer any assignment of longer term rights of use until it had developed a clear spectrum plan (in particular in relation to digital dividend (800 MHz) spectrum).

A 2.14 O2 in its response to Consultation 09/99 made submissions arising from the consultation process, and asserted that:

1. ComReg had misjudged the potential impact of the loss of spectrum by an existing operator in a full band auction;
2. ComReg was not required to link licence-expiry with liberalisation;
3. O2 was entitled to reasonable notice prior to any proposal which would involve the loss of 900 MHz spectrum;
4. it was within ComReg's power to extend existing licences on a 2G only basis;
5. if liberalisation were not part of EU policy then ComReg would not have held a spectrum auction;
6. if licences were not about to expire then ComReg would have taken more time in which to liberalise rights of use;
7. ComReg should extend the GSM 900 MHz licences in the way it would have done if liberalisation had not been on the agenda and then liberalise in an orderly manner;
8. ComReg had taken the position that liberalisation had to happen prior to the expiry of the then-existing 2G licences, with no legal basis for this position – with the result that O2 and Vodafone were being unnecessarily and severely penalised because of the practicalities of their existing licences happening to end on a particular date in what was then the near

future – a date that had been fixed many years ago, and before liberalisation had even been considered; and

9. that a licence extension (even on an unliberalised basis) would avoid many of what it saw as the problems with ComReg's then proposal.

A 2.15 O2 also submitted that ComReg should grant a licence-extension and that:

A 2.16 "Once ComReg extends the licences, it can subsequently as it is entitled to do under Directive 2009/114 (ref Recital 7) as part of liberalisation "amend rights of use…review these rights of use and…redistribute such rights in order to address distortions" – which can be and should be done within a timeframe that is "objectively justified and proportionate".

ComReg's Response to Specific Issues Raised

A 2.17 As mentioned at the outset in this Annex, the process has moved on since this issue was raised, developments have taken place and the relevant facts and circumstances obtaining have changed. In particular, ComReg has now, for the reasons set out in Consultation 11/29 and Decision D03/11, granted Interim Licences to Vodafone and O2. While the reasoning behind providing for and granting Interim Licences is fully set out in those documents, ComReg notes the application by O2 for, and the grant to it of, such a licence has, in effect, addressed most of O2's above-enumerated points relating to licence extension, and ComReg is accordingly of the view that these require no further treatment.

A 2.18 As regards O2's point 1 above, ComReg understands this submission to relate to two separate matters:

- the potential impact on consumers, which ComReg has addressed previously, and considers further in chapter 3; and
- the impact on individual competitors in the market, which, again, ComReg has addressed previously.

A 2.19 As these issues are considered in detail elsewhere they are not addressed further in this Annex.

A 2.20 As regards the submission that O2 was entitled to reasonable notice prior to any proposal which could involve the loss of 900 MHz spectrum, ComReg notes that:

- the duration of the GSM 900 MHz licences was part of the Regulations under which the licences were granted, and part of the licences themselves and licensees, including O2, were aware of this;
- ComReg commenced the consultation process in relation to its broader spectrum-release proposal in 2008, approximately three years prior to licence-expiry, and, whilst O2 and Vodafone have since applied for, and been granted, Interim Licences from the time of expiry of their pre-existing GSM 900 MHz licences until January, 2013, ComReg also notes that the Broader Spectrum Liberalisation Process is still on-going;

- the availability of 800 MHz spectrum has significantly reduced the possibility of one or more incumbent operators losing spectrum; and
- the introduction of the Interim Licences of itself provides a reasonable notice period before any loss of spectrum could potentially occur.

A 2.21 Taking O2's points 5, 6 and 7 together, ComReg notes that points 5 and 6 are based on hypotheses which do not reflect the actual reality and the current facts and circumstances, and, accordingly, are not particularly relevant. ComReg further notes that, had either of the counterfactual scenarios put forward at O2's points 5 and 6 above actually arisen, it would have embarked on a consultation process prior to expressing a finalised view. Nevertheless, ComReg points out that:

- whilst it considers each spectrum-allocation process on its merits, ComReg's preferred allocation method in cases where demand is expected to exceed supply is to hold an auction, as this has proven to be a quick, fair and transparent method of proceeding. ComReg remains of the view that auctions are an effective means of releasing spectrum rights of use (even where there is unlikely to be excess demand) – for instance, by avoiding administrative resolution of such issues as location-in-band; and
- whilst the GSM Amendment Directive does not set a strict timeframe for liberalisation, ComReg's view is that, for reasons previously stated, liberalisation should be achieved at the earliest time, having regard to the potential for distortions to competition.

A 2.22 O2's submission at point 7 above, in essence, is that ComReg should have ignored significant facts and circumstances that were before it and of which it was aware, in developing a proposal with potentially long-term consequences for the electronic communications sector in the State. ComReg is of the view that it would have been improper for it to develop proposals, and to reach any decision, on such a basis.

A 2.23 In relation to O2's points 2 and 8, ComReg notes that it has never taken the position that liberalisation must happen prior to licence-expiry. The view that it adopted in Consultation 09/14, which is set out above, was that ComReg did not believe that it was appropriate to issue licences in respect of liberalised rights of use other than in an open, non-discriminatory and proportionate process[22]. ComReg believes that that view remains appropriate.

A 2.24 In relation to Meteor's contention (in response to Consultation 09/99) that any longer term solution should be deferred until ComReg had developed a clear spectrum plan, ComReg notes that clarity has subsequently emerged in relation to the release of digital dividend spectrum in the 800 MHz band and, due to the effluxion of time

[22] ComReg further notes that the Interim Licences are not in respect of liberalised rights of use and accordingly, as set out in Document 11/29, different criteria were applied in granting same than are being applied to this Multi-Band Spectrum Release.

A 2.25 ComReg has now granted the Interim licences, which would appear to constitute an interim solution of the type proposed by Meteor in response to Consultation 09/99.

A 2.26 ComReg notes that, purely by chance, the expiry dates of two of the existing 900 MHz 2G licences are relatively close to the date by which Member States were obliged to bring into force laws transposing Directive 2009/114/EC[23].

A 2.27 While this temporal alignment has perhaps contributed to the complexity of running a spectrum allocation process in Ireland, it also rendered it unnecessary for ComReg to consider many of the issues that arose in other jurisdictions relating to the amendment of long term rights of use of spectrum.[24]

2.2 ComReg's Final View

A 2.28 Since these issues were raised, ComReg consulted on proposals relating to, and, for the reasons set out in Consultation 11/29 and Decision D03/11, subsequently decided in favour of, Interim Licences. The granting of the Interim Licences to O2 and Vodafone has also tangentially had the effect of temporally de-coupling the expiry of pre-existing GSM licences[25] in the 900 MHz band from the grant of liberalised licences in respect of the 900 MHz band.

A 2.29 To the extent that submissions put forward by respondents, and set out above, relate to the short-term issue of ComReg's earlier proposals involving the grant of liberalised rights of use essentially at the earliest opportunity (being the expiry of pre-existing GSM 900 MHz licences held by Vodafone and O2), ComReg believes that the granting of the Interim Licences has rendered it unnecessary to give further consideration to most of the issues considered in this annex in the context of its Multi-band Spectrum Release process.

A 2.30 To the extent that any of the respondents intended their submissions to imply that ComReg should renew GSM 900 MHz licences on a longer-term basis, and then separately address the issue of liberalisation, ComReg is of the view that such an approach:

- would fail to deliver the benefits of liberalisation to consumers as early as possible;
- would be likely to distort competition and discriminate against potential new entrants; and
- might entail the granting of rights of use which ComReg might subsequently need to amend with significant consequences for regulatory certainty, efficient investment and the financial terms of the licenses.

[23] Which has been transposed in Ireland by S.I. 195 of 2010 The European Communities (Public Pan-European Cellular Digital Land-Based Mobile Communications) Regulations 2010 (S.I. 195 of 2010)
[24] As acknowledged by BT in its response to Consultation 09/99 (see document 10/21r).
[25] ComReg notes that the expiry of Meteor's existing 900 MHz licence is later than the proposed grant of longer liberalised rights of use and accordingly does not consider that the same issues arise in respect of this licence.

A 2.31 ComReg is of the view that it is not appropriate to grant longer-term rights of use of spectrum other than by an open, transparent, proportionate and non-discriminatory process decided upon, having taken account of all of the facts before it and the relevant circumstances. Accordingly, ComReg does not consider that it was advisable to renew the existing GSM 900 MHz licences on a long-term unliberalised basis and subsequently to address liberalisation.

A 2.32 For the reasons set out above and elsewhere in this document, ComReg is of the view that it is not required to liberalise existing GSM 900 MHz licences, including the Interim Licences[26].

[26] This accords with the position put forward by H3GI in response to Consultation 08/57 – see document 09/14s.

Annex 3

Spectrum Release Proposal: What Band

A 3.1 This annex is divided into three parts. The first section deals with the spectrum suitable for this award. The second section deals with the award process, and the third section deals with the timing of the availability of liberalised spectrum.

3.1 Spectrum Suitable for Award

Background

A 3.2 During the course of ComReg's consultation process on the release and award of liberalised spectrum in the 900 MHz band, ComReg's views on the proposed award process and the appropriate bands for inclusion in such a process have evolved, in response to both respondents' views and changing circumstances, including the increased clarity around the timing of the availability of certain spectrum bands and equipment capable of using certain spectrum bands.

A 3.3 Prior to the publication of Consultation 10/71, ComReg was, for the most part, of the view that it would not be suitable to consider other spectrum bands for award along with the 900 MHz band (for reasons set out in previous consultation documents).[27] However, in July 2010, the Minister for Communications, Energy and Natural Resources ("the Minister") announced that analogue terrestrial television will be switched-off in the State in Quarter 4 of 2012, in conjunction with analogue switchover in Northern Ireland.[28] As a result of this announcement, it was evident that another sub-1GHz band, the 800 MHz band, would be available for liberalised use from early 2013. Thus, given the increased clarity around the availability of the 800 MHz band, ComReg thought it appropriate to consider and consult upon the joint award of the 800 MHz and 900 MHz bands, in Consultation 10/71.

A 3.4 In addition, as a result of both evidence of equipment availability in the 1800 MHz band, and the clarified timescales for availability of liberalised sub-1GHz spectrum (arising from the proposed inclusion of the 800 MHz band), ComReg formed the view that it would be appropriate to also consider the inclusion of 1800 MHz spectrum in the proposed joint award of sub-1 GHz spectrum. Consultation 10/105, published in December 2010, provided further details of how this could be achieved.

A 3.5 This section of Annex 3 revisits the matters leading up to ComReg's consideration of a multiple band award of the 800, 900 and 1800 MHz bands,

[27] This was primarily due to the state of technological developments in the bands in question, i.e. the Digital Dividend spectrum (800MHz) and in the 1800MHz band.

[28] See:http://www.dcenr.gov.ie/Press+Releases/2010/New+%e2%82%ac70+million+digital+ network +to +be+built+ by+ RT%c3%89+including+new+satellite+service.htm

with particular emphasis given to the arguments around the substitutability and/or complementarity of these bands. It provides a summary of ComReg's position as set out in previous Consultation Documents and a summary of respondents' views. In so doing, ComReg firstly provides a summary of the discussion regarding the inclusion of the 800 MHz band in a joint award process with the 900 MHz band, and then provides a summary of the discussion regarding the inclusion of other high frequency spectrum bands in the award process, in particular the 1800 MHz band. This section concludes by outlining ComReg's current position on the spectrum bands suitable for inclusion in the proposed award process, which are in turn examined in the draft RIA in Chapter 3.

Inclusion of the 800 MHz band

A 3.6 On 28 October 2009, the European Commission ("EC") published a Recommendation[29] which set a target date for switching-off analogue TV transmissions of 1 January 2012, with the aim of encouraging availability of the 800 MHz band for electronic communication services ("ECS"). In this Recommendation, the Commission called for Member States to refrain from actions that might hinder the adoption of the 800 MHz band as a harmonised band in the EU. In addition, on 6 May 2010, the EC published a Decision on harmonised technical conditions of use in the 800 MHz band.[30]

A 3.7 The release of 800 MHz spectrum on a liberalised basis provides a new opportunity for the provision of ECS and, in particular, advanced mobile services. During the course of ComReg's consultation process on the liberalisation of spectrum in the 900 MHz and potentially other bands, developments relating to the timing of analogue switch-off ("ASO"), and thus the availability of the 800 MHz band, have enabled ComReg to actively consider its inclusion in a joint award with the 900 MHz band.

A 3.8 The section below provides a summary of how ComReg's position on the 800 MHz band has developed over the course of this consultation process and the views of interested parties throughout the consultation process.

Summary of ComReg's Previous Position

A 3.9 Prior to the publication of Information Notice 10/59, published on 29 July 2010, ComReg was of the view that, whilst the release of liberalised 800 MHz spectrum would provide an excellent opportunity for the deployment of advanced mobile services given the technical characteristics of this spectrum, the timescale for the availability of this spectrum band remained uncertain. In particular, there was no certainty in relation to the timeframes for digital terrestrial television ("DTT")

[29] Commission Recommendation of 28 October 2009, Facilitating the Release of the Digital Dividend in the European Union (2009/848/EC).

[30] Commission Decision of 6 May 2010 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 (2010/267/EU).

switch-on, corresponding ASO and therefore 800 MHz availability for ECS. As a consequence, ComReg did not regard it as appropriate to indefinitely delay the release of the 900 MHz band (on a liberalised basis) to enable a joint award of these spectrum bands.

A 3.10 However, circumstances changed considerably when, on 29 July 2010, the Minister announced that analogue terrestrial television would be switched-off in the State in Quarter 4 of 2012, in conjunction with the analogue switchover in Northern Ireland. Following this announcement, ComReg published Information Notice 10/59 which noted that the clarity in the date for ASO in Ireland rendered it possible for ComReg to consider bringing forward the release of the valuable 800 MHz band to release it in the same process as the 900 MHz band.

A 3.11 In light of the substantial potential benefits[31] that could accrue from the release of liberalised 800 MHz spectrum and given, amongst other things, the comparable propagation characteristics of the 800 MHz and 900 MHz spectrum bands, ComReg noted that it would be appropriate to consider the joint release of assignment of liberalised rights of use of spectrum in the 800 MHz and 900 MHz bands.

A 3.12 In Consultation 10/71 ComReg stated that it was of the view, in principle, that it was no longer appropriate to maintain its previous position of considering the award of spectrum rights of use in the 900 MHz band in isolation and proposed the joint award of the 800 MHz and 900 MHz spectrum bands. In Section 2.4.1 of Consultation 10/71, ComReg identified, amongst other things, the substitutability of the 800 MHz and 900 MHz bands and efficient spectrum management as some of the key benefits of a joint award of these bands.

A 3.13 In Consultation 10/71 ComReg noted the following factors which linked the two sub-1 GHz bands:

- both sub-1 GHz bands have similar radio propagation characteristics and can both 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;
- the long distance propagation characteristics of both bands are ideal for covering sparsely populated areas, which is an important consideration in the Irish context;
- the costs involved in using 800 or 900 MHz spectrum to roll out a new mobile network are substantially lower than those that would be incurred using higher frequency spectrum bands, due to lower capital expenditure (e.g. fewer base stations, antennas and sites required to roll out a network) and operational expenditure; and

[31] See Section 2.4 of Consultation 10/71.

- the combination of these factors means that both bands can ultimately be used by operators to serve the same mobile retail markets, including mobile broadband.

A 3.14 Given these factors, and as both bands would be available for award on a liberalised basis in a relatively similar timeframe, this would make 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 possible that an operator, in the course of an auction, would be willing to switch its bidding between blocks of spectrum in the 800 MHz and 900 MHz band depending on their relative price.[32]

A 3.15 In addition, ComReg noted in Consultation 10/71 that awarding rights of use in such related bands separately in sequential processes would, amongst other things, not allow bidders the same degree of substitution possibilities and the flexibility to seek different mixes of spectrum across the sub-1GHz bands. In this regard, 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. Where there is the likelihood that such expectations may not be correct, this could seriously inhibit substitution between the two bands and fail to encourage the efficient allocation and pricing of spectrum in these bands which may, in turn, not encourage the most efficient use of the spectrum. In contrast, a joint award would remove much of this uncertainty by allowing operators to bid on both bands simultaneously. Accordingly, and following due consideration of advice received by ComReg from DotEcon on this issue[33], a joint award of the bands was proposed.

A 3.16 Despite the significant benefits associated with a joint award, ComReg noted that there would be some disadvantages associated with a joint award, primarily in relation to increased complexity of the award process.[34]

A 3.17 On balance, however, ComReg considered that the potential benefits of a joint award of the two sub-1 GHz bands would outweigh any potential disadvantages.

Views of Respondents

A 3.18 Prior to Consultation 10/71, ComReg's proposals had considered the liberalisation of the 900 MHz band in isolation. A number of respondents (Meteor, O2, and Vodafone) to Consultations 08/57, 09/14 and 09/99 noted, however, the importance of a 'holistic' approach toward spectrum management.

[32] See Section 2.4.1 of Consultation 10/71.

[33] See Section 4.1 of Dotecon Report (Document 10/71a).

[34] It was noted that a joint award of spectrum in multiple bands would result in additional categories of lots that may potentially complicate the situation for bidders. In order to facilitate the maximum choices for bidders, such an award process would 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 deciding what to bid for during the auction.

These respondents noted, in particular, the similarities between the 900 MHz and 800 MHz bands. Some of the issues raised by respondents prior to Consultation 10/71 included:

- Due to the favourable propagation characteristics for mobile broadband, any decision on which spectrum would be assigned in future years should take into account the availability of additional spectrum freed up in the Digital Dividend process;[35]
- The 800 MHz band can be considered as a substitute for the 900 MHz band;[36]
- Rushing through a solution on 900 MHz spectrum only, when access to digital dividend is not part of a solution, would be potentially damaging to the entire sector;[37]
- Proceeding without clarity about the availability or potential assignment of the 800 MHz band would create artificially high demand for the 900 MHz band, increase the financial burden on bidders in the full band auction and unfairly distort competition[38]; and

[35] In its response to Consultation 08/57 Meteor stated *"...any decisions on the conditions under which spectrum would be assigned in future years should be taken in the context of the circumstances that exist at the time, which may include the availability of additional spectrum freed up in the Digital Dividend process and the advent of spectrum trading rights."*

[36] In its response to Consultation 09/99 O2 stated *"The 800MHz band is considered to be a likely suitable substitute for the 900MHz band."* and *"ComReg should take a holistic approach to the way in which it manages and releases spectrum in Ireland. This is particularly the case where certain bands are potentially substitutable for each other. Though not identical, the Digital Dividend band (800MHz) is generally considered to be a likely suitable substitute for the 900MHz band."*

In its response to Consultation 09/99 Meteor stated *"there is a high degree of substitutability between the 800 MHz and 900 MHz bands"*.

Vodafone's response to Consultation 09/99 included a report from Ingenious Consulting who stated *"The 800 MHz band is technically equivalent to 900 MHz in terms of propagation and building penetration and may be considered a close substitute."*

[37] In its response to Consultation 09/14 Meteor stated *"Rushing through a potentially damaging solution on 900 MHz spectrum only, when 1800 MHz access and access to the digital dividend are not part of a solution, is potentially damaging to the entire sector."*

[38] In its response to Consultation 09/99 O2 stated *"A slight delay in the liberalisation of the 900MHz band, and assignment of unused spectrum, is the more attractive and appropriate course of action when any delay would be short, and when the overall benefit to consumers and operators would outweigh any disadvantages or cost of delay."* page 29

In its response to Consultation 09/99 O2 stated *"Proceeding to auction 900MHz spectrum in the manner ComReg proposes, in the absence of ComReg providing clarity, or waiting to be in a position to be able to provide clarity, on allocation of the Digital Dividend could also increase the likelihood that an existing 900MHz operator will unnecessarily lose access to this spectrum because of the increased artificial demand."*

- Since valuation of spectrum in the 900 MHz, 1800 MHz and 800 MHz bands, that can act as substitutes together, is interrelated, it is vital that ComReg adopt a holistic approach to allocation[39].

A 3.19 In Consultation 10/71, ComReg invited views on its proposals for a joint award of the 800 MHz and 900 MHz bands.[40] In their submissions, no respondent was opposed to a joint award of the 800 MHz and 900 MHz bands. Of those respondents who welcomed a joint award of 800 MHz and 900 MHz bands, support focussed on the similar propagation characteristics, substitutability between the bands and the benefits of a holistic approach.[41] The comments made by those in favour of a joint award can be summarised as follows:

- The 800 MHz and 900 MHz bands are substitutable over the time period under consideration (according to eircom) as they offer broadly similar propagation characteristics (according to Ericsson). These spectrum bands are the most closely substitutable for the purposes of wider area provision of services such as mobile broadband (according to Vodafone)[42];
- There are merits of taking a holistic approach, especially when there are substitution possibilities between bands (according to eircom);[43]
- A joint award should, in principle, provide the best chance for new entrants to access the market (according to Digiweb);
- A combined approach to award could lead to more efficient outcomes and would present an opportunity for greater consumer and competition benefits (according to eircom);

[39] In its response to Consultation 08/57 Vodafone stated *"This objective can be achieved by holding spectrum award processes for these spectrum bands at the earliest practical opportunity, and ideally holding these award processes simultaneously, or as close together in time as is feasible."* (page 46)

In its response to Consultation 08/57 Vodafone stated *"Vodafone considers that it is vital that ComReg adopts a holistic approach to the allocation of spectrum in the 900 MHz, 1800 MHz, and Digital Dividend spectrum bands that takes account of the fact that the valuation of these different spectrum bands, that can substitute for one another to varying degrees, is interrelated."*

[40] Question 3 of Consultation 10/71 asked *"Do you agree with ComReg's proposal to progress with a joint award of the 800 MHz and 900 MHz bands? Please provide reasons for your view."*

[41] In response to Consultation 10/105, Vodafone reiterated its support for ComReg's approach which they stated that, taken as a whole, it is appropriate and addresses the key concerns raised in previous consultation responses on the future licensing arrangements for the 900 MHz band.

[42] O2 further expressed its view that the 800 MHz and 900 MHz bands are close substitutes and agreed that it is appropriate that both bands should be assigned in a single process. They also argued that to award the 900 MHz and 900 MHz bands separately would create uncertainty for applicants and hamper an efficient assignment outcome.

[43] O2 expanded on this point in its response to Consultation 10/105, *"Bands that are close substitutes should be auctioned together so that bidders can switch between bands depending on how bidding, contention and availability develops in the auction...It makes sense to auction 800MHz and 900 MHz together in a combinatorial auction".*

- Joint availability will provide greater certainty for forward planning and acquisition strategies in both bands (according to Qualcomm and ESBN); and
- Joint award will allow for efficient spectrum management (according to Ericsson and ESBN).

A 3.20 Despite the majority of respondents supporting the joint award of 800 MHz and 900 MHz, one respondent, UPC, was supportive of the joint award proposal subject to the reservation of some spectrum for new entrants, while two other respondents, H3GI and Qualcomm, expressed some concern regarding the justification for a joint award, namely the substitutability of the 800 MHz and 900 MHz bands in the short term arising from a lack of equipment availability in respect of the 800 MHz band, and also the lack of global harmonisation.

A 3.21 As noted above, one respondent, UPC, stated that a joint award would make sense only if a portion of the 800 MHz band was reserved for new entrants. According to UPC, assigning a portion of the spectrum for new entrants would provide additional competition in the market, thus benefiting Irish consumers. UPC submitted that the 800 MHz band *"would best able meet [sic] the needs of new entrants because of the large amount of spectrum available and the beneficial propagation characteristics of the lower frequencies"* (UPC's response to Consultation 10/71, page 3).[44]

A 3.22 Two respondents, H3GI and Qualcomm, while stating that they agreed with a joint award[45], questioned the substitutability of the 800 MHz and 900 MHz bands for reasons including:

- The lack of network equipment or mobile devices currently available which support the 800 MHz band, in contrast with those that function using the 900 MHz band (according to H3GI);
- The lack of a roadmap for 800 MHz devices or equipments in place for the 800 MHz band (according to H3GI);

[44] In Consultation 09/99 ComReg provided its reasoning for not reserving spectrum in the 900 MHz band specifically for new entrants. *"Under UPC's option, the effect of reserving blocks A and B for a new mobile entrant could, in ComReg's view, be detrimental to the most efficient outcome by removing competition from existing GSM licensees for these blocks and thus risking that those who may value the spectrum most highly will not obtain it and be incentivised to make efficient use of that spectrum."* (page 135) ComReg considers the same arguments to be relevant in relation to reserving spectrum in the 800 MHz band for new entrants.

[45] In its response to Question 10 of Consultation 10/71, H3GI stated that, *"Subject to the main body of our response above, H3GI agrees with ComReg's proposal to hold an auction for the 800 MHz and 900 MHz bands." Also on page 18 of H3GI's response to Consultation 10/71 H3GI state "...while H3GI does not take any issue with the joint auction of these bands...."* The caveat to H3GI's response was that it did not agree that the release and liberalisation of the 900 MHz band should be delayed to coincide with 800 MHz availability. This matter is addressed later in this annex and in Chapter 7.

In its response to Consultation 10/71, Qualcomm stated that *"Qualcomm approves ComReg proposal to award the 800 MHz and the 900 MHz bands simultaneously in order to enable operators to deploy acquisition strategies combining both bands."* (page 18)

- No worldwide harmonisation for the 800 MHz band, in contrast to the "global standard" of the 900 MHz band (according to H3GI);[46]
- The 900 MHz band will allow use of mobile broadband very soon after release, whereas the 800 MHz band will only be able to support the evolution towards higher bandwidth in the future (according to Qualcomm);[47] and
- The 800 MHz and 900 MHz bands are, in fact, complementary rather than substitutable (according to Qualcomm).

A 3.23 Despite their concerns regarding ComReg's views on the substitutability of the bands, as noted above, H3GI and Qualcomm both stated that they agreed with ComReg's proposal for a joint award of the bands. However, both respondents disagreed with ComReg's views on the appropriate timing for the release of the 900 MHz band.[48] This matter is discussed later in this annex and also in Chapter 7.

Inclusion of other Spectrum Bands

A 3.24 MNOs tend to use sub 1 GHz spectrum in conjunction with higher frequency spectrum so that both coverage and capacity requirements can be addressed. In this context, sub-1 GHz and higher frequency spectrum can be considered complementary in nature. Therefore, allowing operators the opportunity to access both types of spectrum at the same time can be beneficial as it would allow operators to access the best 'mix' of spectrum that suits their needs, and thereby encourage efficient use of spectrum. In addition, offering both substitutable and complementary spectrum in the same award process provides greater incentives for new entrants by enabling them to gain access to a portfolio of suitable spectrum in the same award process to become an effective player in the market.

A 3.25 There are a number of higher frequency spectrum bands which can be used for capacity purposes for mobile ECS. During this consultation process, ComReg has considered a number of complementary spectrum bands and has received views

[46] In response to Consultation 10/71, H3GI state, *"...there is no network equipment or existing GSM of 3G mobile devices currently available which can be supported by 800 MHz spectrum. In contrast, all equipment and devices currently available on the market can function using 900 MHz spectrum. Secondly, in contrast to 900 MHz spectrum, there is no roadmap for 800 MHz devices or equipment and no worldwide harmonisation measure are in place for 800 MHz. While significant clarity on the future plans of regulators for 900 MHz spectrum has been received, regulators plans for 800 MHz remain unclear."*

[47] In questioning the substitutability of the bands Qualcomm state that *"800 and 900 MHz correspond to widely different service offering and terminal availability timelines, with vastly unbalanced ecosystems. As a result, the 800 and 900 bands should not be considered as substitutable."*

[48] In response to Consultation 10/71, H3GI state *"...while H3GI does not take any issue with the joint auction of these bands, H3GI does not agree that the release and liberalisation of the 900MHz band should be delayed to 2013 to coincide with 800MHz availability."*

Also Qualcomm noted that if there was a joint award, the 800 MHz lots should be clearly separated from the 900 MHz lots and mobile broadband should be allowed in the unused 900 MHz spectrum blocks as soon as the auction is complete.

on their potential inclusion in this award process. These views are summarised below.

The 1800 MHz band

A 3.26 Currently, the 1800 MHz band is primarily used in urban areas to support high levels of traffic and capacity in the networks. Two of the three existing 1800 MHz licences expire at the end of December 2014 and June 2015. There is currently a contiguous unassigned block of 2 × 26.4 MHz spectrum in the band.

A 3.27 Prior to Consultation 10/71, ComReg had considered, but rejected, the inclusion of the 1800 MHz band in an award process with liberalised 900 MHz spectrum on the basis of timing issues and the lack of equipment for the band; however, as the consultation process has progressed, due to changes in the timing of the planned release of liberalised 900 MHz spectrum and 800 MHz spectrum, ComReg has reconsidered its inclusion in a joint award with the 800 MHz and 900 MHz bands.

Summary of ComReg's Previous Position

A 3.28 In Consultation 10/71, ComReg set out its view that there would be merit in considering the inclusion of 1800 MHz spectrum within a joint award of 800 MHz and 900 MHz spectrum on the grounds that it would lead to greater economic efficiency and could, amongst other things, enhance the opportunity for new entry and structural change within the mobile industry in Ireland.[49] ComReg asked respondents for their views on whether the 1800 MHz band should be included in a joint auction with the 800 MHz and 900 MHz bands.[50] The issues raised by respondents in response to Consultation 10/71 were addressed by ComReg in Consultation 10/105 and are summarised below.

A 3.29 In Consultation 10/105, ComReg restated its view on the potential inclusion of the 1800 MHz band. ComReg outlined a range of benefits associated with including the 1800 MHz band in the joint award of sub-1GHz spectrum including consumer and competition benefits, providing regulatory certainty, increasing the efficiency of the auction outcome and providing a wider choice of spectrum bands in the competition. Consultation 10/105 outlined the factors that would need to be considered in order to incorporate the 1800 MHz band into the existing proposals for an award of sub 1 Ghz spectrum. In response to Consultation 10/105 a number of respondents raised additional comments on the inclusion of the 1800 MHz band, as discussed below.

[49] In Section 4.2.3 of its Report (Document 10/71a), DotEcon noted that the presence of 1800 MHz in a common award process would likely have the greatest impact on new entrants. While maximising opportunity for new entrants would not mean that entry will occur, it may still be beneficial to make it desirable for entrants to participate. This is because even in the threat of competition for entrants in a CCA with limited transparency is likely to undermine gaming behaviour such as tacit collusion and strategic demand reduction.

[50] Question 4 of Consultation 10/71

Views of Respondents

A 3.30 Of the eleven responses received to Consultation 10/71, nine of these respondents expressed a view on the inclusion of 1800 MHz in the proposed sub-1 GHz auction. Overall, these responses were mixed, with five respondents in favour of the inclusion of the 1800 MHz band in the auction while four were against its inclusion.

A 3.31 Of the respondents who supported the inclusion of spectrum in the 1800MHz band in a sub-1GHz spectrum auction, reasons cited for its inclusion were as follows:

- It is a complement to sub-1GHz spectrum (according to Ericsson and Qualcomm);
- It would lead to greater economic efficiency (according to eircom);
- The resulting award would provide the best opportunity for entrants (according to eircom);
- Its inclusion is timely given the emergence of LTE in the 1800MHz band (according to Ericssion); and
- It would provide certainty for operators in terms of spectrum planning. (according to UPC).

A 3.32 Vodafone's comments supported, in principle, the inclusion of the 1800 MHz band as this respondent acknowledged that these bands are used in tandem to provide mobile services and that there may be valuation links between the bands.[51] However, Vodafone also provided reasons against inclusion of the 1800 MHz band in a joint award with the 800 MHz and 900 MHz bands as noted below.

A 3.33 Of the respondents that did not support the inclusion of 1800MHz spectrum in an award of sub-1 GHz spectrum (including three of the four existing MNOs), reasons cited were that:

- Its inclusion would cause a delay to the proposed joint award of sub-1GHz spectrum (according to Vodafone and Digiweb);
- There has been insufficient demand shown by stakeholders for 1800 MHz spectrum (according to H3GI); and
- Because of the similar propagation characteristics and thus closer substitutability between 1800 MHz and other high frequency spectrum such as that in the 2.6 GHz band, 1800 MHz spectrum would be more suitably included in a joint award of 1800 MHz and 2.6 GHz spectrum if

[51] In its response to Consultation 10/71, Vodafone stated *"Vodafone is in favour, in principle, of the inclusion of 1800 MHz spectrum in a joint award process with spectrum in the sub-1 GHz bands given the potential for this approach to maximise the economic efficiency of the spectrum allocation outcome across these bands that are to a significant extent substitutable and/or complementary to one another in the delivery of communication services to retail customers."*

and when 2.6 GHz spectrum becomes available (according to Vodafone and O2).

A 3.34 In addition to these main concerns, one respondent, O2, raised additional or specific concerns in their response to Consultation 10/105 including:

- in the absence of a question regarding the inclusion of the 1800 MHz band in a triple-band auction, ComReg simply assume in Consultation 10/105 that this decision has already been taken;
- ComReg has not properly taken into account O2's position on the inclusion of the 1800 MHz band as submitted in response to Consultation 10/71, in particular as regards the point that the 1800 MHz band should not be included without the 2.6 GHz band[52]; and
- ComReg has overstated the potential efficiency gains of including 1800 MHz in the 800/900 MHz award given that 1800 MHz is a more complementary rather than substitutable spectrum band.[53]

The 2.3 GHz Band

A 3.35 The current use of the 2.3 GHz band in Ireland is as follows[54]:

- The sub-band 2307 – 2327 MHz is assigned to Rurtel Rural Telecommunications), a service operated by eircom which provide wireless telegraphy services to customers in rural areas of the country where it is not economically viable to provide copper to the premises;
- The sub-band 2308 – 2316 MHz is assigned to Dáil TV;
- In addition, the Amateur Service has access to the whole of the 2.3 GHz band on a secondary basis; and

[52] O2 also highlighted its concern that ComReg may have misrepresented its views in Consultation 10/105, which stated that O2 had expressed concern that the inclusion of the 1800 MHz band could result in the delay of the proposed joint award of sub-1GHz spectrum and for this reason they did not support the inclusion of the 1800 MHz band. In its response to Consultation 10/105 O2 state, *"This is not a correct representation of O2's position or response. We were, and are concerned that the inclusion of the 1800MHz band in the auction would delay ComReg's process both for delivering the auction, and also for clarifying ComReg's decision and procedure for dealing with licence expiry. This is already proving to be correct, however O2's most significant reason for objection related to the inclusion of 1800MHz without 2.6GHz."*

[53] In its response to Consultation 10/105, O2 state *"In document 10/105 ComReg focused on the perceived efficiency gains of including 1800 MHz in the 800/900 MHz auction. O2 considered that ComReg has overstated the potential efficiency gains given that 1800 MHz is more complementary rather than directly substitutable. However in setting such a high minimum price for 1800 MHz and one so close to the 800/900MHz reserve price, ComReg is effectively ruling out the very efficiency outcome which it cites as the main reason for including 1800MHz in the auction in the first place. ComReg has also failed to consider efficiency gains lost by auctioning 1800MHz and 2600MHz separately."*

[54] See Consultation 09/49 (Release of spectrum in the 2300 – 2400 MHz band) for further details.

- Services ancillary to programming or services ancillary to broadcasting utilises spectrum across the whole 2300 – 2400 MHz band.

A 3.36 The Electronic Communications Committee ("ECC") is currently drafting a report due for publication in September 2011 which will examine compatibility and interference issues and measures to assist administrations in border coordination relating to the 2.3 GHz band.

Summary of ComReg's Previous Position

A 3.37 In previous consultations, ComReg has considered whether the 2.3 GHz band would be an appropriate complementary spectrum band to include in the award of sub 1 GHz spectrum. In summary, the inclusion of the 2.3 GHz band was discounted by ComReg for a number of reasons, including:

- The use of the 2.3 GHz band is yet to be harmonised across Europe. Harmonisation is not expected in the short to medium term as the band is currently used for military purposes and, as such, inclusion of this band is unlikely to fit within ComReg's timeframe for its proposed joint spectrum award; and
- Unlike the other bands under consideration, which are harmonised for delivery of mobile ECS, there remains some uncertainty regarding the potential uses of the 2.3 GHz band, the equipment which can be deployed in the band and the associated technical criteria.

A 3.38 Consequently, ComReg noted its intention to consult on the future of the 2.3 GHz band separately to this consultation process.

Views of Respondents

A 3.39 One respondent, O2, noted that the 2.3 GHz band is not a standard band and so questioned the availability of European standard equipment; and noted that the 2.3 GHz band is a TDD band, which had not been as sought after as FDD spectrum. Another respondent, Digiweb, was in favour of the inclusion of the 2.3 GHz band in a joint award of the 800 MHz and 900 MHz bands.[55]

The 2.6 GHz Band

A 3.40 In Ireland, the majority of the 2.6 GHz band (144 MHz out of a total of 190 MHz) is currently licensed for the provision of Multipoint Microwave Distribution System ("MMDS") services. MMDS involves the distribution of licensed programme television material with coverage extending to most of the State, with

[55] In its response to Consultation 10/71, Digiweb stated *"…we believe the 2.3 GHz spectrum could be included in the auction. This would not generate extra delays (it is our understanding that the band is readily available) and this "spectrum auction bundling" could enhance the prospects for new entrants."*

the exception of major urban areas. A number of the MMDS licences expire in 2012[56], with the rest expiring in April 2014.

A 3.41 In June 2008 the EC published a Decision (2008/477/EC) relating to the harmonisation of the 2.6 GHz band.[57] MMDS services are considered an ECS under this Decision.[58]

Summary of ComReg's Previous Position

A 3.42 The MMDS licences are subject to the provision of the Wireless Telegraphy (MMDS) Regulations 2003.[59] Regulation 7 and 8 of these Regulations set out, amongst other things, the provisions for the duration of licences. The Regulations include the possible extension of the MMDS licence for up to 5 years from their current expiry date. Any such renewal can only be granted after ComReg has conducted a review.

A 3.43 Based on the current expiry dates, the earliest availability of the full 2.6 GHz band for liberalised use would be April 2014, when the second group of the current MMDS licences expire. This would occur if, following ComReg's review under the MMDS Regulations, there was no extension to the duration of MMDS licences.

A 3.44 ComReg has noted previously that this review is currently ongoing. ComReg issued a call for inputs in May 2010 (Document 10/38) and is currently drafting a first consultation document.

Views of Respondents

A 3.45 In response to previous Consultations, interested parties have raised a number of comments in relation to whether or not it would be appropriate to include the 2.6 GHz band in the proposed joint award process. There are a number of common threads among the comments of respondents, such as:

- *Certainty and efficient use of spectrum:* A number of respondents (e.g. O2 and Vodafone) requested information and clarity on the timing for

[56] There are a total of ten MMDS licences in this band. As a result of regulatory action arising from licence compliance issues, the expiry of the three original NTL licences was brought forward to April 2012. See ComReg Document 10/38 for more details.

[57] Commission Decision of 13 June 2008 on the harmonisation of the 2500-2690MHz frequency band for terrestrial systems capable of providing an electronic communications services win the community. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:163:0037:0041:EN:PDF

[58] As noted in Section 2 of the Radio Spectrum Committee's Explanatory Memorandum on MMDS in the 2500-2690 MHz band, published on 27 June 2008. Available at: http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/_document_storage/rsc/rsc24_public_docs/rscom08-39.pdf

[59] See SI No 529/2003.

availability of all bands of interest (especially the 2.6 GHz band) in order to reduce uncertainty and to prevent inefficient use of spectrum;[60]

- *Preference for multi band auctions:* A number of respondents requested that the maximum number of bands would be made available in a single process (e.g. O2 and Vodafone). According to Eircom, for a holistic approach to be truly effective it must be extended to encompass relevant bands above 1 GHz; and
- *Award substitutable bands together:* A number of respondents noted that bands that are near substitutes for each other should be grouped together. O2 and Vodafone noted that there is a distinction between those above and below 1 GHz therefore ComReg should consider holding a separate award process for the 1800 MHz and 2.6 GHz spectrum bands.[61] According to O2, ComReg has failed to consider the efficiency gains lost by auctioning 1800 MHz and the 2.6 GHz bands separately.

ComReg's Current Position

A 3.46 The award process used to assign spectrum rights of use – whether a single, simultaneous process of these bands, or multiple, sequential awards – can affect the efficiency of the allocation of spectrum and the subsequent use of these spectrum assignments.

A 3.47 ComReg agrees with Dotecon's view that a simultaneous multi band award process is likely to lead to more efficient allocation of spectrum than sequential awards where an operator's valuation of spectrum in one band depends on what spectrum it holds, or expects to win, in another band. Such valuation linkages are

[60] For example, in response to Consultation 10/71, Vodafone stated *"If ComReg fails to provide such transparency then this may result in an inefficient allocation process as the earlier part of the process incorporating the 1800 MHz band will necessarily be addressed by potential bidders by taking a conservative view of the availability of the 2.6 GHz band. If ComReg were to subsequently confirm the future availability of the 2.6 GHz band then there is a significant risk that operators will have bid for and obtained 1800 MHz spectrum that is sub-optimal for its intended use when compared to the 2.6 GHz. Having committed to the 1800 MHz they may not bid the full economic value for a 2.6 GHz allocation."*

[61] In response to Consultation 10/71 O2 noted, *"Clearly the 800MHz and 900MHz bands are close substitutes for each other and it is appropriate that they should be assigned together. By the same token, the bands above 1GHz would also be grouped together and awarded together, however in practice this is not likely to work in the short term in Ireland because:*

- *2.1GHz is assigned and out of consideration in the short to medium term;*
- *2.3GHz is not a standard band and so questions arise regarding the availability of European standard equipment. In addition it is a TDD only band, which has not been as sought after as FDD spectrum;*
- *2.6GHz is currently in use for MMDS, and is subject to a review by ComReg. Earliest availability would seem to be 2014, when the second of the current MMDS licences expire."*

Following this argument, O2 conclude that the most appropriate approach would be to hold over the award of the 1800 MHz band for a combined assignment in a single process involving the 2.3 GHz and 2.6 GHz bands.

most likely to occur between substitutable or complementary spectrum. In other words, where spectrum, in different bands are either substitutable or complementary, the demand for spectrum in one band may be influenced by the availability and price of other spectrum bands. For this reason, a combined award of such spectrum bands makes sense.

A 3.48 Whilst a single spectrum band award has the advantage of simplicity, this simplicity is achieved at a cost. If substitutable (or complementary) spectrum is awarded in separate award processes, the bidders' valuation must be based on the expected price of the substitutable (or complementary) spectrum to be awarded at a later date, rather than the actual price. In a situation where the expected valuations are incorrect, this could result in an inefficient allocation of spectrum.[62]

A 3.49 Multiple band awards may involve more complexity than single band awards (but much of this can be addressed through appropriate auction design). Furthermore, the multiple band award offers some attractive qualities:

- a much richer set of opportunities for bidders regarding their desired holding of spectrum to suit their individual needs and investment plans, through the combination of substitutable and complementary spectrum in the same award;
- facilitating new entry; and
- much greater transparency in pricing as bidders are able to adapt their valuations and associated demand for spectrum in different bands in response to relative prices.

A 3.50 In this regard, it can be seen that such an award process would lead to a more efficient allocation of spectrum.[63]

A 3.51 For these reasons, ComReg sees merit in a simultaneous award of multiple related spectrum bands where the availability of such bands permits. In this section, ComReg outlines its current position on the bands that could be included in the proposed award process, taking into account respondents' views, as set out above.

The 800 MHz Band

A 3.52 A review of respondents' submissions indicates that, although two respondents voiced their concerns regarding the substitutability of the 800 MHz and 900 MHz bands, this has not led either of these respondents to oppose a joint award of the

[62] See Section 2.2 of Dotecon Report (Document 11/58).

[63] See Section 4.1 of Dotecon Report (Document 10/71a)

two bands, as proposed by ComReg. As such, all respondents agree with a joint award of the 800 MHz and 900 MHz bands.[64]

A 3.53 At the present time the degree of substitutability of the two bands may differ as between individual operators depending on their particular circumstances. For instance, an operator who intends to continue offering GSM services could not do so using the 800 MHz band; due to lack of GSM base station and user equipment availability for the 800 MHz band. On the other hand, operators who propose to use the 800 MHz and 900 MHz bands for 3G, LTE and Wi-Max are likely to see spectrum in each of these bands as highly substitutable.

A 3.54 While the two bands have been used for very different purposes over the last 20 years, as pointed out by H3GI, liberalisation of the 900 MHz band, and the emergence of harmonisation of the 800 MHz band, will greatly change this going forward. While the early years of the liberalised licences will see some of the 900 MHz band being used solely for GSM services, this will change over time as demand for GSM services continues to fall.

A 3.55 Given that any concerns regarding substitutability relate to the short term and tend to centre around the use of legacy networks such as GSM, and given that the proposed award of liberalised licences in these bands until 2030, ComReg remains of the view that the 800 MHz and 900 MHz bands are highly suitable for a joint award, for the following reasons:

- The technical and propagation characteristics of the two bands are very similar. Both bands are located at frequencies suitable for wide-area and in-building coverage. BEREC – RSPG notes that at the technical level, most European countries see the 800 MHz band as substitutable for 900 MHz.[65] The common technical and propagation characteristics of the bands allows operators to use either band to serve the same retail markets, namely advanced mobile services including mobile broadband;
- Studies have shown that the cost savings of rolling out new networks at either 800 MHz or 900 MHz are very similar, compared to higher frequency bands. ComReg commissioned Vilicom/Red-M to conduct a costing exercise which found that the costs of rolling out new network at 900 MHz would be approximately 35% of the cost of using 2100 MHz, [66] and similar cost savings could be achieved using the 800 MHz band;

[64] As noted above, a number of respondents raised the potential joint award of both sub-1 GHz bands early in this consultation process, prior to clarity regarding the availability of the band, and therefore prior to ComReg's proposal to hold a joint award.

[65] *"Across Europe there is a general positive acknowledgement on the substitutability of the 800 and 900 MHz bands, with most of the respondents to the questionnaire considering that the benefits of 800 MHz and 900 MHz were comparable and substitutable"* paragraph 26 of BEREC RSPG *Report on Competition: Transitional Issues in the Mobile Sector in Europe*, February 2011. Available at: http://rspg.ec.europa.eu/_documents/documents/meeting/rspg24/rspg10_351_transitional_issues.pdf

[66] See Vilicom report (Document 09/14a)

- The 900 MHz band is harmonised for use across the EU. The 800 MHz band is being promoted across the EU for the provision of ECSs, providing the necessary scale to ensure equipment availability. The technical standards for the 800 MHz band have already been harmonised;[67]
- LTE is fast becoming a reality with commercial launches of LTE networks in 16 countires already.[68] The 800 MHz band is considered a core band for LTE. Recently, the market for LTE equipment and LTE-capable user devices, suitable for use across multiple bands, including the 800MHz band, has been growing rapidly to meet current and anticipated needs of operators and their customers.[69]
- International developments indicate a high level of substitutability across the two bands. It is evident that industry players are looking at both bands together when planning their networks. This is likely to be linked to the fact that efficient deployment of higher bandwidth data services requires access to wider contiguous blocks of spectrum than previously was the norm. Using the 800 and 900 MHz bands together allows access to larger blocks of contiguous spectrum. A number of operators in Europe have recently gained access to liberalised spectrum in both the 800 and 900 MHz bands, for instance in Germany and in Sweden where Hutchison recently was awarded spectrum in the 800 MHz band and also has spectrum in the 900 MHz band.

A 3.56 Having considered the views of respondents, for the reasons set out previously and taking into account the most recent information available, ComReg is of the view that it is appropriate to consider the inclusion of the 800 MHz band in the award of the 900 MHz band. This option is considered in the Draft RIA (Chapter 3).

The 1800 MHz band

A 3.57 In response to O2's concern that ComReg had prematurely made a decision regarding the inclusion of the 1800 MHz band, it should be noted that although ComReg has consulted on how the 1800 MHz band could potentially be included in the proposed joint award of 800 and 900 MHz spectrum in Consultation 10/105, no final decision has been made as to how or when the 1800 MHz band

[67] See EC Decision 2010/267/EU.

[68] In July 2011, the Global mobile Suppliers Association ("GSA") published an update to it Evolution to LTE Report which confirmed that 218 operators are now investing in LTE in 81 countries, including 24 operators that have commercially launched LTE networks, in Austria, Denmark, Estonia, Finland, Germany, Hong Kong, Japan, Lithuania, Norway, Philippines, Poland, Singapore, South Korea, Sweden, USA, and Uzbekistan. Further, it anticipates that at least 91 LTE networks will be in commercial service by the end of 2012. Source: www.gsacom.com/news/gsa_334.php4

[69] The GSA reported in July 2011 that 45 manufacturers have confirmed a total of 161 LTE-enabled user devices are now in existence. E.g. Sierra Wireless Airprime MC7710 Module, Huawei B593 Router and Huawei E392 USB Modem (all of which have LTE operating frequency 800, 900, 1800, 2100, 2600). Source: GSA Report: Status of the LTE Ecosystem.

will be liberalised. In forming its view on this matter, ComReg will take full account of the views expressed by respondents regarding 1800 MHz spectrum.

A 3.58 Of the respondents that did not support the joint award of 1800MHz spectrum (including three of the four existing mobile operators), reasons cited were that:

- Its inclusion would cause a delay to the sub-1GHz award process;
- There has been insufficient demand shown by stakeholders for 1800MHz spectrum; and
- Because of the similar propagation characteristics and thus closer substitutability between 1800MHz and other high frequency spectrum such as that in the 2.6GHz band, 1800MHz spectrum would be more suitably included in a joint award of 1800MHz and 2.6GHz spectrum if and when 2.6GHz spectrum becomes available.

A 3.59 Each of these issues is addressed in DotEcon's Report[70]. A summary is provided below.

The inclusion of 1800 MHz would cause a delay to the sub-1GHz award process.

A 3.60 As noted by Dotecon, the necessary preparatory steps have already been taken to ensure that if the 1800MHz spectrum band were to be included, this should not affect the timeline for a sub-1GHz award or the availability of sub-1GHz spectrum. Many of the aspects of the sub-1GHz spectrum award have been applied consistently to the proposed award of 1800 MHz spectrum and as such have not raised issues additional to those being considered as part of the sub-1GHz consultation process. In addition, many of the concerns regarding delay of the award of sub-1GHz spectrum were related to the expiry of O2 and Vodafone's 900MHz licences which ComReg has addressed separately.[71] Therefore, there is no compelling reason to believe that the inclusion of 1800MHz spectrum in a sub-1GHz award process would cause a delay to such an award.

Insufficient demand shown by stakeholders for 1800MHz spectrum

A 3.61 In Consultation 08/57, ComReg was of the view that, at that time, there appeared to be little interest in deploying non-GSM systems in the 1800 MHz band before new wideband systems were expected to become available (circa 2012).[72] Therefore ComReg proposed that it would consider the release of the band on a liberalised basis closer to 2013 or in light of market developments.

A 3.62 Since then, a number of developments have taken place that strongly suggest that the 1800 MHz spectrum would be more attractive to both existing and potential

[70] Section 2.5 of Dotecon's Report (Document 11/58)

[71] See Documents 11/11 and 11/29, and Information Notice 11/36.

[72] See section 9.2 of Consultation 08/57.

new operators than previously envisaged if awarded for use from early 2013 in conjunction with the 800 MHz and 900 MHz bands, rather than at a later date:

- First the prospect of entry into the market in Ireland would be less risky where such an entrant could secure all of its spectrum requirements in a single process. Given that 1800MHz spectrum is a complement to sub-1GHz spectrum and a substitute at the margin, the inclusion of this spectrum in the planned sub-1GHz auction would represent a rare opportunity to secure a combination of spectrum across sub-1GHz and higher frequencies that would be sufficient to be an effective competitor within the market.[73]
- As noted above, LTE is fast becoming a reality. The 1800 MHz band is now considered a core band for LTE.[74] According to reports, vendors such as Ericsson are *"predicting that 1800 will become an international LTE band alongside 800 MHz and 2.6GHz in Europe and 700 MHz and 2.6GHz in the Americas."* Also a recent report by the GSA states that *"...with improved coverage being a key driver – twice the coverage area can be achieved using 1800 MHz compared to 2.6 GHz. Shorter time to market is another key benefit. Recent announcements by leading operators committing to LTE1800 deployments will help to establish 1800 MHz as a core band for LTE."*[75] Therefore, the release of the 1800 MHz band on a liberalised basis would provide operators the opportunity of deploying LTE using this spectrum.
- There have been already been a number of commercial launches of LTE at 1800 MHz worldwide to date, with others planned for later this year.[76] There have also been extensive trials in Europe and elsewhere.

A 3.63 Given the potential for there to be demand for 1800 MHz spectrum on a liberalised basis, and the benefits that would result if it were awarded to operators that used it to roll out LTE and other technologies, ComReg is of the view that it would be appropriate to consider the inclusion of this band in the planned sub-1GHz spectrum award.

[73] This is in contrast to the case where obtaining the optimal combination of spectrum would be uncertain and might take a number of years owing to the time and effort required to run consecutive award processes.

[74] At the LTE World Summit in Amsterdam (May 2011), European operators united around 1800 MHz as a core band for LTE. Deutsche Telekom, France Telecom and Teliasonera have collectively called for vendors to fast-track LTE devices in the 1800 MHz band as a priority for LTE. http://www.fiercewireless.com

[75] *LTE 1800 Rollout in Lithuania*, Policy Tracker, May 10, 2011; and *GSA confirms almost 200 operators investing in LTE*, GSA, 24 March 2011. http://www.gsacom.com/news/gsa_324.php4.

[76] LTE1800 MHz networks have already commercially launched in Germany, Lithuania (by Scandinavian operator TeliaSonera), Poland, Hong Kong and Singapore. The Australian incumbent also intend to launch LTE 1800 n cities later this year. Source: GSA, July 2011 and *LTE 1800 Rollout in Lithuania*, Policy Tracker, May 10, 2011.

1800MHz spectrum would be more suitably included in a joint award of 1800MHz and 2.6GHz spectrum if and when 2.6GHz spectrum becomes available

A 3.64 As noted above, two respondents (O2 and Vodafone) proposed that the 1800 MHz band be held back and awarded in a joint process alongside the 2.6 GHz spectrum, when the latter becomes available. Whilst 1800 MHz and 2.6 GHz spectrum may be closer substitutes than 1800 MHz and sub-1 GHz spectrum, substitutability is not the sole motivation for a multi-band award process including sub-1GHz and higher frequency bands. ComReg has previously outlined its view that, while 1800 MHz spectrum is a substitute for sub-1 GHz spectrum only at the margin[77], its complementarity to sub-1 GHz spectrum is the main benefit associated with its inclusion in the planned sub-1 GHz award.[78]

A 3.65 ComReg is of the view that the inclusion of the 1800 MHz band in the planned sub-1 GHz auction would provide certainty to bidders for their required spectrum planning. Existing operators make forecasts for their high and low frequency spectrum needs based on their forecasts of growth of both number of customers and demand per customer, while a potential new entrant to the market, with no existing spectrum holdings, would likely require a mix of sub 1 GHz and higher frequency spectrum to compete effectively with incumbent operators who already hold such a mix or would be able to acquire such a mix in an award process for sub-1 GHz spectrum.[79] Accordingly not releasing 1800 MHz at this time would appear to place new entrants at a disadvantage.

A 3.66 In their response to Consultation 10/71, eircom noted that to have two separate award processes, for sub 1 GHz and higher frequency spectrum would result in a significant time lag between awards owing to the resources required to plan and complete an award process. ComReg notes that this would mean that a winner of sub-1GHz frequency spectrum in the first award would not have the opportunity to acquire the high frequency spectrum necessary for an optimal network for a significant period of time after this first award. This could result in lack of competition in the auction as potential new entrants may be discouraged since participating in the award process for sub-1GHz spectrum as it would incur the

[77] There are exceptions to this, for example, in the UK Everything Everywhere provides mobile services using only the 1800 MHz spectrum band.

[78] DotEcon note that, *"allowing substitutability between 1800MHz spectrum and sub-1GHz spectrum within the auction provides a level of flexibility within the auction that will facilitate a broad range of bidding behaviour and outcomes that are beneficial in ensuring that the resulting spectrum allocation across band is efficient..."* (Document 10/105a)

DotEcon has previously noted that the presence of 1800 MHz in a common award process alongside sub-1 GHz spectrum is likely to have the greatest impact on new entrants. A new entrant is likely to seek a mix of sub 1GHz and higher frequency spectrum so as to be able to provide both wide-area coverage and capacity in urban areas.

[79] As noted by DotEcon, whether new entry in fact occurs or not the only important consideration, *"...even if entry foes not occur, it may still be beneficial to make it desirable for entrants to participate. This is because even the threat of competition from entrants in a CCA with limited transparency is likely to undermine gaming behaviour such as tacit collusion and strategic demand reduction".* (Document 10/71a)

risk of not being able to obtain high frequency spectrum to complement its sub-1 GHz spectrum, and would in any case have to make do with acquiring this spectrum significantly later.

A 3.67 In relation to the potential award of the 2.6 GHz band (which is discussed in more detail below) and the 1800 MHz bands together (as noted above this was a proposal put forward by respondents), the availability of this spectrum for mobile ECS is not certain at this point. Spectrum across the 2.6 GHz band will not be available before 2012/2014 and may not become available before 2019 whereas some unallocated 1800 MHz spectrum is currently available and the full band will be available for allocation from mid-2015 at the latest (noting ComReg's proposal for advanced commencement of liberalised licences as set out in Chapter 7). Therefore, it would be inappropriate for both spectrum efficiency reasons and on a proportionality basis to postpone the award of the available 1800 MHz spectrum until the 2.6 GHz band becomes available. Equally, it would not seem reasonable to award short licences for 1800 MHz spectrum, e.g. only until 2019, as this would not promote efficiency of investment.

A 3.68 ComReg is of the view that the benefits of the inclusion of the 1800 MHz band in the award of sub 1 GHz spectrum would outweigh the benefits of a later joint award of high frequency spectrum bands.

A 3.69 Having considered the views of respondents, for the reasons set out previously[80] and taking into account the most recent information available, ComReg is of the view that it is appropriate to consider the inclusion of the 1800 MHz band in a multi band spectrum release alongside the 800 MHz and 900 MHz bands. This option is considered in the Draft RIA (chapter 3).

The 2.3 GHz and 2.6 GHz Bands

A 3.70 ComReg agrees that, where possible, related spectrum bands should be awarded together. ComReg's proposals accord with the holistic approach suggested by a number of respondents from early in this consultation process.

A 3.71 ComReg notes that there are benefits of including both substitutable and complementary spectrum in the same award process. ComReg has previously set out its view regarding the benefits of awarding the 800 MHz and 900 MHz band together, and the additional benefit of including higher frequency and complementary spectrum in the same award. The particular circumstances of the award of sub 1 GHz spectrum creates a unique opportunity to attract new entry to the Irish market, while the award of a number of high frequency spectrum bands together, in a process that does not include sub-1 GHz spectrum, is unlikely to have the same impact. Therefore ComReg is of the view that the benefits of a multi band award would not apply to the same extent when considering the case of joining only higher frequency spectrum bands in the same award.

[80] See Section 2.3.2 of Consultation 10/105

A 3.72 In relation to the 2.3 GHz band, as noted earlier, ComReg has set out in its previous consultation documents that it intends to consult on this band separately since availability of this band is out of line with the timeline to which ComReg is working toward for this award process.

A 3.73 In relation to the 2.6 GHz band, as noted above, a number of respondents argued that because the 1800 MHz band and the 2.6 GHz band are substitutable spectrum bands they should be awarded together. For the reasons set out above, ComReg is of the view that it would not be appropriate to hold off on the award of the 1800 MHz band for a future award with 2.6 GHz spectrum, particularly given the uncertainty that exists regarding when the 2.6 GHz band will be available for liberalised use in Ireland, versus the ability for operators to deploy LTE equipment in 1800 MHz band now.

A 3.74 ComReg notes the views of respondents regarding clarity on the availability of spectrum bands. As noted in previous consultations, ComReg's review of the 2.6 GHz band is underway. A call for inputs was previously published and a consultation paper will be issued in due course. Interested parties are requested to monitor this process and respond to ComReg's consultation at the appropriate time.

A 3.75 Given the competing demands for this spectrum, the complexity of the issue, and the current stage of the 2.6 GHz process ComReg has concluded that it is not appropriate to include the 2.6 GHz band in this particular multi-band auction. Instead, it will form part of a separate award process, which may include other relevant spectrum bands. For instance, it is possible that the 2.3 GHz and 2.6 GHz bands could be awarded jointly at a later date however this would depend on whether the timing of such an award would be appropriate and it is not possible to determine this at this point in time.

Summary of ComReg's Current Position

A 3.76 In summary, based on the preceding analysis, ComReg is of the view that the spectrum bands that are currently available for award and use on a liberalised basis in a clearly defined timeframe are the 800 MHz, 900 MHz and 1800 MHz spectrum bands.

A 3.77 ComReg notes that of the likely candidates for a complementary band, the 1800 MHz band is the most suitable for inclusion in a multiple band award process together with sub 1 GHz spectrum for a number of reasons, as set out above, including:

- The terms of the EC's 900 MHz and 1800 MHz harmonisation Decision;
- There is certainty regarding the expiry of existing licences in the 1800 MHz band, and the expiry dates of these licences are December 2014 and July 2015, which fall with the proposed 'first time slice' (see Annex 6 for further details). Also there is a large amount of unassigned spectrum in the band.

- Under ComReg's proposed early liberalisation option for existing 1800 MHz licences (see Annex 6/Chapter 4 for more details), this could result in liberalisation of the entire 1800 MHz band earlier than otherwise would be the case.

A 3.78 These bands are considered in the Draft RIA (Chapter 3).

3.2 Spectrum Release Proposal: The How of the Award Process

Background

A 3.79 In this second part of this Annex ComReg deals with the type of award process by which to award the spectrum.

A 3.80 ComReg is obliged[81], when granting spectrum rights for electronic communications networks or services (usually in the form of a licence granted under the Wireless Telegraphy Act 1926) to, amongst other things:

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

A 3.81 ComReg notes that the above obligations do not, of themselves, indicate a preference for any particular assignment mechanism. Accordingly, ComReg must choose the most appropriate assignment mechanism having regard to the particular circumstances of each award and which, in ComReg's opinion, would best achieve its statutory objectives.

A 3.82 ComReg makes the following observations regarding its preferred use of auction mechanisms, particularly in circumstances where, for instance, spectrum rights of use are scarce, there is likely to be considerable demand for particular spectrum rights and/or where access to particular spectrum rights is important to the nature and dynamic of competition in the relevant downstream retail market:[82]

- *"Auctions have proven in Ireland and in many other jurisdictions to be a fast, fair, effective and transparent assignment mechanism. One reason which may explain this is that they avoid the subjective element that can be associated with comparative selection procedures, and avoid issues related to administrative assignments, especially where the spectrum manager does not have access to complete information;*

[81] See Annex 1 of this document.

[82] Set out in ComReg Document 11/28 – see section 4.2.

- *Auctions also allow firms which most value the spectrum rights to obtain access to same. By doing so, auctions promote innovation and investment in new infrastructures and contribute to the efficient use of the spectrum rights assigned by providing real economic incentives for winners to make use of the spectrum rights obtained. This also ensures that consumers and citizens derive the maximum benefit in terms of the provision of end-services using that spectrum; and*
- *Open auctions also promote, amongst other things, regulatory certainty, competition (both for spectrum rights and in downstream markets), and the internal market by ensuring there is no favourable treatment of particular undertakings thereby providing fair opportunities for new entry from within the State and throughout the EU*."

A 3.83 During the consultation process for the award of spectrum in the 900 MHz and related bands, ComReg has received varying proposals from a number of respondents as to their preferred method of awarding liberalised spectrum in the 900 MHz band and related bands. For the purpose of the discussion it is useful to set out all of the options which have been proposed to date, starting with the early proposals made in the context of a 900 MHz only award, followed by the later responses to Consultations 10/71, 10/105, and Document 11/11 which were made in the context of a proposed multi-band award. This annex tracks the views of respondents throughout the consultation process, as to their stated preferences for the type of award process that ComReg should use and their supporting reasoning, noting in particular where respondents' views have changed.

A 3.84 ComReg received proposals from respondents in response to Consultations 08/57 and 09/14. Most of those proposals related to the award of the 900 MHz band only. Those proposals were considered in a draft RIA contained in Section 9 of Consultation 09/99.

A 3.85 Following publication of Consultation 09/99, ComReg received further proposals which again related primarily to the 900 MHz band in isolation. However, due to the change in circumstances that followed the publication of Consultation 09/99, ComReg provided respondents the opportunity, in subsequent consultation documents, to reconsider their preferred option in light of the changed circumstances – i.e. the proposal to conduct a multi-band spectrum award process.

A 3.86 By considering all options proposed by respondents throughout this consultation process it should be possible to determine which of the earlier proposals (set out in the context of a 900 MHz only award) are still relevant in the context of a multi-band award. This approach should ensure that all of the proposed options are fully considered. ComReg has identified those respondents that have fundamentally changed their views on their preferred award process over the course of this consultation process, and those respondents whose original views remain unchanged despite the changed circumstances.

A 3.87 This annex concludes by setting out a list of each respondent's most recent proposal which are subsequently analysed in the draft RIA contained in Chapter 3.

Summary of ComReg's Position (Consultation 08/57)

A 3.88 At the commencement of this consultation process, in Consultation 08/57, ComReg discussed the various award processes it had used in previous spectrum awards, including those based on a "first come, first served" approach (the Fixed Wireless Access Local Access award), beauty competitions (the fourth 3G licence), and auctions (the 26GHz National Block Licence Awards). ComReg noted in Consultation 08/57 that where demand for spectrum is expected to exceed supply, an auction would be ComReg's preferred assignment method. ComReg was of the view that when underpinned by a technology-neutral approach and, where appropriate, being service-neutral, auctions have proved to be successful in facilitating the introduction of new services and greater competition in the market.

A 3.89 At the time of publication of Consultation 08/57, ComReg was considering the primarily focused on the award process for the 900 MHz band. ComReg was of the view that, given the substantial portion of the band occupied by GSM networks and the importance of the band for mobile services, demand for 900 MHz spectrum was likely to exceed supply. To ensure that the spectrum was awarded to those operators who valued it most, ComReg's preference was to use an auction and sought respondents' views on this proposal.[83]

A 3.90 ComReg set out three possible award processes in Consultation 08/57[84] and invited comments from respondents on these options as well as inviting alternative proposals. These Options were:

- **Option A** - a multiple competitive award process with corresponding assignment of spectrum.
- **Option B** - a single licence competition for the entire 900 MHz band in 2009 followed by a phased assignment process.
- **Option C** - a single licence competition for the entire 900 MHz band in 2009, with spectrum reserved for new entrants, followed by phased assignment.[85]

[83] Question 4 of Consultation 08/57 asked, *"Do you agree with ComReg's proposal that an auction mechanism is the most appropriate format for granting future 900 MHz spectrum licences? Please provide supporting arguments with you answer and suggest a detailed alternative if applicable".*

[84] Each option was proposed alongside a 2 × 10 MHz spectrum cap in the 900 MHz band for each participant in the award process. See page 25 of Consultation 08/57. For a full discussion of issues related to the spectrum cap see Annex 6.1 of this document.

[85] See Section 8 of Consultation 08/57 for more details on ComReg's proposed award processes.

Views of Respondents to Consultation 08/57[86]

A 3.91 Four respondents (H3GI, Ericsson, Meteor and O2) considered an auction mechanism to be the most appropriate award format for granting future 900 MHz spectrum licences.

A 3.92 Three respondents (Imagine, H3GI and UPC) expressed a preference for Option C while four respondents (Ericsson, Meteor, O2 and Vodafone) proposed alternative options. All of the proposed alternative options included, as a fundamental element, that the three existing 900 MHz licensees would be administratively granted some form of licence renewal, extension, expansion or reservation of spectrum, with any remaining spectrum being competitively assigned via an auction. A summary of respondents' views is provided below.

A 3.93 The three respondents who favoured the reservation of spectrum for new entrants were as follows:

- UPC supported the arguments made by ComReg in favour of Option C, *"with the exception that new entrants get a minimum of a 2 × 10 MHz block even if it is at the expense of existing operators 900MHz blocks being smaller."*[87]
- Imagine stated a preference for Option C[88] but also commented that it would support the use of either an auction or beauty contest for an award with the condition that existing 900 and 1800 MHz holders would not be able to acquire the newly released spectrum.[89]
- H3GI also stated a preference for Option C, commenting that, *"a single auction is preferable from an administrative and financial point of view. Reservation of at least one block of 2 × 5 MHz of currently unallocated 900 MHz for a new entrant will promote competition and the interests of end-users."*[90]
- The four respondents who favoured an administrative assignment of spectrum to incumbent operators were as follows:

[86] See Section 6.3.1.6 of Consultation 09/14 for a full overview of respondents' views.

[87] UPC's response to Question 15 of Consultation 08/57 – see document 09/14s.

[88] In response to Questions 15 and 16 of Consultation 08/57 (09/14s), Imagine stated *"Imagine is in favour of Option C. This option maximises the potential for new entrants to enter the market thereby ensuring that competition is promoted by this spectrum reallocation... Two blocks should be reserved for new entrants. This is to maximise the potential for successful market entry by a new operator."*

[89] In response to Question 4 of Consultation 08/57 (09/14s), Imagine stated *"Imagine does not agree that an auction mechanism should be used to award this spectrum. Rather the award process should be designed to ensure that the spectrum is awarded to bidders that will bring enhanced competition and value to the market. Imagine would support the use of either auction or beauty contest for award of this spectrum with the condition that existing 900MHz and 1800MHz holders would not be able to acquire the newly released spectrum."*

[90] Page 4 of H3GI's response to Consultation 08/57 (09/14s).

- Ericsson proposed a variant of Option B in which it considered that a single auction should be combined with "*a decision to reserve at least a 5MHz block for each of the existing 2G operators, and a decision to extend the existing 2G assignments to the end of the 3G license period"*.[91] Ericsson argued that existing operators should have spectrum reserved for them on the basis that, *"If spectrum is to be reserved for any operators it surely would make more sense to try and insure [sic] the minimum disruption to the 4.9 million existing consumers..."*
- Meteor submitted that a proposal which in its view would balance *"ComReg's preference for supporting entry in the 900 MHz band with the need to assure existing operators of the availability of 2×10 MHz of 900 MHz spectrum in order to lower the costs of potential customer disruption".* Specifically Meteor proposed:
    - The administrative assignment of 2 × 10 MHz of spectrum to each of the three existing GSM operators thereby increasing their respective holdings from their current allocation of 2 × 7.2 MHz; 92
    - The administrative assignment or auction of the remaining 2 × 5 MHz block to a new entrant in the band;
    - Reduction of the 2 × 10 MHz assignments to 2 × 5 MHz for each GSM operator over an unspecified period of time as GSM demand falls; and
    - The reassignment of the 3 blocks vacated by GSM operators.
- O2 submitted that ComReg should allocate all spectrum in a single process. It called for spectrum to be divided into blocks of 2.5 MHz and proposed that ComReg reserve 2 × 7.5 MHz for each of the three existing operators.[93] This would leave 2 × 12.5 MHz available for auction.

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[91] Ericsson response to Question 17 of Consultation 08/57 (09/14s).

[92] In its response to Consultation 08/57 (09/14s), Meteor proposed that *"2×10 MHz will be assigned to all existing 900 MHz licensees by expanding each operator's holding so that each has a contiguous 2×10 MHz block that includes as far as possible their current spectrum assignment...The remaining 2×5 MHz of currently unassigned spectrum could be administratively assigned or auctioned to a new entrant to the band, at the earliest opportunity considered appropriate by ComReg."*

[93] In response to Consultation 08/57 (09/14s) O2 stated *"In summary, it is proposed that ComReg should:*

- *Allocate all the spectrum in the band in a single process;*
- *Auction spectrum in blocks of 2 × 2.5 MHz*
- *Reserve spectrum for the three existing operators in the band (2 × 7.5 MHz each)*
- *Include an initial spectrum cap of 2 × 10 MHz per operator for a limited period only*
- *Assign the spectrum using a two stage process in which the quantity of spectrum assigned to each operator is determined first, and then position within the band."*

- Vodafone submitted that ComReg should extend the term of licences held by existing GSM licensees until at least the expiry of the 2.1 GHz licences in 2021. Additionally it suggested that ComReg should amend these existing licences and increase each to 2 × 10 MHz leaving a single 5 MHz block for an auction in which existing licensees would not participate.[94] Vodafone submitted that this would be a viable option, *"while avoiding the significant risk of adverse auction outcomes and the associated potentially substantial costs and disruption..."*

A 3.94 ComReg notes that respondents to Consultation 08/57 fell into two distinct groups:

- Three respondents who stated a preference for Option C, whereby all spectrum would be auctioned but with a specified amount reserved for new entrants, primarily to promote competition; and
- Four respondents who proposed that existing licensees be granted some form of licence renewal, expansion or reservation of spectrum, primarily on the basis that this would avoid customer disruption, with any remaining spectrum being competitively assigned.[95]

Summary of ComReg's Position (Consultation 09/14)

A 3.95 Having considered the alternative proposals as set out by respondents in response to Consultation 08/57 and its statutory objectives, ComReg proposed two new options in Consultation 09/14.[96] These proposed new options, Option 1 and Option 2, both involved an auction[97] and differed only as to the timing of the availability of liberalised spectrum:

- **Option 1** would have involved making the entire 900 MHz band available in a single auction.
- **Option 2** would have involved a phased liberalisation of the 900 MHz band, dealing first with the legacy issues of those 2G licences in the band expiring in May 2011 and then making the 900 MHz spectrum available

[94] In its response to Consultation 08/57 (09/14s), Vodafone stated *"Extend the term of the spectrum licences held by the existing licensees until at least the expiry date of the current 2100 MHz licences in 2021. Subject to agreement from all the existing 900 MHz licensees, amend the terms of the existing licences to increase the spectrum holdings of each existing licensee from 7.2 MHz to 10 MHz and to alter the frequencies covered under each licence. In the context of the 2 × 10 MHz per licensee spectrum cap currently proposed by ComReg, assign a single 2 × 5 MHz spectrum block in an auction in which existing licensees would not participate."*

[95] Meteor was the only respondent who suggested that any remaining spectrum could be assigned by an auction *or* by administrative assignment.

[96] See Section 9 of Consultation 09/14.

[97] Each option was proposed alongside a spectrum cap of 2 × 10 MHz in the 900 MHz band for each participant in the award process. See page 64 and 67 of Consultation 09/14. For a full discussion of issues related to the spectrum cap see Annex 6.1 of this document.

in blocks, the timing of which would be linked to expiry of the 2G licences.

Views of Respondents to Consultation 09/14

A 3.96 Respondents' views on Options 1 and 2, and the alternatives they proposed, were to a large extent aligned with their responses to Consultation 08/57. [98]

A 3.97 Of the four respondents to Consultation 08/57 who had expressed a preference for an award process which involved a partial administrative assignment, three of these (Ericsson, Meteor and Vodafone) essentially reiterated their continuing support for those options, while the fourth (O2) proposed a variant of its proposal to Consultation 08/57 which would involve the extension of current licenses and the auction of remaining spectrum based on indefinite licence terms.[99]

A 3.98 Of the respondents to Consultation 08/57 who had expressed a preference for the reservation of spectrum for new entrants, one of these (UPC) maintained its previous view. UPC proposed a variant of Option 1 which would involve the reservation of Blocks A and B for one new mobile entrant.[100] In conjunction with an *"alternative fee structure"* for new entrants, UPC asserted that this would

[98] See Questions 6 and 7 of Consultation 09/14. Question 8 of Consultation 09/14 invited views regarding any other new options ComReg should consider. Question 8 asked, "*Are there any other new Options that ComReg should consider in finalising the process? Again please provide supporting arguments with your answer."*

A number of respondents did not propose alternative options. For example, H3GI expressed its agreement with Option 1 and suggested that ComReg should implement the proposed Option 1 as soon as possible. "*H3GI prefers option 1"* page 5 of H3GI's response to Consultation 09/14 (09/99s).

Section 7.5 and 7.6 of Consultation 09/99 provides additional commentary on the options proposed by respondents to Consultation 09/14.

[99] In its response to Consultation 09/14 (09/51s), O2 put forward a variant of Option 2, as proposed by ComReg. As part of their modifications, O2 suggested that ComReg would need to, *"Complete the application and decision making process for extension of current licences in advance of any auction of unassigned spectrum – this will allow any released spectrum to be included in the first auction...Make all unassigned and released spectrum available for assignment in the auction. This would require that Block C1 is included, any spectrum released by existing operators prior to the auction, and in addition any spectrum that must be released by operators as a result of their breaching the spectrum cap by buying a lot in the auction."*

In addition O2 noted, *"O2 is of the view that the new licence term should be indefinite subject only to a reasonable period of notice where assignments must be recovered for spectrum management reasons."* (Page 23)

O2 also outlined that *"many of the points raised by O2 at [the time of 08/57] remain valid, and in general, this document does not repeat detailed points already made".*

[100] By referring to the allocation of both Blocks A and B in their entirety to "*one new mobile entrant"* as opposed to "*new entrants"* this proposal was more restrictive than UPC's response to 08/57 (09/14s). In its response to Consultation 09/14 (09/51s), UPC stated *"ComReg should provide that existing MNO's are ineligible to bid on either of the new 2 × 5 MHz blocks (A & B). Instead these should be reserved and allocated in its entirety to one new mobile entrant...An alternative fee structure could be considered for new entrants such as a beauty contest (without fees) based upon their ability to offer real alternative competition to the current status quo"*

enable new entrants to offer *"real alternative competition to the current status quo"*. Digiweb, who had not responded to Consultation 08/57, also expressed a preference for Option 1 in its response to Consultation 09/14, subject to at least one of the two unused blocks (i.e. Blocks A or B) being reserved for new entrants.[101]

A 3.99 At that stage of the overall consultation process, on the issue of the award process and format, respondents still fell into two distinct groups:

- Four respondents favoured all spectrum being competitively assigned with a specific amount of spectrum reserved for new entrants (UPC, in response to Consultations 08/57 and 09/14; Digiweb, in response to Consultation 09/14; Imagine and H3GI, in response to Consultation 08/57); and
- Four respondents (namely Vodafone, Meteor, O2 and Ericsson) favoured a combined administrative assignment of spectrum to the existing GSM operators, with the competitive award of any remaining spectrum.

Summary of ComReg's Position as set out in Consultation 09/99

A 3.100 In Consultation 09/99, ComReg undertook a draft RIA which compared the merits of a competitive award process against the options proposed by respondents to Consultations 08/57 and 09/14. ComReg identified three 'categories' into which the various options could be grouped:

- **Category 1:** Options which involve the automatic administrative assignment of new licences to existing licensees for various lengths of time;
- **Category 2:** Options which provide for an assessment of the need of existing licensees to retain spectrum in order to continue providing services to customers uninterrupted; and
- **Category 3:** Options which involve the competitive assignment of all radio spectrum in the 900 MHz band. [102]

A 3.101 ComReg's view, as set out in Consultation 09/99, was that the benefits of a competitive award process for the full 900 MHz band would outweigh the benefits of any full or partial administrative assignment, for a number of reasons including the following:

- An auction should ensure that spectrum licences are awarded to those bidders with the strongest business cases, which usually corresponds to their ability to generate the most economic and social value. A bidder in an auction should only value spectrum more than competing bidders if it

[101] In its response to Consultation 09/14 (09/51s) Digiweb stated *"...a variant of Option 1 is the optimum of the two options presented for the liberalisation of the 900 MHz spectrum with the caveat that at least one of the blocks (i.e. Blocks A or B) are reserved for new entrants."*

[102] For a full assessment of these options see Section 9.1.5 of Consultation 09/99.

believes that it can generate greater profits over the period in which it would hold the spectrum rights of use. The bidder can only believe this if it intends to sell more at a lower cost.

- The best way of ensuring that the spectrum is put to its best use is through an open, transparent and non-discriminatory competition. The administrative assignment of spectrum to existing licensees does not provide any such assurance.
- Reducing the amount of spectrum available to be assigned via an open competition would reduce the competitive benefits associated with liberalising the band. Therefore a 'hybrid' approach would be sub-optimal when compared against a full competitive process.
- An appropriately designed auction process is the best and most transparent, non-discriminatory, and proportionate measure to encourage efficient use and effective management of the relevant spectrum. ComReg believes that this would produce the maximum benefit to society but particularly to consumers in terms of services, prices, choice, quality and innovation.

A 3.102 In the same draft RIA ComReg set out the perceived disadvantages associated with administrative assignment of spectrum.[103]

A 3.103 Following an analysis of four potential auction formats[104], ComReg favoured proceeding with a sealed bid combinatorial ("SBC") auction in which bidders could place bids on as many different combinations of packages as they wished, but these bids would be collected in a single round with no bidder having visibility of the other bids made.[105]

Views of Respondents to Consultation 09/99

A 3.104 Respondents were invited to submit their views on ComReg's proposal to award the 900 MHz spectrum band using a SBC auction, as set out in Consultation 09/99.

[103] See Section 9.1.3 of Consultation 09/99.

[104] See Section 12 of Consultation 09/99.

[105] The main reasons given for this choice were that, in ComReg's view, having considered, among other things, expert economic advice from DotEcon, common value uncertainty was unlikely to be substantial, and that an open multiple-round combinatorial auction may facilitate strategic behaviour. The choice of auction format is discussed in detail in Annex 6.2.

This was proposed alongside a spectrum cap of 2 × 10 MHz in the 900 MHz band for each participant in the auction. However, ComReg noted that in the event that demand would not exceed supply it would be minded to relax the auction spectrum cap and accept bids up to 2 × 15 MHz in the 900 MHz band. See page 79 of Consultation 09/99 for more details. For a full discussion of issues related to the spectrum cap see Annex 6.1 of this document.

A 3.105 Two respondents, H3GI[106] and Digiweb[107], favoured ComReg's proposed award process.

A 3.106 Of the three existing GSM licensees, who had all previously argued for the administrative assignment of spectrum to existing GSM licensees, the responses received from O2 and Vodafone showed a noticeable shift in their views as compared to their earlier responses, whereas Meteor's views remained largely unchanged.

A 3.107 Both O2 and Vodafone, in responding to Consultation 09/99, reduced the quantity of spectrum which they argued should be administratively assigned, thus, on the basis of their revised proposals, increasing the amount of spectrum available for auction.

A 3.108 O2, having previously proposed that ComReg reserve 2 × 7.5 MHz of spectrum for each of the three existing GSM licensees in the 900 MHz band, now proposed that 2 × 5 MHz should be administratively assigned to O2, and potentially to Vodafone.[108] O2 also proposed that this administrative assignment should be granted until 2015, whereas it had previously proposed that administratively assigned spectrum should be granted for an indefinite period.[109] O2 commented that *"extending existing licenses would avoid severe consumer disruption."* O2 further considered that, *"If the Digital Dividend (800MHz) band has not been assigned by then, it could be included in the same process, as could any spectrum not assigned in the 1800MHz band."*

A 3.109 In a similar manner, Vodafone, having previously argued for the reservation of 2 × 10 MHz for each existing GSM licensee in the 900 MHz band, now proposed that ComReg should grant an extension of 2 × 5 MHz to each of these existing licensees, with the remaining 4 blocks being auctioned.[110]

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[106] In its response to Consultation 09/99 (10/21r), H3GI stated "Hutchison 3G Ireland Limited ("3") welcomes and supports ComReg's proposals to: (i) proceed with the establishment of a competitive award process based on the preferred option set out by DotEcon in its report accompanying ComReg's Response to Consultation." (page 2)

[107] "*Digiweb agrees with this approach"* Digiweb response to Q1.B of 09/99 (10/21r).

[108] In response to Consultation 09/99 (10/21r), O2 called on ComReg to *"immediately grant to O2 an extension for 2×5MHz of spectrum in the band (O2 can provide further specific information to demonstrate its need if required). On the basis that Vodafone could demonstrate a continuing requirement a similar extension to Vodafone might be granted."* O2 did not refer to Meteor's position when outlining this view.

[109] O2's response to Consultation 09/99 (10/21r) *"The extension should be for sufficient time to allow for an orderly migration from the current dependence on GSM in the 900MHz band – at present it appears the most appropriate minimum period for the extension would be until 2015. However, O2 propose that ComReg could carry out a review in 2012/2013 to determine whether this is indeed the case. This would give ComReg the option to auction the remaining spectrum in the band (Vodafone, O2, and Meteor remaining assignments) in 2012/2013 – 2/3 years before the expiry of the licences."* (page 48)

[110] In its response to Consultation 09/99 (10/21r) Vodafone stated *"...an extension of the three existing 900 MHz operators' licences in respect of 5 MHz only each, with the remaining 20MHz being auctioned."* (page 2)

A 3.110 As noted above, Meteor's position was unchanged from its previous proposals, with the exception that it now also proposed the administrative assignment of spectrum to H3GI in addition to the three GSM licensees. In its earlier responses, Meteor had suggested that the remaining spectrum, 2 × 5 MHz, should be awarded to *"a new entrant in the band"* and not administratively assigned to a specific operator.[111]

A 3.111 As set out above, due to the change in circumstances that followed the publication of Consultation 09/99 the proposals made in response to that consultation were not responded to in detail by ComReg. ComReg instead gave respondents the opportunity to reconsider their preferred options in light of the changed circumstances as set out in the subsequent consultation documents.

Summary of ComReg's Position (Consultation 10/71)

A 3.112 ComReg proposed, in Consultation 10/71, the joint award of the 800 MHz and 900 MHz bands.[112] ComReg considered that adding the 800 MHz band to the award process would increase the supply of sub-1 GHz spectrum in the award process; however, this would not necessarily mean that the supply of sub-1 GHz spectrum would now exceed demand. In addition as noted earlier a number of respondents had indicated their interest in the 800 MHz band in the previous consultations. It was 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"* for the two sub 1 GHz bands.

A 3.113 Consultation 10/71 also contained a number of other proposals including:

- changes to the auction format to address certain risks to business continuity concerns raised by respondents;[113]
- changes to the proposed spectrum cap;[114] and

[111] In its response to Consultation 09/99 (10/21r), Meteor proposed *"the immediate administrative grant of 2×10 MHz of the 900MHz range to each of the existing 900 MHz licensees and 2×5 MHz to 3 Ireland, with an agreement to be mediated by ComReg amongst all of the licensees on the date by which the three holders of 2×10MHz would each relinquish 2×5 MHz (linked to a reasonable transition from 2G to 3G). At that time there would be 2×15 MHz within the 900 MHz band and quite likely additional spectrum available in the 800 MHz band, which could be auctioned off together."*

[112] Consultation 10/71 also set out ComReg's proposal to grant interim 900 MHz GSM licences to Vodafone and O2. These interim licences would cover the period between May 2011 (when the existing licences would expire) and the final award of liberalised spectrum. ComReg considered that such interim licences were an objectively justified and proportionate means of addressing the temporal issue identified, and that they would safeguard existing competition, avoid undue effects on the sustainability of the business of Vodafone and O2, and protect end users by avoiding significant disruption to GSM consumer services in the interim period.

[113] Section 4 of Consultation 10/71. ComReg proposed a shift from a SBC auction to a CCA format for the reasons set out in Annex 6.2.

[114] A spectrum cap of 2 × 20 MHz for all sub 1 GHz spectrum (800 MHz plus 900 MHz) was deemed to be the most appropriate cap. See Section 4.1.1 of Consultation 10/71 for a full discussion. For a full discussion of issues related to the spectrum cap see Annex 6.1 of this document.

- a proposal to issue Interim GSM licences for Vodafone and O2.

Views of Respondents to Consultation 10/71

A 3.114 Following the proposed addition of the 800 MHz band to the auction, as set out in Consultation 10/71, once again there was a split in respondents' views.

A 3.115 Four respondents (Ericson, Digiweb, RTÉ/RTÉNL, O2 and Vodafone) were largely supportive of ComReg's proposed auction format:

- Ericsson agreed with ComReg's proposal to proceed with an auction of the 800 and 900 MHz bands, and also supported the inclusion of the 1800 MHz band.
- RTÉ/RTENL agreed with ComReg's proposal to proceed with a joint award of the 800 and 900 MHz bands, also commenting that *"the 1800MHz band spectrum should be included as early as possible".* Furthermore, RTÉ agreed with the proposal to hold an auction, but added that this should be *"an auction with a suitably defined reserve to ensure that the lower 800MHz blocks are only taken up if demand is particularly strong…"*
- O2 considered that, *"...the latest ComReg proposals address many of the concerns raised by O2 and the industry, when compared to the proposals in ComReg's document 09/99. In particular O2 welcomes the proposal to auction 800MHz and 900MHz spectrum together, to grant the necessary interim licences to O2 and Vodafone, and to move away from a sealed bid auction format."*[115]
- Vodafone commented that the features proposed by ComReg in Consultation 10/71[116] *"...when taken together, are an appropriate approach that in large measure address the concerns that we have raised in response to the proposals in the previous ComReg consultation papers*

[115] O2's response to Consultation 10/71 (10/103r)

[116] In its response to Consultation 10/71 (10/103r) Vodafone stated:

"ComReg now proposes:

a) The joint award of all spectrum in both the 900 MHz and 800 MHz bands in a single auction process in early to mid 2011.

b) The use of an open combinatorial clock auction (CCA) format with a 'relative cap' activity rule which effectively guarantees that existing licensees would win a minimum amount of 900 MHz spectrum (at least 2 × 5 MHz) in the award process provided that they are prepared to make a sufficiently high bid.

c) The granting of Interim Licences to both Vodafone and 02 in the period from May 2011 until the new 800 MHz and 900 MHz licences (to be awarded under the proposed multi band auction process) are made available no earlier than the beginning of 2013.

d) The formal provision for transitional arrangements, as appropriate, to accommodate issues such as re-tuning and re-location of spectrum assignments that may arise between the conclusion of the auction and the commencement of the new licences awarded in the bands" (page 2)

on the future licensing arrangements for the 900 MHz band."[117] Furthermore, Vodafone commented that *"the proposed auction format now ensures*[118] *that existing licensees will not lose access to the minimum amount of spectrum usage rights they require to maintain existing service provision in the 900 MHz band. We therefore strongly welcome the current proposed auction format and believe that it must be incorporated in ComReg's final licensing decision."*[119]

- Digiweb stated that it agreed with ComReg's proposal to hold an auction for the 800 and 900 MHz bands, but, as noted above, was not in favour of the inclusion of the 1800 MHz band in this auction.[120]

A 3.116 Of the other respondents to Consultation 10/71, a number made comments in line with their previous proposals: [121]

- UPC was still in favour of reserving spectrum for a new entrant. UPC remained of the view that an auction would only make sense if sufficient spectrum is reserved for new entrants. UPC suggested that 2 × 20 MHz should be reserved for new entrants in the 800 MHz band.[122]

[117] Page 3 of Vodafone's response to Consultation 10/71 (10/103r).

[118] In the interests of clarity ComReg notes that this is only the case where the existing licensees are willing to bid appropriately.

[119] Page 5 of Vodafone response to Consultation 10/71 (10/103r).

[120] See Digiweb's response to Question 10 of Consultation 10/71 (10/103r).

[121] There were two other respondents to Consultation 10/71 (10/103r), Ericsson and Imagine.

Ericsson stated that it had *"no firm position in relation to this issue"* and commented that *"ultimately it is for the regulator to decide".*

In its response to Question 10 of Consultation 10/71 (10/103r), Imagine commented that *"[it] does not agree that an auction mechanism should be used to award this spectrum. Rather the award process should be designed to ensure that the spectrum is awarded to bidders that will bring enhanced competition and value to the market."* In response to Imagine's comment, the draft RIA in Chapter 3 sets out in detail how the various options being considered by ComReg would fulfil ComReg's statutory objective to promote competition.

[122] In response to Consultation 10/71 (10/103r), UPC stated *"The key for new entrants to have a chance at obtaining such desirable spectrum in an auction is for frequency blocks to be allocated for new entrant bidding only. Additionally, sufficiently sized continuous blocks (e.g. – 2 × 20 MHz in the 800 MHz band) must be provided in the new entrant only bands if the Ministerial Policy Direction of attaining true broadband wireless speeds on a national basis is to be accomplished."*

- Eircom continued to favour administrative assignment followed by competitive award. [123]

A 3.117 ESBN, having not responded to any of the previous consultation documents, agreed that an auction was the fairest means of allocating the spectrum and facilitating competition for the spectrum, but proposed that ComReg should set aside 10 MHz of the 900 MHz band as a critical infrastructure asset for communications to support the energy sector.[124]

A 3.118 H3GI, in contrast to its previous proposals, but on a similar note to proposals previously made by GSM licensees, now favoured an administrative assignment of 2 × 5 MHz to the four existing MNOs, alongside a competitive award of the remaining spectrum. Under H3GI's proposal, it would be granted either block A or B.[125] H3GI noted that if it were granted immediate access to Blocks A or B, existing 2G licence holders could then use their existing 900 MHz spectrum for 3G purposes, following the expiry of Vodafone and O2's licences in May 2011 up until the award of licences secured at auction in 2013.[126]

[123] In its response to Consultation 10/71 (10/103r), eircom restated its suggestion of a mediated solution under the provision that eircom *"do not believe that the particular circumstances of existing licensees can be ignored. Combined consideration of the 800MHz and 900MHz greatly increases the supply of sub 1GHz spectrum and as such provides greater scope for a balance to be struck between facilitating continuity of service for existing licensees and facilitating market entry" and urged ComReg to reconsider its views. In response to the proposed auction, eircom noted that it "agrees that unallocated spectrum should be awarded through an open and transparent process and that all bands should be liberalised simultaneously in 2013. The proposed combinatorial clock auction is superior to the design proposed in ComReg 09/99 and addresses concerns that arose in respect of strategic bidding incentives."*

[124] In response to Consultation 10/71 (10/103r), ESBN stated *"ESBN proposes the allocation of 10MHz of dedicated spectrum in the 900MHz band to enable Smart Utility Networks to support the long term requirements of the energy industry, its customers and the state."*

[125] In response to Consultation 10/71 (10/103r), H3GI stated *"H3GI proposes that each of the four MNOs be granted access to 5MHz of liberalised 900MHz spectrum immediately in mid-2011 by way of administrative grant for the minimum reserve price...with each operator having the opportunity to bid for additional spectrum (whether 900 MHz or 800 MHz) by auction in 2011, which would be available in 2013. H3GI proposes that it be granted one block of 2 × 5 MHz spectrum in the currently available unencumbered blocks (ie Blocks A and B), as this spectrum is not subject to transitional issues and so would be available immediately."*

[126] In response to Consultation 10/71 (10/103r), H3GI stated *"If granted immediate access to 2 × 5 MHz of spectrum of unallocated 900MHz spectrum in the unencumbered Blocks A or B, H3GI would not have any issue with the use by the existing 2G licence holders of their existing 900MHz spectrum for 3G purposes following the expiry of Vodafone and O2's licences in May 2011 up to the award of licences secured at auction in 2013, as the reservation of at least one block of 2 × 5 MHz of currently unallocated 900MHz to H3GI would mitigate the competitive harm otherwise occasioned by such a decision. This spectrum is currently unused and there is sufficient spectrum available to allow H3GI one block of 2 × 5 900 MHz and still accommodate the spectrum realignment that is required. In such circumstances, ComReg could grant Vodafone and O2 interim licences in respect of the remainder of their existing 900 MHz spectrum holdings up to 800 MHz Availability."*

Summary of ComReg's Position (Consultation 10/105)

A 3.119 In Consultation 10/105, ComReg set out its views regarding the potential inclusion of the 1800 MHz band in the proposed joint award of the 800 MHz and 900 MHz bands. ComReg continued to propose a competitive award process, in the form of a Combinatorial Clock Auction ("CCA"),[127] for the award of the three spectrum bands.

Views of Respondents to Consultation 10/105

A 3.120 Of the responses to Consultation 10/105, three are of relevance to this discussion.

- Eircom maintained its previous position for a *"mediated industry settlement"* and disagreed with an auction of the full 900 MHz band.[128]
- O2 maintained its earlier position, as set out in Consultation 09/99, that incumbent GSM licensees should be administratively assigned 2 × 5 MHz of spectrum in the 900 MHz band until 2015.[129]
- Vodafone proposed an additional element to the approach proposed by ComReg. Vodafone noted that it favoured the inclusion of the 1800 MHz band in a joint award with sub 1 GHz spectrum; however it suggested that *"a much simpler approach could better achieve the desired objectives. Subject to agreement from each of the existing licensees, ComReg could 'buy out' the tail period of Meteor's existing licence in the 900 MHz band, and the tail period of all the existing licences in the 1800 MHz bands such that all the existing licences expire in early 2013."*[130] Vodafone also stated its view that, *"in principle the best approach to the licensing of the 1800 MHz band would be to extend the duration of most or all of the spectrum usage rights under 1800 MHz licences held by existing licensees in this band, at a minimum until the*

[127] See Annex 6.2 for more detail on the auction format. This was proposed alongside a revised spectrum cap. ComReg proposed an overall spectrum cap of 2 × 50 MHz and a sub-1 GHz cap of 2 × 20 MHz. See Section 3.3 of Consultation 10/105 for more detail. For a full discussion of issues related to the spectrum cap see Annex 6.1 of this document.

[128] In response to Consultation 10/105 (11/10), Eircom stated, *"we remain of the fundamental view, as expressed in previous submissions, that a full band auction is not the appropriate mechanism to address expiry of existing licences. Rather, a mediated industry settlement should be progressed in respect of the 900MHz band, as set out in our response to ComReg 09/99, and an equivalent approach undertaken in respect of the 1800MHz band."*

[129] In response to Consultation 10/105 (11/10), O2 stated *"This response is without prejudice to O2's entitlement to have its licence extended, and this has been documented in detail in previous consultation responses and correspondence."*

[130] This issue is addressed in Annex 6.3.

end date of the current 3G licences in 2021, and to auction only the remainder of the band."[131]

Summary of ComReg's Position (Document 11/11)

A 3.121 Document 11/11 set out ComReg's Draft Decision in relation to the award of Interim Licences to Vodafone and O2.[132]

Views of Respondents to Document 11/11

A 3.122 Of the responses to Document 11/11 on Interim Licences, only the views of one respondent, H3GI, are relevant to this discussion. H3GI, in a noticeable shift from its response to Consultation 10/71 where it had called for the administrative assignment of spectrum to each of the four incumbent MNOs, stated that *"H3GI agrees with ComReg's proposal to hold an auction for the 800 MHz and 900 MHz bands*".[133]

ComReg's Current Position

A 3.123 The views of respondents have evolved over the course of the consultation process. At the outset, it was possible to group respondents' views into two distinct groups:

- Those with a preference for spectrum to be auctioned but that a specified amount be reserved for new entrants, or
- Those with a preference for existing licensees being granted some form of licence renewal or extension primarily in the case of the 900 MHz band (or in relation to the 1800 MHz band, as suggested by Vodafone) with any remaining spectrum being competitively assigned.134

[131] Page 4 of Vodafone's response to Consultation 10/105 (11/10). Although it is unclear from Vodafone's response whether this extension would be granted on a liberalised basis, ComReg has reasonably assumed that this would be Vodafone's intention. In section 5.1 of Consultation 09/14, and referred to below in this Annex, ComReg set out its reasons why it does not consider the extension of existing licences in the 900 MHz would be appropriate. The same arguments apply in the case of licences in the 1800 MHz band.

[132] The final decision to grant the interim licences was set out in Response to Consultation and Decision Document 11/29, published on 13 April 2011.

[133] However, H3GI also noted that, *"The comments contained in this document are in addition and without prejudice to H3GI's previous responses to ComReg's consultation on liberalisation of the 900 MHz spectrum band..."*. In particular, H3GI disagreed with the proposed inclusion of the 1800 MHz band – this issue has been addressed earlier in Annex 3. H3GI also disagreed with the proposed timing for the availability of liberalised spectrum in the 900 MHz band – this issue is addressed in Annex 3 and Chapter 7.

[134] Meteor was the only respondent who suggested that any remaining spectrum could be assigned by an auction *or* by administrative assignment.

A 3.124 Of those respondents who originally fell into the first category, only UPC has maintained this view throughout. ComReg's views on the reservation of spectrum for new entrants are set out in the draft RIA in Chapter 3.

A 3.125 In relation to the 800 MHz band, all respondents, bar two,[135] agreed with ComReg's proposal to award the full 800 MHz band using an auction. In relation to the 1800 MHz band, most respondents did not express strong preferences regarding the award process used to award this band on a liberalised basis. Most of the comments received in relation to the 1800 MHz band focused instead on the timing for the release of that band, rather than the award process.

A 3.126 Significant differences between ComReg's views and those of respondents arise only in the case of the 900 MHz band. Two principal factors appear to have led to a number of respondents, who had previously been in favour of administrative assignment of spectrum in the 900 MHz band, shifting their preferences so as to agree with ComReg's proposal to award the 900 MHz band using an auction. These factors are:

- The addition of more spectrum to the award process; and
- The changes made by ComReg, in line with advice from DotEcon, to the proposed auction format.

A 3.127 In particular, ComReg's change in position from a SBC auction to a CCA appears to have been influential in this regard. As discussed in detail in Annex 6.2, a CCA has the benefit of price discovery and a 'relative cap' activity rule whereby bidders could make a 'knock out' bid to ensure they win a particular lot in the final primary round.

A 3.128 The respondents who have changed their views are as follows:

- Vodafone, who was originally in favour of administrative assignment of spectrum to GSM licensees, as a means of avoiding consumer disruption, is now in favour of full competitive award process in line with ComReg's proposal.
- Ericsson, who was originally in favour of an administrative assignment of spectrum to GSM licensees, in its response to Consultation 10/71 stated that it is in favour of an auction of the three bands, in line with ComReg's proposal.
- H3GI was originally in favour of a competitive award process (with spectrum reserved for new entrants). In its response to Consultation 10/71 H3GI expressed a preference for the administrative assignment of spectrum for each of the four incumbent operators. However, in response to Document 11/11 H3GI now favours a full competitive award process of the 800 and 900 MHz bands.

[135] UPC argued in favour of the reservation of spectrum in the 800 MHz band for new entrants and ESBN argued in favour of the reservation of spectrum in the band for the utility sector.

A 3.129 However, not all respondents have moved away from favouring an administrative assignment of spectrum in the 900 MHz band to existing licensees despite the addition of the 800 MHz band to the proposed auction and the changes to the proposed auction format:

- O2 was originally in favour of the administrative assignment of 2 × 7.5 MHz of spectrum to the GSM licensees, for an indefinite period. O2 subsequently reduced this amount to 5 MHz and noted that this would be required until 2015 rather than indefinitely. O2 continues to favour the continuance of its current right of use of 900 MHz spectrum until 2015.[136]
- Meteor is the only respondent to maintain its original view throughout the process. Meteor continues to assert that there should be an administrative assignment of 2 × 10 MHz for each of the GSM licensees, which could be reduced over time to 5MHz as demand for GSM falls, and an administrative assignment of 5MHz to H3GI, with any remaining spectrum being auctioned. The changes made by ComReg to the proposed auction format, and the addition of the 800 MHz band have not resulted in any change in Meteor's position.

A 3.130 The significant factors referred to above have lead to a number of respondents supporting ComReg's proposal. Meteor and O2, however, have not changed their views despite the fact that the proposed auction mechanism, as expressed in the consultation exercise, would ensure that they could each win the spectrum they wish to acquire without any risk to the continuity of their business (provided, of course, that they are the highest bidders).This has not been sufficient to assuage their stated concerns and both operators continue to seek an administrative assignment of liberalised spectrum, though without any additional and up to date explanation as to why such an administrative assignment would be justifiable or necessary.

A 3.131 ComReg notes ESBN's proposal that ComReg allocate 10MHz of sub-1 GHz spectrum to support the long term requirements of the energy industry. ComReg is of the view that it is not possible to restrict use of the sub 1 GHz spectrum for a particular use, as all licences issued must be on a technology and service neutral basis. Under ComReg's proposal, ESBN would not be excluded from bidding for 10 MHz of spectrum.

A 3.132 Therefore of the options proposed by ComReg and by respondents that are still relevant for consideration in the context of a multi-band award, ComReg is of the view that these options are as follows:

- **ComReg's preferred Option** i**n Consultation 10/105.** This would involve a full, competitive, multi-band award process (specifically a Combinatorial

[136] Although they have not raised an appeal to the issue of Interim Licences that end in January 2013.

Clock Auction) for the 800 MHz, 900 MHz and 1800 MHz spectrum bands[137];

- **H3GI's Option** as proposed in response to Document 11/11. This would involve an auction in line with ComReg's preferred Option in Consultation 10/105, but subject to a number of modifications including earlier availability of the 900 MHz band before the 800 MHz band and the exclusion of the 1800 MHz band from the award[138];
- **Digiweb's Option** as proposed in response to Consulation 10/71. Digiweb's option is very similar to H3GI's Option as set out above, such that the 800 MHz and 900 MHz bands would be auctioned, but that the 1800 MHz band would not be included in the award.
- **O2's Option** as proposed in response to Consultation 09/99. This would involve an administrative assignment of 2 × 5 MHz of 900 MHz spectrum to O2 (and potentially Vodafone) on the basis of demonstrating a need for this spectrum. O2 propose that ComReg could then auction the other 5 blocks in the 900 MHz band in 2012/13 alongside the 800 MHz band (if not assigned by then) and spectrum not assigned in the 1800 MHz band;
- **Eircom's (Meteor's) Option.** Eircom (Meteor) initially proposed an administrative assignment of spectrum in the early stages of the consultation process, moving to a mediated industry solution, most recently in response to Consultation 10/105. As stated above, Eircom (Meteor) proposes a mediated industry settlement in the 900 MHz band and a similar approach in the 1800 MHz band. In terms of the 900 MHz band this would involve the assignment of 2 × 10 MHz to each of the 3 existing operators in this band and an assignment of 2 × 5 MHz to H3GI. This administrative assignment to the GSM operators could then be reduced to 2 × 5 MHz allocation following the agreement of all parties, with the released 2 × 15 MHz of 900 MHz spectrum auctioned alongside the full 800 MHz band.

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[137] With an overall spectrum cap of 2 × 50 MHz and a sub-1 GHz cap of 2 × 20 MHz (as proposed in Consultation 10/105). For a full discussion of issues related to the spectrum cap see Annex 6.1 of this document.

As noted earlier, RTE agreed with this option, on the condition that the lower 800 MHz blocks are only taken up if demand is particularly strong.

Vodafone also agreed with this option, but, as noted above, put forward an alternative proposal regarding the award of the 1800 MHz band.

[138] H3GI's proposal differs from that proposed by ComReg in that H3GI does not agree with the inclusion of the 1800 MHz band in the award process. In response to Question 4 of Consultation 10/71, H3GI commented, "*H3GI believes that the 1800 MHz band should not be included in a joint auction with the 800 MHz and 900 MHz bands*".

H3GI are not opposed to the joint award of the 800 MHz and 900 MHz bands but they do have different views regarding the availability of liberalised spectrum: *"...while H3GI does not take issue with the joint auction of these bands, H3GI does not agree that the release and liberalisation of the 900 MHz band should be delayed to 2013 to coincide with 800 MHz availability..."* page 18 of H3GI's response to Consultation 10/71 (10/103r).

- **UPC's Option** as proposed throughout the consultation process, most recently in response to Consultation 10/71, which proposes that ComReg should reserve 2 × 20 MHz in the 800 MHz band for a new entrant, with the remainder of the 800 MHz and 900 MHz bands awarded by auction.

A 3.133 The options set out above can be grouped into two broad categories for the purpose of the draft RIA contained in Chapter 3:

- **Option 1**: Assignment of all available spectrum (800, 900 and 1800 MHz) on the basis of a fully competitive, open, transparent assignment process. This option proposes a Combinatorial Clock Auction, which would include: a relative cap activity rule such that bidders could adopt a simple strategy in the supplementary bids round such that their position in the final primary bid round is protected; and a spectrum cap set to ensure that, at a minimum, the current level of competition in the market is maintained (e.g. auction or other competitive process).
- **Option 2**: A hybrid approach combining a mix of both administrative assignment (on long-term basis) and competitive assignment of spectrum rights of use. The spectrum granted by way of administrative assignment could be awarded to both incumbents and new entrants, or alternatively could be limited to incumbents only or new entrants only. These latter scenarios are referred to as Option 2A and 2B:
- **Option 2A**: Administrative assignment of all/part of the 900 MHz band to the three GSM operators or the four incumbents with a competitive award of the full 800 MHz band.
- **Option 2B**: Reserve part of the sub 1 GHz spectrum specifically for new entrants and award the rest by competitive assignment.

3.3 Availability of the Bands on a Liberalised Basis

Background

A 3.134 This is part three of this Annex. Having considered what spectrum should be included in the award process and what format of award process should be used, the next consideration is the availability of the spectrum to be awarded, i.e. when should the future liberalised licences take effect. A key consideration in this regard is to ensure that liberalisation occurs as early as possible, to ensure that consumers reap the benefits of liberalisation as early as possible, while at the same time, in accordance with the Amending GSM Directive[139], ensuring that market competition is not distorted.

A 3.135 Over the course of this consultation process, the various proposed timelines have changed considerably. Many of ComReg's earlier considerations in respect of the timing of the release of liberalised licences are not worth revisiting in this consultation paper as they are simply no longer relevant.

[139] See EC Directive 2009/114.

A 3.136 It is, however, worth noting that throughout the consultation process ComReg has considered a number of possibilities which would enable the release of part, or all, of the 900 MHz band on a liberalised basis, as early as possible and without distorting market competition. ComReg considered a number of options primarily in the context of a 900 MHz only award (prior to Consultation 10/71), including whether existing GSM licensees should be liberalised for the remainder of their term and whether it would be appropriate to liberalise the 900 MHz band on an incremental basis. Each of these proposals was ultimately rejected by ComReg on the basis that, among other things, they would have introduced the potential for market competition to be distorted.

A 3.137 Later, ComReg considered the appropriate timing for the release of liberalised spectrum in the context of a joint award of the 800 and 900 MHz bands, having regard to the anticipated availability of the 800 MHz band (due to become available at the end of 2012 following ASO). Later still, ComReg considered the appropriate timing for the release of liberalised spectrum in the context of a joint award of the 800, 900 and 1800 MHz bands.

A 3.138 More recently, again in the context of a joint award of the 800, 900 and 1800 MHz bands, ComReg has revisited the possibility of releasing the 900 MHz band earlier than the 800 MHz band and set out a proposal as to how this could be achieved.

A 3.139 This section of Annex 3 presents an overview of ComReg's position throughout the consultation process, and the views of respondents, and it also sets out ComReg's current position on the appropriate timing for the release of liberalised spectrum.

Summary of ComReg's Previous Position (Consultations 08/57, 09/14, 09/99)

A 3.140 As set out in earlier consultation documents which considered a 900 MHz only award, ComReg considered two options by which all, or part, of the 900 MHz band could be liberalised as soon as possible. Both options were eventually ruled out because they would introduce the potential for market competition to be distorted. Each of these options is summarised below.

A 3.141 First, in Consultation 08/57[140] ComReg consulted on whether existing GSM licenses should be liberalised for the remainder of their term.[141] In its response to Consultation 08/57, one respondent (H3GI) contended that this would distort competition by conferring an unjustified competitive advantage on parties with existing 900 MHz and 1800 MHz spectrum rights of use and that it could infringe State Aid provisions in the EC Treaties. H3GI called upon ComReg to ensure equality of opportunity for all operators or, alternatively, submitted that ComReg

[140] At this time, in July 2008, there was almost three years remaining on Vodafone and O2's GSM current licences, and five years remaining on Meteor's.

[141] Q1 of Consultation 08/57 asked, *"Do you agree with ComReg's proposal to liberalise the existing GSM licences in the 900 MHz and 1800 MHz bands as soon as practicable after the EC Decision enters into force and subject to a number of conditions (see below)?"*

should compensate H3GI for the significant competitive disadvantages which it asserted it would face if its competitors were permitted to use 900 MHz spectrum on a liberalised basis for the remainder of the duration of their respective licences.

A 3.142 In Consultation 09/14, ComReg noted the above submission by H3GI concerning the liberalisation of existing GSM licences and how this could distort competition by potentially conferring a significant advantage on existing GSM licensees that would not be available to a non-GSM mobile operator. Noting that:

- Article 1(2) of the then proposed Amending GSM Directive acknowledged the potential for the distortion of competition arising from liberalisation;
- there was no requirement for Member States to liberalise existing GSM licences;
- two of the existing GSM licences had, at that time, just over two years to run; and
- legacy issues existed surrounding the provision of GSM services, which strongly suggested that the benefits of early liberalisation (both to operators and consumers) would likely not be as significant as suggested by some respondents

A 3.143 ComReg indicated that any existing 900 MHz GSM licences, and any 900 MHz spectrum retained to address GSM legacy issues, would not be liberalised while all new licences in the 900 MHz band would be granted on a liberalised basis.

A 3.144 Secondly, in Consultation 09/14 ComReg considered allowing earlier access to that part of the 900 MHz band which is currently unassigned (i.e. Blocks A and B). This was referred to as 'Option 2' which would involve a multi phased approach. It would first deal with legacy issues surrounding existing 2G licences, expiring in May 2011, and would then make the 900 MHz spectrum available in sequence, the timing of which would be linked to licence expiry. Following a review of respondents' submissions to Consultation 09/14, and advice from DotEcon,[142] ComReg rejected such a multi phased approach. As noted in the Draft RIA in Consultation 09/99, ComReg was of the view that pursuing a multi phased approach would mean that a significant first mover advantage would be achieved by the winner(s) of the blocks which were liberalised first. This could cause a serious distortion in market competition, as the successful bidders(s) would potentially have a significant advantage over other operators who would not have access to liberalised spectrum. For these reasons, ComReg ruled out Option 2.

Summary of ComReg's Previous Position (Consultation 10/71)

A 3.145 Prior to July 2010, ComReg considered that while the release of Digital Dividend spectrum (i.e. 800 MHz band) would provide an excellent opportunity for the deployment of advanced ECS, given the technical characteristics of this spectrum,

[142] See Dotecon Report (Document 09/99c).

the timescale for the spectrum becoming available was uncertain. Given the uncertainty around the availability of the 800 MHz band, ComReg therefore did not consider it appropriate, at that time, to delay the release of the liberalised 900 MHz band so as to enable a combined award of both bands.

A 3.146 However, circumstances changed on 29 July 2010 when the Minister for Communications, Energy and Natural Resources announced that analogue terrestrial television would be switched-off in the State in Quarter 4 of 2012, in conjunction with the analogue switchover in Northern Ireland. The Minister's announcement meant that the 800 MHz band would potentially be available for re-assignment to new licensees, on a liberalised basis, from January 2013. Following this announcement, ComReg published Information Notice 10/59, on 29 July 2010, in which it noted that as a result of greater clarity as to the date for ASO in Ireland this now made it possible for ComReg to consider bringing forward the release of the 800 MHz band so as to release it at the same time as the 900 MHz band, using the same award process.

A 3.147 As discussed earlier in this annex, ComReg was of the view that the similar propagation characteristics of 800 MHz and 900 MHz spectrum were such that it was appropriate to consider assigning the liberalised 800 MHz and 900 MHz spectrum bands at the same time.

A 3.148 Therefore in Consultation 10/71, having considered the joint award of the two sub 1 GHz bands, ComReg now considered whether the liberalised 800 MHz and 900 MHz bands should be made available for use at the same time. In Section 2.4.4 of Consultation 10/71, ComReg considered two approaches:

- **Approach 1** - make the entire 900 MHz band available for liberalised use shortly after the proposed joint 800/900 MHz award process in mid-2011; or
- **Approach 2** - provide for the availability for liberalised use of 800 and 900 MHz spectrum commencing early 2013.

A 3.149 ComReg, having set out a number of arguments for and against each of these two approaches, reached the preliminary view that, on balance, the joint availability of 800 MHz and 900 MHz spectrum from early 2013 (Approach 2) would be a better approach in light of its statutory functions, objectives and duties.

A 3.150 Approach 1 was not favoured as ComReg was of the view that the earlier release of liberalised 900 MHz spectrum might not result in the benefits of liberalisation being realised significantly earlier than would be the case if the 800 and 900 MHz bands were liberalised simultaneously, while it also carried the risk of creating a distortion in competition. ComReg's view was based upon the following considerations:

- If existing GSM licensees were to win liberalised 900 MHz spectrum they might have to take certain measures in order to free up the spectrum blocks which they occupy under their current licences and such transition measures could take time to complete. Red-M/Vilicom considered

various scenarios, based on different quantity assignments of liberalised 900 MHz spectrum. In the first scenario, each existing GSM licensee would obtain 2 × 10 MHz of liberalised 900 MHz spectrum by auction but would have to relocate to different parts of the 900 MHz band; the report estimated that this would take about seven months.[143] Under a second (and far less likely) scenario, where an existing GSM licensee won only 2 × 5 MHz of 900 MHz spectrum by auction and had to "retune" its network so that it could operate within the constraints of this reduced spectrum assignment; the report estimated that such retuning would take a maximum of 2 years.[144] ComReg considered that such potential transition requirements could significantly delay the ability of auction winners to utilise their liberalised 900 MHz spectrum assignments.

- ComReg noted that it was reasonable to expect considerably greater demand for Blocks A and B which are unoccupied by any existing GSM licensee and so would be unaffected by any transition requirements. This gave rise to concerns about potential distortions in competition which could arise from one or two operators gaining a "first-mover" advantage through earlier access to the (fully liberalised) Blocks A and B. ComReg cited Recital 7 of the Amending GSM Directive - *"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."*
- ComReg further recognised the potential for operators to engage in strategic behaviour in order to achieve earliest transition for themselves whilst seeking to delay use of liberalised spectrum by their competitors.
- ComReg further noted that a practical complication of releasing the liberalised 900 MHz band on a piecemeal basis could 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 noted that the potentially inter-related nature of relocation activities (whereby sequenced/coordinated relocation would be required by existing GSM licensees) suggested that early release and use of Blocks A and B should be avoided.

A 3.151 ComReg favoured Approach 2, for the following reasons:

- Delaying liberalisation of the 900 MHz band until the 800 MHz band became available could result in productive inefficiency or dynamic inefficiency to the extent that it would delay the provision of new services to consumers. However, these potential inefficiencies should be

[143] Section 3.4 of the Red-M/Vilicom Report - "Retuning and Relocating GSM900 Spectrum Assignments in Ireland" (Document 10/71c).

[144] Section 4.6 of the Red-M/Vilicom Report - "Retuning and Relocating GSM900 Spectrum Assignments in Ireland" (Document 10/71c).

viewed in light of ComReg's proposal to grant "preparatory licences" to all winners of liberalised 800 MHz and 900 MHz spectrum. This would allow those winners to plan and deploy advanced networks from the time of the proposed joint award until the 800 MHz became available. In this context, ComReg queried whether there would be any efficiency gain through the earlier release of liberalised 900 MHz spectrum (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.

- In addition, ComReg considered 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 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."

Views of Respondents to Consultation 10/71

A 3.152 In response to Consultation 10/71, the majority of respondents agreed with ComReg's proposal to issue preparatory licences,[145] however a number of respondents (H3GI, Qualcomm and Vodafone) disagreed with ComReg's proposal to make 900 MHz available at same time as 800 MHz, thereby delaying the availability of liberalised 900 MHz spectrum until Jan 2013. Overall, it was asserted that not liberalising 900 MHz until 2013 would be detrimental to: H3GI and other new entrants who currently do not have access to 900 MHz spectrum; the development of mobile broadband services in Ireland; and the welfare of end users.

A 3.153 A number of respondents called for liberalisation of the 900 MHz band to happen as soon as possible:

- H3GI stated that it *"... strongly disagrees with ComReg's proposals for the delay of release and liberalisation of 900 MHz spectrum to 800 MHz Availability".*[146] *H3GI further stated that the "proposal to postpone the release and liberalisation of the 900 MHz band to 800 MHz Availability would constitute an unjustifiable and disproportionate delay in the release and liberalisation of 900 MHz spectrum to the detriment of H3GI and other new entrants who currently do not have access to 900 MHz spectrum, and to the detriment of Irish consumers."*[147]
- Qualcomm stated *"The liberalisation of the 900 MHz bands should not be artificially delayed. On the contrary, the introduction of mobile broadband in the 900 MHz band should be allowed as early as possible."Qualcomm also stated "A delay in 900 MHz liberalisation till 2013 as proposed would be detrimental to the development of mobile broadband services in Ireland. We consider that competition issues could be better addressed through the rules of the auction to be held in 2011"*[148]
- Vodafone stated that it *"...disagrees with ComReg's proposal to delay the making available of 900 MHz spectrum on a liberalised basis until the date when 800 MHz spectrum is available for use. This risks significant unnecessary delay in the refarming of the 900 MHz band for 3G use, and consequent delay in the provision of enhanced mobile broadband services, to the detriment of the welfare of end users."*[149]

A 3.154 In addition, two operators called for ComReg to provide more certainty regarding availability of the 800 MHz band. O2 stated that *"there can be no uncertainty or risk relating to the availability of the 800 MHz band...Auction participants can*

[145] Preparatory licences are discussed in more detail in Annex 7.

[146] Page 2 of H3GI's response to Consultation 10/71 (10/103r).

[147] Page 13 of H3GI's response to Consultation 10/71 (10/103r).

[148] Page 2 of Qualcomm's response to Consultation 10/71 (10/103r).

[149] Page 4 of Vodafone's response to Consultation 10/71 (10/103r).

not seriously bid on lots of 800MHz spectrum if there is any uncertainty about, or risk of, delayed availability."[150] Similarly, H3GI commented that *"the timescales for the availability of the 800 MHz spectrum band are still considerably uncertain..."*[151]

Summary of ComReg's Position (Consultation 10/105)

A 3.155 In Consultation 10/105, ComReg proposed the inclusion of the 1800 MHz band in the award process for 800 and 900 MHz spectrum. Having previously considered the joint award of sub-1GHz spectrum and arriving at the view that this would represent a better approach than the staggered release of the 900 MHz band followed by the release of the 800 MHz band, ComReg then considered making the 1800 MHz band available through the same award process, noting that many of the factors discussed in the context of the sub-1GHz discussion would also be relevant.

A 3.156 As set out in section 3.4.1 of Consultation 10/105, ComReg considered a common start date for all liberalised licences in the three bands under consideration. In particular, ComReg noted that a number of factors relating to the discussion of the joint availability of sub 1 GHz spectrum were also relevant in the context of the 1800 MHz band:

- "Allowing asymmetric access to liberalised 1800 MHz would raise the possibility of distorting competition in downstream markets;
- Homogenous lots in the joint award allow bidders increased flexibility and choice in switching their preferences between bands. This would allow bidders to pursue more refined strategies and increases the efficiency of the auction. Overall the risk of distortions within the auction is reduced with homogenous lots; and
- Given that there are existing licences in the 1800 MHz, it is envisaged that a certain degree of transitioning would be required following the joint award in order for existing and new licensees to align their spectrum holdings to their new locations. The present availability of unassigned spectrum in the 1800 MHz band could assist the timely implementation of transitional activities. This is particularly relevant for the spectrum blocks currently occupied by the GSM 1800 MHz licences, as transitioning activities for these licensees would need to be completed before these blocks could become available for liberalised use." [152]

A 3.157 In addition, and in light of ComReg's proposed granting of preparatory licences for winners of liberalised 1800 MHz rights of use, ComReg considered that any adverse effects of aligning the availability of liberalised spectrum in the three bands to the same date to be small relative to the likely advantages. ComReg thus

[150] Page 4 of O2's response to Consultation 10/71 (10/103r).

[151] Page 13 of H3GI's response to Consultation 10/71 (10/103r).

[152] Section 3.4 of Consultation 10/105.

considered that, on balance, the joint availability of liberalised 1800 MHz spectrum with sub-1 GHz spectrum in early 2013 would be reasonable, appropriate and justified in the context of ComReg's statutory functions, objectives and duties.

A 3.158 With regard to respondents' views concerning the lack of certainty on the availability of the 800 MHz band, ComReg noted that:

A 3.159 "ComReg is cognisant that the date of Analogue Switch Off ("ASO"), and therefore the availability of the 800 MHz band, 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".[153]

Views of Respondents to Consultation 10/105

A 3.160 In response to Consultation 10/105, Vodafone reiterated its previous call for ComReg to proceed with, *"the earliest possible liberalisation of 900 MHz and 1800MHz licences."*[154] No other respondent commented on the proposed timing for the availability of liberalised spectrum.

Summary of ComReg's Position (Document 11/11)

A 3.161 In Document 11/11, which primarily dealt with the issue of interim licences, ComReg also discussed the possibility of modifying the broader spectrum release proposal relating to the multi band award of 800, 900 and 1800 MHz spectrum, as outlined in Consultation 10/105, so as to allow for the earlier liberalisation of the 900 MHz band, prior to early 2013.[155]

A 3.162 The Amending GSM Directive requires that ComReg should liberalise the 900 MHz band as soon as possible, whilst ensuring that market competition is not distorted. With this in mind, ComReg set out in Document 11/11 an 'early liberalisation proposal' whereby the 900 MHz band could be released, on a liberalised basis, earlier than January 2013.

A 3.163 ComReg outlined a number of criteria that would have to be met in order to allow for earlier liberalisation of the 900 MHz band:

[153] Footnote 19 on page 21 of Consultation 10/105.

[154] Page 2 of Vodafone's response to Consultation 10/105 (11/10).

[155] As noted in above, ComReg had previously considered, but subsequently rejected, the proposals for the earlier release of all, or part of, the 900 MHz band on a liberalised basis in the context of a 900 MHz only award.

- *"….all transitional activities required to be completed by all existing licensees in the 900 MHz band could be completed prior to both 31 January 2013 and 800 MHz availability;*
- *all holders of rights of use in respect of the 800, 900 and 1800 MHz bands (whether the rights are then current or contingent or prospective) approving of, or at a minimum not being in such a position to show that they would suffer any disadvantage as a result of, such earlier liberalisation; and,*
- *appropriate spectrum fees would be determined for the period relating to the earlier 900 MHz liberalised rights of use."* [156]

A 3.164 As these matters would be determined by the outcome of the proposed auction and events subsequent to that (being the speed at which transitional measures could be completed by 900 MHz licensees) ComReg considered that it would not be possible to conclusively state at that point in time whether and, if so when, earlier availability of liberalised 900 MHz rights would occur.

Views of Respondents to Document 11/11

A 3.165 Only one respondent, H3GI, made reference to ComReg's earlier liberalisation proposal in their response to Document 11/11. While H3GI did not state that they disagreed with ComReg's proposal for the potential earlier liberalisation of the 900 MHz band, they asserted that the 900 MHz band should be immediately liberalised upon completion of the auction.

A 3.166 H3GI commented on the competitive effects of delaying the availability of liberalised 900 MHz spectrum: "Failing to liberalise the 900 MHz spectrum at this time has the effect of preserving and entrenching the position of Vodafone and O2 just when there is a huge opportunity for H3GI to challenge the position of the incumbents and offer innovative new services."[157] H3GI further stated: "ComReg's decision to delay access to 900MHz spectrum (in particular that which is not already allocated) thus directly harms the interests of both H3GI and all consumers of voice and data mobile services in Ireland by reducing H3GI's ability to offer competitive pricing and new & innovative services, entrenches the unfair competitive advantage granted to Ireland's other mobile network operators, and runs contrary to both the EU Directive 20091114/EC and ComReg's stated aim of `ensuring that there is no distortion or restriction of competition in the electronic communications sector." H3GI recommended that ComReg should "amend its interim licence proposal, auction liberalised 900 MHz spectrum by September 2011 and, based on the results of the auction, licence liberalised 900 MHz immediately after its proposed auction."[158]

[156] Section 3.11 of Document 11/11.

[157] Page 11 of H3GI's response to Document 11/11 (11/27).

[158] Page 4 of H3GI's response to Document 11/11 (11/27).

A 3.167 H3GI also noted the uncertainty surrounding the availability of spectrum in the 800 MHz band: "... ComReg fails to provide clarification as to when 800 MHz availability will actually take place ... H3GI is of the view that the timescales for the availability of the 800 MHz band are still considerably uncertain. H3GI considers this state of affairs as highly unsatisfactory."[159]

Summary of ComReg's Position (Document 11/29)

A 3.168 In Document 11/29, ComReg stated that it would consider its 'early liberalisation proposal' to the extent that it could be accomplished without distorting competition, and only after the broader spectrum release process had been completed.

A 3.169 ComReg noted that its "interim-licence-amendment and early-liberalisation" option was essentially in line with H3GI's recommendation to auction liberalised 900 MHz spectrum by September 2011 followed by immediate licensing of liberalised-use of spectrum by winning bidders based on the results of that auction. ComReg also noted however that acceding to H3GI's proposal to liberalise the 900 MHz band immediately after the auction "…*could be argued to be discriminatory against new entrants (who would not have mast sites and a back haul infrastructure in place), and potentially discriminatory against the current 900 MHz licensees (who would have transitional issues to address before they could make use of liberalised spectrum).*" [160]

A 3.170 ComReg also stated that "it is not possible or appropriate, at this stage of its deliberations and at this time, to predict matters or to predetermine the approach that it will take in this regard, noting also the possible severe impacts on consumers and operators, matters which ComReg is entitled to consider".[161] In Section 2.9 of Document 11/29, ComReg concluded by stating that it holds out the prospect of earlier liberalisation of the 900 MHz band "if that can be achieved without significant distortion of competition".

Views of Respondents to Document 11/29

A 3.171 Following the publication of the Decision on Interim Licences for the 900 MHz band (Document 11/29) ComReg received a letter from H3GI[162] which raised a number of points regarding the timing for liberalisation of the 900 MHz band. H3GI welcomed ComReg's acknowledgement of the possibility of liberalising the 900 MHz band in advance of January 2013:

- *"….it notes some of the more positive aspects of the Decision, namely... (ii) ComReg's indication that the 900 MHz band could be liberalised*

[159] Page 11 of H3GI's response to Document 11/11 (11/27).

[160] Section 2.7 of Document 11/29.

[161] ibid

[162] Letter from H3GI to ComReg dated 21 April 2011, published in ComReg Document 11/37.

prior to 31 January 2013 and the interim licences revoked at such earlier date"

- *"H3GI is encouraged by certain of ComReg's statements at various places in the Decision which might tend to suggest that there is real support for possible liberalisation of the 900 MHz band prior to 31 January 2013..."*

A 3.172 However, H3GI also called on ComReg to provide greater clarity regarding its proposal.

- *"H3GI would be grateful if ComReg could clearly identify the measures it will put in place so as to ensure that liberalised 900 MHz spectrum will be made available no later than 31 January 2013."*
- *"ComReg's statements suggesting that there could be liberalisation of the 900 MHz band prior to 31 January 2013 do not provide much comfort when read with some other statements of ComReg in the decision which seem very tentative and inexact leaving the approach to be adopted very uncertain."*
- *"H3GI therefore requests that ComReg explain in detail the nature and extent of ComReg's commitment to seek earlier liberalisation of the 900 MHz band including the mechanisms that it is proposing to use to secure earlier liberalisation."*

A 3.173 In responding to H3GI's submission[163], ComReg noted:

- *"ComReg does not consider there to be any material inconsistency between its statements as suggested by H3GI. In summary, ComReg was making the following points, in addition to that cited by H3GI:*
  - ComReg had not made a decision to delay availability of liberalised 900 MHz spectrum to January 2013;
  - ComReg was proposing to issue interim licences-which were capable of being amended in the event of earlier liberalisation providing to be possible-in a manner that was designed to facilitate and not unduly constrain its deliberations on, and implementation of, its broader spectrum release proposals;
  - ComReg was not in a position to know which operators would win spectrum nor what blocks of spectrum any operator would hold; and
  - While ComReg remained open, as previously indicated, to evaluating the potential earlier liberalisation once the result of the currently-proposed broader spectrum release process was known, it was of the view that it was not possible or appropriate, at this stage of its deliberations and at this time, to predict matters or to predetermine the approach that it would take in this regard, noting

[163] Letter from ComReg to H3GI dated 28 April 2011, published in ComReg Document 11/37.

also the possible severe impacts on consumers and operators – matters which ComReg was entitled to consider."

- *"...early liberalisation would appear to depend on certain facets and circumstances being in place in the future, which cannot be predicted at this point in time."*
- *"ComReg detailed, in section 3.2 of Document 11/11, how its current spectrum release proposals for the 800 MHz, 900 MHz and 1800 MHz bands could, in principle, be modified so as to provide the potential for liberalisation of the 900 MHz band earlier than 31 January 2013."*
- *"...the interim licence provided for in the Decision and in the Regulations are capable of fitting in with and facilitating the possible earlier liberalisation of the 900 MHz band."*
- *"ComReg is still interested in, and continues to carefully consider this particular aspect of its broader spectrum-release proposals in light of submissions provided by interested parties and in the context of ComReg's statutory functions, objectives and duties.*"

A 3.174 It its reply[164], H3GI acknowledged transitional issues affecting the potential for liberalising the 900 MHz earlier than 800 MHz spectrum. H3GI called on ComReg to provide clarity on the transition process, post spectrum award, and expressed its expectation that ComReg's forthcoming document would address the following: *"The adoption by ComReg of a sufficiently robust and transparent process to ensure prompt completion of transitional activities by Vodafone, O2 and Meteor Mobile Communications Limited (Meteor)(e.g. setting of milestones for specific tasks, sufficiently robust and transparent mechanisms to monitor compliance with milestones set, and appropriate sanctions for non-compliance)."*

A 3.175 H3GI further suggested that ComReg should, "...ensure that it has sufficient information in relation to the networks of Vodafone, O2 and Meteor in advance of the auction to allow ComReg to properly consider the issue of early liberalisation of 900 MHz in the light of those auction results, so as to seek liberalisation of 900 MHz as early as possible, and in advance of 31 January 2013."

A 3.176 In addition, H3GI sought further information regarding the issue of fees in respect of early liberalisation of 900 MHz.

ComReg's Current Position

A 3.177 ComReg remains of the view that it is appropriate to consider whether it would be possible to enable the commencement of liberalised licences in the 900 MHz band prior to 31 January 2013. Also, although not specifically proposed in earlier consultation documents, ComReg is of the view that it is equally appropriate to consider the advanced commencement of liberalised licences for all spectrum bands in the award prior to January 2013. Earlier use of liberalised spectrum is

[164] Letter from H3GI to ComReg dated 11 May 2011, published in ComReg Document 11/37.

good for consumers, so long as competition problems can be avoided, and transitional issues are adequately addressed.

A 3.178 In developing a proposal for the advanced commencement of liberalised licences, ComReg is of the view that no proposal should create incentives for an operator to delay the advanced commencement of liberalised licences.

A 3.179 ComReg's proposal as set out in section 3.2 of Document 11/11 suggested that the advanced commencement of liberalised licences in the 900 MHz band would require the approval of, or at a minimum all winners of liberalised spectrum in all three bands not being in such a position to show that they would suffer any disadvantage as a result of such earlier liberalisation. Upon further consideration and taking into account the views of certain respondents, ComReg recognises that tying the three bands in this way could create perverse incentives for the winners of spectrum in one band to frustrate the advanced commencement of liberalised licences in another band (e.g. an operator could conceivably choose to obtain 800 MHz spectrum only and later attempt to show that the advanced commencement of 900 MHz spectrum earlier than 1 February 2013 would adversely affect it).

A 3.180 For this reason, ComReg is of the view that it is appropriate to consider proposals for the advanced commencement of liberalised licences on an individual band basis.

A 3.181 In considering the advanced commencement of liberalised spectrum on a per band basis, ComReg believes that it is also appropriate to consider each of the bands on a per block basis as:

- Bidders can consider any differences between blocks in the assignment round of the auction and adjust their bids accordingly.
- The timing difference between the start date of one block and another could be circa 1 year or less. This assumes that ComReg commences the auction in Q4 2011 and issues new liberalised licences shortly thereafter.
- If one or more blocks has an earlier commencement date, this should incentivise all the remaining licensees to complete their transition activities as speedily as possible in order to have its block(s) considered for advanced commencement.

A 3.182 ComReg's newly developed advanced commencement proposal is set out in detail in Chapter 7.

Annex 4

Expectations of Renewal and Property Rights

4.1 Expectations of Renewal

Summary of ComReg's View in 09/99

A 4.1 In 09/99, ComReg:

- noted that it had already clearly set out its view and position on the "legitimate expectations" issue in document Consultation 09/14;
- noted that further submissions and representations had nevertheless been received by it from GSM licensees in response to Consultation 09/14 concerning entitlements they claimed relating to possible 2G licence-extension or renewal following expiration of their respective 2G licences, on the basis of a statement made by ComReg's predecessor, the Office of the Director of Telecommunications Regulation (or "ODTR"), in an information memorandum in 2001 (document number 01/96) ("the Director's Statement");
- stated that it had had careful regard to these submissions, as well as to the assertions of the GSM licensees concerning their harbouring expectations of licence-renewal. In this regard, ComReg noted, inter alia, that it had considered and assessed various options in the process to date, taking into account the expectations expressed by the licensees concerned, as well as their submissions generally;
- noted the various factors referred to in Section 4.1 of Consultation 09/14, which it still regarded as being of relevance to the determination of the issue, including but not limited by the following:
- the fact that the obligations, powers and discretions enjoyed by ComReg were imposed and conferred by statute;
- the fact that the Director's Statement was made in circumstances where the Information Memorandum in which it was contained was itself attended by disclaimers and caveats, and which expressly indicated that it did not contain the Director's final position on any matter in the 3G licensing process;
- the fact that the Director's Statement was not reflected or incorporated by the ODTR into its subsequent 3G tender documents or relevant licences or GSM regulations, a fact which went without comment or complaint from the GSM licensees;
- noted, inter alia, that its selection of Modified Option 1 as its preferred option at the time had been arrived at in circumstances where options put forward by the GSM licensees – including one based on a particular implementation of elements in the Director's Statement – had been

considered, assessed, and rejected on the merits, and having regard to relevant facts and circumstances, materials and advice. In particular, ComReg at the time of Consultation 09/99 considered that, notwithstanding the expressed expectations and submissions of the GSM licensees, and its consideration of 2G licence-extension based on elements of the Director's Statement, Option 1, as described in Section 10 of Consultation 09/99, represented the best option it could reasonably identify at that time and in the particular circumstances, in furtherance of its statutory remit and the particular discretions vested in it, in the public interest; and

- made clear that, having regard to all of the foregoing and the existing facts and circumstances of relevance, as well as to the advices of its consultants and the material before it, it had arrived at a position whereby it was satisfied that the GSM licensees did not enjoy an enforceable legal right to 2G licence-renewal or extension.

Views of Respondents

A 4.2 Whilst some time has elapsed, a number of papers have been issued and responded to, and developments have taken place since further submissions and representations were received by ComReg from certain GSM licensees concerning this issue. In the main, these were received in response to Consultation 09/99.

A 4.3 In Consultation 09/99, ComReg had reiterated[165] its clearly-stated position from Consultation 09/14[166] on the GSM licensees' particular views of the meaning and effect of the Director's Statement and their views on how ComReg ought to proceed on the basis of that Statement, and further pointed out that its substantive assessment of the options available to it at that time, while having regard to the expressed expectations concerned, and the fact of their being held, did not, on balance, suggest to it that it ought to proceed on the basis of the Director's Statement in the manner contended for by the GSM licensees, for the reasons set out in those earlier documents.

A 4.4 Again, as in their responses to 09/14, the GSM licensees, in response to Consultation 09/99, nevertheless continued to make submissions surrounding the Director's Statement and legitimate expectations. Non-confidential versions of the particular GSM licensees' further submissions and representations in this regard are contained in Document 10/21R, and it is not proposed to set them out in full in this document[167].

[165] Section 6.5 of Consultation 09/99.
[166] Section 4.1 of Consultation 09/14.
[167] Note that references in this section to the GSM licensees' submissions and representations are not intended to indicate that all such licensees made the same submissions and representations. For convenience, they are referred to cumulatively in the text of this section, and without discriminating between the submissions and representations actually made by particular, individual, licensees. The individual submissions are available in Document 10/21R.

A 4.5 Whilst it is not proposed to set out precisely and exhaustively all of the submissions and representations made, they can be summarised generally and cumulatively as follows:

- a reservation of rights concerning the matter;
- a re-iteration, amplification and adoption of what had been submitted previously;
- a citation of recent case law on legitimate expectations;
- that a failure to have sufficient regard to expectations in fact held by parties would be unlawful;
- that expectations held were objectively reasonable insofar as they accorded with international practice, whereby 2G licences have been extended;
- that expectations held could lawfully be accommodated by ComReg, insofar as the adoption by ComReg of an option representing delivery on those expectations would not be unlawful;
- that the best option regarding the 900 MHz spectrum band was, in fact, for GSM licensees to retain existing spectrum allocations;
- that insufficient notice was given of the alleged proposed change in ComReg's alleged policy and/or inadequate opportunities had been given to respond or avail of transitional arrangements to prepare for a possible loss of 900 MHz spectrum;
- that there was an entitlement, at least, to a completed review of existing spectrum assignments in the 900 MHz and 1800 MHz bands three years prior to licence-expiry and that this procedural expectation could not be delivered upon under ComReg's proposals at that time;
- that there was an entitlement, at the very least, to reasonable notice of any proposal that might result in loss of an allocation of 900 MHz spectrum, and, in particular, notice sufficient to afford a party an opportunity to consider and implement alternative means for dealing with the issues arising from such loss;
- that due weight should be given to the expectation allegedly given in the Director's Statement; and
- that ComReg's analysis suggesting that its statutory functions, duties and objectives would not be best performed and attained by delivering on parties' expressed expectations of renewal was flawed, inadequate, clearly influenced by bias (in both wording and substance) and easily addressed.

ComReg's Response

A 4.6 As noted above, ComReg had clearly stated its position in consultation documents 09/14 and 09/99 on the GSM licensees' particular views of the meaning and effect

of the Director's Statement and their views on how ComReg ought to proceed on the basis of that Statement. ComReg also pointed out in these documents that its substantive assessment of the options available to it at that time, while having regard to the expressed expectations concerned, and the fact of their being held, did not, on balance, suggest to it that it ought to proceed on the basis of the Director's Statement in the manner contended for by the GSM licensees, for the reasons set out in those earlier documents. Without wishing to limit the foregoing, ComReg notes that it has at all times been cognisant of the need to liberalise the use of spectrum in the 900 MHz band in a manner that is, amongst other things, non-discriminatory and not distortive of competition.

A 4.7 ComReg has noted the further submissions and representations made by GSM licensees in response to Consultation 09/99, and subsequently, concerning this issue.

A 4.8 ComReg confirms that the expectations expressed to be held by the GSM licensees are ones to which ComReg has had regard as a factor in its decision-making, both generally, and in terms of the fact that these expectations are professed to be held and to operate on respondents in particular ways.

A 4.9 ComReg notes that it has engaged openly with GSM licensees on this issue, including assessing licensing proposals put forward by them and by other parties (and, in particular, a potential licensing proposal based upon the Director's Statement).

A 4.10 ComReg is further satisfied that GSM licensees have been given a fair opportunity to be heard in relation to this issue generally.

A 4.11 In addition, ComReg categorically rejects claims that its draft RIA, as set out in Consultation 09/99, was influenced by bias (in wording or substance) and, furthermore, notes that it was clearly stated to be in draft form and that comments and material were invited from stakeholders to inform its analysis. In this regard, stakeholders are referred to Chapter 3 of document 11/60 where ComReg continues to assess the various options open to it.

A 4.12 Furthermore, ComReg notes that its selection, at the time, of Modified Option 1 as its preferred option had been arrived at in circumstances where options put forward by the GSM licensees – including one based on a particular implementation of elements of the Director's Statement – as well as Modified Option 2 in Consultation 09/99 (i.e revised Modified Option 2 in light of further submission), had been considered, assessed, and rejected on the merits, and having regard to relevant facts and circumstances, materials and advice. In particular, ComReg considers that, notwithstanding the expressed expectations and submissions of the GSM licensees, and its consideration of options involving 2G licence-extension, Modified Option 1, as described in Section 8 of 09/99, at that time seemed to ComReg to represent the best option it could reasonably identify in the particular circumstances that were then current, in furtherance of its statutory remit and the particular discretions vested in it, in the public interest.

A 4.13 Moreover, to the extent that respondents have referred to an entitlement to reasonable notice of a proposed change to the 'policy' alleged to be referred to in the Director's Statement, and to being given an opportunity of adjusting their positions or availing of transitional arrangements before any change is implemented, ComReg notes that its view and position on licence-extension on the basis of the Director's Statement has been both apparent, and clearly set out, for a reasonably substantial period of time (noting that licence-extension was not part of ComReg's original proposals in Consultation 08/57 and that such extension on the basis of the GSM licensees' particular views of the meaning and effect of the Director's Statement was clearly rejected in section 4.1 of Consultation 09/14).

A 4.14 Further, as the overall process has developed and the general facts and circumstances have changed, ComReg has developed its overall proposals with regard to release of liberalised-use spectrum. The relevant facts and circumstances have included the earlier-than-expected availability of digital dividend spectrum in the 800 MHz band and a proposal to include such spectrum, as well as 1800 MHz spectrum, with 900 MHz spectrum, in a 'big auction' (thus mitigating further any possibility that a current GSM licensee might lose access to relevant spectrum because of licence-expiry and non-extension on the basis contended for by the GSM licensees).

A 4.15 The subsequent developments have also included application for, and the granting to Vodafone and O2 for the time being of, Wireless Telegraphy interim GSM Mobile Telephony licences from expiry of these particular GSM licensees' pre-existing 2G licences on 15 May, 2011, up until 31 January, 2013 (or earlier, if earlier liberalisation of the 900 MHz band following the holding of the currently-proposed auction transpires to be feasible), thus allowing for the continued provision of 2G services by these operators for the time being, and pending the finalisation and implementation of ComReg's broader spectrum-release proposals.

A 4.16 ComReg's position on the GSM licensees' particular views of the meaning and effect of the Director's Statement and their views on how ComReg ought to proceed on the basis of that Statement remains the same as previously articulated. ComReg therefore remains of the view that, having regard to all of the foregoing and the current facts and circumstances of relevance, as well as to the advices of its consultants and the material before it, the GSM licensees do not enjoy an enforceable legal right to 900 MHz licence-renewal or extension.

A 4.17 Also, whilst the options considered since Consultation 09/99 have changed, ComReg's substantive assessment of the current options continues to suggest to it that it ought not, in the exercise of its statutorily-conferred discretionary decision-making functions, to proceed on the basis of the Director's Statement in the manner contended for by the GSM licensees. Rather, ComReg has rejected such an option on its merits, and notwithstanding ComReg having had regard to the professed expectations of the parties concerned, to the fact of their being held and to the impact claimed by respondents to result from any 'non-delivery' by ComReg on the asserted meaning and effect of that Statement, or from the

allegedly circumscribed timeframe within which its spectrum-assignment review has taken place, and its proposals have been subject to due consideration.

A 4.18 The selection by ComReg of its preferred option has therefore been arrived at in circumstances where ComReg has considered, but rejected - on the merits, and having regard to relevant facts, circumstances, materials and advice - an option based on implementation of elements in the Director's Statement. ComReg considers that its preferred option represents the best option it can reasonably identify at the current time and in the particular current circumstances in furtherance of its statutory remit and the particular discretions that have been vested in it in the public interest, and having taken due account of the submissions and representations made by the GSM licensees concerning the expectations they expressed themselves to harbour.

4.2 Constitutional and Other Rights to Property and to Earn a Livelihood

ComReg notes that certain respondents previously raised concerns in relation to alleged interference of ComReg's multi-band spectrum release with certain rights under the Irish Constitution, the EU Charter of Fundamental Rights and the European Convention on Human Rights. ComReg has given careful consideration to these concerns and, in this regard, first sets out the various submissions received by respondents and then its views on these matters.

Views of Repondents

A 4.19 In its response to Consultation 09/99, O2 submitted:

- ComReg was then proposing - less than 12 months before the expiry of O2's then-existing licence in respect of 900MHz spectrum - to organise and hold a Full Band Auction that flew in the face of O2's demonstrable need for the spectrum in order to maintain effective network coverage and protect the interests of its consumers;
- this would have constituted an unjustified interference with, and an unjust attack on, the property rights of existing licensees in their businesses (including their shares) and their right to carry on a business and earn a livelihood contrary to the relevant provisions of the Constitution of Ireland, the EU Charter of Fundamental Rights now given legal status under the TFEU and the European Convention on Human Rights. In advancing this proposal, ComReg had failed to take account of comments of all interested parties (in particular, existing licensees such as O2) concerning the proposed Decision "within a reasonable period" and was failing to adopt the option regarding assignment of the spectrum which best accommodated and gave effect to its statutory obligations;
- The actions of ComReg under its then proposal would have constituted an unlawful interference with the constitutional property rights of O2 (in

its business and its Shares) and with its constitutional right to earn a livelihood (arising from the suggestion by ComReg that if O2 did not secure spectrum, it could simply sell its redundant assets). ComReg's proposed Full Band Auction (and the asserted attendant risk of loss of 900MHz spectrum for existing licensees such as O2 and, in turn, their customers) would represent a totally disproportionate outcome from the Consultation Process and an unjustified and unlawful interference with and unjust attack on O2's property rights in its business (including its shares). The objective pursued by ComReg in proposing the Full Band Auction – early liberalisation of the entire 900MHz spectrum - was not an objective of sufficient importance to warrant interference with a constitutionally protected right, in particular in circumstances where such rights were not proposed to be impaired as little as possible and where the means chosen were unfair and disproportionate to the objective; and

- ComReg would not have made a final decision, nor completed any assignment process, before mid-2010 at the earliest, which left an unacceptably short period of time before the expiry of the then current 900MHz licences. This was insufficient time for O2 to implement any mitigation plan. Loss of 900MHz would reduce coverage for voice and text services and disrupt service to all of O2's customers. It would represent a totally disproportionate outcome from the Consultation Process, and would constitute an unjustified and unlawful interference with O2's property rights in its business.

A 4.20 In its response to Consultation 09/14, Vodafone submitted:

- Any failure to address the situation of the existing licensees, including Vodafone, would constitute a serious and manifest error and will be manifestly irrational and unreasonable. Any such decision, depending on its terms, may be in breach of the licensees' right to property under Article 40.3 of the Constitution and Article 43 of the Constitution. A licence may, in certain circumstances, be considered to be property (see inter alia, Minister for the Environment and Local Government & Ors v. Irish Ispat Ltd. (In voluntary liquidation) & Anor [2004] IEHC 143.

ComReg's Response

A 4.21 ComReg notes that, in summary, it was, at the relevant time these submissions were made, alleged that the holding of a full band auction, in the manner, and within the timeframe, then proposed, would constitute an unjustified interference with, and an unjust attack on, the property rights of certain licensees in their businesses (including their shares) and their right to carry on a business and earn a livelihood contrary to the relevant provisions of the Constitution of Ireland, the EU Charter of Fundamental Rights and the European Convention on Human Rights. These submissions were made at a different juncture in ComReg's overall process concerning its liberalised-use spectrum-release proposals, and the analysis which follows refers to the submissions as made at that point in time, rather than reflecting the facts and circumstances and developments since then. Whilst these developments will have had an effect on the submissions, ComReg is of the view

that its analysis below deals with those submissions both in the current context and in the context of the facts and circumstances prevailing at the point in time in which they were made.

A 4.22 Further, as the overall process has developed, the general facts and circumstances have changed, and representations and submissions of interested parties have been taken into account and woven into ComReg's proposals with regard to release of liberalised-use spectrum. The views of interested parties, including Vodafone and O2 have also evolved and in their submissions to Doc 10/71, both these parties acknowledged the extent to which ComReg's more recent proposals addressed concerns previously noted.

A 4.23 The relevant facts and circumstances have included the earlier-than-expected availability of digital dividend spectrum in the 800 MHz band and, accordingly, a proposal to include such spectrum, as well as 1800 MHz spectrum, with 900 MHz spectrum, in a 'big auction.' The proposals have also included auction mechanisms ensuring, for example, visibility of the progress of the proposed auction and also scope to adopt bidding strategies to secure spectrum deemed essential to bidders. These factors should serve to mitigate and dilute even further any possibility that a current GSM licensee might lose access to relevant spectrum because of licence-expiry and non-extension on the basis contended for by the GSM licensees.

A 4.24 The subsequent developments have also included the application for, and the granting to Vodafone and O2 for the time being of, Wireless Telegraphy Interim GSM Mobile Telephony Licences from expiry of these particular GSM licensees' pre-existing 2G licences on 15 May, 2011, up until 31 January, 2013[168], thus allowing for the continued provision of 2G services by these operators for the time being, and pending the finalisation and implementation of ComReg's broader spectrum-release proposals.

A 4.25 The application by Vodafone and Telefonica O2 for, and granting of, these Interim Licences has also tangentially had the effect of temporally de-coupling the expiry of pre-existing GSM licences in the 900 MHz band from the holding of a spectrum-allocation process and the granting of liberalised licences in respect of the 900 MHz band. In addition, it has had the effect of extending further the period of notice afforded to interested parties, between the time ComReg commenced its overall consultation process in 2008, and the time Vodafone or Telefonica O2 could theoretically lose access to any 900 MHz spectrum currently assigned. The envisaged steps and timeframes leading towards the proposed allocation process have also been set out by ComReg in its published documents relating to the overall consultation.

A 4.26 While ComReg acknowledges that persons generally are capable in principle of enjoying rights of the kind asserted, it does not concede that such rights necessarily arise in the current context, nor does it consider in any case that any

[168] Or earlier, if early liberalisation of the 900 MHz band following the holding of the currently-proposed auction transpires to be feasible.

such rights would be unlawfully infringed by the holding of a full band auction of the type proposed.

A 4.27 In particular, ComReg notes that such rights would in any event not be absolute, and would lawfully be susceptible to being subjected to legitimate legal restraints or justifiable impairment or interference. ComReg notes, for example, that any legal restriction or interference with such rights can generally[169] be justified if:

- lawful, and clearly provided for;
- made in pursuit of a legitimate aim, which aim is not objectively arbitrary or irrational;
- proportionate to the aim sought to be achieved, such that conflicting interests are balanced against each other, and the associated burden of such restriction eased to the extent deemed practicable; and,
- procedurally fair.

A 4.28 With regard to the question of property rights, ComReg also notes, for example, that:

- interests generated by State regulation will not, generally, give rise to a compensable right;
- no compensable property right vests in a party merely by the possession of a licence;
- any interference with such rights will not be disproportionate where that interference does not attempt to expropriate a licensee's property; and
- rights arising in licences created by law (enacted or delegated) are subject to the conditions created by law and to an implied condition that the law may change those conditions.

A 4.29 In these circumstances, ComReg is of the view that its proposals to date and its Broader Spectrum Release Proposal would not, in any event, unjustifiably breach any property rights that might be said to be enjoyed, or to have been enjoyed, by licensees.

A 4.30 With regard to the right to earn a livelihood, ComReg notes that, there is no right to earn a particular livelihood in Irish law, and it is merely a right not to be prevented from working.

[169] ComReg does not purport to set out an exhaustive treatment of the circumstances in which interference with any rights traceable to the various sources cited might lawfully be justified. Also, the criteria contained in the succeeding list of bullet-points have been generalised in an effort to summarise the justifications that would apply commonly to interference with rights traceable to the various sources.

A 4.31 In the present case, ComReg considers that its proposals did not, and do not, seek to prevent any licensee from "working" in the mobile markets concerned. In particular, ComReg considers that:

- its proposals involve acting on foot of the position that was in place and has been known to licensees all along (that is to say, that their licences expire, or as the case may be, expired, on the dates set out, amongst other places, in their respective licences and in the relevant licensing Regulations);
- GSM licensees are not precluded, in any way, from gaining access to 900 MHz spectrum or other applicable mobile spectrum (e.g. 800 MHz, 1800 Mhz) under ComReg's proposals; and
- in any event, even if they were not to gain 900 MHz spectrum, they would not be precluded from "working" in the mobile markets concerned. In this regard, they would continue to have rights to use 1800 and/or 2100 MHz spectrum and could continue to provide mobile services using such spectrum.

A 4.32 In light of all of the above considerations, ComReg does not agree that its proposals to date or its Broader Spectrum Release Proposal breach any constitutional or other rights of the type asserted to be enjoyed by licensees, contrary to the submissions of respondents set out above.

Annex 5

Band Plans for the 800 MHz, 900 MHz and 1800 MHz Bands

A 5.1 This annex discusses the band plan or channelling arrangements for each of the 800 MHz, 900 MHz and 1800 MHz bands. In particular, it discusses ComReg's proposals for, and interested parties' views upon, the duplex mode arrangements[170] and the minimum block size for each of these spectrum bands.

A 5.2 This annex separately discusses the band plan arrangements for the 900 MHz and 1800 MHz bands, on the one hand, and the 800 MHz band on the other because:

- the 900 MHz and 1800 MHz bands share many similar characteristics. For example, both bands are subject to the same EC Decision (being the EC 900/1800 MHz Decision), both are currently used for the provision of GSM services etc. As a result, many of the band plan considerations are the same for both bands; whereas
- the 800 MHz band has a number of different characteristics to the 900 MHz and 1800 MHz bands. For example, it is subject to a separate EC Decision (being the EC 800 MHz Decision), it is a new band for electronic communications services, etc.). For this reason, many of the band plan considerations are unique to this band.

5.1 The 900 MHz and 1800 MHz Bands

Summary of ComReg's band plan proposals in **previous consultations**

A 5.3 ComReg's previous Consultations have discussed the potential channelling arrangements for each of the 900 MHz and 1800 MHz bands, and a summary of ComReg's proposals is set out below.

The 900 MHz band

A 5.4 Consultations 08/57 and 09/14 discussed ComReg's proposed band plan arrangements for the 900 MHz band. In those consultations, ComReg proposed:

- a Frequency Division Duplex ("FDD") band plan arrangement; and
- a minimum block size of 2 × 5 MHz.

A 5.5 FDD was the proposed duplex mode as this is the common usage for this band. GSM equipment based upon a FDD arrangement is currently deployed in the 900

[170] A band can be planned on a number of duplex mode arrangements. It can be planned on a Frequency Division Duplex ("FDD") basis OR a Time Division Duplex ("TDD") basis OR on a neutral basis where both duplex modes are allowed.

MHz band, and equipment based upon an FDD arrangement for the other permissible technologies (e.g. UMTS) is either currently available or expected to be available in the future.

A 5.6 ComReg proposed a minimum block size of 2 × 5 MHz in Consultation 08/57 and Question 11 of that consultation sought views of interested parties on this proposal. ComReg received eight responses to this question and section 6.2.2.1 of Consultation 09/14 noted that five respondents supported ComReg's proposal, two respondents suggested a larger block size of 2 × 10 MHz and one respondent suggested a smaller block size of 2 × 2.5 MHz.

A 5.7 As set out in section 6.2.2.2 of Consultation 09/14, ComReg considered the potential use of larger and smaller spectrum block sizes and was of the view that:

- a smaller block size (e.g. 2 × 2.5 MHz) would be inappropriate, as it created the potential for a licensee holding a single stranded spectrum block which would prevent it from deploying wideband systems which would require a bandwidth of 2 × 5 MHz or greater (e.g. UMTS); and
- a larger block size (e.g. 2 × 10 MHz) would be unnecessary, as those prospective users seeking to obtain larger spectrum holdings would have the possibility of aggregating blocks in the proposed spectrum award process.

A 5.8 ComReg continued to favour a spectrum block size of 2 × 5 MHz as this would enable the deployment of wideband technologies which are likely to require this minimum block size and would not unduly limit the number of potential licensees in the band – thereby facilitating the development of competition and maximising the benefit for end users.

A 5.9 ComReg's 900 MHz band plan proposal in all subsequent consultations (Consultation 09/99, 10/71 and 10/105) was based on:

- a Frequency Division Duplex ("FDD") band plan arrangement; and
- a minimum block size of 2 × 5 MHz.

The 1800 MHz band

A 5.10 Consultation 10/105 discussed the inclusion of the 1800 MHz band into a joint award of the 800 MHz and 900 MHz bands.

A 5.11 Section 3.1 of that consultation discussed the potential band plan arrangements for the 1800 MHz band and ComReg proposed a FDD arrangement with a block size of 2 × 5 MHz because:

- GSM equipment based upon a FDD-arrangement is currently deployed in the 1800 MHz band, and equipment based upon an FDD arrangement for the other permissible technologies (e.g. UMTS) is either currently available or expected to be available in the future; and

- this band plan arrangement would be consistent with ComReg's proposal for the 800 MHz and 900 MHz bands.

A 5.12 Question 1 of Consultation 10/105 sought the views of interested parties on this proposed channelling arrangement as follows - Do you agree with ComReg's proposal to use a Frequency Division Duplex (FDD) arrangement with a 2 × 5 MHz Block size for the 1800 MHz band? Please provide reasons for your view.

900 MHz and 1800 MHz bands - Views of Respondents

A 5.13 This section summarises the views of the respondents received on ComReg's proposed band plan arrangements for the 900 MHz and 1800 MHz bands.

The 900 MHz band

A 5.14 ComReg's proposal for a FDD duplex mode arrangement for the 900 MHz band has been supported by all respondents to ComReg's consultations.

A 5.15 Since Consultation 09/14 discussed the views of respondents on the minimum block size, all subsequent responses received have supported a 2 × 5 MHz block size.

The 1800 MHz band

A 5.16 ComReg received three responses to Question 1 of Consultation 10/105. All three respondents (eircom Group, O2 and Vodafone) agreed with ComReg's proposal for a FDD arrangement with a 2 × 5 MHz block size. Submissions provided in this regard included that:

- eircom Group believed that ComReg's proposal would ensure that Ireland enjoys the economic benefits associated with the pan-European harmonised exploitation of this band. In this regard, it noted that CEPT Report 40[171] clearly assumed that an FDD arrangement will be used for LTE and other technologies in the 900 and 1800 MHz bands;
- Vodafone and O2 supported ComReg's proposal as this channel arrangement is compatible with the technologies that are likely to be deployed in the band and is consistent with ComReg's proposal for the 800 MHz and 900 MHz bands; and,
- Vodafone added that the use of a different block size or band arrangement for the 1800 MHz band, relative to that used for the 800 MHz and 900 MHz bands, could unduly complicate the award process by limiting the ability of bidders to switch between lots during the auction process, thereby reducing the probability of an optimal auction outcome.

[171] CEPT Report 40: Report from CEPT to European Commission in response to Task 2 of the Mandate to CEPT on the 900/1800 MHz bands, "Compatibility study for LTE and WiMAX operating within the bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz (900/1800 MHz bands)" http://www.erodocdb.dk/Docs/doc98/official/Word/CEPTREP040.DOC

900 MHz and 1800 MHz bands – Recent Development – Amended EC 900/1800 MHz Decision

A 5.17 ComReg notes that the EC 900/1800 MHz Decision governing the use of the 900 MHz and 1800 MHz bands was amended on 18 April 2011.[172]

A 5.18 In summary, these amendments permit the use of Long Term Evolution (LTE) and the Worldwide Interoperability for Microwave Access (WiMAX) technologies in the 900 MHz and 1800 MHz bands. This means that four technologies can now be deployed in these bands: namely GSM, UMTS, LTE and WiMAX.

A 5.19 Given these amendments, it is appropriate to revisit ComReg's proposals in light of the range of technologies which can now be used in these bands.

A 5.20 The following sub-sections therefore discuss the duplex mode arrangements and block sizes for these bands and, amongst other things, consider the operational possibilities of each technology standard that is currently identified as permitted for use in these bands.

A 5.21 It should be noted that the standards for these identified technologies are developed in various bodies, such as the 3rd Generation Partnership Project[173] (3GPP) and the WiMAX Forum[174], and are relevant to the band plan discussion, as these standards define the operational possibilities of each technology, including the operational frequency bands, the duplex mode, the channel size etc.

A 5.22 Duplex Mode Arrangements - the 900 MHz and 1800 MHz bands

A 5.23 **Table 1** below presents the duplex modes that are standardised in the 900 MHz and 1800 MHz bands for each of the currently identified permissible technologies.

[172] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:106:0009:0010: EN:PDF
[173] http://www.3gpp.org/
[174] http://www.wimaxforum.org

Band	GSM175	E-UTRA (UMTS, LTE, & other 3GPP technologies)176	WiMAX177
900 MHz	FDD	FDD	FDD
1800 MHz	FDD	FDD	FDD

Table 1: Standardised Duplex Mode in the 900 and 1800 MHz bands

A 5.24 It demonstrates that FDD-mode is the only duplex mode standardised for these technologies.

A 5.25 In addition, ComReg notes that the CEPT's recent compatibility study carried out in respect of the 900 MHz and 1800 MHz bands (CEPT Report 40) only considered FDD-mode operation, suggesting that CEPT believe this to be the likely mode of operation for this band.

A 5.26 ComReg notes that these factors would support the use of the FDD duplex mode for the 900 and 1800 MHz bands.

Minimum Block Size - the 900 MHz and 1800 MHz bands

A 5.27 **Table 2** below presents the channel sizes that are standardised for each of the permissible technologies in the 900 MHz and 1800 MHz bands.

Band	GSM	E-UTRA (UMTS, LTE, & other 3GPP technologies)	WiMAX
900 MHz	2 × 200 kHz	2 × 5 MHz, 2 × 10 MHz, 2 × 15 MHz,2 × 20 MHz[178]	2 × 5 MHz, 2 × 10 MHz
1800 MHz			

Table 2: Standardised Channel sizes for the 900 and 1800 MHz bands

[175] 3rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Radio transmission and reception (Release 10) http://www.3gpp.org/ftp/Specs/html-info/45005.htm

[176] 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (Release 10) http://www.3gpp.org/ftp/Specs/html-info/36104.htm

177 WiMAX Forum® Air Interface Specifications, WiMAX Forum® Mobile Radio Specification, WMF-T23-005-R015v05, WMF Approved, (2011-04-04), http://www.wimaxforum.org/sites/wimaxforum.org/files/technical_document/2011/04/WMF-T23-005-R015v05_RSP.pdf

[178] ComReg will not discount any future developments in the use of other harmonised bandwidths in these bands.

A 5.28 It demonstrates that there are a wide number of standardised channel sizes so alternative block sizes to that proposed by ComReg (2 × 5 MHz) could be appropriate for use in these bands.

900 MHz and 1800 MHz bands – ComReg's Position

ComReg's Position - Duplex Mode Arrangements for the 900 MHz and 1800 MHz bands

A 5.29 In light of the above discussion, ComReg's proposal is for a FDD-mode arrangement for each of the 900 MHz and 1800 MHz bands. Factors informing ComReg's position include that:

- GSM equipment currently deployed in these bands use FDD-arrangements;
- FDD-mode is the only duplex mode standardised for the technologies currently identified by the EC 900/1800 Decision for use in the 900 MHz and 1800 MHz bands;
- The recent CEPT compatibility study carried out in respect of the 900 MHz and 1800 MHz bands (CEPT Report 40) only considered FDD-mode operation, suggesting this should be the likely duplex mode of operation for these bands;
- Adopting a FDD-mode arrangement in Ireland consistent with that adopted in other Member States would contribute to harmonisation of these bands across Europe thereby allowing Ireland to take advantage of the potential economic benefits through harmonised use of these bands (for example, economies of scale for manufacturers of equipment for these bands which could be passed onto consumers in the form of cheaper equipment costs thus promoting the interests of users in the Community and contributing to the development of the internal market;
- It would be consistent with ComReg's proposal for FDD-mode arrangements for the 800 MHz band (see below for ComReg's discussion of duplex mode arrangements for the 800 MHz band), thereby avoiding any complexity that could otherwise arise from the joint award of these bands using different band plan arrangements; and
- The submissions from interested parties on this issue all support the adoption of a FDD-mode arrangement with no evidence of any support for TDD-mode.

ComReg's Position - Minimum Block Size Arrangements for the 900 MHz and 1800 MHz bands

A 5.30 In light of the above discussion, and noting that there is a range of standardised channel sizes that could be adopted, ComReg's proposal is for a minimum block size of 2 × 5 MHz for each of the 900 MHz and 1800 MHz bands. Factors informing ComReg's position include that:

- a spectrum block size of 2 × 5 MHz would enable the deployment of wideband technologies which are likely to require this minimum block size (e.g UMTS, LTE and WiMAX). For example, the minimum channel size standardised for the WiMAX technology is 2 × 5 MHz in the 900 MHz and 1800 MHz bands, and block sizes smaller than 2 × 5 MHz could prevent the deployment of this technology. In addition, it is generally expected that most E-UTRA technologies deployed will use a 2 × 5 MHz (or multiple of 2 × 5 MHz) channel size;
- a smaller block size (e.g. 2 × 2.5 MHz) might run counter to ComReg's objective of ensuring the efficient management and use of spectrum as it would create the potential for a licensee/s holding a "stranded" spectrum block which could prevent it from deploying wideband systems requiring a bandwidth of 2 × 5 MHz or greater (e.g. UMTS);
- in addition, operators wishing to deploy systems with smaller channel sizes (e.g. for GSM or LTE) could still do so within a 2 × 5 MHz block, provided these systems are deployed in compliance with the EC 900/1800 Decision;
- a larger block size (e.g. 2 × 10 MHz) would, in ComReg's opinion, be unnecessary as prospective users seeking to obtain larger spectrum holdings would have the possibility of aggregating 2 × 5 MHz blocks in the proposed award process, as set out in Annex 6.4;
- given the quantum of spectrum in the 900 MHz band (2 × 35 MHz) and the 1800 MHz band (2 × 75 MHz), a block size greater than 2 × 5 MHz would result in the use of two different block sizes in the auction, as otherwise parts of the spectrum band would be unassigned (e.g. with a 2 × 10 MHz block size, one 2 × 5 MHz block would also have to be auctioned in order to assign the full band). This would add additional complexity to the auction process;
- it is noted that across Europe a minimum block size of 2 × 5 MHz has been used in practically all award process for the 900 MHz band and has been used in the majority of award process for the 1800 MHz band.[179] ComReg is aware that some countries have used a 2 × 10 MHz block size for circumstances particular to their situation, but as noted above, such large block sizes are unnecessary in ComReg's proposed award process, given the possibility of aggregating blocks;
- A block size of 2 × 5 MHz would provide a consistent minimum block size for all bands (see below for ComReg's discussion of minimum block size for the 800 MHz band). In ComReg's opinion, this would promote auction efficiency as such consistency simplifies the award process and removes complexity that could otherwise restrict bidders from switching between lots in the different bands during the proposed award process; and

[179] See Cullen International website (subscription required) www.cullen-international.com

- the reasons provided by interested parties on this issue would support the adoption of a minimum block size of 2 × 5 MHz.

800 MHz Band

800 MHz band - summary of ComReg's proposals in previous consultations

A 5.31 Consultation 10/71 considered the inclusion of the 800 MHz band in a joint award process with the 900 MHz band.

A 5.32 Section 2.3 of that consultation discussed the potential band plan arrangements for the 800 MHz band and ComReg proposed a FDD-mode arrangement with a block size of 2 × 5 MHz because:

- this is the preferred channelling arrangement as recommended by the CEPT in CEPT Report 31[180];
- this band plan arrangement would be consistent with ComReg's band plan proposals for the 900 MHz band; and
- it was noted that a number of other Member States had used, or were proposing to use, this band plan arrangement in their 800 MHz spectrum awards.

A 5.33 Question 1 of Consultation 10/71 sought the views of interested parties on these proposed band plan arrangements as follows - 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.

800 MHz bands - Views of Respondents

A 5.34 This section summarises the views of the respondents received on the band plan arrangements for the 800 MHz band.

Q1 of Consultation 10/71 - the proposed 800 MHz band plan

A 5.35 ComReg received 11 responses to Question 1 of Consultation 10/71. Ten of the respondents (Digiweb, eircom Group, Ericsson, ESBN, H3GI, O2, Qualcomm, RTE & RTENL, UPC and Vodafone) agreed with ComReg's proposal for a FDD-mode arrangement with a 2 × 5 MHz block size, whilst one respondent (Imagine) held a different view.

A 5.36 The ten respondents who agreed with ComReg's proposal generally considered that it was very important for Ireland to adopt a channelling arrangement that is consistent with those being deployed in other Member States, as this would

[180] CEPT Report 31: Report from CEPT to the European Commission in response to the Mandate "Frequency (channelling) arrangements for the 790-862 MHz band" (Task 2 of the 2nd Mandate to CEPT on the digital dividend)" http://www.erodocdb.dk/Docs/doc98/official/Word/CEPTREP031.DOC

enable Ireland to obtain the benefits of EU-wide economies of scale (such as in relation to operator/consumer equipment used in the band). In support of this view:

- Four respondents (eircom Group, Ericsson, O2 and Vodafone) noted that the FDD-arrangement is the preferred channelling arrangement of the CEPT and the EC, and it is very likely to be the common approach adopted by the majority of EU member states;
- O2 and Vodafone noted that the FDD approach had already been deployed in large EU countries, such as Germany;
- eircom Group added that it believed that the industry is almost unanimous in its support of FDD;
- Two respondents (O2, UPC) believed that a primary benefit of the FDD operation is the large ecosystem of FDD capable handsets and mobile devices that is likely to be available in comparison to TDD;
- Two respondents (eircom Group, UPC) stated that a single preferred channelling arrangement would lead to reduced equipment costs in the 800 MHz band, as market fragmentation and the added complexity and cost of supporting two modes (i.e. FDD and TDD) would be avoided;
- These two respondents (eircom Group, UPC) also stated that there would be additional interference considerations with the TDD mode of operation:
- eircom Group noted that the CEPT had shown that the protection of base station reception is much more challenging than mobile terminal reception, and therefore the TDD frequency arrangement, where base stations are receiving over the whole band, creates a much more difficult coordination challenge than the FDD frequency arrangement; and
- UPC believed that the potential for interference for collocated TDD and FDD base stations could be of concern for an operator;
- Finally, in relation to any licensing process for spectrum rights in the 800 MHz band:
- eircom Group noted that a single preferred channelling arrangement would simplify the award process; and
- O2 noted that this is clearly an area where a decision must be made early by ComReg so that the band can be divided into appropriate lots for licensing.

A 5.37 On the other hand, Imagine considered that the 800 MHz band should not be restricted to FDD-mode operation only, but instead it should be issued on a technology- and service-neutral basis so as to also allow the use of TDD-mode of operation. In support of its view, it noted that:

- the Annex to the EC 800 MHz decision sets out technical parameters for both TDD and FDD modes of operation and it believed that this should provide the basis for Ireland's licensing regime for the band; and
- the ecosystem for 4G network deployment is still evolving. Two variants of the LTE technology (Frequency Division (FD) and Time Division (TD)) are developing as well as WiMAX-based solutions, and it is important that licence conditions do not artificially restrict the potential for convergence among these technologies.

Implications of EC 800 MHz Decision and CEPT Report 31 on Duplex Mode Arrangements for the 800 MHz band

A 5.38 Before assessing the merits of the views of interested parties on this issue, it may first be helpful to understand the range of technologies that can be deployed in this band.

A 5.39 In that regard and unlike the EC 900/1800 MHz Decision, the EC 800 MHz Decision does not identify a range of technologies permitted for use in the band. Instead it defines technical conditions in the form of frequency arrangements and Block-Edge Masks (BEMs).[181] In effect, all technologies that comply with the technical conditions set out in the EC 800 MHz Decision are permitted to be used in the 800 MHz band. While this allows numerous technologies to be used in this band, in practice it is likely that the permissible technologies will be very similar to, if not the same as, those permitted in the 900 MHz and 1800 MHz bands under the EC 900/1800 MHz Decision (with the exception of GSM as this is not a wideband technology).

A 5.40 Similar to the earlier 900MHz and 1800 MHz band discussion, a review of the technology standards provides information on the operational possibilities of each technology and the table below presents the duplex modes that are standardised for the 800 MHz band.

Band	GSM	E-UTRA (UMTS, LTE, & other 3GPP technologies)	WiMAX
800 MHz	This frequency band is not listed in the standard	TDD/FDD	TDD/FDD

Table 3: Standardised Duplex Mode in the 800 MHz band

A 5.41 From **Table 3** above table it is notable that the 800 MHz band is not currently listed as one of the possible frequency bands for the GSM technology. In addition,

[181] The BEM defines conditions such as the maximum mean out-of-block Equivalent Isotropic Radiated Power ("EIRP") and the maximum mean in-block EIRP etc. and is designed to mitigate the risk of harmful interference between neighbouring networks.

A 5.42 Also demonstrates that the technology standard bodies have not chosen a single duplex mode for the 800 MHz band, but instead have developed standards for both the FDD and TDD duplex modes.

A 5.43 Given this potential flexibility and that the 800 MHz band is a new spectrum band which can be used for the deployment of ECS, the CEPT have considered the frequency (channelling) arrangements for the 800 MHz band. In particular, CEPT Report 31 identifies the FDD-mode as the preferred mode for harmonisation purposes, although it recognises that alternative approaches could also be used to meet specific national circumstances and market demand. In arriving at this view, CEPT Report 31 considered technical issues such as coexistence and spectrum utilisation as well as other market issues.

A 5.44 First, from a co-existence and spectrum efficiency perspective, CEPT Report 31 considered the possibility of a mixed FDD/TDD arrangement in the 800 MHz band and concluded that it is preferable to have a single preferred frequency arrangement in the band because:

- the mixing of FDD and TDD in close proximity requires constraints (such as lower power etc) to be placed on the frequency blocks that separate both modes and such constraints result in "lost" spectrum; and
- every considered mixed FDD/TDD band plan arrangement would result in less spectrum being available in the band, compared to a FDD-only or a TDD-only band plan. [182]

A 5.45 In addition, CEPT Report 31 noted the following economic/market advantages to having a single preferred frequency arrangement:

- reduced development and operating costs for future radio infrastructure or terminal equipment by the avoidance of de-fragmentation of the market within CEPT countries;
- increased opportunity for roaming services within CEPT countries and reduced costs;
- a simplified licensing process; and
- increased market certainty.

A 5.46 The EC 800 MHz Decision (2010/267/EU) has considered the views of CEPT, and in particular CEPT Report 31, and the Annex to this EC Decision strongly suggests that the preferred duplex mode is FDD.

[182] It should be noted that in the case where the full quantum of the harmonised 800 MHz band is not available and some FDD channels would be unused, CEPT Report 31 noted that a mixed FDD/TDD arrangements can provide a means of utilising this spectrum and achieving greater spectrum utilisation.

A 5.47 ComReg notes that many of the issues considered by CEPT have also been highlighted by interested parties in their respective submissions to Consultation 10/71. For instance:

- Practically all respondents noted the importance of adopting a channelling arrangement that is consistent with other Member States so as to avail of the economies of scale which can lead to reduced equipment and operating costs. ComReg notes that this is a particularly important consideration for smaller countries, such as Ireland, which would not have sufficient scale by themselves; and
- eircom Group and UPC noted the additional interference considerations associated with a mixed FDD/TDD arrangement and the associated interference management costs. These respondents also noted that a single preferred arrangement would lead to reduced equipment costs as market fragmentation and the added complexity and costs of supporting two modes (i.e. FDD and TDD) would be avoided.

800 MHz Band - ComReg's Position

ComReg's Position - Duplex Mode Arrangements for the 800 MHz band

A 5.48 In light of the above discussion, ComReg's proposal is for a FDD-mode arrangement for the 800 MHz band. Factors informing ComReg's position include that:

- The findings of CEPT Report 31 would strongly suggest that a mixed FDD/TDD arrangement would not be ideal for the 800 MHz band in Ireland, in terms of spectrum efficiency and market/economic factors identified by CEPT;
- In addition, ComReg agrees that a single preferred channelling arrangement would simplify the proposed award process and as it would avoid the additional interference considerations associated with a mixed FDD/TDD mode of operation noted by two interested parties (eircom Group, UPC), it would appear to contribute to the efficient management and use of spectrum;
- As such, the remaining issue is whether the band should be designated for FDD-only or TDD-only. In that regard, the following factors would support a FDD-only arrangement:
- the FDD-arrangement is the preferred channelling arrangement of the CEPT and the EC, and is likely to be the common approach adopted by the majority of EU member states. In that regard, ComReg notes that across Europe most, if not all, countries with plans for the 800 MHz band have proposed or designated it on an FDD arrangement basis;[183]

[183] Source Cullen International (subscription required) http://www.cullen-international.com

- accordingly, adopting a FDD-mode arrangement in Ireland consistent with that adopted, or likely to be adopted, in other Member States would contribute to harmonisation of these bands across Europe thereby allowing Ireland to take advantage of the potential economic benefits through harmonised use of these bands (for example, economies of scale for manufacturers of equipment for these bands which could be passed onto consumers in the form of cheaper equipment costs), accordingly this would appear to promote the interests of users in the Community and to promote the development of the internal market;
- in addition, ComReg notes the submission from O2 and UPC that a primary benefit of the FDD operation is the large number of FDD capable handsets and mobile devices that is likely to be available in comparison to TDD; and
- The weight of reasons provided by interested parties on this issue would support the adoption of a FDD-only arrangement.

ComReg's Position - Minimum Block Size for the 800 MHz band

A 5.49 The remaining issue for consideration is the minimum block size for the 800 MHz band.

A 5.50 The EC 800 MHz Decision defines technical parameters for the 800 MHz band, and in relation to the block size it states that the assigned block size shall be in multiples of 5 MHz. This removes the possibility of assigned block size smaller than 5MHz.

A 5.51 In relation to whether the minimum block size should be greater than 2 × 5 MHz, ComReg refers to the discussion of this issue in the context of the 900 MHz and 1800 MHz bands and considers that the reasons set out there are also applicable to the 800 MHz band.

A 5.52 In addition, ComReg notes that:

- a block size of 2 × 5 MHz would provide a consistent minimum block size across all bands in ComReg's proposed award which should therefore improve auction efficiencies and minimise undue complexity;
- across Europe a block size of 2 × 5 MHz has been proposed or used for the majority of 800 MHz processes[184]; and
- all respondents to Consultation 10/105 agreed with ComReg's 2 × 5 MHz block size proposal

A 5.53 Accordingly, ComReg's proposal is for a minimum block size of 2 × 5 MHz for the 800 MHz band.

[184] Source Cullen International (subscription required) http://www.cullen-international.com

5.2 The Proposed Band Plans for the 800 MHz, 900 MHz and 1800 MHz Bands

A 5.54 This section graphically details the band plans for each of the 800 MHz, 900 MHz and 1800 MHz bands on the basis of ComReg's position on the band plan arrangements for same.

800 MHz band

A 5.55 There would be 6 lots in the 800 MHz band, labelled A to F, as depicted in **Figure 1**.

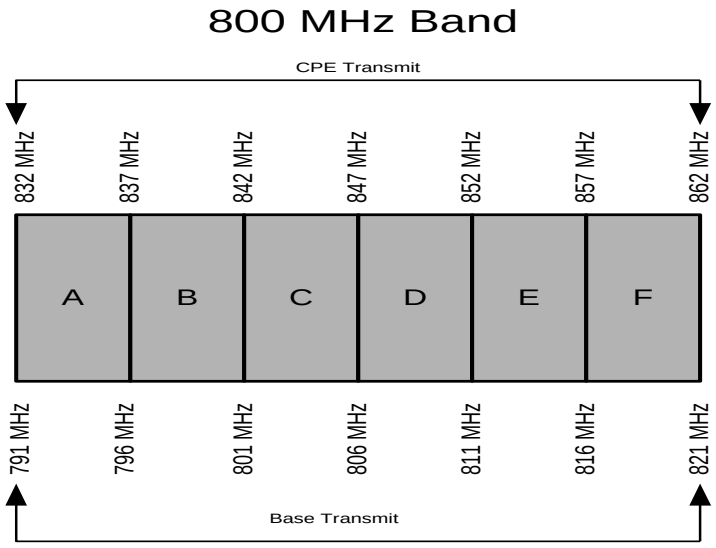

Figure 1: The 800 MHz band plan

900 MHz band

A 5.56 There would be 7 lots in the 900 MHz band, labelled A to G, as depicted in **Figure 2**.

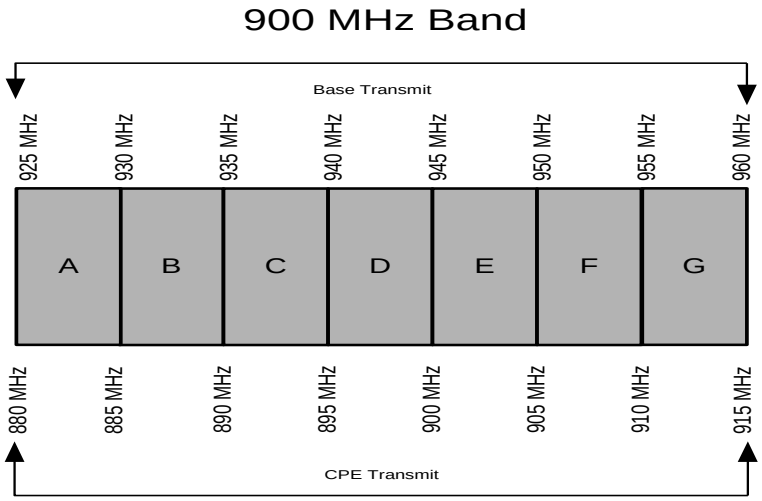

Figure 2: The 900 MHz band plan

1800 MHz Band

A 5.57 There would be 15 lots in the 1800 MHz band, labelled A to O, as depicted in **Figure 3**.

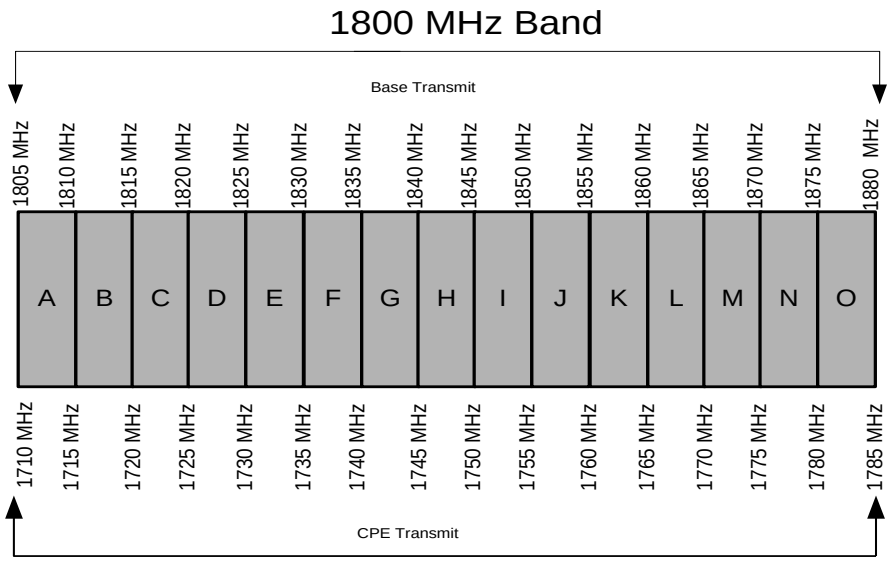

Figure 3: The 1800 MHz band plan

Annex 6

Details of the Award

6.1 Spectrum Caps for the Duration of the Competition

A 6.1 This section discusses the spectrum caps that ComReg proposes to use in the award process for the duration of the competition.

Summary of ComReg's Proposals in Previous Consultations

A 6.2 The issue of spectrum caps has been discussed in ComReg's previous consultations and over the course of these consultations ComReg has made spectrum cap proposals for:

- the 900 MHz band;
- the 800 MHz and 900 MHz bands (i.e. "sub 1 GHz spectrum"); and
- the 800 MHz, 900 MHz and 1800 MHz bands.

A 6.3 A summary of these proposals is set out below.

The 900 MHz band

A 6.4 ComReg's earlier consultations (08/57, 09/14 and 09/99) discussed an award process for the 900 MHz band.

A 6.5 Consultation 08/57 proposed a cap of 2 × 10 MHz for the 900 MHz band. This cap would apply to all spectrum in the band including spectrum held by the existing licensees and would apply for the duration of the competition. Among other items, ComReg noted that this cap promoted competition and reflected the likely needs of the existing 900 MHz operators.[185] Question 5 of Consultation 08/57 sought the views of interested parties on this proposal.

A 6.6 Section 6.2.1 of Consultation 09/14 set out ComReg's response on this issue in light of the views received to Consultation 08/57. Consultation 09/14 noted that the respondents were in general agreement with ComReg's spectrum cap proposal of 2 × 10 MHz and stated that ComReg was minded to apply a 2 × 10 MHz spectrum cap in the 900 MHz award process.

[185] Subsequent to the publication of Consultation 08/57, the existing GSM licensees clarified that a 2 × 10 MHz spectrum assignment in the 900 MHz band would be sufficient to meet their needs. See ComReg Document 09/73 which sets out the non-confidential minutes to each of the bilateral meetings held with the interested parties and section 5.3 of Consultation 09/99 which summarised the key discussion points of the bilateral meetings held with the GSM licensees.

A 6.7 In Consultation 09/99, and in line with the advice from DotEcon as set out in Document 09/99c, ComReg maintained its proposal of the 2 × 10 MHz spectrum cap. However, ComReg added that it was also minded to relax this cap and accept bids of up to 2 × 15 MHz in the event that demand did not exceed supply, as some blocks would not be utilised otherwise.

The 800 MHz and 900 MHz bands ("sub-1GHz spectrum")

A 6.8 Consultation 10/71 discussed the inclusion of the 800 MHz band in the award process with the 900 MHz band, noting that a joint award of these two spectrum bands would result in 2 × 65 MHz of spectrum being released simultaneously.

A 6.9 Section 4.3.3 of DotEcon's report to ComReg (Document 10/71a) considered the appropriate spectrum cap for this joint award of spectrum and advised that *"the level of a spectrum cap should be set in order to balance the benefits of protecting competition against the costs of doing so."*

A 6.10 DotEcon proposed that a spectrum cap of 2 × 20 MHz for sub-1GHz spectrum was appropriate, as such a cap would "permit reasonable competition amongst the incumbents and does not raise concerns about creating incentives for tacit collusion or strategic demand reduction."

A 6.11 Section 4.1.1 of Consultation 10/71 considered the issue of a spectrum cap for the joint award and ComReg noted that:

- the inclusion of the 800 MHz band would almost double the amount of spectrum in the competition;
- while there may be short-run differences (e.g. due to equipment availability) between the 800 MHz and 900 MHz bands, ComReg did not believe these to be sufficient to prevent the use of a single cap for the sub-1GHz spectrum; and
- while perfect symmetry in sub-1GHz spectrum distribution between competitors is not necessary to facilitate competition,[186] highly asymmetric distributions of sub-1GHz spectrum could be detrimental to competition downstream.

A 6.12 ComReg's proposed a spectrum cap of 2 × 20 MHz for the sub-1GHz spectrum and questions 8 and 9 of Consultation 10/71 sought the views of interested parties on this proposal.

Q.8. of Consultation 10/71: Do you agree with ComReg's proposal to set a sub 1 GHz cap for the competition? Please provide reasons for your view.

[186] Indeed ComReg noted in Consultation 10/71 "that perfect symmetry might even be inconsistent with the competing business strategies between MNO's, who could require differing amounts of spectrum."

Q.9. of Consultation 10/71: Do you agree that a 2 × 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.

The 800 MHz, 900 MHz and 1800 MHz Bands

A 6.13 Consultation 10/105 discussed the inclusion of the 1800 MHz band into an award process with the sub-1GHz spectrum, noting that a multi-band award of these three spectrum bands would result in 2 × 140 MHz of spectrum available in the competition across the three bands:

- 2 × 75 MHz (or 15 blocks) of spectrum in the 1800 MHz band; and
- 2 × 65 MHz (or 13 blocks) of sub-1GHz spectrum. This would be made up of 2 × 30 MHz in the 800 MHz band and 2 × 35 MHz in the 900 MHz band.

A 6.14 Section 5 of DotEcon's report to ComReg (Document 10/105a) on this multi-band award considered the issue of spectrum caps. In summary, DotEcon advised that:

- *"A symmetric cap for incumbents and entrants is preferable."*
- *"The spectrum cap should not include the existing 2.1GHz spectrum holdings."*
- *[ComReg] "should not prescribe symmetric spectrum holdings in individual bands, or set caps that are too tight so that spectrum is not contested; the purpose of using an auction is to allow competition to determine the amount of spectrum to be awarded to each bidder."*
- *"The extreme case of one bidder (even an entrant) acquiring the whole of the 1800 MHz band is not a short term threat to competition, but may be a long term concern due to the asymmetry it creates in spectrum holdings if availability of further spectrum above 1GHz is significantly delayed."*
- *[ComReg]"should allow for the possibility for a bidder bidding only on 1800MHz spectrum to acquire a sufficiently large amount of spectrum as to effectively compete with operators that have sub-1GHz spectrum – a bidder not bidding for sub-1GHz spectrum should be allowed to bid for up to 2×50MHz in the 1800MHz band."*
- *"The polar opposite case is where a bidder bids for the maximum of 2 × 20 MHz allowed in the sub-1GHz band...Such an operator might require up to 2 × 30 MHz of 1800 MHz spectrum for additional capacity in highly populated areas."*
- *"It would seem that an overall cap of 2 × 50 MHz in addition to the 2 × 20 MHz cap on sub-1GHz spectrum seems reasonable. This would allow operators to trade-off sub-1GHz spectrum and 1800 MHz spectrum."*

A 6.15 Section 3.3 of Consultation 10/105 set out ComReg's proposed spectrum cap for this joint award and ComReg noted that:

- The inclusion of the 1800 MHz band would increase the amount in the award process. If the 1800 MHz band is added to the joint award, there would be a total of 2 × 140 MHz of spectrum available in the competition across the three bands.
- Given the amount of spectrum in this award process, the existing spectrum holdings (i.e. those in the 2.1 GHz band) are not likely in themselves to be large enough to materially affect the long-run structure of the market after the award process. ComReg therefore proposed that the existing spectrum assignments in the 2.1 GHz band would not count towards the spectrum cap for this competition.[187]
- It is important to place a limit on the amount of 1800 MHz spectrum that a bidder can obtain in the competition, as an outcome where a single bidder (whether an incumbent or an entrant) acquired the rights to the entire 1800 MHz band would potentially adversely affect downstream competition in the longer term.
- An overall spectrum cap (i.e. for 1800 MHz and sub-1GHz spectrum) would be appropriate in the proposed award as such a cap would not unduly restrict bidders from switching their bids between bands during the award process.[188] ComReg proposed an overall spectrum cap of 2 × 50 MHz.
- A sub-1GHz spectrum cap continues to be appropriate as the characteristics of sub-1GHz spectrum in terms of its propagation qualities, etc., make it particularly valuable spectrum for mobile use and the provision of wide area coverage, while the 1800 MHz band is subject to different propagation characteristics and is thus not as valuable as sub-1GHz spectrum. ComReg proposed that a sub-1GHz spectrum cap of 2 × 20 MHz appeared to be appropriate.[189]
- Overall, the proposed overall cap of 2 × 50 MHz and the sub-1GHz spectrum cap of 2 × 20 MHz appeared appropriate as:
    i. it allows a bidder only bidding on 1800 MHz spectrum to acquire sufficient 1800 MHz spectrum so as to effectively compete with operators that have sub-1GHz spectrum;
    ii. it allows a bidder to acquire up to 2 × 20 MHz of sub-1GHz spectrum and up to 2 × 30 MHz of 1800 MHz spectrum, and this would seem to be sufficient spectrum for an operator to

[187] However in other circumstances where existing spectrum holdings were much larger in relation to the amount of spectrum in respect of which licences were being awarded, ComReg may come to a different view on whether such holdings should be considered to count towards a competition spectrum cap.

[188] In this regard, it was noted that each bidder in the auction is likely to have different views on the degree to which they consider 1800 MHz spectrum to be complementary or substitutable to sub-1GHz spectrum.

[189] In Consultation 10/105, ComReg noted that it was still considering the responses it had received to Consultation 10/71 on the proposed 2 × 20 MHz sub-1GHz spectrum.

deploy a service and provide additional capacity in highly populated areas.

A 6.16 Question 2 of Consultation 10/105 sought the views of interested parties on ComReg's spectrum cap proposal which consisted of:

- an overall spectrum cap of 2 × 50 MHz; and
- a sub-1GHz spectrum cap of 2 × 20 MHz

> Q.2. of Consultation 10/105: Do you agree with ComReg's proposal to set an overall cap of 2 × 50 MHz for the joint award including the 2 × 20 MHz sub-1GHz spectrum cap that was proposed in Consultation 10/71? Please provide reasons for your view.

Views of Respondents

A 6.17 This section sets outs the views of the respondents received in relation to ComReg's spectrum cap proposals. It first sets out the responses received to the questions in Consultation 10/71 and 10/105 which discussed the spectrum cap, and then sets out the responses received on issues relevant to the spectrum cap.

Q8 of Consultation 10/71

A 6.18 Question 8 of Consultation 10/71 asked respondents whether they agreed with ComReg's proposal to set a sub-1GHz spectrum cap.

A 6.19 ComReg received eleven responses to this question. Nine of the respondents (Digiweb, eircom Group, Ericsson, ESBN, H3GI, Imagine, Qualcomm, UPC and Vodafone) agreed with ComReg's proposal, while two respondents (O2 and RTÉ & RTÉNL) disagreed.

A 6.20 O2 disagreed with the imposition of a sub-1 GHz spectrum cap as it believed that spectrum caps should only be used in special circumstances where it is highly likely that the auction outcome would inhibit competition. O2 propose that ComReg should allow for the market to solely determine the outcome of the auction, where those who value the spectrum the most obtain it without any regulatory intervention with respect to imposition of a spectrum cap. RTÉ & RTÉNL also disagreed with ComReg's proposal as they believed that a spectrum cap could restrict an operator from planning its spectrum usage in order to mitigate interference into the broadcast services below the 800 MHz band. It proposed that the auction should be structured such that the higher frequency blocks are auctioned first, so that if demand is not as high as expected, in their view, the broadcast service will not be impacted severely.

A 6.21 The nine respondents who supported ComReg's proposal generally noted that a spectrum cap promotes competition, encourages entry into the market and is in the interests of consumers. In addition these respondents provided the following additional comments:

- Digiweb noted that the setting of a spectrum cap is an acceptable and widespread practice;
- Ericsson and Vodafone noted that a spectrum cap is appropriate to ensure a reasonable distribution of sub-1GHz spectrum between operators, as excessive asymmetric distributions can have negative consequences on retail competition;
- while not objecting to ComReg's proposal, O2 was of the view that it is not necessary to set a spectrum cap; and
- to create a new entrant, UPC proposed that a portion of the 800 MHz band be allocated for bidding by new entrants only.

Q9 of Consultation 10/71

A 6.22 With the introduction of the 800 MHz band into the award, Question 9 of Consultation 10/71 asked respondents whether they agreed with ComReg's proposal to set a sub-1GHz spectrum cap of 2 × 20 MHz.

A 6.23 The views of the respondents were mixed. From the eleven responses received to this question:

- Four respondents (eircom Group, ESBN, O2, and Vodafone) agreed with ComReg's proposal, although O2 reiterated its preference for no spectrum cap;
- Five respondents (Digiweb, H3GI, Imagine, RTÉ & RTÉNL, UPC) disagreed with the proposal; and
- Two respondents (Ericsson, Qualcomm) did not comment on the level of the spectrum cap, but instead outlined a number of considerations for ComReg to take into account in setting the spectrum cap.

A 6.24 Of the four respondents who supported ComReg's proposal:

- Vodafone believed that a 2 × 20 MHz spectrum cap was reasonable in the context of the spectrum available as it strikes a balance between avoiding extremely asymmetrical outcomes in spectrum allocations, minimising the risk of spectrum going unallocated and also providing any efficient new entrants with the opportunity to obtain access to spectrum;
- The ESB believed that this proposal would provide for fair and adequate apportionment of spectrum among operators;
- eircom accepted the arguments that a sub-1GHz cap of 2 × 20 MHz should be established in advance of the auction, but added that a disadvantage of this proposal is the possibility that the existing GSM operators face the risk of not retaining 900 MHz spectrum after 2015. Eircom believed that the simple remedy to this situation is to exclude 2 ×

15 MHz of 900 MHz spectrum from the auction and award 2 × 5 MHz each directly to the three existing GSM operators[190].

- Although O2 was of the view that no sub-1GHz spectrum cap was required (as the dynamics of the proposed auction had changed with the increased supply of sub-1GHz spectrum), it believed that if a spectrum cap is to be imposed, then it should be a simple cap of not less than 2 × 20 MHz. It believed that this would provide a reasonable amount of capacity for when the ecosystem will be able to use the 800 MHz and 900 MHz bands together.
- O2 also believed that it is important that any spectrum cap should not become a barrier to developments in the structure of the market, such as infrastructure and/or spectrum sharing. It proposed that if a spectrum cap is imposed, then ComReg should allow the possibility of eligible bidders combining their individually capped allowances to bid as single entity. (Note: this issue is discussed in further detail below – Issues relevant to the spectrum cap).

A 6.25 Of the five respondents who disagreed with ComReg's proposal:

- Digiweb, Imagine and UPC proposed the reservation of part of the spectrum for new entrants as they believed that ComReg's proposal would not result in new entry.
- H3GI proposed a spectrum cap of 2 × 15 MHz with the possibility of relaxation in the event of supply exceeding demand. H3GI added that it believed that ComReg's proposal is focused on securing revenue in the award process at the expense of long-term competition in mobile market and it noted that there is a risk of H3GI only securing 2 × 5 MHz of sub 1GHz spectrum which will put H3GI at a significant disadvantage to incumbent operators.
- RTÉ was concerned about the possibility of interference into the broadcasting bands and suggested that the spectrum cap should be higher than 2 × 20 MHz or linked to the allocation of the lowest block (i.e. block A in the 800 MHz band) such that the winners of this lower block will have access to higher blocks also.

A 6.26 Two respondents did not comment on the level of the spectrum cap, but instead outlined a number of considerations for ComReg to take into account in setting the spectrum cap.

- Ericsson noted that there are differences between the 800 MHz and 900 MHz bands[191] and it could also be argued that setting a 2 × 10 MHz cap

[190] This issue is addressed in Annex 3

per band while allowing and supporting spectrum sharing could result in a better overall outcome.

- Qualcomm recommended that ComReg take into account the terminal eco-system and recognize that the 800 MHz and 900 MHz bands correspond to different service offering and terminal availability timelines and thus currently have different eco-systems.

Q2 of Consultation 10/105

A 6.27 With the introduction of the 1800 MHz band into the award process, Question 2 of Consultation 10/105 asked respondents whether they agreed with ComReg's proposal to set an overall cap of 2 × 50 MHz in addition to a sub-1GHz spectrum cap of 2 × 20 MHz.

A 6.28 ComReg received four responses to this question:

- H3GI disagreed with ComReg's proposal for the same reasons it set out in its response to Consultation 10/71.[192]
- eircom Group provided comments on the two caps separately.
  - It agreed with ComReg's proposal for a 2 × 20 MHz sub-1GHz cap, as this prevents high asymmetry in overall spectrum holdings.
  - However it did not agree with the overall cap of 2 × 50 MHz. It believed this cap would unfairly favour the large established operators O2 and Vodafone affording them the opportunity to squeeze out the competitive tension created by smaller new entrants and potential new entrants. It proposed an overall cap of 2 × 40 MHz.
- Although O2 would prefer no spectrum cap, it agreed that ComReg's proposal was appropriate in principle.
- Vodafone agreed that ComReg's proposal was reasonable to avoid the extreme asymmetries in distribution of spectrum. In addition it also agreed with ComReg's proposal that existing spectrum assignments of 2.1 GHz would not count towards the spectrum cap for this competition.

[191] Ericsson noted that that *"unlike the 900 MHz band, the 800MHz band will be unencumbered with legacy GSM services and also that, in the short- to medium–term, more advanced devices and equipment will be available in the 800 MHz band before equivalent 900 MHz devices and equipment come on stream. It is possible, therefore, that if one operator were to secure usage rights to 20 MHz of the 30 MHz on offer in the 800 MHz band, that that operator could gain an unfair competitive advantage over all other market players."*

[192] H3GI's response to Consultation 10/71 was in relation to the 800 MHz and 900 MHz bands and did not discuss 1800 MHz spectrum.

H3GI's alternative cap and their consultants report

A 6.29 H3GI in its letter of 5 July 2011 to ComReg referenced Ofcom's "Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues" (22 March 2011) ("Ofcom's Consultation") and Hutchison 3GUK Limited's ("H3GUK's") non-confidential response to Ofcom's Consultation.

A 6.30 Considering these documents, H3GI believed that:

- *"ComReg should conduct an assessment of the likely future competition in markets for the provision of mobile electronic services after conclusion of the award of the 800, 900 and 1800 MHz bands. The promotion of competition at the national wholesale level in Ireland needs to ensure that after the auction, subject to demand, there are at least four holders of a minimum spectrum portfolio that mean they are credibly capable of providing high quality data services in the future ("Credible Future MNO Competition")."*
- *"As a result, ComReg should impose appropriate spectrum floors and caps. H3GI does not believe that the spectrum cap currently proposed by ComReg is sufficient to ensure Credible Future MNO Competition. This is supported by the response of H3GUK to Ofcom's consultation. In particular, H3GI believes that it is inappropriate for ComReg to proceed on the unproven assumption that the spectrum cap currently proposed by ComReg is sufficient to ensure Credible Future MNO Competition."*

A 6.31 Subsequent to this, on 22 July 2011 H3GI submitted another response to ComReg and attached a report from its' consultants Value Partners Management Consulting and Radio Regulatory Associates Limited ("H3GI's consultants") in respect of ComReg's proposed spectrum cap structure. In this letter H3GI:

- restated its request as per its letter of 5 July 2011 (see above);
- notes that its consultants' reports "*examine the applicability of Ofcom's analysis to Ireland and recommend alternative spectrum rules to (i) ensure a sustainable and competitive four player market going forward; (ii) and avoid the risk of significant damage to the Irish economy*;"
- notes that its consultants reports recommend alternative spectrum rules "*namely the combination of a total spectrum cap of 2 × 40 MHz across all bands and a spectrum floor of 2 × 10 MHz of contiguous sub 1 GHz spectrum, alongside the 2 × 20 MHz sub 1 GHz spectrum cap.*"
- state that it "*agree[s] with this analysis and believe that ComReg should implement the Alternative Spectrum Rules in the upcoming auction*".

Issues relevant to the spectrum cap

A number of issues relevant to the spectrum cap were raised by respondents in their responses to ComReg's consultations. These issues are set out below:

A) <u>Dealing with unsold spectrum at the end of the auction</u>

A 6.32 Eircom in its response to Question 12 of Consultation 10/71 queried ComReg's proposed approach dealing with unsold spectrum at the end of the auction. It noted that this issue is not addressed in Consultation 10/71 but was addressed in Consultation 09/99 where a method was proposed to allow bidders to submit bids that exceeded the spectrum cap in order that no spectrum remained unsold.[193]

A 6.33 Overall, eircom argued that ComReg should not allow bids exceed the spectrum cap as this could facilitate highly asymmetric spectrum holdings to distort the market.

"ComReg should not allow the 2 × 20 MHz cap to be exceeded by any bidder. If the facility proposed in consultation 09/99 is retained (whereby bidders may extend their bids for unsold spectrum beyond the spectrum cap) then this could facilitate highly asymmetric spectrum holdings and severely distort the mobile market."

B) Spectrum sharing and the ability of bidders to combine their individually spectrum cap allowances

A 6.34 In its response to Consultation 10/71 and 10/105, O2 proposed that if a spectrum cap is imposed, then ComReg should allow the possibility of eligible bidders combining their individually capped allowances to bid as a single entity. Specifically, it stated that:

"…operators who would plan to share spectrum could not realise the efficiency gain if the auction rules were structured in such a way as to, even inadvertently, prevent appropriate bidding. For example, the operators of a shared network might wish to combine and enter the auction as a single bidder….."

"There are only two ways that O2 sees whereby ComReg's auction process can facilitate the delivery of spectrum efficiency through spectrum sharing:

1. *having no spectrum cap;*
2. *allowing pre-qualification of bidders, and then allowing eligible bidders to combine their individually capped spectrum allowance, e.g. two individual eligible bidders with individual allowances of 4 lots each, could bid as a single entity, with an allowance capped at 8 lots.*

ComReg must also ensure that in prescribing bidder characteristics, that they do not prohibit approaches other than single operator bids – for example, joint bidding by a consortium of companies.

ComReg must accommodate this possibility within any assignment process, and should specifically address this issue within proposals to be included in the consultation on the auction mechanism."

[193] In Consultation 09/99, ComReg stated that "in order to ensure a robust process in the event that demand does not exceed supply ComReg is minded to relax the auction spectrum cap and accept bids up to 2 × 15 MHz"

DotEcon's Current Position

A 6.35 In Section 4 of DotEcon's latest report (ComReg Document 11/58 – Issues relating to the award of spectrum in multiple bands in Ireland), DotEcon provides its views on the appropriate spectrum cap for this award.

A 6.36 DotEcon's considers this issue in relation to:

- ComReg's previous spectrum cap proposals, namely a 2 × 20 MHz sub-1GHz spectrum cap and a 2 × 50 MHz overall spectrum cap; and
- an additional cap in the 900 MHz band in the first temporal lot.

ComReg's previous spectrum cap proposals - A sub-1GHz spectrum cap and an overall spectrum cap

A 6.37 Section 4.1 of Document 11/58 sets out the background to the spectrum cap proposal as discussed in DotEcon's previous reports and ComReg's previous consultations.

A 6.38 The respondents' views received to these proposals and DotEcon's commentary in light of these views is set out in section 4.2 of Document 11/58.

A 6.39 DotEcon state at the outset of this section, that their

"view of the proposed caps in light of these responses is unchanged, and as such we have not introduced arguments in addition to those previously put forward in coming to our recommendation in our commentary on these responses below."

A 6.40 In considering the respondents views, DotEcon notes that the majority of respondents agreed with ComReg's proposals, but some respondents suggested lowering or increasing the caps.

A 6.41 The following sets out DotEcon's commentary on the respondents proposals.

1) A higher sub-1GHz spectrum cap

A 6.42 Section 4.2 of Document 11/58 considers the issue of a higher sub-1GHz spectrum cap and DotEcon are of the view that;

"*We note that extreme outcomes that would be possible where the sub-1GHz cap were higher (two operators with 2×25MHz of sub-1GHz spectrum with 2×15MHz distributed in some way between at least two other bidders) and consider that such outcomes will likely have a damaging effect on competition. Therefore, we do not consider further the option of increasing this sub-1GHz cap where four or more parties apply for sub-1GHz spectrum at the application stage."*

2) A lower sub-1GHz spectrum cap for entry

A 6.43 Section 4.2.1 of Document 11/58 considers the issue of a lower sub-1GHz spectrum cap for entry.

A 6.44 As set out in this section, DotEcon considers that the arguments for lowering the cap and reserving spectrum should be considered together "as in practice they have the same effect;

"the setting of a spectrum cap on the four existing operators of 2×15MHz of sub-1GHz spectrum would result in the certain availability of at least 2×5MHz of sub-1GHz spectrum for an entrant."

A 6.45 This section also consider the merits of the respondents' suggestion to lower the sub-1 GHz spectrum cap and among other items, DotEcon states that:

"*the imposition of a 2×15MHz sub-1GHz cap, effectively reserving spectrum for an entrant, can only result in negative consequences for the efficiency of the auction outcome, as there is no obvious case on competition grounds for requiring such an outcome*"

A 6.46 Section 4.2.1 also sets outs DotEcon's overall view of the respondents' suggestion and DotEcon are of the view that there is no case for imposing a sub-1GHz spectrum cap of 2 × 15 MHz.

"Overall, therefore, given the high intrinsic value of sub-1GHz spectrum and the importance of ensuring that this spectrum is awarded in the most efficient way to ensure its most efficient use in providing services over the duration of the relevant licences, we do not consider that there is a case for imposing a spectrum cap of 2×15MHz, as it would likely result in inefficiency of the auction outcome for no obvious gain in terms of the competitiveness of service markets".

3) A lower sub-1GHz spectrum cap to avoid harm to competition

A 6.47 Section 4.2.1 of Document 11/58 considers this issue of a lower spectrum cap to avoid harm to competition.

A 6.48 DotEcon firstly note that this suggestion was from H3GI and that H3GI argued that "the proposed sub-1GHz spectrum cap of 2×20MHz would risk it only being awarded 2×5MHz of this spectrum."

A 6.49 In response to this, DotEcon considers that the following points are important;

- "*A 2×20MHz sub-1GHz cap would not allow three operators to use their bids in the auction to prevent a fourth bidder from winning any sub-1GHz spectrum.*

- *with a sub-1GHz cap of 2×20MHz, the risk of only being awarded 2×5MHz of sub-1GHz spectrum does not apply only to one operator only but to all existing operators*
- *indeed, if it were the four existing mobile operators competing for spectrum in the auction and if bidders were to bid for sub-1GHz spectrum based on their valuations for this spectrum, for one bidder to only be awarded 2×5MHz of sub-1GHz spectrum it would have to have incremental value of a second 2×5MHz sub-1GHz lot of less than the incremental value that each of the other three existing operators have for a fourth 2×5MHz sub-1GHz lot. The probability of this situation arising in reality is low, but where this were to be the case, the allocation of more than 2×5MHz of sub-1GHz of spectrum to that bidder would in fact not be efficient; and*
- *the proposed format for the award process is a multi-round combinatorial auction (a CCA), which should give all bidders the opportunity to observe how much others value this spectrum (in the aggregate) at round prices. In this case, each bidder can calculate the cost to it of pursuing various options relative to others (e.g. bidding on different amounts of spectrum in the auction with a view to facing different levels of cost and service capabilities over the duration of the resulting licences)".*

A 6.50 Given the above, DotEcon "consider that the proposed sub-1GHz cap of 2×20 MHz strikes a good balance of the relevant factors in setting a sub-1GHz spectrum cap."

4) A lower overall cap to avoid harm to competition

A 6.51 Section 4.2.1 of Document 11/58 considers the issue of a lower overall cap to avoid harm to competition.

A 6.52 In this section, DotEcon firstly notes that this proposal originally came from Meteor, and that Meteor "argued against the overall spectrum cap being set at 2×50MHz on the basis that it would unfairly favour the large established operators O2 and Vodafone, affording them the opportunity to squeeze out the competitive tension created by smaller operators and potential new entrants."

A 6.53 Before discussing this proposal, this section notes again the objective in setting spectrum caps, namely being "*to preclude outcomes, and only those outcomes, that are sufficiently extreme as to harm competition."*

A 6.54 Given this objective, the existing 2 × 50 MHz proposal is discussed in this section as well as Meteor and H3GI's 2 × 40 MHz proposal

A 6.55 In relation to the existing 2 × 50 MHz overall cap, this section states that:

- *"This spectrum cap [of 2 × 50 MHz] would allow for an 1800MHz-only entrant – where there were value in operating such an 1800MHz-only network, the proposed spectrum caps would provide such an entrant with the*

scope necessary to acquire as much spectrum as it might feasibly need for providing advanced data services using 1800MHz frequencies";

- "*The most asymmetric outcomes that might result given the market has four existing operators are:*
    - *two existing operators winning 2×20MHz each of sub-1GHz spectrum and 2×30MHz each of 1800MHz spectrum; or*
    - *an entrant winning 2×50MHz of 1800MHz spectrum with the remaining 2×25MHz distributed amongst the existing operators, which also win all of the sub-1GHz spectrum available."*
- "*Neither of these outcomes is unequivocally harmful to competition*"

A 6.56 In relation to Meteor and H3GI's 2 × 40 MHz proposal, section 4.2.1 states that:

"In contrast, the proposed alternative overall spectrum cap of 2×40 MHz would ensure almost fully symmetric outcomes where the number of alternative feasible allocations of spectrum amongst bidders would be small. For example, if only the four existing mobile operators were to bid in the auction, the outcome would most likely be that each existing operator would win 2×15MHz or 2×20MHz of sub-1GHz spectrum plus 2×15MHz or 2×20MHz of 1800MHz spectrum, or some small variant thereof. Given the number of alternative outcomes that would be precluded relative to the alternative 2×50MHz cap, it is highly likely that the imposition of such a cap would result in significant inefficiency of allocation, and potentially spectrum going unsold inefficiently. The benefit to competition of ensuring relatively symmetric spectrum holdings of operators after the auction is not clear, and in any case does not appear to be sufficiently great to offset the efficiency loss as a result of significantly limiting the breadth of feasible auction outcomes."

A 6.57 DotEcon's overall view on this issue is stated in paragraph 95 and states that

"Given these points, and the importance of allocating the spectrum available in the most efficient way, we do not think that there is a case for lowering the overall spectrum cap on account of asymmetric outcomes resulting in harm to competition."

An additional cap on the 900 MHz band in the first time slice

A 6.58 Section 4.3 of Document 11/58, sets out DotEcon's consideration of an additional cap on 900 MHz spectrum in the first time slice.

A 6.59 DotEcon firstly considers whether it is prudent to consider the costs and benefits of an additional cap on the 900 MHz band in the first time slice.

A 6.60 This section noted that while the proposed sub-1GHz cap of 2 × 20 MHz and the overall cap of 2 × 50 MHz "address directly the issue of preventing only those outcomes that are so asymmetric that they would undoubtedly harm competition" the proposed levels assume that:

- *"There are at least four bidders in the auction;*
- *800MHz and 900MHz spectrum is closely substitutable in the long run (so that it is reasonable to use an overall sub-1GHz cap); and*
- *1800 MHz spectrum is complementary to sub-1GHz spectrum and is substitutable at least at the margin (so that it is reasonable to set an overall spectrum cap, as opposed to a 1800 MHz-specific cap, in combination with the proposed sub-1GHz cap)."*

A 6.61 This section also notes that the proposed caps "do not necessarily address competition concerns that may result as a consequence of 800 MHz and 900 MHz spectrum not being close substitutes 'in the short run' and adds that "these short run issues result from the fact that while similar from a technical perspective, mobile technologies evolve at different paces in each band"

- "*Spectrum in the 900MHz band has been used on a harmonised basis for the provision of 2G mobile services for many years, and equipment using 3G technologies such as HSPA and corresponding handsets are readily available in the market at present;*"
- "*Spectrum in the 800MHz band has only been harmonised relatively recently, and while equipment and handsets for use using this spectrum are fast being developed, at present only data dongles are available for use in this band…..*"

A 6.62 DotEcon notes that the importance of the 900 MHz band has also been asserted by a number of stakeholders and as set out in its section 4.3 (11/58). DotEcon's overall view is that it is prudent to consider the costs and benefits of an additional cap on the 900 MHz band in the short term.

"*given the high degree of importance attributed by potential bidders to 900MHz spectrum, it is prudent to consider the costs and benefits of a band-specific cap on 900MHz spectrum in the short term*".

A 6.63 In considering the short term competition concerns, DotEcon first considers the relevant time period and then the level of such a potential cap.

The relevant time period

A 6.64 Section 4.3 of Document 11/58 sets out DotEcon's view on the relevant time period of these short-terms competition concerns and DotEcon is of the view that *"it should be sufficient to consider band-specific caps in the first time slice only to address competition issues linked to imperfect substitutability of 800MHz and 900MHz spectrum in the short run*."

A 6.65 In arriving at this view, DotEcon notes that

"*The second time slice commences in all bands in July 2015. By this date, the 800MHz band will be well established, with harmonisation complete in EU member states, and there should be equipment and handsets available for deploying services*

using LTE (and potentially other advanced technologies) using either 800MHz or 900MHz spectrum."

The level of such a potential cap

A 6.66 DotEcon considers the level of such a potential cap in section 4.3 of Document 11/58.

A 6.67 This section notes that a spectrum cap for the 900 MHz band was considered previously in ComReg's earlier consultations (08/57, 09/14 and 09/99) where ComReg proposed to set a 2 × 10 MHz cap on 900 MHz spectrum.

A 6.68 DotEcon notes that using this 2 × 10 MHz cap proposal for the first time slice, would have a number of potential benefits (section 4.3 of 11/58) and while such a cap would appear to raise a number of issues of potential concern, none of these appear significant relative to the benefits. [194]

A 6.69 DotEcon's overall view is that "there is merit in imposing a 2×10MHz cap on 900MHz spectrum in the first time slice, and that the cost of doing so, if any, is small. On this basis we recommend that such a cap be implemented in the proposed multi-band auction in addition to the sub-1GHz and overall spectrum cap already part of the current auction design."

H3GI's alternative cap and their consultant's report

A 6.70 Section 4.4 of Document 11/58 sets out DotEcon's view on the use of spectrum floors in relation to H3GI's submission.

A 6.71 DotEcon notes that the situation in the UK differs greatly from that in Ireland, particularly in relation to existing asymmetry of sub- 1GHz spectrum in the UK as opposed to Ireland, spectrum in alternative bands will become available sooner in Ireland, and the UK carried out a comprehensive competition assessment to determine that 4 operators is the optimum amount.

A 6.72 DotEcon note that:

"the auction rules proposed for the planned multi-band award in Ireland have been set in the context of the conditions in Ireland to ensure that the market structure going forward will be determined not by ComReg but by the competitive rivalry

[194] In so doing DotEcon notes that in its response to UK Ofcom's recent consultation on multi-band auction proposals in the UK, O2 noted that at present within the EU, only the UK and Austria have individual spectrum allocations of significantly more than 2×10MHz in the 900MHz band. (*http://stakeholders.ofcom.org.uk/consultations/combined-award/?showResponses=true&pageNum=5#responses/Telefonica_UK_Ltd.pdf*) It asserted that the availability of LTE equipment using carriers of more than 2×10MHz is unlikely to emerge in the 900MHz band given this situation. While this condition is likely to change as 800MHz spectrum is allocated in EU countries and provisions are made for spectrum trading amongst sub-1GHz spectrum holders, this is unlikely to happen within the timescale of the proposed 2×10MHz cap.

amongst the mobile operators themselves. The proposed spectrum caps provide protections for downstream competition in mobile services." and

"Ofcom's proposals for use of spectrum floors in addition to spectrum caps to safeguard competition in the UK vary significantly from the spectrum caps proposed in Ireland, and indeed appear to be fit for purpose in the UK case. However, Ofcom's proposals do not affect our view on the appropriateness of the auction format and rules proposed for a multi-band auction in Ireland."

Issues Relevant to the Spectrum Cap

Unsold spectrum at the end of the auction

A 6.73 Section 5.1 of Document 11/58 sets out DotEcon's view on unsold spectrum at the end of the auction.

A 6.74 In this section, DotEcon notes that "the suitability of a particular approach to dealing with unsold spectrum will depend on the amount and type of spectrum that is unsold at the end of the auction. Given the contingent nature of the issue of unsold spectrum, and the uncertainty attached to the amount and type of spectrum that might go unsold, we would recommend that ComReg retain the discretion to decide on how it wishes to proceed if and when the issue of unsold spectrum becomes a reality."

A 6.75 DotEcon elaborated on its recommendation in and states that:

"We do, however, recommend that while the suitability of an approach to spectrum left unsold in the proposed auction process be evaluated on the merits of the particular case, unless there are circumstances that merit a divergence from the general policy, a principle should be set that spectrum left unsold at the end of the auction would not be otherwise allocated for a period after the auction of at least 1-2 years. This is to avoid providing a negative incentive to bidders to "wait and see", that is, strategically withhold demand during the auction in the hope of being allocated this spectrum on the same terms as those offered in the auction in a follow-up process"

Spectrum sharing and the ability of bidders to combine their individually spectrum cap allowances

A 6.76 Section 12 of Document 11/58 sets out DotEcon's view on spectrum sharing and the ability of bidders to combine their individually spectrum cap allowances.

A 6.77 The issue of joint bidding in the auction is considered in this section, and DotEcon's view as set out states the caps for the bid vehicle should be the same as those set for any other bidder.

"One important issue for operators in respect of spectrum sharing agreements is how such an arrangement would affect their ability to bid for spectrum in the auction, that is, how a spectrum cap on a bid vehicle would be treated within the

auction. In this respect, we consider that where operators bid as a bid vehicle representing a spectrum sharing venture, the spectrum caps set for such a bid vehicle should be the same as those set for any other bidder i.e. a 2×10MHz cap on 900MHz spectrum in the first time slice, a 2×20MHz sub-1GHz cap and an overall cap of 2×50MHz."

A 6.78 DotEcon notes that it could be possible to permit spectrum sharing after the auction and this issue is discussed in this section.

ComReg's Position

A 6.79 This section discusses ComReg's view on the spectrum cap(s) appropriate for the proposed award of the 800 MHz, 900 MHz and 1800 MHz bands, and considers the following:

- Should a spectrum cap (or other restriction) be set for the proposed auction?
- Should existing spectrum assignments count towards a spectrum cap (or other restriction)?
- What type(s) of spectrum cap (or other restriction) are appropriate for the proposed auction?
- What is the appropriate level for the spectrum caps

A 6.80 Following this, ComReg presents its position on the issues relevant to spectrum cap, namely:

- method for dealing with unsold spectrum;
- spectrum sharing.

Should a spectrum cap (or other restriction) be set for the proposed auction?

A 6.81 This issue of spectrum caps was discussed in ComReg's initial consultation on this issue (Consultation 08/57) and since then ComReg spectrum cap proposals have evolved in light of ComReg's proposals to include the 800 MHz and 1800 MHz bands in the award process.

A 6.82 With the exception of O2 who did not object to ComReg's spectrum cap proposals but preferred if there was no spectrum cap, ComReg notes that all the remaining respondents to ComReg's consultations supported the application of a spectrum cap (or other spectrum restriction), and among other reasons, these respondents expressed the view that this would promote competition, encourage entry into the market and would be in the interests of consumers. ComReg's notes that the rationale put forward by the respondents is generally in agreement with ComReg's own rationale as set out in its previous consultations and as such no new material has been submitted by respondents to cause ComReg to alter that view.

ComReg's Proposal

A 6.83 Overall ComReg is of the view that the setting of a spectrum cap (or other spectrum restriction) for the duration of the competition in line with its statutory objectives as set out in Annex 1 to this document, and ComReg therefore proposes to set such a spectrum restriction in the proposed auction

A 6.84 It should be noted the ComReg's proposed spectrum restriction is only for the duration of the proposed auction and operators would, subject to the licenses granted on award and their conditions, be free to trade, lease and combine rights of use of spectrum after the auction to the extent that such rights of use of spectrum are designated as being tradable or leasable and in line with competition law and the legal framework for electronic communications in Ireland.

A 6.85 For the avoidance of doubt: the foregoing statement does not indicate that any particular rights of use of spectrum will or should be designated as tradable.

Should existing spectrum assignments count towards a spectrum cap (or other restriction)?

A 6.86 In ComReg's consultations, ComReg proposed that the spectrum caps should take account of the existing spectrum assignments in the 900 MHz and 1800 MHz bands (i.e. spectrum bands in the proposed auction), but not take account of spectrum assignments in other bands (e.g. the 2100 MHz band).

A 6.87 ComReg notes that there was general support from the respondents and ComReg's believes that its proposal remains valid.

A 6.88 In relation to the 900 MHz and 1800 MHz bands, ComReg notes that these spectrum bands are in the proposed auction and existing licensees have the option of 'exchanging' their existing spectrum assignments for liberalised spectrum via the early liberalisation option as set out in Annex 6.6. ComReg therefore believes that it is appropriate that existing spectrum assignments in these 900 MHz and 1800 MHz bands count towards the spectrum cap.

A 6.89 Considering the other spectrum bands not included in the proposed auction, ComReg believes that the only spectrum band of relevance is the 2.1 GHz, as the existing licences in these bands run until 2022 and 2027 and are used to provide 3G services. In this band, each of the four incumbent operators has 2 × 15 MHz of paired 2.1GHz spectrum. When considered against the total amount of spectrum available in this proposed award (2 × 140 MHz), ComReg is of the view that the size of these existing spectrum holdings are not likely in themselves to be large enough to materially affect the long-run structure of the market after the award process. ComReg therefore remains of the view that the existing spectrum assignment in the 2.1GHz band should not count towards the spectrum cap.

A 6.90 However, it should be noted that in other circumstances where existing spectrum holdings are much larger in relation to the amount of spectrum being awarded, ComReg may come to a different view on whether they should be considered to count towards a competition spectrum cap.

ComReg's Proposal

A 6.91 Overall ComReg proposes that the spectrum caps should:

- take account of the existing spectrum assignments in the 900 MHz and 1800 MHz bands (i.e. spectrum bands in the proposed auction); and
- not take account of spectrum assignments in other bands (e.g. the 2100 MHz band).

What type(s) of spectrum cap (or other restriction) are appropriate for the proposed auction?

A 6.92 This section considers the appropriate type of spectrum restrictions for the proposed auction, noting that.

- in the previous consultations ComReg's proposed various types of spectrum caps, including:
  - a 900 MHz spectrum cap (Consultation 08/57, 09/14, 09/99);
  - a sub-1GHz spectrum cap (Consultation 10/71); and
  - an overall spectrum cap for all bands in the award (i.e. 800 MHz, 900 MHz and 1800 MHz) in combination with a sub-1GHz spectrum cap (Consultation 10/105).
- H3GI submitted that ComReg should first consider the minimum spectrum requirement necessary for credible future MNO competition based upon four holders of spectrum rights and then set appropriate spectrum restrictions that would ensure credible future MNO competition. Specifically H3GI proposed that ComReg set:
  - an overall spectrum cap for all bands in the award;
  - a sub-1GHz spectrum cap; and
  - a sub-1GHz spectrum floor (which would guarantee 2 × 10 MHz of contiguous spectrum for four players in the sub-1GHz bands).

A 6.93 Each of the above in now considered and in doing so, ComReg notes that DotEcon has also considered each of the above issues in section 4 of its report (Document 11/58).

An overall spectrum cap for all bands in the award

A 6.94 With the proposed introduction of the 1800 MHz band into the competition, in Consultation 10/71 ComReg proposed to set an overall spectrum cap for all bands in the award. In proposing this, ComReg noted that each bidder in the auction is likely to have different views on the degree to which they consider 1800 MHz spectrum as complementary or substitutable to sub-1GHz spectrum and an overall spectrum cap (i.e. for 1800 MHz and sub-1GHz spectrum) would not unduly restrict bidders from switching their bids between bands during the award.

A 6.95 ComReg notes that all respondents to Consultation 10/105 supported the inclusion of an overall cap (although there was varying views on the level of this cap) and DotEcon remains of the view that it is appropriate to set such a cap.

A 6.96 Such an overall cap (i.e. for 1800 MHz and sub 1 GHz spectrum) would be appropriate as such a cap would guard against extreme asymmetrical and anti-competitive outcomes in total spectrum distribution at 800 MHz, 900 MHz and 1800 MHz while not unduly restricting bidders from switching their bids between bands during the award.

A 6.97 In summary, ComReg believes that the rationale for an overall cap remains valid.

ComReg's Proposal

A 6.98 ComReg proposes to set an overall spectrum cap for all spectrum bands in the competition.

A sub-1 GHz spectrum cap

A 6.99 With the proposed introduction of the 800 MHz band in Consultation 10/71, ComReg proposed to set a sub-1GHz spectrum cap (i.e. the 800 MHz and 900 MHz bands). ComReg maintained this view in Consultation 10/105.

A 6.100 In proposing this spectrum cap, ComReg noted that the characteristics of sub-1GHz spectrum in terms of its propagation qualities, etc., make it particularly valuable spectrum for mobile use and the provision of wide area coverage, and the proposed addition of the 1800 MHz band (as per Consultation 10/105) would not change ComReg's view on the necessity for a sub-1GHz spectrum cap.

A 6.101 In addition, bidders in the auction could have different views on the degree of substitutability between the 800 MHz and 900 MHz bands. A combined sub-1 GHz spectrum cap for both bands would therefore not unduly restrict bidders from switching their bids between these two bands during the award.

A 6.102 ComReg notes that with the exception of RTÉ and RTÉNL all respondents to Consultations 10/71 and 10/105 supported the inclusion of a sub-1GHz spectrum cap (although again there were varying views on the level of this cap) and DotEcon remains of the view that it is appropriate to set such a cap.

A 6.103 In summary, ComReg believes that the rationale for a sub-1GHz spectrum cap remains valid.

ComReg Proposal

A 6.104 ComReg proposes to set a sub-1GHz spectrum cap in the competition.

A 900 MHz spectrum cap

A 6.105 In consultation 08/57, 09/14 and 09/99, ComReg proposed to set a 900 MHz spectrum cap. With the proposed introduction of the 800 MHz band in Consultation 10/71, ComReg proposed that the 900 MHz spectrum cap could be relaxed to a sub-1GHz cap. In proposing this ComReg noted that while there may be short-run differences (e.g. due to equipment availability) between the 800 MHz and 900 MHz bands, ComReg did not believe these to be sufficient to prevent the use of a single cap for the sub-1GHz spectrum.

A 6.106 Before providing ComReg's updated proposal on this issue, this section first presents information in relation to.

- views of respondents received ;
- updated information on device ecosystem; and
- DotEcon's analysis;

Views of respondents

A 6.107 While most respondents to ComReg's consultations did not express an opinion on the substitutability of the 800 MHz and 900 MHz bands, ComReg notes that this issue was raised by three respondents (Ericsson, Qualcomm and H3GI in H3GI's consultants report).

A 6.108 Ericsson and Qualcomm (in response to Consultation 10/71) submitted that there are differences between the 800 MHz and 900 MHz bands (e.g. in terms of terminal availability timelines and eco-systems) and that ComReg should take such considerations into account when setting spectrum caps for the award.

A 6.109 H3GI's consultants' report notes that there are technical differences between the 800 MHz and 900 MHz bands and states that *"this means that the 800 MHz band, in the short term, may be less attractive to operators than 900 MHz"*.

A 6.110 Among other items, section 3.2.2 of H3GI's consultants report notes that:

- *"The 900 MHz and 1800 MHz bands are widely used for GSM but are now being refarmed for HSPA/HSPA+ or LTE services. There is a consensus that the 900 MHz band will be primarily used for 3G services such as HSPA/HSPA+ for the short-term. Refarming the 900 MHz band to LTE is not expected to happen much before 2020."*
- *"The 800 MHz band is just starting to become available in a number of European countries but there are regulatory and compatibility issues that may slow the wider adoption of this band for mobile data. These concerns may restrain the growth of what is at present a small ecosystems of devices for LTE 800. In contrast, the 900 MHz band has a significantly larger ecosystems of devices for HSPA/HSPA+."*

A 6.111 And section 3.5.2 d) of H3GI's consultants report notes that:

- *"If an operator acquires 800MHz spectrum in the planned award but has no other sub-1GHz spectrum then that operator will not be able to provide voice services on LTE800 in the early stages of deployment as voice on LTE (VOLTE) is still a feature not currently available on handsets and probably will not be available until 2014. It will also take many years before the market share of LTE800 devices with VOLTE is significant. This gives other operators with access to 900MHz an advantage in terms of access to the market for voice calls inside buildings."*

Updated information on device ecosystem

A 6.112 ComReg notes that Global mobile Suppliers Association website presents information on the availability of LTE and UMTS user devices and:

- in relation to UMTS 900, a GSA survey of April 2011 states that there are "618 UMTS 900 devices supported by 87 suppliers"[195]; and
- in relation to the LTE ecosystem across all operating frequencies, a GSA report titled "Status of the LTE Ecosystem" (July 29, 2011) notes that while *"the device ecosystem is rapidly establishing to support LTE as the fastest developing mobile communications systems technology ever"*, 161 LTE user devices had been launched in the market by July 2011.[196]

A 6.113 While the GSA notes that the LTE device ecosystem is developing rapidly, it is noticeable that the number of LTE user devices (across all operating frequency bands and not just 800 MHz band[197]) is substantially less than the number of UMTS 900 MHz user devices.

DotEcon's view

A 6.114 As discussed above, DotEcon discusses the issue of an additional spectrum cap in the 900 MHz band in section 4.3 of its report (Document 11/58). DotEcon notes the respondents' views and technical issues (as discussed directly above) and its recommendation is that ComReg implement a spectrum cap on the 900 MHz band for the first temporal lot.

ComReg's updated assessment and proposal

A 6.115 From the above information it appears to ComReg that there are likely to be short-term substitutability issues between the 800 MHz and 900 MHz bands. In this regard, ComReg notes that:

[195] http://www.gsacom.com/downloads/pdf/UMTS900_information_paper_270711.php4

[196] http://www.gsacom.com/downloads/pdf/gsa_lte_ecosystem_report_290711.php4

[197] ComReg notes that the 161 LTE user devices (as listed in the "Status of the LTE Ecosystem" GSA Report, July 29, 2011) includes devices that do not operate in the 800 MHz band, and thus the number of LTE devices operating in the 800 band is less than 161.

- voice over LTE (VoLTE) is still in the early stages of development and the ability of the 800 MHz band to support voice services (at least in the short term) is much reduced compared to the 900 MHz band;
- while the LTE device ecosystem is developing rapidly, the number of LTE user devices (across all operating frequency bands and not just 800 MHz band) is substantially less than the number of UMTS 900 MHz user devices;
- respondents to ComReg's consultations have commented on the short-term differences between the 800 MHz and 900 MHz bands.
- DotEcon has analysed the short-term competition concerns and states that:
  - "*given the high degree of importance attributed by potential bidders to 900 MHz spectrum, it is prudent to consider the costs and benefits of a band-specific cap on 900 MHz in the short-term*"; and
  - "*there is merit in imposing a 2×10MHz cap on 900MHz spectrum in the first time slice, and that the cost of doing so, if any, is small. On this basis we recommend that such a cap be implemented in the proposed multi-band auction in addition to the sub-1GHz and overall spectrum cap already part of the current auction design*."

A 6.116 Given the above and ComReg's obligations under EC Directive (GSM Amendment) to liberalise the 900 MHz and 1800 MHz bands in a fashion that does not distort competition, ComReg believes that this it is appropriate to include an additional cap on the 900 MHz band for the first time slice.

ComReg's Proposal

A 6.117 ComReg proposes to set a 900 MHz spectrum cap for the first time slice in the competition.

What is the appropriate level for the spectrum caps?

As discussed above, ComReg believes that it is appropriate to set a spectrum cap for:

- the 900 MHz band in the first time slice;
- the sub-1GHz spectrum (i.e. the 800 MHz and 900 MHz bands); and
- an overall spectrum cap (i.e. all bands in the competition, the 800 MHz, 900 MHz and 1800 MHz bands).

A 6.118 This section discusses the appropriate level for each of the above proposed spectrum caps.

The level of the 900 MHz cap in the first time slice

A 6.119 In ComReg's earlier consultations (08/57, 09/14 and 09/99) ComReg proposed to set a 2 × 10 MHz spectrum cap in the 900 MHz band. Among other reasons, ComReg noted that this cap promoted competition and reflected the likely needs

of the existing 900 MHz operators. This proposal was well received by the respondents to those consultations.

A 6.120 In considering the issue of an additional spectrum cap in the 900 MHz band in the first time slice, DotEcon also considers the appropriate level for this cap. DotEcon notes ComReg's earlier consideration of the level of such a spectrum cap and discusses the potential benefits and concerns arising in relation to this 2 × 10 MHz level.

A 6.121 DotEcon expresses the view that while such a cap raises a number of potential concerns, none of these appear significant relative to the benefits and overall that "*there is merit in imposing a 2×10MHz cap on 900MHz spectrum in the first time slice, and that the cost of doing so, if any, is small.*"

A 6.122 ComReg believes that the rationale for a 2 × 10 MHz spectrum cap still holds, and notes that such a cap would provide sufficient spectrum for a minimum of four licensees and would therefore facilitate competition.

ComReg's proposal

A 6.123 ComReg considers that the differences between the 800 MHz and 900 MHz bands only exist in the short run, and in the long run both bands will become substitutable with the larger scale deployment of 800 MHz equipment and availability of handsets. Given that the differences between both these bands are only in the short term, and in order to allow bidders the flexibility to choose its long term strategy with respect to sub- 1GHz spectrum holdings, ComReg proposes a 2 × 10 MHz level for the 900 MHz spectrum cap in the first time slice.

The level of the sub-1 GHz cap

A 6.124 In consultation 10/71 and 10/105, ComReg proposed a 2 × 20 MHz spectrum cap for sub-1GHz spectrum. ComReg received mixed views to this proposal:

- three respondents, ESBN, O2 and Vodafone, supported the 2 × 20 MHz spectrum cap;
- one respondent, RTÉNL, suggested that the spectrum cap should be a higher than 2 × 20 MHz; and
- five respondents suggested that the spectrum cap should be lower (H3GI, eircom group) or spectrum should be set aside for a new entrant (Digiweb, Imagine, UPC).

A 6.125 Each of the above is now discussed.

A 2 × 20 MHz sub-1GHz spectrum cap

A 6.126 ComReg introduced the concept of a sub-1 GHz spectrum cap in Consultation 10/71 when ComReg first proposed to release the 800 MHz and 900 MHz spectrum in a joint auction. ComReg 'Modified Option 1' proposal in Consultation 09/99 allowed for the 2 × 10 MHz spectrum cap to be relaxed to 2 ×

15 MHz for 900 MHz spectrum release (proposal at this time was for 900 MHz spectrum to be released on its own) should demand not exceed supply. Given the release of additional spectrum, ComReg considered it appropriate to revisit its previous proposed cap of 2 × 10 MHz (potentially relaxed to 2 × 15 MHz) for 900 MHz spectrum release only.

A 6.127 ComReg recognised in Section 4.1.1 of Consultation 10/71 that "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". However, ComReg also stated that "perfect symmetry in sub 1 GHz holdings is not necessary to facilitate competition, 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."

A 6.128 ComReg carried out an analysis in relation to a suitable sub-1 GHz spectrum cap. Of the options analysed, ComReg determined that 2 × 20 MHz was the most appropriate. Such a sub-1 GHz spectrum cap guarantees a minimum of four operators gaining access to sub-1 GHz spectrum. A lower cap could result in an inefficient outcome, whereas a higher cap could result in only three operators gaining access to all sub-1 GHz spectrum.

A 6.129 A number of respondents agreed that the spectrum cap should be 2 × 20 MHz.

A 6.130 DotEcon's previous analysis[198] concluded that a sub-1 GHz spectrum cap of 2 × 15 MHz could be too tight, whereas 2 × 25 MHz was too large; a cap of 2 × 20 MHz for sub-1 GHz spectrum is the most appropriate.

A 6.131 In its most recent Report[199], DotEcon has considered the appropriateness of the sub-1 GHz cap in light of respondents' views. H3GI criticised the proposed 2 × 20 MHz sub-1 GHz cap stating that such a cap could result in it only being awarded 2 × 5 MHz of this spectrum. Having considered this submission, DotEcon was not persuaded to alter its 2 × 20 MHz spectrum cap proposal.

A 6.132 In conclusion, DotEcon reiterates its recommendation, as "the proposed sub-1GHz cap of 2×20 MHz strikes a good balance of the relevant factors in setting a sub-1GHz spectrum cap".

A 6.133 In light of respondent's views, ComReg considers the appropriateness of a lower and a higher sub-1 GHz cap below.

[198] Section 4.3.3 of Report, ComReg Document 10/71a

[199] Section 4.2.1 of ComReg Document 11/58

A higher sub-1GHz spectrum cap

A 6.134 ComReg notes that a higher sub-1GHz spectrum cap was suggested by only one respondent, RTÉ (although O2 preferred no cap). While the rationale for RTÉ's suggestion is not entirely clear, RTÉ's submission to Consultation 10/71 was primarily focused on ensuring that services in the 800 MHz band did not interfere into the broadcasting band. One could interpret RTÉ's suggestion as being a suggestion to use the higher frequency blocks as opposed to the lower frequency blocks and if this is the case, then this issue not linked to spectrum caps. Instead it is relevant to the co-existence of the 800 MHz and broadcasting bands as discussed in Annex 10 of this document.

A 6.135 The use of a higher sub-1GHz spectrum cap has been considered by DotEcon in its report (11/58) and DotEcon states that it does "*we do not consider further the option of increasing this sub-1GHz cap where four or more parties apply for sub-1GHz spectrum at the application stage.*" In coming to this view, DotEcon notes that such a cap could lead to extreme outcomes and such outcomes will likely have a damaging effect on competition.

A 6.136 ComReg agrees with the analysis of DotEcon and does not believe that it is appropriate to set a sub-1GHz spectrum cap greater than 2 × 20 MHz.

A lower sub-1GHz spectrum cap

A 6.137 A number of respondents suggested that the spectrum cap should be lower (2 × 15 MHz) or spectrum should be set aside for a new entrant.[200] In essence these suggestions can be considered to have the same effect, as having a 2 × 15 MHz cap of sub-1GHz spectrum would result in the availability of 2 × 5 MHz for a new entrant.

A 6.138 DotEcon considers the merits of a lower sub-1GHz spectrum cap in its report (11/58) and note that such a cap "would likely result in inefficiency of the auction outcome for no obvious gain in terms of the competitiveness of service markets"

A 6.139 In coming to this view, DotEcon notes that "If it is efficient to award spectrum to a new entrant, they can obtain spectrum in the auction by bidding for it based on their valuations regardless of the presence or absence of the effective reservation. Therefore, the imposition of a 2×15MHz sub-1GHz cap, effectively reserving spectrum for an entrant, can only result in negative consequences for the efficiency of the auction outcome, as there is no obvious case on competition grounds for requiring such an outcome."

A 6.140 ComReg agrees with the analysis of DotEcon and does not believe that it is appropriate to set a 2 × 15 MHz cap.

[200] ComReg has considered the issue of setting aside spectrum for a new entrant in Annex 3 and is of the view that this is not necessary or appropriate.

ComReg's Proposal

A 6.141 On balance, in light of its statutory obligations and objectives and having considered the views of its consultants (propose a 2 × 20 MHz sub-1 GHz cap) and respondents, ComReg proposes to set a 2 × 20 MHz cap for sub-1GHz spectrum.

The Overall Cap

A 6.142 ComReg proposed a 2 × 20 MHz sub-1 GHz spectrum cap in Section 4.1.1 of Consultation 10/71 when ComReg was considering releasing 800 MHz and 900 MHz spectrum in a joint award. ComReg found it necessary to revise its spectrum cap proposal in Consultation 10/105 in light of the addition of 1800 MHz spectrum to the 800 MHz and 900 MHz spectrum award process. ComReg proposed a 2 × 50 MHz overall competition spectrum cap for the 800 MHz, 900 MHz and 1800 MHz bands, in addition to the proposed 2 × 20 MHz sub-1 GHz spectrum cap.

A 6.143 Of the views expressed on this matter, one respondent agreed with ComReg's proposal, whilst two respondents disagreed and favoured a lower overall competition spectrum cap of 2 × 40 MHz.

A 6.144 In Consultation 10/105, ComReg considered that it was appropriate to set a combined multi-band spectrum cap as it "appears to be the most appropriate in the context of a joint award for a number of reasons. Each bidder in the auction is likely to have different views on the degree to which they consider 1800 MHz spectrum as complementary or substitutable to sub-1GHz spectrum. A bidder may be prepared to switch from sub-1GHz spectrum to 1800 MHz during the auction, in response to sufficiently greater price differentials between sub-1GHz spectrum and 1800 MHz. Any spectrum cap set for a joint award should not unduly restrict such switching strategies"

A 6.145 In setting the overall multi-band spectrum cap, ComReg considered it important to ensure that it was not possible for a single bidder to acquire the entire 1800 MHz spectrum as this could affect downstream competition in the long term. ComReg stated that any bidder who only bid on 1800 MHz spectrum was likely to require a significant amount of spectrum to provide attractive alternative services to those bidders who acquired sub-1 GHz spectrum.

A 6.146 ComReg considered that an overall competition spectrum cap of 2 × 50 MHz was appropriate as this could "strike a balance between providing sufficient 1800 MHz spectrum to allow an operator to provide a differentiated high bandwidth service, while also ensuring that 2 × 25 MHz of 1800 MHz spectrum is available to other bidders if one bidder was to be awarded the maximum permitted under this cap"[201] and:

[201] From Section 3.3.3 of Consultation 10/105

"i. It allows a bidder only bidding on 1800 MHz spectrum to acquire sufficient 1800 MHz spectrum so as to effectively compete with operators that have sub-1GHz spectrum;
ii. It allows a bidder to acquire up to 2 × 20 MHz of sub-1GHz spectrum and up to 2 × 30 MHz of 1800 MHz spectrum, and this would seem to be sufficient spectrum for an operator to deploy a service and provide additional capacity in highly populated areas."

A 6.147 By reducing the overall spectrum cap, DotEcon state this "would ensure almost fully symmetric outcomes" and "Given the number of alternative outcomes that would be precluded relative to the alternative 2×50MHz cap, it is highly likely that the imposition of such a cap would result in significant inefficiency of allocation, and potentially spectrum going unsold inefficiently". By reducing the overall cap, ComReg could reduce the ability of an 1800 MHz only operator successfully competing with sub-1 GHz operators[202], affecting competition.

A 6.148 DotEcon concludes that a 2 × 50 MHz spectrum cap is appropriate, for reasons outlined in section 4.2.1 of its most recent Report.[203]

A 6.149 On balance, in light of its statutory obligations and objectives and having considered the views of its consultants and respondents, ComReg proposes to set a 2 × 50 MHz overall spectrum cap for this multi-band award.

A Sub-1GHz Spectrum Floor

A 6.150 H3GI submitted that ComReg should set a spectrum floor for sub-1GHz spectrum (which would guarantee 2 × 10 MHz of contiguous spectrum for four players in the sub-1GHz bands). Spectrum floors are designed to guarantee specific outcomes and have been used/proposed by Ofcom.

A 6.151 ComReg's assessment on this issue is set out below. Before providing ComReg's view on this issue information on the following is first presented:

- relevant information from H3GI's consultants submission ;
- updated information from Ofcom's consultation process; and
- DotEcon's analysis;

A) <u>Relevant information from H3GI's consultants</u>

A 6.152 H3GI submitted a report generated by its consultants (Value Partners & Radio Regulatory Associates ('VP/RRA')) to ComReg in July 2011.[204] VP/RRA

[202] Following text from Section 5 of DotEcon Report 10/105a, - "[spectrum cap] should allow for the possibility for a bidder bidding only on 1800MHz spectrum to acquire a sufficiently large amount of spectrum as to effectively compete with operators that have sub-1GHz spectrum – a bidder not bidding for sub-1GHz spectrum should be allowed to bid for up to 2×50MHz in the 1800MHz band."

[203] ComReg Document 11/58

considered Ofcom's recent publication[205], and set out why, in their view, ComReg should adopt a similar approach in Ireland. Ofcom's document discusses its proposal "*to ensure that after the auction, subject to demand, there are at least four holders of a minimum spectrum portfolio that mean they are credibly capable of providing high quality data services in the future*"[206] Ofcom's Option 1 outlines a range of possbilities for minimum spectrum portfolio's[207,] being:

a) 2×5 MHz of sub-1 GHz spectrum and 2×20 MHz of 2.6 GHz spectrum; or

b) 2×5 MHz of sub-1 GHz spectrum and 2×15 MHz of 1800 MHz spectrum; or

c) 2×10 MHz of sub-1 GHz spectrum and 2×15 MHz of 2.6 GHz spectrum; or

d) 2×10 MHz of sub-1 GHz spectrum and 2×10 MHz of 1800 MHz spectrum; or

e) 2×15 MHz of sub-1 GHz spectrum.

A 6.153 Ofcom presented another option, Option 2. This option presented a range of minimum spectrum portfolios, with each minimum spectrum portfolio containing at least 2 × 10 MHz of sub-1 GHz spectrum. This differs from Option 1, as Option 1 allows for minimum spectrum portfolios where operators have only 2 × 5 MHz of sub-1 GHz spectrum.

A 6.154 Ofom's preferred option is Option 1. Ofcom state that this minimum spectrum portfolio "with 2 × 5 MHz of sub-1 GHz spectrum and a certain amount of above-1 GHz spectrum can go a long way towards matching the coverage and maximum speed delivered by a network with only sub-1 GHz spectrum using the same number of sites", and "It may be the least onerous measure necessary to achieve our aim of promoting a minimum of 4 credible wholesale competitiors".

A 6.155 VP/RRA carried out analysis on the mobile market in Ireland, and put forward the view that ComReg needed to a apply minimum spectrum portfolio in order to ensure that it maintained a credible and a competitive four-player mobile telecommunications market in Ireland. VP/RRA recommended that ComReg apply

1. an overall spectrum cap of 2 × 40 MHz across the 800 MHz, 900 MHz and 1800 MHz bands, whilst

2. also implementing a spectrum floor of 2 × 10 MHz of contiguous sub-1 GHz spectrum.

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[204] To be published.

[205]Ofcom Consultation, "Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues" - http://stakeholders.ofcom.org.uk/binaries/consultations/combined-award/summary/combined-award.pdf

[206] Paragraph 1.16 of Ofcom Consultation.

[207] Paragraph 5.73 of Ofcom Consultation.

A 6.156 VP/RRA also state that applying these two recommendations would also ensure that each of the four operators would acquire at least 2 × 10 MHz of 1800 MHz[208]. VP/RRA state that if ComReg did not apply its VP/RRA's minimum spectrum portfolio, "*the player with the weakest bidding capacity will be left with a total of only 2 × 5MHz of spectrum, located in the sub-1GHz bands*", and "*would be at a significant competitive disadvantage at competing on a network quality basis with other operators who have allocations of spectrum well above the MSP*" undermining its ability to compete in the market. VP/RRA state that such an outcome would cause such a bidder a "*risk of a total or partial market exit*", "*causing a loss of welfare to the Irish economy*".

B) Updated information from Ofcom's consultation process

A 6.157 Ofcom held a seminar on 22 May 2011 which outlined more specific details of its proposals, particularly with respect to how the minimum spectrum portfolio would work in practice.[209]

C) DotEcon's analysis

A 6.158 DotEcon's analysis on the spectrum floor proposal is detailed in Section 4.4 of its Report.[210] DotEcon state that an underlying assumption in the VP/RRA report is that "*there needs to be four national operators in the Irish mobile market*". In Section 4.4.2, DotEcon disputes VP/RRA assessment that "*a fairly symmetric four player market is essential in Ireland and as such, that the four existing mobile operators should therefore be protected."* and "*Therefore, in the context of mobile telecoms, it does not compute that more competitors result in net benefits to society through greater competitive intensity. At some point, network duplication and spectrum scarcity effects overwhelm competitive benefits.*"

A 6.159 DotEcon notes that "The competition assessment conducted by Ofcom therefore considers the effect on competition of the planned auction in the context of many other factors, which will together largely govern the use of mobile spectrum. In addition, the proposed safeguards of competition will be implemented in a market with characteristics that are uncommon in other countries. Therefore, the approach adopted in the context of the very particular circumstances in the UK at present should not be treated as a generally applicable approach to spectrum management or spectrum awards."

A 6.160 DotEcon sets out some the differences between the situation in the UK and the situation in Ireland;

- *"There is less spectrum becoming available in the UK than in Ireland over the period of the competition assessment (5-10 years from the end of the*

[208] This appears to assume that there will be only four participants in the auction.

[209] Ofcom seminar documents from 22 May 2011, http://stakeholders.ofcom.org.uk/binaries/consultations/combined-award/annexes/slides.pdf

[210] ComReg Document 11/58

*auction). This means that the competitive landscape after the auction is unlikely to change in the UK over the duration of the competitive assessment. This is not necessarily the case in Ireland."*and

- *"A significant asymmetry of spectrum holdings exists amongst existing UK operators before the auction, generating a potential motivation to ensure that this is not exacerbated as a result of the planned award. In contrast, the situation in Ireland is currently highly symmetric"*

A 6.161 DotEcon further analysed the differences between the UK and Ireland when it stated:

"*The competition assessment carried out in the UK, and the related assessment that measures to promote competition were necessary, was in the context of spectrum caps that would allow extremely asymmetric outcomes and substantial spectrum holdings of a small number of operators. This same correction is not necessary given the spectrum caps proposed in Ireland and the proposal to award all spectrum in the relevant bands."*

A 6.162 DotEcon also stated "In its competition assessment, Ofcom considered the case for ensuring 3, 4 or 5 national wholesale operators, and concluded that ensuring 4 such operators should safeguard competition over the period considered in the assessment (5-10 years). This assessment was based on an evaluation of competition, efficiency and broader social value (which it equated to widespread coverage). Each of these factors varies significantly in the case of Ireland relative to the UK, and as such, the conclusion of the UK competition assessment does not translate into a suitable prescription for the planned award in Ireland"

A 6.163 In conclusion, DotEcon concluded that "the auction rules proposed for the planned multi-band award in Ireland have been set in the context of the conditions in Ireland to ensure that the market structure going forward will be determined not by ComReg but by the competitive rivalry amongst the mobile operators themselves. The proposed spectrum caps provide protections for downstream competition in mobile services.", and "Ofcom's proposals for use of spectrum floors in addition to spectrum caps to safeguard competition in the UK vary significantly from the spectrum caps proposed in Ireland, and indeed appear to be fit for purpose in the UK case. However, Ofcom's proposals do not affect our view on the appropriateness of the auction format and rules proposed for a multi-band auction in Ireland."

ComReg's Assessment

A 6.164 ComReg concurs with DotEcon's assessment that the situations facing Ofcom and ComReg are significantly different. ComReg notes that there are important differences between the communications markets in the UK and Ireland.

A 6.165 In addition, if the proposed spectrum floor was applied, this would appear to facilitate a natural auction outcome, potentially facilitating tacit collusion with a strong possibility of the weakest bidder acquiring the reserved spectrum at the reserve prices, whilst also enhancing an inefficient outcome where the bidders

who value the spectrum the most do not access a sufficient amount (whilst remaining under the proposed spectrum cap).

A 6.166 The Report draws heavily from the report sent to Ofcom by H3GUK. ComReg would question the robustness of the consultant's findings when comparing two very different markets.

A 6.167 The use of a spectrum floor can restrict competition and efficiency in the auction and could result in a natural outcome. As stated by DotEcon in paragraph 94 of its report, "*the objective in setting spectrum caps is to preclude outcomes, and only those outcomes, that are sufficiently extreme as to harm competition*". By employing a spectrum floor, this could affect auction efficiency and spectrum could be inefficiently assigned. Such a spectrum floor could be almost equivalent to *ex ante* market partitioning by ComReg and as such would be inappropriate. Ultimately this could adversely affect competition in the market.

A 6.168 ComReg considers that its proposal to apply a 2 × 10 MHz 900 MHz cap (for the first time slice), a 2 × 20 MHz sub-1 GHz cap and an overall cap of 2 × 50 MHz best achieves its goal of only precluding outcomes which would comprise extreme asymmetries, which could in turn affect competition in the market. In light of this, ComReg maintains that its proposal is superior to the VP/RRA proposal, as it allows for some asymmetry in spectrum distribution but not so much to distort competition in the market, whilst preserving competitive tension in the spectrum award competition and allowing for an efficient outcome.

6.2 Auction Format

A 6.169 This section considers ComReg's favoured auction award process in respect of the 800 MHz, 900 MHz and 1800 MHz spectrum bands. In so doing, it firstly sets out ComReg's previously expressed view on the most appropriate format and sets out how ComReg's view of auction formats has developed in light of the views of respondents and in changing circumstances in the course of the consultation process.[211]

A 6.170 Having taken into consideration its statutory objectives ComReg presents in this annex its current position on the choice of auction format for the award of liberalised spectrum in the 800 MHz, 900 MHz and 1800 MHz spectrum band.

A 6.171 For the avoidance of doubt, this annex considers only those issues relating directly to the auction format and any comments that respondents provided that are of relevance in this regard. Respondents' views on the issues of whether an auction presents the best award method, what bands to include in any proposed auction, and the timing of any such auction are all discussed in other sections of this document.

[211] In Consultations 09/14 and 09/99, ComReg was considering the award of the 900 MHz band only. In Consultation 10/71, ComReg considered the joint award of the 800 MHz and 900 MHz bands. In Consultation 10/105, ComReg considered the multiple award of the 800 MHz, 900 MHz and 1800 MHz bands.

ComReg Position as Set Out in Consultations 08/57 and 09/14

A 6.172 In Consultation 08/57, ComReg noted that auctions are its preferred assignment method for spectrum rights of use where demand for the spectrum in question is expected to exceed supply. ComReg was of the view that, given that a substantial proportion of the 900 MHz band is currently occupied by GSM networks, the demand for the available spectrum would likely exceed supply. Accordingly, in light of the high consumer demand for mobile electronic communications services and the consequent anticipated demand for spectrum by providers of such services, ComReg's preference was to hold an auction for the available spectrum.

A 6.173 As described in Annex 3 of this document, Consultation 08/57 set out three possible "competitive award processes" which could be used to award spectrum in the 900 MHz band. Although Options B and C discussed the possibility of an "Assignment Phase" in addition to a "licence competition", no specific auction format was discussed at that time.

A 6.174 Having reviewed the responses received, ComReg, in consultation 09/14 proposed two new award processes, each of which would involve an auction. However, ComReg noted that "*the precise format of the competition is still to be decided*"[212].

A 6.175 Although ComReg had not provided any detail on the exact format of any auction that it might run, a number of respondents to Consultations 08/57 and 09/14 provided their initial views and recommendations on the auction format. These responses are discussed below.

Views of Respondents to Consultations 08/57 and 09/14

A 6.176 Of those respondents to Consultation 08/57, three (O2, Meteor and Vodafone) provided specific comments on the auction format and the features which they considered should be incorporated into the selection of an appropriate auction format. In general, respondents expressed concern that ComReg had yet to provide any details on the auction format to be used. The views of these respondents can be summarised as follows:

- ComReg had not specified the precise auction format to be used (according to Vodafone and Meteor);
- ComReg should assign spectrum in a two-stage process in which participants bid first for the amount of spectrum in the band, and secondly for the exact position in the band (according to O2);
- Any auction format used should involve a bidding process that would allow licensees to submit sets of package bids for combinations of frequency specific contiguous spectrum blocks (according to Vodafone);

[212] Section 9 of Consultation 09/14

- Some form of combinatorial auction design could be used to reduce the potential for an unfair and inefficient outcome (according to Meteor); and
- Package bidding mechanisms such as a combinatorial auction are optimal if the relevant objective is to guarantee successful bidders contiguous blocks of spectrum (according to Vodafone).

A 6.177 Further to these observations, two respondents also made specific recommendations as to the auction format that should be used.

A 6.178 O2 proposed the use of a combinatorial clock auction ("CCA") involving a principle stage and an assignment stage. O2 pointed to ease of implementation, guarantee of contiguous spectrum for successful applicants, and reduced scope for strategic bidding as reasons for its proposal.[213] Further, and in addition to its principle recommendation of a CCA, O2 suggested that ComReg should conduct a thorough study of all available options before deciding on the most appropriate auction format.[214]

A 6.179 Vodafone also provided a specific recommendation as to the auction format that should be used. In forming its recommendation, Vodafone commented that only certain types of auction could effectively address the issue of aggregation risk that may arise where bidders wish to obtain a specific "package".[215] Upon commenting that the primary objective of any auction format is to ensure the efficient use of the spectrum, Vodafone stated this required that (1) spectrum auctioned would be allocated to those users that value it most highly and; (2) successful bidders would be guaranteed contiguous spectrum blocks. Upon discussing a number of candidate auction formats, Vodafone dismissed a first

[213] *"Combinatorial Clock Auctions are proposed for both the upcoming UK and Dutch 2.6GHz auctions. They are attractive as they are relatively easy to implement and simple for participants to understand. It guarantees that all successful applicants are assured contiguous spectrum. Finally, it reduces scope for strategic bidding, as prices are automatically uniformly applied to all bidders in the proxy phase."* Page 22 of O2's response to Consultation 08/57 (09/14s)

[214] *"O2 currently believe that the above format* [CCA] *represents a good option, however, it recommends that ComReg conducts a thorough study to establish the most appropriate format. In particular ComReg might consider a simultaneous multi round auction (SMRA) if the valuation between lots is expected to be large"* page 22 of O2's response to Consultation 08/57 (09/14s)

[215] *"Only certain types of auction format, those that allow licensees to submit package bids, or that give full transparency to bidders on how other bidders are seeking to aggregate lots in a multiple round auction process (the simultaneous multiple round bidding process) effectively address aggregation risks, and ComReg has not given any assurance that these would be implemented."* Vodafone response to question 13 of Consultation 08/57 (09/14s)

sealed bid auction[216] in favour of a simultaneous multiple round ascending auction.[217]

A 6.180 In their responses to Consultation 09/14, four respondents commented specifically on the auction format that should be used (Ericsson, Meteor, Vodafone and O2). The views of those four respondents can be summarised as follows:

- Ericsson, which had not provided a response to Consultation 08/57, suggested a two-stage process - a first stage in which operators would bid for the amount of spectrum and a second stage where operators would bid for their place in the band, i.e. the specific blocks they desire.[218]
- Meteor was of the view that all details of the auction process must be consulted on before any decision is taken.[219]
- Similarly, Vodafone further commented that it could not make an informed and conclusive view on the proposals made regarding the award process in the absence of a decision on the appropriate award format.[220]
- O2 restated its comments made in response to Consultation 08/57.[221]

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[216] *"A first price sealed bid auction format involves substantial risks that the first requirement would not be achieved. In a first price sealed bid auction, the optimal level of a bid depends not only on the value that a bidder places on spectrum, but also on the expected level of competition. By providing no information about participation it is entirely possible that under this auction approach, a bidder that places a high valuation on the spectrum could be outbid by a bidder with a lower valuation, simply because the second bidder expects more competition."* Vodafone response to question 17 of Consultation 08/57 (09/14s)

[217] *"Vodafone considers that a simultaneous multiple round ascending auction with package bidding features, or a sealed bid combinatorial auction with a second price rule (such as that used by ComReg in the recent award process for block licences in the 26 GHz band) are the optimal auction format options in terms of achieving the two key requirements for the spectrum award process set out above.*
On balance Vodafone considers that the simultaneous multiple round ascending auction format is the best approach to use in a proposed spectrum award process for the spectrum in the 900 MHz band. This format offers considerable benefits in terms of transparency as it would allow bidders to see how other licence applicants would be aggregating lots over the auction rounds and would also provide information to address issues of common value uncertainty." Vodafone response to question 17 of Consultation 08/57 (09/14s)

[218] "*Ericsson would have the view that the auction should have two stages. The first stage operators would bid for the amount of spectrum they require i.e. 5MHz or 10MHz. The second stage operators would then bid for which 5MHz blocks they want. In this way the process is more transparent and potential less fractious."* Page 5 of Ericsson's response to Consultation 09/14 (09/51s)

[219] *"Meteor would submit that it would be a violation of due process for ComReg to move forward with any auction process unless the essential details had been fully and thoroughly consulted with key stakeholders."* Page 23 of Meteor's response to Consultation 09/14 (09/51s)

[220] *"...the absence of a decision on the appropriate auction format at this stage and the omission of this key information makes it difficult for Vodafone to make an informed decision and subsequently take a reasoned, rational and conclusive view on the proposal."* Page 29 of Vodafone's response to Consultation 09/14 (09/51s)

[221] "*O2 would again refer ComReg to section 6.4 of its response to consultation document 08/57. O2 would repeat its view that where auctions are required, a two-stage process should be used. There*

ComReg's Position as Setout in Consultation 09/99

A 6.181 Having considered the views of respondents to Consultations 08/57 and 09/14, ComReg outlined a number of auction formats available to it and provided a discussion of the advantages and disadvantages of each,[222] in light of DotEcon's Report[223] and, in particular, Section 6 of that report.

A 6.182 ComReg considered four potential auction formats:

- Standard simultaneous multiple-round ascending ("SMRA") auction;
- SMRA auction with augmented switching ("SMRA/AS");
- Combinatorial clock auction ("CCA"); and
- Sealed-bid combinatorial ("SBC") auction.

A 6.183 DotEcon was of the view that there were a number of major disadvantages associated with using an SMRA[224] for this spectrum award, as follows:

- SMRA's are poorly suited to dealing with aggregation risks. This would mean that bidders who bid on a combination of lots may be exposed to the risk of ending up being the standing high bidder for some but not all of the lots which they wished to win. This could lead to inefficient outcomes;
- Where bidders may bid for more than one lot and withdrawals are not permitted, an SMRA also imposes significant fragmentation risk on bidders; and
- Where bidders have an interest in specific lots, this can facilitate a collusive outcome. A typical SMRA has a high degree of transparency and it is thus relatively easy to formulate gaming strategies aimed at reducing competition and trying to establish tacitly collusive arrangements.

A 6.184 Although the addition of augmented switching to a SMRA could mitigate bidder fragmentation risks, it was not considered to be the best way to address such risks.[225] In light of, amongst other things, DotEcon's advice, ComReg was of the view that the main shortcomings of a SMRA/AS) auction format were as follows:

- The bidding process is complex;
- It is difficult for bidders to bid within their budget constraints. As all bids may be re-activated at any time during the auction due to withdrawals submitted by other bidders, it would be difficult for bidders to contract

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would be a principal stage in which bidding is for abstract lots, followed by an assignment stage where specific lots are assigned" Page 7 of O2's response to Consultation 09/14 (09/51s)

[222] See Section 12.2 of Consultation 09/99

[223] See ComReg document 09/99c

[224] See Section 6.2 of DotEcon's report – Document 09/99c

[225] See Section 6.3 of DotEcon's report - Document 09/99c

demand in response to price increases in a manner that truly reflects their budget constraints; and

- The aggregation risks associated with a standard SMRA, as noted above, also exist in a SMRA/AS format.

A 6.185 For these reasons, ComReg favoured an auction format in which bidders could make bids for packages of lots – referred to as a combinatorial auction. This auction format would eliminate the problem of aggregation risk. In addition, DotEcon noted that by making a number of mutually exclusive package bids, a bidder could fully express any preferences over complements or substitutes more easily[226]. A package bid is atomic, in the sense that it either wins in its entirety or fails in its entirety. The combinatorial auction mechanism in contrast, does not allot a bidder only part of its package bid.

A 6.186 As set out by DotEcon in Section 6 of Document 09/99c, there are two main combinatorial auction formats; a CCA and a SBC auction. The main difference between these two formats is the issue of price discovery. The desirability of a price discovery stage was analysed in detail by DotEcon in section 8.1 of its Report.[227]

A 6.187 In an open auction such as the CCA, the advantage of providing for price discovery[228] in the presence of common value uncertainty[229] may be offset if there is limited excess demand for the spectrum. DotEcon noted that where there is limited excess demand, open rounds may facilitate a non-optimal outcome where bidders tacitly coordinate behaviour in order to reduce demand. As noted by DotEcon, where there is a possibility that there will be limited excess demand then there is a case for a SBC auction in order to minimise the potential for collusive behaviour.

A 6.188 ComReg favoured the use of a SBC auction given that common value uncertainty was unlikely to be substantial for the award of 900 MHz spectrum, and that an open multiple-round combinatorial auction with price discovery (such as a CCA)

[226] For example, suppose that a bidder wants two lots, but not one, but otherwise does not care which lots it received. It can make bids for all packages containing two lots. It will either win one f these two lot packages or nothing at all.

[227] See Dotecon's Report (Document 09/99c) for further detail

[228] Price discovery involves the process of buyers and sellers arriving at a transaction price for a given quality and quantity of a product at a given time and place. It involves several interrelated concepts, among them market structure (number, size, location, and competitiveness of buyers and sellers); market behaviour (buyer procurement and pricing methods); market information and price reporting (amount, timeliness, and reliability of information); and futures markets and risk management alternatives - Department of Agricultural Economics, Oklahoma State University.

[229] Common value uncertainty occurs where bidders are faced with an uncertainty as to the market price for goods, in this instance spectrum. Each bidder can develop its own private valuation for spectrum based on its estimates of new services and costs from deploying new technology. Thus it can derive a range of prices that it may be willing to bid for spectrum. However uncertainty as to the market value potentially leaves a bidder exposed to the 'winner's curse': paying significantly more than any other participant was willing to pay for such spectrum. The application of the second price rule aims to eliminate this risk. Common value uncertainty is probably relevant to all spectrum awards to a lesser or greater extent.

might facilitate strategic behaviour or collusion by auction participants perhaps leading to a sub-optimal result.[230] Furthermore, ComReg also considered that:

- Open combinatorial auctions are more complex, slower and more costly relative to SBC auctions;
- SBC auctions may be more effective at encouraging marginal bidders to compete than an open auction (in light of potential predatory behaviour by larger participants); and
- The sealed-bid format was used in ComReg's 26 GHz auction and there is familiarity with the process and its outcomes by industry participants.

A 6.189 In light of the above considerations, and having regard to ComReg's statutory objective to promote competition through encouraging the efficient use and ensuring the effective management of radio frequency spectrum (see Annex 1), ComReg favoured proceeding with a SBC auction[231] for the award of the 900 MHz band.

A 6.190 ComReg invited views from respondents as to whether it was appropriate to select an auction format so as to ensure a competitive outcome, and also whether a SBC auction was the most appropriate auction format.[232]

Views of Respondents to Consultation 09/99

A 6.191 Six respondents (BT, Digiweb, H3GI, Meteor, O2 and Vodafone) provided their comments on ComReg's proposal to select an auction format so as to ensure a competitive outcome. Opinions amongst respondents were split - three respondents (BT, Digiweb and H3GI) favoured ComReg's proposal while three others (Meteor, O2 and Vodafone) expressed concern or disagreement with the proposal.

A 6.192 Of those respondents who agreed with ComReg's proposal to select an auction format so as to ensure a competitive outcome, comments provided included:

- The choice of auction format is very important and an appropriate format should be chosen to ensure a competitive, fair and transparent process is achieved (accoding to BT);[233]
- All reasonable steps should be taken in selecting an auction format so as to ensure a competitive outcome (according to Digiweb and H3GI).

[230] See Section 12.2.2 of Consultation 09/99

[231] Incorporating a second price rule, see page 13 of Consultation 09/99.

[232] Question 1A of Consultation 09/99 asked, *"Do you agree that ComReg should take all reasonable steps in selecting an auction format so as to ensure a competitive outcome?"*
Question 1B of Consultation 09/99 asked, "*Do you agree that a sealed bid format is the most appropriate approach in this case?"*

[233] *"We agree that the choice of auction format is very important and that an appropriate format should be chosen to ensure a competitive fair and transparent process is achieved. Given the complexities of the existing licences and the different expiry dates we consider the option that have been considered to be comprehensive."* BT response to Question 1A of Consultation 09/99 (10/21r)

A 6.193 Of those respondents who were not in agreement (either fully or in part) with ComReg's proposal to select an auction format so as to ensure a competitive outcome:

- O2 held the view that ComReg should not implement auction rules solely to increase bidding competition "*as this could only have the effect to increase the overall price paid for spectrum*."[234]
- Although Meteor agreed with ComReg that the award process should promote competition, it maintained that it was not possible to establish an efficient and proportionate auction format in the context of the 900 MHz band. Meteor also commented that if an auction were to be chosen, then the mechanism must be such that there was the best opportunity for a fair and balanced outcome to be realised.[235]
- Vodafone expressed its opposition to ComReg's proposal for a full band auction of the 900 MHz band.[236]

A 6.194 The same six respondents also commented on ComReg's specific proposal to implement a SBC auction. Two respondents (Digiweb[237], H3GI[238]) agreed with ComReg's proposal, one BT[239] expressed no strong view either way, whilst three respondents (Meteor, O2 and Vodafone) expressed concern or disagreement with the proposed auction format.

A 6.195 Two of the respondents who disagreed with ComReg's proposal, namely Vodafone and O2, argued against ComReg's main reasons (set out in Consultation 09/99) for proposing a SBC auction – namely ComReg's view that

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[234] "*Where auctions are used, the aim of the process should be to decide the outcome in an efficient manner, which would not mean deciding on the assignments at the highest price, but the lowest price that achieves the legitimate objective. The level of competition at an auction will be dictated by the number of lots available, the number of bidders and their demand for the lots, and in addition any particular rules in the auction. It would be wrong for ComReg to implement auction rules solely to increase the bidding competition as this could only have the effect to increase the overall price paid for the spectrum. If there was not an excess demand for the available spectrum, then it would not be necessary to hold an auction at all, and engineering the process to increase the overall price paid is contrary to ComReg's statutory objectives."* O2 response to question 1A of Consultation 09/99 (emphasis added) (10/21r)

[235] *"Meteor believes that the award process for the 900 MHz band should promote a competitive environment in mobile markets...Meteor fundamentally disagrees that an efficient and proportionate auction format can be established in the context of 900 MHz spectrum...However, if ComReg can establish a legitimate basis for an auction, the auction mechanism chosen must have the best opportunity to realise a fair and balanced outcome, taking into consideration all of the relevant circumstances."* Meteor response to question 1A of Consultation 09/99 (10/21r)

[236] *"No. Irrespective of the auction format used, Vodafone is opposed to ComReg's current proposal to auction 2 × 35 MHz of spectrum in the 900 MHz band."* Vodafone's response to question 1A of Consultation 09/99 (10/21r)

[237] "*Digiweb agrees with the approach"* Digiweb's response to question 1B of consultation 09/99 (10/21r)

[238] "*Yes, a sealed bid format is the most appropriate approach in this case"* H3GI's response to question 1B of Consultation 09/99 (10/21r)

[239] "*We tend to agree that a combinatorial auction format would be the best choice in the circumstances, but do not have a firm view as to whether an open or sealed bid format is best in the circumstances."* BT response to question 1B of Consultation 09/99 (10/21r)

common value uncertainty was likely to be relatively low, and that an open format with price discovery would raise concerns around the potential for strategic behaviour or collusion by auction participants. The views expressed by each of these two respondents are discussed in relation to each of these two issues, below:

A 6.196 Common value uncertainty is likely to be relatively low:

- O2 asserted that bidders would be expected to develop valuations for a total 19-year period though there is a significant degree of uncertainty as to future requirements for data capacity and other factors relevant to the valuation.[240]
- Vodafone asserted that there is "considerable" common value uncertainty in relation to 900 MHz spectrum. Vodafone referred to uncertainty relating to future economic and technological conditions, future trends in service demand, revenues and margins, cost efficiencies likely to be achievable, and the likely evolution of factors driving spectrum valuation beyond the first 3 – 4 years.
- Vodafone also commented that the valuation problem would be even more acute for potential new entrants who would not have any practical experience of operating in the Irish market.

A 6.197 An open, multiple round combinatorial auction may facilitate strategic behaviour:

- O2 stated that ComReg had not given any evidence to support its contention that there was a likelihood of coordination between bidders and as such O2 did not believe this to be a valid consideration.[241]
- Vodafone commented that specific measures could be included in auction rules in an open auction format so as to ensure that scope for collusion or strategic behaviour could be minimised. They quoted the example of a CCA with a second price rule.[242]

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[240] *"Bidders will be expected to develop valuations for a total 19-year period, and future predictions regarding network data capacity among other things can have a significant impact on the value operators will place on the spectrum. There is a significant degree of uncertainty surrounding this future requirement for data capacity and other factors relevant for the valuation. It is incorrect to say that there would be no common value uncertainty for this spectrum."* O2's response to question 1B of Consultation 09/99 (10/21r)

[241] "*ComReg has not given any evidence to support the belief that there would be coordination between bidders and O2 does not believe that this is a valid consideration – coordinated bidding will be prohibited, regardless of what auction method is used. It seems instead that ComReg is concerned to ensure that there is contention in the bidding so as to ensure that the overall revenue raised by the process is significant."* O2's response to question 1B of Consultation 09/99 (10/21r)

[242] "*Vodafone also rejects DotEcon and ComReg's view that the minimisation of incentives for collusion by participants in any 900 MHz auction justifies the selection of a SBC auction format over a CCA format or a SMRA format with package bidding features. Vodafone considers that specific measures can be included in the auction rules that can ensure that the scope for collusion or strategic behaviour on the part of auction participants is minimised in an open auction format such as the CCA format with a second price rule. In particular, Vodafone considers that the anonymisation of bidder identities during the auction and a requirement that bids can only be raised in fixed increments (of say €50,000 or €100,000) to avoid any potential for signalling through bid prices would minimise any*

A 6.198 Furthermore, of the three respondents who disagreed with ComReg's proposal (Meteor, O2 and Vodafone) additional objections given by them included:

- The SBC auction design would create incentives for strategic and non-truthful bidding, leading to sub-optimal spectrum distribution and would risk distorting competition in the mobile market (according to Meteor);
- A single-round sealed bid auction is inherently lacking in transparency and eliminates the possibility of price discovery (according to O2);
- The choice of a SBC auction format is inconsistent with minimising the probability of one or more of the existing licensees failing to obtain any 900 MHz spectrum, where common value uncertainty is present (according to Vodafone).

A 6.199 Two respondents to Consultation 09/99 (O2 and Vodafone) further emphasised that a SBC auction would not be appropriate due to the single sealed bid element. Instead they favoured an alternative format which would allow incumbent operators the ability, if they chose, 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.

A 6.200 Vodafone commented: "The choice of a SBC auction format is inconsistent with minimising the probability of one or more of the existing licensees failing to obtain any 900 MHz spectrum, where common value uncertainty is clearly present".[243] Similarly O2 commented, "Given the importance of continuity of a mobile communications service to consumers and to the Irish economy, it is incomprehensible that ComReg has proposed a solution that carries a real risk of widespread disruption to this service."[244]

A 6.201 Vodafone noted how the price discovery element of an open auction would help alleviate this uncertainty, "...information provided during other auction format such as CCA allow bidders 'the opportunity to revise their business case during the auction"[245]. Furthermore, Vodafone expanded on this issue stating: "Vodafone considers than an open auction format achieves essentially all of the objectives for an appropriate auction design...while reducing significantly the probability of existing licensees losing access to 900 MHz spectrum (relative to the use of the SBC auction format)."[246]

A 6.202 The three respondents who did not agree with ComReg's proposal for a SBC auction (Meteor, O2 and Vodafone) all proposed alternative open auction formats, arguing that such an approach would be more appropriate given the circumstances:

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scope for strategic or collusive behaviour that may exist." Vodafone's response to question 1B of Consultation 09/99 (10/21r)

[243] Vodafone's response to question 1B of Consultation 09/99 (10/21r)

[244] Page 7 of O2's response to Consultation 09/99 (10/21r)

[245] Vodafone's response to question 1B of consultation 09/99 (10/21r)

[246] Vodafone's response to question 1B of Consultation 09/99 (10/21r)

- Meteor considered that the use of a CCA, or a variant of the SBC auction that used a proxy bidding process for winner determination based on rational pay-off maximisation, would be more appropriate, if an auction could be legitimately justified (which it believed it could not).[247]
- O2 restated its view that a multi-round auction would be more suitable and also referred to DotEcon's analysis in this regard.[248]
- Vodafone considered that an open auction format would achieve all of the objectives for an appropriate auction design, concluding that a CCA or SMRA should therefore be adopted.[249]

ComReg's Position as Set out in Consultation 10/71

A 6.203 In Section 4.4 of Consultation 10/71, ComReg set out its views on the choice of auction format specifically taking account of the views of respondents and upon consideration of the impact of adding the 800 MHz band to the proposed award process.

A 6.204 ComReg had previously favoured a SBC auction format over a CCA since it was presumed that common value uncertainty was likely to be relatively low and that an open format would raise concerns around the potential for strategic behaviour or collusion by auction participants. However, in Consultation 10/71, ComReg reconsidered its position regarding the appropriate auction format having considered the views of respondents to Consultation 09/99, the inclusion of the 800 MHz band, and DotEcon's updated[250] analysis.

A 6.205 The responses to Consultation 09/99 yielded some significant insights. First, a number of respondents noted that there would be common value uncertainty amongst bidders due to uncertainty surrounding future requirements and economic and technological conditions. These respondents argued that the price discovery element of an open auction could help alleviate the uncertainty surrounding business continuity in a situation where they may otherwise only be able to submit a one shot bid in a sealed auction. Secondly, two respondents (O2 and Vodafone) further commented that the SBC auction format could result in existing licensees failing to obtain any 900 MHz spectrum.

A 6.206 ComReg further noted that the potential award of 800 MHz spectrum along with 900 MHz spectrum, through a joint award process, could increase the scope for

[247] Meteor's response to question 1B of Consultation 09/99 (10/21r)

[248] *"O2 has previously stated its view that a multi-round auction would be more suitable. In fact DotEcon's own analysis (reproduced in table 4 of the consultation document) shows that a combinatorial clock auction would be the most suitable method."* O2's response to question 1B of Consultation 09/99 (10/21r)

[249] *"Vodafone considers that an open auction format view achieves essentially all of the objectives for an appropriate auction design as set out by DotEcon in section 6.1 of its report while reducing significantly the probability of existing licensees losing access to 900 MHz spectrum (relative to use of the SBC auction format). An open auction format such as CCA or SMRA should therefore be adopted in any competitive allocation process for the allocation of the 900 MHz spectrum."* Vodafone's response to question 1B of Consultation 09/99 (10/21r)

[250] As set out in DotEcon's Report (Document 10/71a).

additional bidders in the auction. ComReg noted that by increasing the amount of substitutable spectrum available (thirteen blocks of 2 × 5 MHz rather than seven blocks), this would provide appreciably greater opportunities for current licence holders as well as new entrants to gain access to spectrum. ComReg expressed the view that there no longer appeared to be a likely natural outcome as there may have been with the 900 MHz band alone.[251] Furthermore, with the inclusion of the 800 MHz band, ComReg noted that there was a much wider range of potential outcomes that could occur as bidders could opt for either or both the available bands.

A 6.207 DotEcon also re-evaluated its analysis on the auction format in light of the responses to Consultation 09/99. DotEcon determined that the open format of the CCA would address respondents' concerns surrounding price discovery. However, DotEcon remained of the view that there may be risks of weak competition in the open format of the CCA and thus risk of collusive behaviour. DotEcon noted that this risk could be reduced by ensuring that there was limited transparency in the auction, relatively high minimum prices, and the use of a second price rule.

A 6.208 In addition, DotEcon provided detail on the 'relative cap' activity rule[252] to be implemented as part of the CCA. DotEcon suggested that use of this rule would ensure that there would be a simple strategy that bidders could adopt to ensure that in a supplementary bidding round, which would occur after the primary rounds, they could win the number of blocks that they remained in contention for at the end of the primary bidding rounds.[253] This 'relative cap' activity rule, in addition to the price discovery element of the CCA, was proposed to alleviate any remaining concerns regarding business continuity risks in the absence of administrative assignment of spectrum.[254]

A 6.209 In summary, DotEcon was of the view that a CCA with limited transparency, relatively high minimum prices, a second price rule and a relative cap activity rule would be the most appropriate auction format and rules to mitigate business continuity risks and reduce incentives for tacit collusion as well as strategic demand reduction.[255]

A 6.210 Having considered the views of respondents to Consultation 09/99, the inclusion of the 800 MHz band, and DotEcon's analysis, ComReg set out its view that an open CCA format (with second price and relative cap activity rules) appeared to be more appropriate than a sealed bid auction for this award, given the circumstances.

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[251] Section 4.1.1 of Consultation 10/71

[252] The relative cap activity rule refers is discussed in detail on page 13 of Dotecon's Report (10/71a). It was developed by DotEcon and Ofcom for the CCA for use in the planned UK 2.6GHz auction].

[253] See Section 2.2.2 of DotEcon's Report (Document 10/71a) for detail

[254] *"Rather than having caps on supplementary bids based on eligibility points, caps on these bids would be determined by a 'relative' activity rule similar to that used in the recent 2.6GHz auction in Denmark...This activity rule in necessary to address the concerns about business continuity by permitting strategies that can guarantee winning a minimum amount of spectrum provided existing operators are prepared to bid accordingly."* Section 2.2 of Dotecon's Report (Document 10/71a)

[255] In Section 2 of DotEcon's Report (Document 10/71a)

A 6.211 In summary, the main features of the proposed open CCA[256] were as follows:

- The auction would consist of a main stage comprising both primary bid rounds during which bidders bid on the quantity of spectrum in each band and a single round during which supplementary bids can be made by bidders. Bidding in the main stage would be for generic lots. The main stage would determine the amount of spectrum won in each band.
- The main stage would be followed by an assignment stage during which bidders would bid on the location of spectrum assignments.
- After the assignment round has ended and bids in this round have been processed, bidders would be informed of the specific frequencies awarded to them in each time category along with those awarded to all other winners.
- To deal with business continuity risks, the auction would also use a relative activity rule which would enable bidders to make a 'knock out' bid to ensure they win a particular package (for which they remained in contention at the end of the final primary bid round).
- The auction would be run with restricted transparency of other bidders bidding behaviour during the auction, revealing information about aggregate demand, but not individual bids, during the primary bid rounds.
- The auction would allow for a high level of transparency of the auction itself, and all results and calculations will be verifiable after the auction has been completed.

A 6.212 ComReg invited respondents to provide their views on the proposed CCA format.[257]

Views of Respondents to Consultation 10/71

A 6.213 Of the eleven respondents to Consultation 10/71, six respondents (Digiweb, eircom, H3GI, O2, UPC and Vodafone) agreed with ComReg's proposal to use an open CCA format for the proposed joint award of 800 MHz and 900 MHz spectrum while the remaining five respondents did not express a view on ComReg's proposal.[258]

[256] See DotEcon's report (Document 10/71a)
[257] Q12 of Consultation 10/71 - *"Do you agree with ComReg's proposal to use an open combinatorial clock auction format for this auction? Please provide reasons for your view"*
[258] In response to Q12 of Consultation 10/71 five respondents did not express a view on ComReg's proposal:
Ericsson – "*Ericsson does not wish to offer any opinion in relation to this proposal"*
ESB Networks – *"ESBN has no views on this process..."*
Qualcomm – *"Qualcomm would like to limit its current response to mobile broadband market, technology and spectrum policy considerations."*
RTÉ and RTÉNL – *"No comment"*
Imagine provided no response.

A 6.214 The three respondents (eircom, Vodafone and O2) who had previously opposed ComReg's choice of a SBC auction format now supported ComReg's new proposal for a CCA as proposed in Consultation 10/71. The comments provided by respondents in favour of ComReg's proposal can be summarised as follows:

- the proposed CCA is superior to the design proposed by ComReg in 09/99 and addresses the concerns that arose in respect of strategic bidding incentives (eircom)
- The proposed CCA with supplementary and assignment stages whilst retaining the second price rule appears to address the main objectives of an auction; (O2)
- We strongly welcome the current proposed auction format and believe that it must be incorporated in ComReg's final licensing decision; (Vodafone)
- Significant common value uncertainty favours the choice of a CCA over a SBC auction format; (Vodafone)
- Any potential for tacit collusion in the context of an award process exclusively for 900 MHz spectrum is further reduced in the context of a multi-band award process for sub-1 GHz spectrum. (Vodafone)

A 6.215 Specifically with regard to the relative cap activity rule, respondents also commented as follows:

- The CCA format in conjunction with the relative cap activity rule provides greater safeguards against unintentional loss of business continuity; (eircom)
- O2 welcomed clarification from DotEcon that by adopting a specific bidding strategy, a bidder could be guaranteed not to be outbid in the supplementary round for lots where it was the highest bidder in the primary round; (O2)
- Use of a CCA format when combined with the relative cap activity rule described by DotEcon must be retained in any final decision. (Vodafone)

ComReg's Position as Set out in Consultation 10/105

A 6.216 In Consultation 10/105, in which ComReg proposed the addition of the 1800 MHz spectrum band to the joint award of the 800 MHz and 900 MHz bands, ComReg was of the view that the same auction format as proposed in Consultation 10/71 (an open CCA[259]) should also be used in the multiple award of the 800 MHz, 900 MHz and 1800 MHz bands.

A 6.217 DotEcon's recommendation, as outlined in Section 3 of Document 10/105a, was that the CCA as proposed in its previous Report (Document 10/71a) was still the

[259] As described in previous Consultations and as set out in detail in DotEcon's Reports (Documents 09/99c and 10/71a)

most appropriate even with the inclusion of 1800 MHz into a spectrum release with 800 MHz and 900 MHz spectrum.

Views of Respondents to Consultation 10/105

A 6.218 Only one respondent, Meteor, referred to the proposed auction format reiterating its support for ComReg's proposal stating, "ComReg has significantly reduced the risk of collusion by the design of the auction by proposing the use of a combinatorial clock auction in conjunction with a second price algorithm."[260]

DotEcon's Current Position

A 6.219 DotEcon present its current position in Section 6.3 of its Report (Document 11/58). In this Report, DotEcon state "Based on our own assessment and on the view of respondents, we consider that the use of the CCA format, and the use of relative caps for constraining supplementary bids, are uncontested aspects of the proposed award process". DotEcon consider this auction format the most appropriate of the multiband release of 800 MHz, 900 MHz and 1800 MHz spectrum.

ComReg's Current Position

A 6.220 Having taken into account its statutory objectives, the views of respondents throughout this consultation process and advice provided by DotEcon, ComReg is of the view that a CCA format would be the most appropriate auction format for a multiple award of the 800 MHz, 900 MHz and 1800 MHz bands. The proposed CCA has the following important features:

- a multiple round auction process to allow for price discovery;
- a combinatorial format to allow bidders to bid for packages of spectrum;
- allowing only limited transparency regarding the bidding behaviour of bidders in the auction to reduce the risk of tacit collusion and strategic demand reduction that may otherwise occur;
- use of eligibility points in the primary bid rounds such that bidders cannot increase the number of lots they bid for in a time category from one primary bid round to the next;
- using a supplementary bids round to allow bidders to bid for all packages of interest to them and to do so without fixed bid increments, allowing bidders to express their exact valuations;
- adopting activity rules in the supplementary bids round that implement relative caps based on the preferences expressed by bidders during the clock rounds to mitigate business continuity concerns; and

[260] Page 22 of Meteor's response to Consultation 10/105 (11/10)

- using a second price rule for spectrum to control incentives for strategic demand reduction.

6.3 Temporal Lots Proposals for the 800 MHz, 900 MHz and 1800 MHz Bands

A 6.221 This section:

- summarises ComReg's previous consideration of and proposals for the use of temporal lots for the award of liberalised rights of use in the 800 MHz, 900 MHz and 1800 MHz bands, as set out in Consultations 08/57, 09/14, 09/99, 10/71 and 10/105;
- considers the views of interested parties on each of these proposals and other relevant material; and
- concludes with ComReg's current position with regard to this issue.

Summary of ComReg's Previous Proposals

A 6.222 In Consultation 08/57 (Section 7.3.2) ComReg proposed that all new licences issued in the 900 MHz band should be for a minimum duration of between 10 to 15 years and have a common termination date. Question 7 and 8 of that consultation sought views on this proposal.

A 6.223 Consultation 09/14 (Section 6.3.1) set out ComReg's revised proposals including, in particular, ComReg's view that a licence duration of 15 years would be appropriate for all new licences issued in the 900 MHz band. In addition, it was noted that while the benefits of licence co-termination were widely acknowledged, the practical issues[261] were such that ComReg was not in a position at that time to promote licence co-termination. ComReg stated that it would revisit this issue in light of the responses received to consultation 09/14.

A 6.224 In Consultation 09/99 (Section 12.2.3), in light of the analysis set out in DotEcon's Report 09/99c (Section 7), ComReg proposed a time-disaggregated packaging approach, where licences would be issued in two temporal lots.

- The first temporal lot would run from 2011 to 2015. Its commencement date would be based upon the licence expiry date of Vodafone and O2's GSM 900 MHz licences, while its expiry date would be based upon the licence expiry date of Meteor's GSM 900 MHz licence.
- The second temporal lot would commence immediately after the end of the first time slice and would run from 2015 to 2030. Its duration would be based upon ComReg's proposal that licences be issued for 15 year duration.

[261] Vodafone and O2's GSM 900 MHz licence had a licence expiry date of 2011, while Meteor's licence has a licence expiry date of 2015.

A 6.225 As noted by DotEcon in Section 7.5 of Document 09/99c, a time-aggregated packaging approach (i.e. a single temporal lot) in the 900 MHz band may lead to competition for some lots being muted, as for example, Meteor would be unable to compete for spectrum blocks prior to its GSM licence expiry date of 2015 due to the proposed spectrum cap of 2 × 10 MHz, unless Meteor was to return at least part of its spectrum assignment. In contrast, DotEcon noted that the main benefit of using a time-disaggregated approach (i.e. two temporal lots) is that competition in the second time slice would not be impacted by the existing GSM 900 MHz licences, as all existing licences would expire within the first time slice, thus leaving all lots in the second times open for all bidders. In addition ComReg noted (Section 8.1.4 of Consultation 09/99) that this approach would ensure that all new licences issued would terminate on the same date. Consultation 09/99 did not ask a specific question in relation to this proposal but instead invited comments on ComReg's overall spectrum release approach as proposed in that consultation.

Consultation 10/71

A 6.226 In Consultation 10/71, ComReg proposed to release liberalised 800 MHz spectrum in a joint award with liberalised 900 MHz spectrum and Section 4.3 of Consultation 10/71 discussed temporal lots in light of this proposal.

A 6.227 In considering the appropriate lot structure for the award of liberalised 800 MHz spectrum, ComReg noted that, while there are a number of packaging options available, the two most practical options for the 800 MHz band appeared to be:

- in two temporal lots mirroring the proposed time periods for 900 MHz lots; or
- in one temporal lot spanning the time period from some common start date (early 2013 was the envisaged start date) to the proposed final termination date of the 900 MHz licences.

A 6.228 DotEcon considered this issue in section 4.2.1 of Document 10/71a and noted that "the main benefit of creating the same times slices for 800 MHz spectrum [as for 900 MHz spectrum] would be that this would create flexibility for bidders to have different mixes of 800MHz and 900MHz spectrum in the two time slices". DotEcon noted that the relative cost of 800 MHz and 900 MHz might differ across the two time slices, and bidders may wish to pursue strategies that would not be possible if 800 MHz and 900 MHz spectrum did not have the same time slices.

A 6.229 In order to realise the benefits of a combined auction including substitutable spectrum, DotEcon recommended that the 2 temporal lot approach proposed by ComReg for liberalised 900 MHz spectrum also be applied to the award of liberalised 800 MHz spectrum.

A 6.230 In addition, the commencement date of spectrum in the 800 MHz and 900 MHz bands was considered by DotEcon in Section 4.2.1 of Document 10/71a where DotEcon noted that a common start date of 2013 across both spectrum bands

appeared more attractive than one where spectrum in the 900 MHz band was released from May 2011 and spectrum in the 800 MHz band was released in 2013.

A 6.231 After due consideration of the issue and DotEcon's analysis and recommendation, ComReg formed the view that the two temporal lots approach (mirroring that proposed for 900 MHz spectrum) would be the preferable option for the award of liberalised 800 MHz spectrum. Whilst it was noted by ComReg that such an approach would involve greater complexity than a single lot approach, it was considered that this disadvantage would be outweighed by the benefits of allowing bidders to pursue more refined strategies in the proposed joint award.

A 6.232 ComReg then invited views from interested parties on its temporal lot proposal for the 800 MHz band as follows:

> Q. 11. (from ComReg Consultation 10/71) 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.

Consultation 10/105

A 6.233 In Consultation 10/105, ComReg proposed including the 1800 MHz spectrum band in its joint award of the 800 MHz and 900 MHz bands and Section 3.4 of Consultation 10/105 discussed temporal lots in light of this proposal.

A 6.234 In considering the appropriate temporal lot packaging approach for liberalised 1800 MHz spectrum, ComReg's analysis focused on the two following issues:

- whether there should be a common start date for all liberalised licences in the 800 MHz, 900 MHz and 1800 MHz bands; and
- in light of this issue, whether there should be a 2 temporal lot approach or 3 temporal lot approach for the 1800 MHz band.

A 6.235 In relation to the first issue, ComReg stated in Consultation 10/105 that, on balance, the joint availability of 1800 MHz spectrum with sub-1GHz spectrum (in early 2013) is reasonable, appropriate and justified in the context of ComReg's statutory functions, objectives and duties.

A 6.236 In relation to the second issue, ComReg noted that, given the different expiry dates of existing GSM 1800 MHz licences[262], there appeared to be two possible temporal lot approaches for all spectrum bands in the award, being:

- 3 temporal lots:

[262] There are currently three existing GSM 1800 MHz licences and, while all of these have 15 year durations, the expiry dates differ. Two of these licences (being those of Vodafone and O2) are due to expire on 31 December 2014, whilst the other licence (Meteor) is due to expire on 12 July 2015.

- Early 2013 - 31 December 2014;
- 1 January 2015 – 12 July 2015; and
- 13 July 2015 – 12 July 2030; or
- 2 temporal lots based on ComReg's 800 MHz and 900 MHz temporal lot proposal in Consultation 10/71:
- Early 2013 – 12 July 2015; and
- 13 July 2015 - 12 July 2030.

A 6.237 Whilst both approaches would enable bidders to switch between bands fluidly, DotEcon's analysis (Section 2.3 of Document 10/105a) of the three temporal lot approach indicated that:

- there would be considerably increased complexity in the 3 temporal lot approach relative to the 2 temporal lot approach. In particular, applying the 3 temporal lot approach across all the spectrum bands would significantly increase the different combinations of bids that bidders could make, and would therefore increase the complexity for bidders deciding how to bid; and
- a risk arises that an operator may have to change frequencies in advance of the second time slice (1 January 2015 – 12 July 2015) and again in advance of the third time slice (from 13 July 2015 onwards).

A 6.238 Additionally, DotEcon noted that the two temporal lot approach raised a transitional issue where the Vodafone and O2's existing GSM 1800 MHz licences would terminate approximately 6 months before the start date of any new licence issued in the 1800 MHz band. DotEcon considered that such transitional issues were fairly modest compared with the benefits of the simpler approach and DotEcon concluded that a two temporal lot solution for the 1800 MHz band, to mirror the temporal lots of the 800 MHz and 900 MHz bands, was its preferred option.

A 6.239 Having considered DotEcon's view and the submissions of respondents on this issue, ComReg formed the view that the above two temporal lot approach was its preferred option.

A 6.240 ComReg noted that, unlike the three temporal lot approach, the two temporal lot approach presented a potential interim GSM 1800 MHz rights of use issue,[263] which might arise in the event that Vodafone and/or O2 won liberalised rights of use in the 1800 MHz band in second time slice and wished to continue to provide a GSM service between 1 January 2015 and 12 July 2015 and these operators:

- did not avail of the proposed 1800 MHz early liberalisation option as set out in section 3.7 of Consultation 10/105; and

[263] See Annex 6.5 of this document for ComReg's current position on the issue of the possibility of interim GSM 1800 MHz rights of use.

- did not acquire sufficient liberalised spectrum in the first temporal lot to allow them to continue to provide a GSM service during this 6½ month period.

A 6.241 Overall, ComReg was of the view, in Consultation 10/105, that the two temporal lot approach was the better approach by which to meet ComReg's statutory objectives and therefore proposed to use this approach in the joint award.

A 6.242 ComReg invited views from interested parties on the above proposal as follows:

> Q.3. (from ComReg Consultation 10/105) Do you agree with ComReg's proposal to use two temporal lots as proposed for the sub-1GHz spectrum, namely early 2013 – 12th July 2015 and 13th July 2015 – 12th July 2030, in the joint award including the 1800 MHz band? Please give reasons for your view.

Views of Interested Parties and other Relevant Material

A 6.243 The following sets outs the views of respondents received on ComReg's temporal lot proposals and, in particular, the responses received to the specific consultation questions contained in Consultations 10/71 and 10/105.

Responses to Consultation 10/71

A 6.244 ComReg received ten responses to Question 11 of Consultation 10/71. The respondents had diverging views on ComReg's two-temporal lot proposal for the 800 MHz and 900 MHz bands. In that regard:

- three respondents (Ericsson, ESB, RTE) supported ComReg's proposal;
- a further three respondents (H3GI, Meteor, O2) supported the temporal lot proposal but without prejudice to their preferred respective spectrum release proposals[264];
- one respondent (UPC) favoured a two temporal lot approach for the holders of 900 MHz spectrum, but a single temporal lot for New Entrants;
- two respondents (Vodafone, Digiweb) favoured temporal lots only in respect of the 900 MHz band; and
- the remaining respondent (Qualcomm) did not favour temporal lots in any form and in reply to Question 19 proposed that the 900 MHz blocks

[264] See Annex 3 and Chapter 3 of this document (RIA) which reviews these three alternative proposals

are released in lots with three different start dates – available immediately following the auction, 2013, and 2015.[265]

A 6.245 Respondents supportive of ComReg's proposal were broadly of the view that it would allow bidders to pursue more refined bidding approaches in the auction, which would likely result in an efficient allocation of spectrum.

A 6.246 Those respondents who expressed conditional support did not provide any specific comments on the temporal lots proposal.

A 6.247 In relation to those respondents who did not support ComReg's proposal, Vodafone indicated that, as there are no existing mobile licences with differing termination dates in the 800 MHz band, it does not believe that there is any justification for replicating the 900 MHz temporal lot structure for the 800 MHz band. It believed that the temporal lots approach should be confined to the 900 MHz band.

A 6.248 Qualcomm, which did not favour using temporal lots at all, submitted that the use of two temporal lots for the 900 MHz band may lead to an increase in the amount of potential transitions in the band which may in turn hamper the development of services.

Responses to Consultation 10/105

A 6.249 ComReg received three responses to Question 3 of Consultation 10/105. In varying degrees, all three respondents supported ComReg's proposal for a two temporal lot approach for the 1800 MHz band.

- One respondent, Meteor, supported ComReg's proposal for the reasons set out in Consultation 10/105;
- Another respondent, Vodafone, supported ComReg's proposal for a two temporal lot approach to the 1800 MHz band but also submitted its own "potential modified auction approach" (as discussed below) as to how ComReg's proposed auction could be modified to address the timing issue arising from the different expiry dates of existing GSM 1800 MHz licences. In addition Vodafone reiterated its arguments, as submitted in its response to Consultation 10/71, in support of a single temporal lot for the 800 MHz band; and
- The final respondent, O2, supported ComReg's proposal to release the 800 MHz, 900 MHz and 1800 MHz in two temporal lots if it were to proceed with a single joint award.[266] It was of the view that three temporal lots would complicate the auction process unnecessarily.

[265] Note: This proposal issue is not considered any further given ComReg proposal for the advanced commencement of liberalised licences in Chapter 7 of this document.

[266] ComReg notes that O2's preference was for the 1800 MHz band to be released at a later date alongside the 2.6 GHz band, and potentially the 2.3 GHz band. This alternative spectrum release proposal is addressed in Annex 3 and Chapter 3 of this document.

Vodafone's Proposed 'Modified Auction Approach'

A 6.250 In its response to Consultation 10/105, Vodafone proposed a "modified auction approach" which, subject to the agreement from each existing licensee, would involve the 'buy out' of the tail period of all existing GSM licences such that these licences would all expire in early 2013. As a result the expiry dates of all existing GSM licences would dovetail exactly with the commencement date of new licences issued in the award process.

A 6.251 Vodafone argued that its "modified auction approach" would allow for a major simplification in the design of the joint award and would have the benefit of;

- removing the requirement for two temporal lots, as single licences could be issued in the three spectrum bands from 2013 until 2030;
- eliminating the "*problematic issue of a potential 6 ½ month gap*" between expiry of Vodafone and O2's existing GSM 1800 MHz licences and the beginning of new licences in the second temporal lot; and
- ensuring "full availability for auction of the entirety of each spectrum band from early 2013 on a liberalised basis" and thus removing the need for the early liberalisation option.

A 6.252 Vodafone proposed that the amount paid to each licensee to 'buy out' the residual term would be derived by the final price realised for spectrum in the auction, adjusting for the 2 to 2 ½ year shortening, and that this methodology would have to be detailed in advance of the auction. In addition, Vodafone proposed that the 'buy out' price would be paid, where possible, in the form of a discount from the up-front price for new licences successfully bid for.

A 6.253 Vodafone noted that in order for this auction approach to be feasible, it would be necessary to obtain the consent of each of the relevant licensees (Vodafone, O2 and Meteor) to shorten the duration of their existing licences, and it urged ComReg to contact these licensees and determine whether the necessary consent would be forthcoming to render its 'modified auction approach' feasible.

A 6.254 In the event that unanimous consent could not be achieved, Vodafone proposed that ComReg should implement its current broader spectrum release proposal.

DotEcon's Latest Advice and Recommendations

A 6.255 In Section 8 of DotEcon's latest report to ComReg Document 11/58, DotEcon provide their views on

- Two time-slice proposal;
- Single time slice for the 800 MHz band; and
- One time slice for all bands with spectrum buy-out.

Two time-slice proposal

A 6.256 Section 8.2.1 of Document 11/58 sets out the background to the two time slice proposal as discussed in DotEcon's previous reports and ComReg's previous consultations.

A 6.257 The respondents' views received to these proposals is set out in Section 8.2.2 of Document 11/58 and Section 8.2.3 of Document 11/58 sets out DotEcon's commentary in light of these views.

A 6.258 DotEcon states from the outset that to maintain the substitutability between different bands, it is necessary to have common temporal lots.

A 6.259 DotEcon previously outlined the potential for a two or three time slice spectrum release, and evaluates the benefits of both options.

A 6.260 Some respondents argued against DotEcon's analysis, with DotEcon summarising the dissenters by stating that: "Some respondents objected to the whole award process or the temporal packaging in general but, while upholding their general objections, preferred the two-time-slice option over the three-time-slice option"

A 6.261 DotEcon considered that no respondent was in favour of the three time slice option as opposed to the two time slice option, and set out its view in section 8.2.2.

A 6.262 DotEcon at this point evaluated two other options presented by respondents, as outlined in b) and c) below.

b) Single time slice for the 800 MHz band

A 6.263 DotEcon state that in response to Consultations 10/71 and 10/105:

A 6.264 "Some respondents argued that 800MHz spectrum should be awarded in a single temporal lot, as there are no existing licences in that band"

A 6.265 DotEcon recognise that offering spectrum in one time slice only from 2013-2030 would make bidding somewhat simpler in the auction, but note that this benefit is limited for the following reasons (section 8.2.3):

- *"If a bidder were to bid on 800MHz spectrum only, it would benefit from only making bids for lots in one time slice. However, in the alternative scenario where there were two time slices in this band, to place the same bids as in the one time-slice case it would simply need to include in its bids two time slices rather than one for the number of lots it wished to bid for. Therefore, provided the auction format allows for package bidding, this is more a benefit of convenience than simplicity"*
- *"If a bidder were to bid on spectrum in bands other than the 800MHz band, it would need to express its demand for these lots across the two proposed time slices anyway"*

A 6.266 DotEcon consider that there are different drivers of demand for spectrum given an operators current situation, and, "if it is considered that 800MHz and 900MHz spectrum are substitutes (a point on which there is general agreement), compared with the two time-slice option for all bands, bidders will be significantly limited in the bids they can place for sub-1GHz spectrum"

A 6.267 DotEcon provide an example evaluating one potential outcome and state in section 8.2.3 that "As a general principle, all substitutable bands should be provided using the same time-slices if flexibility is to be maximized and the auction process allowed to explore a full range of potential alternative outcomes"

A 6.268 DotEcon come to the conclusion that a bidder interested in wining spectrum for the whole period from 2013 – 2030 can overcome the additional complexity of the two-time slices for 800 MHz spectrum by bidding on 800 MHz spectrum in both time slices, and also state that *"given the limited benefit of packaging 800MHz spectrum in one time slice we consider that, on balance, the two time-slice option across all time slices offers a better and lower risk option relative to the one 800MHz time-slice alternative. Such an approach would treat all bands similarly, maximize flexibility for bidders (which they need not use if they did not want to) and avoid distortions to the auction outcome that might result from an asymmetric treatment of the bands"*

c) One time slice for all bands with spectrum buy-out

A 6.269 DotEcon, in section 8.2.3 of Document 11/58, considers Vodafone's proposed 'modified auction approach'.

A 6.270 From the outset, DotEcon recognises that this proposed modified approach could simplify the auction, however does not see any significant added benefits to current proposals, and that in any the proposal is unviable as it could not be achieved within a "*reasonable timescale*".

A 6.271 DotEcon notes Vodafone's assertion that there is no need for temporal lots when employing its modified option, and DotEcon argues that, *"the advantage of there being no temporal lots is very limited. If a bidder has value only for lots from as soon as possible to 2030, the temporal lot structure would have the effect only of requiring the bidder to include in its bids during the auction, for each lot it wishes to bid on, the relevant lots in the first and second time slice instead of just one time period. Where all bidders do this, package bidding will ensure that for a given number of lots in a given category, the bidder will either win these lots in both time periods or in neither. This issue is entirely one of convenience, and as such should not be considered as a significant factor in deciding between alternative auction design proposals"*

A 6.272 In respect of Vodafone's statement that there is a need for 1800 MHz licences between December 2014 and July 2015 with its proposed modified approach, DotEcon note that, *"Depending on the outcome of the auction, these may or may not be required; and ComReg has stated that given this issue will only arise where existing operators are presented with the option of liberalising their*

existing licences and choose not to, where they are necessary such licences will cover current use only"

A 6.273 This results in DotEcon concluding that the issuance of a 6 month licence does not represent a "*significant complexity that existing operators would benefit greatly from avoiding*".

A 6.274 Vodafone claimed that its approach would remove the requirement for an early liberalisation option. DotEcon contest Vodafone's assessment, and state that, *"overall we do not consider that the complexity of the auction process as a result of the early liberalisation option and associated two time slice proposal is significant, and we do not believe that the benefit of removing this complexity is sufficiently great as to merit the adjustment of the auction design as currently proposed"*

A 6.275 DotEcon state that "we need to consider the requirements of a "buy-out" mechanism that would allow a single common time period for all licences."

A 6.276 DotEcon highlights that any 'buy out' "can only be realised where all operators in the 900MHz and 1800MHz bands opt to 'sell' their existing licences notionally to ComReg, so that this returned spectrum can be awarded as liberalised spectrum from 2013". In this regard, DotEcon notes that the incentives differ per licensee and per spectrum band.

A 6.277 For example, DotEcon notes that, while O2 and Vodafone would run the risk of losing some or their entire 1800 MHz spectrum, the probability of this outcome appears low given the amount of spectrum that would be available in the band (2 × 75 MHz). Additionally, even if one or both operators lost some, or all, of their 1800 MHz spectrum, the affected operator(s) should have enough notice and alternative existing infrastructure and spectrum to provide customers with services. In contrast, DotEcon notes that Meteor is in a different position, as it runs the risk of losing not only 1800 MHz spectrum but also more valuable 900 MHz spectrum. DotEcon believe this possibility to be low, however Meteor "*could struggle to ensure continuity of service to its customers*".

A 6.278 DotEcon consider that given the different position of existing operators, "It is unlikely that a 'buy-back' solution, the terms of which are acceptable to Meteor, could be agreed with ComReg within a timeframe that is in keeping with an auction that ensures an acceptable amount of time prior to new licence commencement in January 2013. Put simply, setting terms for a buy-back arrangement is problematic and if disputed would lead to significant delay".

A 6.279 With respect to the calculation of any rebate, DotEcon note that the rebate concept has generated some debate in the consultation process thus far, and states that, *"This highlights the fact that it is unlikely a price linked to the spectrum buy-back option, or indeed a methodology for calculating such a price, could be agreed in a relatively short timeframe"*

A 6.280 In conclusion, DotEcon do not believe that "the only significant benefit of this approach is a somewhat simpler auction, we do not consider that this is a realistic

option open to ComReg for this award" and "we consider that this alternative option does not present an option whose value is greater than that of current proposals".

A 6.281 DotEcon therefore believes the 'buy out' option presented by Vodafone is not a realistic approach for ComReg.

ComReg's Proposal

A 6.282 In relation to the temporal lots proposal for each of the spectrum bands, ComReg notes that:

- practically all respondents supported ComReg's two temporal lot proposal for the 900 MHz and 1800 MHz bands, although
  - Vodafone's preferred option was its 'modified auction approach'; and
  - Qualcomm did not favour temporal lots in any form as it could increase the number of transitions required; and
- the majority of respondents supported ComReg's two temporal lot proposal for the 800 MHz band. The respondents who did not support this proposal argued that such an approach was not necessary for the 800 MHz band as it did not have incumbency issues.

A 6.283 In relation to Vodafone's proposed 'modified auction approach', ComReg notes DotEcon's view that such an approach may not be workable in practice given the differing incentives of each of the existing licensees and the necessity to obtain the consent of all licensees. ComReg agrees with DotEcon's analysis that, given the considerable uncertainties surrounding obtaining consent from each licensee and determining the 'buy-out' fees, it is quite unlikely that the 'modified auction approach' with spectrum 'buy-out' could be implemented in an appropriate timeframe that is in keeping with a timely award process. ComReg therefore does not intend to pursue Vodafone's proposed 'modified auction approach'.

A 6.284 In relation to Qualcomm's assertion that the number of transitions could be increased with temporal lots, ComReg notes that its spectrum assignment proposal (as outlined in Annex 7) would provide continuous spectrum assignments across both time slices in the event that a bidder wins an equal amount of spectrum in the band in each time slice. ComReg therefore believes that this potential downside is mitigated considerably as a transition between time-slices would only occur where a bidder wins a different amount of spectrum in each time slice. ComReg notes that if a bidder falls into this scenario it would have done so by bidding for a different quantum of spectrum in both time slices and this is clearly a commercial decision for the bidder. ComReg therefore believes that the potential downside of additional transitions is minor compared to the benefits of the temporal lot approach which include increased bidder flexibility and switching possibilities in the proposed auction.

A 6.285 In relation to the 800 MHz band and the proposal to issue this in one temporal lot from 2013-2030, ComReg notes that while this would somewhat simplify the auction approach for the 800 MHz band, the downsides are considerable. Such an approach would prevent bidders from pursuing refined strategies across the sub-1GHz spectrum bands. A bidder may prefer the ability to pursue refined strategies within the sub-1GHz bands if there are differing valuations between the bands across time slices. For example, a bidder may wish to obtain 900 MHz spectrum in the first time slice (e.g. to support GSM services) but may be indifferent between 900 MHz and 800 MHz spectrum in the second time slice (e.g. it might wish to obtain a contiguous 2 × 20 MHz spectrum block in either sub-1GHz band).

A 6.286 In addition, ComReg's notes and agrees with DotEcon's recommendations (as set out in Section 8.2 of its latest report (Document 11/58)) and agrees that in a simultaneous multi-band auction of substitutable and complementary spectrum it is important to apply the same temporal lot structure across all substitutable bands in order to reap the full benefits of providing such flexibility. Additionally, ComReg notes that there are mechanisms within the auction for a bidder to obtain lots in both time slices as it can submit a package bid across both time slices and therefore it can avoid situations where it might be required to incur additional transitional costs by winning spectrum in one time slice but not in the other.

A 6.287 In light of ComReg's statutory objectives, and having considered the views of respondents and mindful of the advice of its expert consultants DotEcon, ComReg remains of the view that it is appropriate to apply a two temporal lot approach across all spectrum bands in the award process in order to reap the full benefits of a simultaneous multi-band auction of substitutable and complementary spectrum.

A 6.288 ComReg therefore proposes that the 800 MHz, 900 MHz[267] and 1800 MHz bands would be awarded in two temporal lots, namely:

- Time slice 1: 1 February 2013 – 12 July 2015; and
- Time slice 2: 13 July 2015 - 12 July 2030.

6.4 Relocation of the existing GSM Assignments in the 900 MHz and 1800 MHz Bands –the "Full Assignment Round" Proposal

A 6.289 This section:

- discusses the benefits of contiguous spectrum assignments and summarises ComReg's previous proposals to ensure such assignments including, most recently, its "full assignment round" proposal;
- reviews the views of interested parties to ComReg's proposals;

[267] For details on ComReg's proposal on advanced commencement of liberalised licences please refer to Chapter 7.

- discusses other relevant material (for example, DotEcon's current advice and recommendations); and
- concludes by setting out ComReg's current position with regard to the full assignment round proposal.

Summary of ComReg's Proposals in Previous Consultations

A 6.290 Importance of contiguous spectrum assignments and summary of ComReg's previous proposals in that regard

A 6.291 Throughout its spectrum liberalisation consultation process, ComReg has expressed its preference for assigning spectrum in contiguous blocks.[268] This is because such assignments contribute to the efficient use and effective management of spectrum. For example, from an operator's perspective, contiguous spectrum is attractive as it results in fewer co-ordination boundaries with neighbouring networks which can provide an operator with increased flexibility and allow it to use its spectrum more efficiently. Similarly, from a spectrum management perspective, the ability to assign contiguous blocks of spectrum reduces the amount of inter-operator co-ordination required, reduces or removes the possibility of "stranded" and unused spectrum blocks and can ease interference management requirements for users of adjacent spectrum blocks.

A 6.292 ComReg notes that its views on the importance of contiguous spectrum assignments have been echoed by many respondents to its consultations.

A 6.293 Given that context, ComReg recognised that the location of the existing GSM assignments in the 900 MHz and 1800 MHz bands raise co-ordination and spectrum contiguity issues and these issues were discussed in ComReg's previous consultations.

Consultation 09/99 - ComReg's Proposal Regarding Meteor's Existing GSM 900 MHz Assignment

A 6.294 In Consultation 09/99, ComReg noted that:

- the EC Decision on the 900 MHz and 1800 MHz bands[269] specifies a minimum carrier separation of 2.8 MHz between the centre frequencies of the closest carrier channels in a GSM network and a UMTS network, unless otherwise agreed via bilateral or multilateral agreements between neighbouring networks.[270];

[268] For example, see sections 8.2.1.1 and 8.2.1.3 of Consultation 08/57, section 6.2.3.2 of Consultation 09/14 and section 3.6 of Consultation 10/105.

[269] EC Decision 2009/766/EC of 16 October 2009 on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community.

[270] In Consultation 09/99 ComReg noted that amendments to allow the use of LTE and WiMAX technologies were currently under discussion, and co-ordination requirements similar to that of

- the location of Meteor's existing GSM 900 MHz assignment could give rise to co-ordination issues between Block D and adjoining blocks, as the centre frequency of Meteor's uppermost GSM channel in Block D is only 200 kHz from the edge of Block E; and
- if unaddressed, Meteor's existing assignment could impact upon the efficiency of the proposed auction (in terms of heterogeneity of liberalised 900 MHz lots) and subsequent use of certain liberalised 900 MHz blocks.

A 6.295 Accordingly, ComReg noted that while it remained hopeful that any interference issues relating to Meteor's existing GSM 900 MHz assignment could be fairly and reasonably managed through inter-operator coordination and cooperation, there was a need to take appropriate steps to ensure that the proposed auction delivered an efficient outcome across the entire 900 MHz band. In that regard, ComReg noted that, depending on the outcome of the spectrum release process, it may be appropriate to shift Meteor's assignment in Block C and D down by 200 kHz. In putting forward this proposal, ComReg was seeking to ensure that Block E's utility for deployment of UMTS services was not impaired; thereby ensuring homogeneity of all liberalised 900 MHz blocks in the proposed award. Furthermore, in recognition of the likely costs to Meteor for such a variation to its existing GSM 900 MHz spectrum right, ComReg proposed compensatory measures to meet the actual costs to Meteor of such a variation in the event that such a variation was required following the outcome of the proposed award.

A 6.296 ComReg consulted on this proposal as follows:

UMTS were being discussed in relation to the LTE and WiMAX technologies. As discussed in Annex 8 of this document Decision 2009/766/EC has been amended to allow the use of these technologies. This amended decision specifies a minimum carrier separation of 2.8 MHz between the centre frequencies of the closest carrier channels in a GSM network and a LTE/WiMAX/UMTS network

Q.8. (from ComReg Consultation 09/99)

i) Do you agree that Meteor's continuing presence (within its current assignment of 892.7 – 899.9 MHz paired with 937.7 - 944.9 MHz) has the potential, depending on the auction outcome, to have a detrimental impact on future liberalised use of Block E or any other block in the 900 MHz band?

ii) Do you agree with ComReg's proposal that, if the circumstances justify it, Meteor's assignment should be adjusted post-auction?

iii) Are there any other issues which should be considered?

Q.9. (from ComReg Consultation 09/99)

(i) In the event that Meteor's existing frequency assignment must be adjusted post auction, please provide an estimate of the costs which might reasonably be incurred by Meteor in doing so?

(ii) Please identify any proposal as to whether and, if so how, Meteor should be fairly and reasonably compensated for any such costs, having particular regard to ensuring that costs would be objectively justified, proportionate, and independently verifiable.

Consultation 10/105 - ComReg's Proposal for the 1800 MHz and 900 MHz Bands

A 6.297 Consultation 10/105 proposed a joint award of three spectrum bands, namely the 800 MHz, 900 MHz and 1800 MHz bands. It presented ComReg's updated proposals in light of the changed circumstances of the award and it considered the location issues associated with the existing assignments in the 900 MHz and 1800 MHz bands. In doing so, ComReg noted that most respondents to question 8 of Consultation 09/99 agreed with ComReg's analysis of the potential co-ordination issue that could exist in the 900 MHz band given the location of Meteor's existing GSM 900 MHz spectrum assignment.

A 6.298 Proposed application of "full assignment round" approach to the 1800 MHz band

A 6.299 In Consultation 10/105, ComReg identified fragmentation and co-ordination issues given the location of the existing GSM 1800 MHz assignments. In particular, it was noted that:

- as the centre frequency of Meteor's uppermost GSM channel in Lot N is 200 kHz from the edge of Block O, this could give rise to potential co-ordination issues which, if not addressed, could prevent the use of block O for UMTS based services; and
- the locations of all existing GSM 1800 MHz assignments, coupled with the fact that there are two partially shared blocks, made it likely that fragmentation of spectrum assignments may occur unless appropriate measures are put in place.

A 6.300 In light of these issues, ComReg then considered two different approaches to ensuring that the proposed release of liberalised 1800 MHz spectrum would result in contiguous spectrum assignments.[271] These were:

- Approach 1 - "all or nothing" approach to any early liberalisation option for existing GSM 1800 MHz licensees – whereby partial liberalisation of existing GSM 1800 MHz assignments would not be permitted; and
- Approach 2 – "full assignment round" approach to locations of existing GSM 1800 MHz assignments – whereby every lot in the 1800 MHz band would be included in the assignment round of the proposed auction, including those lots currently occupied by the existing licensees, irrespective of whether they availed of any early liberalisation option or not.

A 6.301 In summary, whilst the "all or nothing" approach would avoid a number of fragmented/non-contiguous spectrum assignment outcomes from the range of potential auction outcomes, ComReg did not favour this approach as:

- it would be incomplete in addressing the potential for fragmentation of spectrum as fragmented outcomes would still be possible; and
- assuming that one or more existing licensees choose not to exercise this early liberalisation option, this approach would impose additional constraints on any early liberalisation mechanism.

A 6.302 In favouring the "full assignment round" approach for the 1800 MHz band, ComReg noted that:

- by making the entire 1800 MHz band available for assignment purposes in the first time slice, it would allow ComReg to provide contiguous spectrum options to all successful bidders in the assignment round. This would alleviate the possibility of an inefficient auction outcome resulting from value differences of bidders for contiguous and non-contiguous spectrum assignments;
- assuming that existing GSM 1800 MHz licensees obtained liberalised 1800 MHz spectrum rights in the second time slice, as a result of the proposed assignment stage for the second time slice, it appeared inevitable that one or more existing GSM 1800 MHz licensees would be required to re-locate their existing spectrum holdings to another part of

[271] DotEcon considered these alternative approaches in section 4.2 of its report (Document 10/105a).

the band in advance of the proposed start date of the second time slice. As noted by DotEcon, the "full assignment round" approach basically brings forward the relocation activities to before the start date of first time slice in early-2013;

- in this context, this approach would not introduce any new costs to an existing GSM 1800 MHz licensee which won spectrum in the second time slice. Instead, these costs would be incurred earlier than otherwise required. In addition, this approach would also have the advantage of providing winners of the auction with contiguous spectrum at an earlier date which could result in more efficient spectrum planning and use; and
- the proposed assignment stage would also offer existing GSM 1800 MHz licensees the opportunity to bid to stay in its current location and avoid incurring relocation costs.

A 6.303 In light of these considerations, ComReg considered that, overall, the benefits of the full assignment round approach would likely outweigh the downsides and, importantly, noted that the relocation costs involved in this approach would likely be incurred by these licensees in any event (on the reasonable assumption that these licensees obtain liberalised 1800 MHz spectrum rights of use in the second time slice).

A 6.304 Accordingly, ComReg proposed to implement the full assignment round approach in relation to the 1800 MHz band.

A 6.305 ComReg separately addressed the issue of likely relocation costs arising from adopting this approach and ComReg's proposal and respondents' view on same are discussed later in this annex.

A 6.306 Proposed application of "full assignment round" approach to the 900 MHz band

A 6.307 In relation to the 900 MHz band, ComReg noted that the location of Meteor's existing GSM 900 MHz assignment could result in a non-contiguous spectrum assignment for a bidder wining 2 × 20 MHz of 900 MHz spectrum in the first time slice (made possible under the proposed 2 × 20 MHz sub-1GHz competition spectrum cap).[272] It was also noted that the probability of this outcome in the first time slice is small and so there appears to be only a low risk of spectrum fragmentation in the 900 MHz band as a result of the location of Meteor's existing GSM 900 Licence (see: section 4.1 of DotEcon report 10/105a).

A 6.308 In light of the benefits identified for the full assignment round approach to the 1800 MHz band, ComReg proposed to apply this approach to the 900 MHz band and noted in that regard:

[272] Consultation 10/105 notes that there are two other cases in which contiguous assignments for winners in the 900 MHz band cannot be guaranteed: if there are two winners of 2×15MHz spectrum and Meteor retains block C; or if there are three winners of 2×10MHz and Meteor retains block D. In both cases Meteor would need to be one of these winners and it seems unlikely that it would put a high value on retaining the problematic block and not receiving its new frequencies contiguously next to or around this block. Therefore these two cases are much less problematic than the case of one winner of 2×20MHz of 900 MHz spectrum.

- the inclusion of all 900 MHz spectrum in an assignment round would have the benefit of increasing the number of potential spectrum assignment outcomes which can arise from the auction process;
- it ensures that all bidders will be assigned contiguous spectrum and thus avoids any auction outcomes resulting from value differences for contiguous and non-contiguous spectrum;
- whilst this approach would potentially require Meteor to relocate to a different part of the 900 MHz band and incur relocation costs, it would appear reasonable to assume that Meteor would seek liberalised 900 MHz rights in the second time slice and, if successful, it is likely that some relocation cost would likely be incurred in any event;
- in such circumstances, adopting the full assignment approach in the 900 MHz band would, in effect, bring forward the relocation activities of Meteor to before the start date of the liberalised licences in the first time slice, as opposed to before the start date of the second time slice.

A 6.309 ComReg consulted on its full assignment round proposal for the 900 MHz and 1800 MHz bands as follows:

> Q.6 of Consultation 10/105. Do you agree with ComReg's proposal to introduce a "full assignment round" into the first time slice of the 900 MHz and 1800 MHz bands? Please give reasons for your view.

Estimated Relocation Costs

A 6.310 Before setting out its proposal for potential compensatory measures for relocation costs incurred by GSM 900 MHz and 1800 MHz licensees arising from its full assignment round proposal, ComReg:

- provided details regarding its understanding of likely relocation costs for an existing assignment in these bands;[273] and
- considered the views of interested parties on its proposal, as set out in Consultation 09/99, of potentially moving Meteor's existing GSM 900 MHz assignment by 200 kHz (including the nature of any relocation costs and whether Meteor should be fairly and reasonably compensated for same).

A 6.311 In relation to the former, ComReg noted:

- Red-M/Vilicom, in their report (Document 10/105b), estimated the cost of relocating an existing GSM 1800 MHz assignment for a 'typically'

[273] Document 10/71c (Red-M/Vilicom Report on the 900 MHz band) & Document 10/105b (Red-M/Vilicom Report on the 1800 MHz band)

sized Irish network[274] would be in the order of €240,000, with the worst-case estimate of time required to carry out such relocation to be in the order of 5 months.[275] This report studied the worst case scenario of a full relocation as opposed to a partial relocation or retune which could be somewhat less costly; and

- In the case of the 900 MHz band, Red-M/Vilicom estimated in their previous report (Document 10/71c) the relocation costs for a typical network to be in the order of €500,000.[276]

A 6.312 In relation to the latter, ComReg noted:

- that it had received four responses to question 9 of Consultation 09/99, summarised as follows:
- Meteor accepted that a certain amount of retuning could be required, and put forward that there would be a cost associated with such a retune. Meteor stated that although it could accept some retuning, it could not accept a reduction in the quantum of its 900 MHz assignment nor a complete relocation to alternative 900 MHz spectrum blocks;
- Meteor asserted that an accurate estimate of the likely relocation costs could only be provided by the licensee itself ;
- H3GI stated that it would be appropriate for likely relocation costs to be independently verified. ComReg also noted that Meteor provided a confidential estimate of such costs;
- O2 noted that "the adjustment required is relatively minor, and it is possible that the costs involved are negligible". However, O2 also added that if the costs were not negligible, "ComReg could consider applying a discount on the auction fee for the relevant amount."
- there was general support of the principle of providing fair and reasonable compensation in the event of a required relocation; and
- it was generally considered that any compensation provided should be via the auction (e.g. a discount on the auction fee) and the costs should not be funded directly or indirectly from other operators; and
- that Red-M/Vilicom, having considered Meteor's confidential estimate, noted that Meteor's estimate is more likely to include figures that reflect the actual cost base of Meteor, and that Meteor's figure would appear,

[274] A 'typically' sized Irish network is assumed to have around 1600 2G sites and 1000 3G sites, with 2G/3G site sharing. It is assumed that of the 1600 2G sites in the network, 30% or 480 are equipped with 1800 MHz equipment

[275] This report also considers slight variations on this scenario. "An operator who had to relocate twice in quick succession under the 'absolute worst case' scenario would see increased engineering costs estimated at approximately €255,000. If, on the other hand, the 1800 MHz relocation project followed closely after an identical project to relocate the same operators 900 MHz network, then it should be possible to reduce the time required for the planning activity to around one month. The costs associated with the reduced project could be reduced to around €130,000."

[276] Red-M/Vilicom also considered the likely costs associated with relocating Meteor's assignment by 200 kHz (Scenario 3) and the cost was estimated to be €300,000.

ostensibly at least, to be a reasonable estimate of the actual cost of this scenario.

Full Assignment Round Proposal - Potential Compensatory Measures for Required Relocation

A 6.313 In section 3.11, Par 7(a) of Consultation 10/105, ComReg, having had regard to the responses received on this issue (summarised below) summarised its proposal in respect of compensation for relocation as follows:

- *"A compensation scheme would be considered for operators who incur relocation costs in particular circumstances only. Compensation would be made if a 900 MHz or 1800 MHz licensee incurs relocation costs as a result of the proposed "full assignment round" and these costs would not have been otherwise incurred as a result of the joint award. Such costs would* [need to] *be objectively justified, proportionate and independently verified."*

A 6.314 In Section 3.6.5.2 of Consultation 10/105 ComReg stated the following:

- In certain circumstances, the full assignment round would not introduce any new relocation activities to an existing GSM operator, but instead it would bring forward these relocation activities to before the start date of first time slice in early-2013.
- In the case of an existing licensee who acquires spectrum in the second time slice but did not avail of the early liberalisation option in the first time slice, ComReg considered that a required relocation under the full assignment round would not introduce new relocation costs (as these relocation costs would be incurred by the licensee in any event just at a later date) and in this context ComReg stated that it was of the preliminary view that it would not be appropriate to grant compensation.
- ComReg was of the preliminary view that compensation measures may be appropriate for relocation costs in other circumstances. For example, if an existing GSM licensee did not win spectrum in the second time slice and did not avail of the early liberalisation option in the first time slice, it would appear reasonable that such licensees are appropriately compensated, as this licensee is likely to incur relocation costs that otherwise would be avoided. Any compensation would only be based on relocation costs which were objectively justified, proportionate and independently verified.

A 6.315 ComReg consulted on its proposal for compensatory measures arising from the full assignment round proposal for the 900 MHz and 1800 MHz bands as follows:

Q.7. (from ComReg Consultation 10/105) Do you consider it appropriate that ComReg would provide compensation to a GSM licensee, in either the 900 MHz or 1800 MHz band, for required relocation costs that otherwise would have been avoided?

Please give reasons for your view.

Respondent's Views to Consultation 10/105

A 6.316 ComReg received views from four respondents (Meteor, H3GI, Vodafone, O2) to its full assignment round proposals.

A 6.317 Firstly, ComReg notes that all four respondents agreed with ComReg's view that there are important benefits to be obtained from designing the proposed auction to ensure contiguous spectrum assignments for the first time slice. Reasons cited in this regard include:

- such an approach avoids sub-optimal spectrum allocation for both 900 MHz and 1800 MHz spectrum in the first time slice, and
- ensuring contiguous spectrum is a technologically and economically efficient approach.

A 6.318 In addition, ComReg notes that all four respondents supported ComReg's full assignment round proposal for the 900 MHz and 1800 MHz bands. Reasons cited in this regard include:

- it would simply bring forward when relocation/retuning takes place;
- it would be the most effective way to allow licensees to aggregate their assignments; and
- the benefits of such an approach would outweigh the costs.

A 6.319 In relation to ComReg's proposals for compensatory measures, the four respondents agreed that some form of compensation should be offered to incumbent licensees for any relocation costs incurred as a consequence of this approach. In that regard:

- three of these respondents (Vodafone, O2 and H3GI) supported ComReg's view that the meeting of relocation costs is only appropriate in certain circumstances. These circumstances are where such costs would only be incurred as a direct result of the "full assignment round"; whereas
- Meteor submitted that "compensation must be provided for the full cost of any, and all frequency relocations/adjustments required of existing licensees". In that regard, Meteor noted:

- Existing licence holders would potentially be required to relocate their assignments and in doing so they would incur additional costs;
- Such costs are not simply brought forward with no net loss as implied in Consultation 10/105 since:
  - Future costs are subject to the time value of money. Bringing relocation costs forward by 2.5 years would effectively increase relocation costs by 22% in real terms[277];
  - Bidders may not gain the same spectrum in the second time slice in which case the full relocation cost is additional; and
  - If bidders are required to incur any of the costs of relocation then they would need to devalue their primary bids by this amount. Bidders not faced with this additional cost would have a bidding advantage which would lead to an inefficient outcome at the end of main stage of the auction.

A 6.320 Some respondents provided views on how such relocation costs should be met:

- Vodafone suggested that it should be provided in the form of a reduction in spectrum access fees or spectrum usage fees arising from the proposed auction. That is, no payments should to be directly or indirectly funded by other licensees; and
- Meteor suggest that relocation costs should be provided from the auction proceeds.

A 6.321 H3GI suggested that ComReg should appoint an independent expert to approve the level of appropriate costs that ComReg intends to provide.

DotEcon's View

A 6.322 In Section 11 of DotEcon's latest report to ComReg Document 11/58, DotEcon provide their views on the assignment stage for this award.

A 6.323 DotEcon consider this issue in relation to both the 900 MHz and 1800 MHz bands, as first presented in Consultation 10/105.

A 6.324 DotEcon state at the outset of this section that, "lots are linked to a band and a time slice, but not to specific frequencies within the given band. There is therefore a requirement for a process through which lots won are assigned to specific frequency blocks".

A 6.325 DotEcon considers one of the benefits having a two stage process, firstly allocating generic lots and then assigning specific frequencies in a separate process, being *"that assignment options would be limited to those that allow contiguous assignment of frequencies"*

[277] Meteor states that the 22% is calculated using a 10.2% discount rate (i.e. $1-1/[1+0.102]^{2.5}$)

A 6.326 DotEcon discuss the history of the assignment stage concept, highlighting its introduction in respect of the 900 MHz band in Document 09/99c, and for 1800 MHz spectrum in Document 10/105a. In Document 10/105a, DotEcon presented two options to address issues arising from early liberalisation of 1800 MHz spectrum "*resulting from the specific frequencies held by existing operators in the band*" (namely potential fragmentation of 1800 MHz assignments), being:

- 'All or nothing'; and,
- 'Full assignment round'.

A 6.327 In the 'All or nothing' assignment approach, DotEcon outlines that such an approach would mean, "operators with existing 1800MHz spectrum would not be permitted to liberalise a subset of their existing frequencies, but rather they would only have the option to liberalise the entirety of their existing holdings. In the case where the licensee wished to liberalise usage rights for all if its existing 1800MHz frequencies, these usage rights would need to be competed for, and the location of its liberalised frequencies within the band would be determined in an assignment stage".

A 6.328 However, DotEcon discussed drawbacks with this approach, namely:

- *"It represents an incomplete solution to the problem of fragmented auction outcomes and auction inefficiency; and*
- *Whether a bidder would be able to win a contiguous block of spectrum would be determined by the actions of other bidders (i.e. incumbent operators)"*

A 6.329 DotEcon considered its "full assignment round" proposal for the assignment stage, which in practice results in "the inclusion of all spectrum in the band in a frequency assignment process, thus including existing licences whether or not licensees choose to avail of the early assignment option. Within this option, frequencies linked to existing 1800MHz licences from 2013 onwards would be determined within the auction"

A 6.330 DotEcon discuss the advantages of the "full assignment round" approach, namely

- "*where the entire band is available for award then the CCA format proposed for the auction it is possible to guarantee that only contiguous blocks of spectrum are awarded where possible" and,*
- *"given the assurance of contiguous frequencies this approach alleviates the problem of an inefficient auction outcome resulting from bidders placing different values on contiguous and non-contiguous spectrum assignments"*

A 6.331 DotEcon note the one drawback from the "full assignment round" approach is that "it requires existing licensees which choose not to liberalise to either bid to maintain their current locations within the band during the assignment stage or otherwise not state a preference over the frequencies that will be assigned, giving

rise to the possibility that frequencies assigned are different to those currently occupied" meaning that "existing operators within a band may be assigned spectrum in another part of the band unless they outbid other bidders to maintain their current locations thus incurring an additional cost"

A 6.332 DotEcon consider the impact of this approach as being small, namely

- *"Technical analysis by Vilicom/Red-M indicates that the monetary costs of relocation are small relative to the costs of running a mobile network",*
- *"At some point all of the incumbent operators will need to incur the costs of relocating its frequencies if they win 1800MHz spectrum in the second time slice…Therefore, the only difference will be that the costs are to be incurred prior to the beginning of the first time slice rather than the beginning of the second time slice",*
- *"The package-bidding feature inherent in the CCA format will allow bidders to make bids for the same frequencies in the two time periods. Therefore, given the reasonable assumption that bidders will want to minimise relocation costs it is expected that where a bidder is to make a package bid it will be assigned the same spectrum for both time slices".*

A 6.333 In light of the benefits of the "full assignment approach" listed above, DotEcon recommended applying this approach "*for the assignment of 1800MHz frequencies to bidders from the beginning of 2013*". DotEcon also noted that *"while the benefits of ensuring a contiguous allocation of spectrum were likely to be smaller in the case of 900MHz spectrum, they are nonetheless material. In addition, we considered that there is an additional benefit to imposing a consistent approach across spectrum bands"*

A 6.334 Taking this into account, DotEcon recommended applying the "full assignment round" to both the 900 MHz and 1800 MHz bands in Document 10/105a. ComReg made the "full assignment round" proposal in Consultation 10/105, and DotEcon noted that *"ComReg proposed to provide compensation to a GSM licensee, in either band, for relocation costs that would otherwise have been avoided"*

A 6.335 DotEcon's overall view on the "full assignment round" issue is that "Respondents to this proposal have not raised any real objections to the use of a 'full assignment round' in order to transition to locations in the band. Therefore, we recommend the adoption of this assignment round option as described in DotEcon report 10/105a and herein"

A 6.336 In Section 11 of its report (ComReg Document 11/58), DotEcon:

- note that all of the respondents to Consultation 10/105 have agreed that the 'full assignment round' approach is beneficial and the preferred

option in order to ensure that contiguous blocks of spectrum are awarded;

- further note that these respondents agreed with ComReg's suggestion to provide compensation to operators in respect of relocation costs that would otherwise have been avoided; and
- therefore recommends the adoption of this assignment round option as described in DotEcon report 10/105c and in its current report.

ComReg's Current Position

The Full Assignment Round

A 6.337 On the basis of reasons put forward by ComReg for its proposal in Consultation 10/105, views received from interested parties to same, and the views of DotEcon (in Document 10/105c and 11/59, ComReg's current position is that it will implement the full assignment round approach for each of the 900 MHz and 1800 MHz bands.

Compensation for relocation costs

A 6.338 In relation to ComReg's proposal to provide compensation for relocation costs arising from the full assignment round in circumstances where a licensee would not have otherwise incurred such costs, ComReg notes the arguments provided by Meteor in support of its view that compensation should be afforded in respect of any and all relocations required of existing licensees.

A 6.339 In relation to Meteor's argument that a bidder may not gain the same spectrum in the second time slice and thus "the full relocation costs are additional", ComReg notes that the spectrum rights of use under the existing GSM licences do not exist in the second time slice and therefore all bidders who win spectrum in the second time slice would have to transition or relocate to that location in any event. Because such successful bidders would have to transition or relocate to their new spectrum assignments in any event, they would not be incurring any additional costs. Therefore the full assignment round would not require any incumbent licensee, who successfully bids for a brand new spectrum assignment, to incur any costs other than those that it would incur in any event. ComReg is therefore of the view that it is not objectively justified, appropriate and/or reasonable to provide compensation for relocation costs incurred as a result of an incumbent licensee not gaining the same spectrum assignment which it previously held, in the second time slice.

A 6.340 In addition it should be noted that in Annex 7 ComReg presents spectrum assignment proposals that reduce the possibility of a bidder obtaining non-continuous spectrum assignments across the bands. Two categories are discussed.

Category A: A bidder wins the same amount of spectrum in a band in both time slices.

A 6.341 In this category, ComReg is of the view that continuous spectrum assignment across time slices can be guaranteed. ComReg proposes that the spectrum assignment round will only present such options and therefore the issue of relocation costs between times slices would not occur for this category;

Category B: A bidder wins a different quantum of spectrum in a band in both time slices.

A 6.342 In this category, ComReg is of the view that continuous spectrum assignment across time slices cannot be guaranteed as it is mathematically impossible to guarantee this when a bidder wins a different quantum of spectrum in each time slice. However, ComReg notes that if a bidder falls into this category it would have done so by bidding for a different quantum of spectrum in both time slices. This is clearly a commercial decision that a bidder will have to consider in the course of the proposed auction and thus not relevant for compensation.

A 6.343 Given the above, ComReg is of the view that compensation for relocation costs as a result of the full assignment round would only be appropriate in two circumstances:

(i) An existing GSM licensee does not avail of the early liberalisation option (partially or fully) in the first time slice and does not win spectrum in the second time slice. In this circumstance it would be appropriate to provide compensation for the relocation costs necessitated as a result of the full assignment round. In this scenario the existing licensee is forced to relocate whereas it otherwise would have stayed in its own spot until existing licence expiry;

(ii) An existing GSM licensee does not avail of the early liberalisation option (partially or fully) in the first time slice and wins spectrum in the second time slice. In this scenario the existing licensee would be forced to bring forward its relocation whereas otherwise it would have done so at the end of its existing licence expiry. In this circumstance ComReg is of the view that it would be appropriate to provide compensation for the additional "time value of money" costs associated with bringing forward the relocation activities necessitated as a result of the full assignment round – but not the relocation costs themselves as these would have to be borne in any case. ComReg proposes the calculation of any such time-value-of-money compensation should be:

- based on an appropriate Weighted Average Cost of Capital (WACC) as such costs relate to a future investment activity by the licensee in question. Additionally it may be appropriate to take into consideration changes in the relocation costs for the time period between when these

costs are actually incurred and when they would have incurred in the future[278]; and

- pro-rata to the quantum of time involved. In this regard, ComReg notes that the quantum of time involved would vary per licence and would be:
- approximately 2 years 5½ months for Meteor's existing 900 MHz and 1800 MHz spectrum rights (i.e. relocation activities would be brought forward from before 12 July 2015 to before 31 January 2013) and:
- approximately 1 year 11 months for O2 and Vodafone's existing 1800 MHz spectrum rights (i.e. relocation activities would be brought forward from before 31 December 2014 to before 31 January 2013).

6.5 Possibility of Interim GSM Rights of Use in the 1800 MHz Band

A 6.344 There are currently three GSM licences in the 1800 MHz band, each with a 15 year duration. Two of these licences, belonging to Vodafone and O2, are due to expire on 31 December 2014, with the remaining licence, belonging to Meteor, due to expire on 12 July 2015.

Summary of ComReg's position in Consultation 10/105

Background – issues arising from ComReg's proposed 2 temporal lot approach to the 1800 MHz band

A 6.345 To facilitate the proposed release of liberalised spectrum rights in the 1800 MHz band in a joint award with the 800 MHz and 900 MHz band, ComReg proposed that the 2 temporal lot approach (rather than a 3 temporal lot approach) proposed for the 800 MHz and 900 MHz bands also be used for the 1800 MHz band (see Section 3.4.4 of Consultation 10/105). In Section 3.4.3 of Consultation 10/105, ComReg noted that such an approach would:

- allow bidders to switch between all three bands during the auction process more fluidly;
- avoid the additional complexity across three bands that would otherwise arise from the introduction of a third temporal lot; and

[278] While ComReg intends to set out the detailed compensation formulation mechanism in the Information Memorandum, ComReg recognises that it would be necessary to make certain assumptions in this formulation about the future cost of relocation activities in 2014 or 2015 (i.e. the time the GSM operator would have been required to relocate under the terms of its existing GSM licence) compared to current cost levels, as these future costs are unknown. For example one could assume that the future nominal cost of relocation:

- is the same as the present-day nominal cost of relocation; or
- is the same as the present day nominal cost of relocation adjusted for inflation (e.g. CPI);

- avoid the possibility of additional transitional issues that would otherwise arise from the introduction of a third temporal lot.

A 6.346 ComReg consulted on its proposed approach and ComReg's consideration of responses received to its temporal lot proposal for the 1800 MHz band are set out in Annex 6.3 of this document.

A 6.347 ComReg noted, however, that a 2 temporal lot approach for the 1800 MHz band also raises issues because of the 6½ month difference between the expiry date of Vodafone's and O2's respective GSM 1800 MHz licences and the proposed commencement date of liberalised 1800 MHz licences in the second temporal lot (being 13 July 2015)[279]. In particular, ComReg noted that issues relating to this timing difference could arise if Vodafone and/or O2 wished to continue to provide a GSM service in this 6½ month period and these operators:

(iii) did not avail of the proposed 1800 MHz early liberalisation option (as set out in section 3.7 of Consultation 10/105); and

(iv) did not acquire sufficient liberalised spectrum in the first temporal lot to allow them to continue to provide a GSM service during this 6½ month period.[280]

ComReg's Position in Consultation 10/105

A 6.348 In Consultation 10/105, ComReg made a number of comments in relation to whether, in its view, interim GSM 1800 MHz rights of use would be required to address the timing issue identified, including:

- bearing in mind that the specific nature and extent of any issues arising during the relevant period will only become clear following the proposed spectrum award, it is very difficult to identify, at this point in time, the likely consequences of Vodafone and/or O2 not having access to GSM 1800 MHz spectrum rights of use between 31 December 2014 and 12 July 2015;
- the proposed spectrum cap of 2 × 50 MHz (subject to the 2 × 20 MHz sub-1GHz cap) would allow these operators to more than double their present spectrum holdings and, accordingly, it is possible that Vodafone and O2 may have sufficient spectrum holdings, at the time the 6 ½ month gap arises, to address this timing difference issue;
- it is also possible that Vodafone and O2 may have a reduced availability of spectrum for GSM purposes during this 6½ month period;

[279] See Section 3.5 of Consultation 10/105.

[280] ComReg also noted that no issues arising from this timing difference would arise if:
- Vodafone and O2 did not acquire liberalised rights of use in the 1800 MHz band in the second time slice; or
- These licensees fully availed of the proposed early liberalisation option as set out in Section 3.7 of that document (i.e. obtained 2 × 15 MHz of liberalised 1800 MHz rights of use).

- a number of factors were identified that would suggest to ComReg that administrative intervention, in the form of interim GSM 1800 MHz spectrum rights of use, is unlikely to be required; and
- nevertheless, and bearing in mind that the specific nature and extent of any issues arising during the relevant period will only become clear following the proposed spectrum award, ComReg considers that it would not be appropriate to entirely rule out the issue of interim rights of use (where justified in the context of ComReg's statutory functions, objectives and duties) and therefore does not discount considering future applications for GSM 1800 MHz interim rights for the relevant period.

A 6.349 ComReg sought views from interested parties on its views as follows:

> Q.4 of 10/105. Do you agree with ComReg's approach in relation to the period between the expiry of Vodafone and O2's respective GSM 1800 MHz licences and the proposed commencement date of licences for the second "time slice" in the 1800 MHz band? Please provide reasons for your view.

Views of Respondents

A 6.350 ComReg received three responses to this question, being from each of the existing GSM 1800 MHz licensees.

A 6.351 Whilst these respondents agreed that a 3 temporal lot approach should not be adopted due to the increased complexity to the proposed auction process that this would entail (noting that Vodafone also stated that this issue could be addressed via its proposed modified auction approach), these respondents did not agree with ComReg's approach to the issue of interim GSM 1800 MHz rights of use.

A 6.352 In that regard, reasons provided in opposition to ComReg's proposed approach included that:

- existing licensees might want to continue to use some or all of their 1800MHz spectrum to provide GSM service up to and beyond the expiry of the current licences. Further, they would fully expect to be able to do this up to the time when their current licences expire without being required to modify existing licences or to buy liberalised spectrum in this period (O2);[281]
- without certainty that interim GSM 1800 MHz rights of use would be granted, these operators would be required to acquire liberalised licences in the first time slice if they wished to ensure continuity of GSM

[281] In the period after 2015, O2 can accept that if an existing licensee wants to continue to use some spectrum in the 1800MHz band for GSM service, then this spectrum will be obtained by buying it in the proposed auction.

services, assuming either operator has intentions to stay in the band (eircom Group, O2);

- the potential for a temporary loss of access to the 1800 MHz by one or more existing licensees in the first half of 2015 that would be realised under certain auction outcome scenarios can be effectively forestalled only by the granting of Interim 1800 MHz licences, where requested by existing licensees, for the relevant period (Vodafone);
- the grant of interim 1800 MHz licences is necessary so as to provide regulatory certainty to the market, maximise efficient use of the spectrum resource, and avert the risk of temporary but considerable degradation of service quality in the many areas of high traffic demand where 1800 MHz spectrum is used by existing licensees to provide capacity (Vodafone);
- the opportunity cost of granting Interim 1800 MHz licences, where required, is extremely low to non-existent as it would involve assigning rights of use for spectrum that would not otherwise be in use for the relevant 6 ½ month period. Indeed by permitting continued use of spectrum for delivery of communications services of high social and economic value that would otherwise remain unutilised for the period the granting of Interim 1800 MHz licences would fulfil the statutory regulatory objectives of maximising the efficient use of spectrum and promoting the interests of end users (Vodafone);
- Given the major benefits of granting Interim 1800 MHz licences in circumstances where one or more existing licensees would temporarily lose access to 1800 MHz that it may still require, and the lack of any discernible disadvantages to doing so, Vodafone considers that it is necessary and justified on public policy grounds for ComReg to make a firm advance commitment to grant 1800 MHz Interim Licences to existing licensees where they apply for these to avoid a temporary loss of access to sufficient spectrum in this band to provide services to their customers;
- ComReg should simply clarify that if such a gap arises, then the existing licensees will have the option to have licenses extended (for whatever portion of the spectrum is required) at the relevant time. While it provides continuity of availability of spectrum for existing licensees, it will have no material effect on the proposed auction process or on other operators. The only alternative would be for ComReg to revert back to three temporal lots, which would make the auction process significantly more complicated (O2); and
- Two respondents did not agree with ComReg's preliminary conclusion that the granting of Interim GSM 1800 MHz spectrum rights of use are unlikely to be required following auction outcomes where existing 1800 MHz licensees would not otherwise have access to any, or sufficient, 1800 MHz spectrum in the first half of 2015 (Vodafone and O2).

A 6.353 Both Vodafone and O2 noted that ComReg had not ruled out the granting of interim spectrum rights of use but argued that ComReg should clarify that if any such timing gap arises that existing licences will be extended.

ComReg's Position

A 6.354 First, ComReg acknowledges the position expressed by Vodafone and O2 with respect to the potential impact of not having GSM 1800 MHz rights of use in the relevant time period (where the auction produces a particular outcome) and their desire for ComReg to make a decision prior to the auction to grant interim rights of use for the relevant period should the auction produce a particular outcome.

A 6.355 However, it is very difficult (if not impossible) to identify, at this point in time, the likelihood and consequences of Vodafone and/or O2 not having access to GSM 1800 MHz spectrum rights of use in the relevant time period.

A 6.356 Given this inherent uncertainty, it would not be appropriate for ComReg to commit to granting interim GSM 1800 MHz rights of use at this point in time irrespective of the results of the proposed auction.

A 6.357 That said, ComReg can, at this point in time, clearly commit to evaluating whether GSM 1800 MHz interim rights of use would reasonably be required in the relevant period, following the proposed auction process but significantly prior to licence expiry.

A 6.358 In addition, whilst ComReg identified a number of factors in Consultation 10/105 which would suggest that, at this point in time, the grant of interim GSM 1800 MHz spectrum rights is unlikely to be required, ComReg notes the arguments provided by certain respondents to the contrary. ComReg acknowledges the merit in some of these arguments and would, of course, take such views and any supporting material into account at the appropriate time.

A 6.359 In conclusion, ComReg welcomes these useful contributions and is pleased to re-affirm that it will consider the issue of whether interim GSM 1800 MHz rights of use should be granted, where justified in the context of ComReg's statutory function, objectives and duties, following the proposed auction but significantly prior to licence expiry.

6.6 Early Liberalisation Option

A 6.360 This section:

- summarises ComReg's proposals for the early liberalisation of the existing GSM licences in the 900 MHz and 1800 MHz bands, as set out previously in ComReg's Consultations 08/57, 09/14, 09/99, 10/71 and 10/105 respectively;
- considers the views of interested parties on each of these proposals and other relevant material; and

- concludes with ComReg's current position with regard to this issue.

Summary of ComReg's Proposals in Previous Consultations

Consultation 08/57

A 6.361 In Consultation 08/57 (Section 5.5), ComReg noted that a draft EC Decision "on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community"[282] had been approved by EC Radio Spectrum Committee (RSC) and was expected to be formally adopted by the European Commission as soon as the repealing or amending Directive for the GSM Directive[283] had been adopted by the European Council and Parliament.

A 6.362 ComReg noted that the aim of this draft EC Decision was to '*liberalise*' the 900 MHz and 1800 MHz bands such that technologies compatible with GSM could also be deployed in these bands (e.g. UMTS).[284]

A 6.363 Consultation 08/57 (Section 5.3) noted that there were a number of potential benefits associated with the liberalisation of the 900 MHz and 1800 MHz bands. Liberalisation of these bands has the potential to deliver improvements in the quality of new wireless technologies and applications to consumers, while also enabling operators to lower their investment and operating costs due to the use of more favourable spectrum.

A 6.364 In light of these potential benefits and the obligations that would arise from this draft EC Decision once adopted, in Section 6.2 of Consultation 08/57 ComReg proposed to liberalise the existing GSM licences in the 900 MHz and 1800 MHz bands as soon as practicable after the EC Decision entered into force. Question 1 of Consultation 08/57 sought the views of respondents on this proposal.[285]

[282] See "RSCOM07-04 final", approved by RSC through a favourable Regulatory Opinion on 22 May 2007, http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/_document_storage/rsc/rsc20_public_docs/07_04%20final_900_1800.pdf

[283] Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31987L0372:EN:NOT

[284] At the time Consultation 08/57 was published in July 2008, UMTS was the only technology listed in the annex to the draft EC Decision as an "other terrestrial system" that could co-exist with GSM and could therefore be deployed in the 900 MHz and 1800 MHz bands. Since then, Decision 2009/766/EC and Decision 2011/251/EU have been adopted, and now UMTS, LTE and WiMAX are listed in the Annex to the EC Decision as being "other terrestrial systems" that can be deployed in the 900 MHz and 1800 MHz bands.

[285] *"Q1 (of Consultation 08/57): Do you agree with ComReg's proposal to liberalise the existing GSM licences in the 900 MHz and 1800 MHz bands as soon as practicable after the EC Decision enters into force and subject to a number of conditions (see below)? Please provide supporting arguments with your answer."*

Consultation 09/14

A 6.365 In Consultation 09/14, Section 5.1 discussed the liberalisation of the existing GSM licences in light of updated information and views received in response to Consultation 08/57.

A 6.366 ComReg noted that the benefits of liberalisation were acknowledged and the principle of liberalisation was generally welcomed by the majority of the respondents to Consultation 08/57, and accordingly ComReg was further satisfied that its proposal to award all new licences in the 900 MHz band on a liberalised basis following an open and transparent process was the appropriate approach.

A 6.367 Concerning the existing GSM licences, ComReg noted that one respondent (H3GI) had argued against ComReg's proposal in Consultation 08/57 to liberalise the licences as soon as practicable after the EC Decision enters into force, as this could distort competition in the mobile market by potentially conferring a significant advantage on the existing GSM licensees that would not be available to a non-GSM mobile operator.

A 6.368 Consultation 08/57 noted that the European Commission had recognised this potential issue in its draft proposal[286] to amend the GSM Directive. Additionally, ComReg noted there would be no requirement under the terms of the draft EC Decision for Member States to liberalise the existing GSM licences, and furthermore ComReg understood that, given the short term remaining on the existing GSM licences and that legacy issues exist, any operator benefits (and by extension any consumer benefits) that could be derived from liberalisation of the existing licences would be reduced.

A 6.369 Accordingly, ComReg revised its liberalisation proposal clarifying that existing GSM licences would not be liberalised, while all new licences issued in the 900 MHz band would be issued on a liberalised basis.

Consultation 09/99

A 6.370 In Consultation 09/99 (Section 12.2.4), and after further consideration of this issue in light of respondents' submissions and DotEcon's analysis[287] as set out in

[286] See Article 1(2) of Brussels, 19.11.2008, COM (2008) 762 final. Proposal for a Directive of the European Parliament and of the Council amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community. http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/_document_storage/legislation/preliminary/gsm_proposal_en.pdf

[287] In particular, Consultation 09/99 (Section 12.2.4) noted that:
"DotEcon's analysis has suggested that this position could raise the issue of a potential distortion to competition if Vodafone, O2, H3GI and/or another operator could have access to liberalised spectrum from 2011, in circumstances where Meteor might not have access to 3G spectrum at 900 MHz until 2015, unless some provision was made for early liberalisation." and
"In DotEcon's view, however, there would be insufficient incentives for an existing operator to do so where the release of existing spectrum is not contingent on the operator winning a liberalised licence (such as where existing spectrum assignments could continue to be used to provide 2G services for

Document 09/99c, ComReg stated that it saw merit in the inclusion of an early liberalisation option, in line with the methodology proposed by DotEcon, in the award process.

A 6.371 The early liberalisation option proposed by DotEcon was discussed in the Executive Summary and Section 8.2 of Document 09/99c. As discussed in that document, DotEcon believed that there would be little point in providing an early liberalisation option for GSM incumbents[288] to relinquish existing 900 MHz GSM licences unconditionally prior to the auction, as this would create unacceptable business continuity risk, as there would be no guarantee of winning back liberalised spectrum in their place. It therefore proposed an auction design that would allow existing licence holders to relinquish spectrum contingent on winning liberalised spectrum back for the same time period.

A 6.372 Furthermore, DotEcon considered that there was also a need to create appropriate incentives for early liberalisation and create a level-playing field between those upgrading an existing licence as compared with buying afresh. To address these issues, DotEcon recommended that a rebate be given to an operator relinquishing existing spectrum rights, and that this rebate would be based on the original purchase price of the licence and the remaining term, assuming some amortisation schedule.[289]

A 6.373 ComReg saw merit in the early liberalisation methodology proposed by DotEcon, with a view to adopting this approach in the auction format, and sought views from stakeholders on this approach and in particular the rebate that would apply.

> Q.2. (Consultation 09/99): Do you agree that a "rebate" in respect of the remaining term of a licence should be provided for in ComReg's auction design?
>
> Q.3. (Consultation 09/99): What factors should ComReg consider in calculating any such rebate?

Consultation 10/71

A 6.374 In Consultation 10/71, ComReg proposed to release liberalised 800 MHz spectrum in a joint award with liberalised 900 MHz spectrum. As there are no existing GSM licences in the 800 MHz band, this consultation did not discuss the

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which there would be demand). In these circumstances, DotEcon suggest that it would be necessary to link the release of existing spectrum with winning new licences."

[288] It should be noted that Meteor was the only GSM licensee in the 900 MHz band that would have affected by this issue, as its GSM 900 MHz licence expires on 12 July 2015. Vodafone and O2's GSM 900 MHz licences have now expired and have been replaced by interim 900 MHz GSM licences with an expiry date of 31 January 2013.

[289] Note, in the Executive Summary of DotEcon 09/99c, DotEcon state that this amortisation schedule should be based upon inflation.

"In practice, this rebate would need to be determined from the amount originally paid for the licence, adjusting for inflation and the time remaining to expiry"

liberalisation of existing GSM licences, nor the 'early liberalisation option' as proposed in Consultation 09/99. Consequently, Consultation 10/71 did not pose any questions on this issue.

Consultation 10/105

A 6.375 In Consultation 10/105, ComReg proposed including the 1800 MHz spectrum band in a joint award of the 800 MHz and 900 MHz bands.

A 6.376 In light of this proposal, Section 3.7 of Consultation 10/105 and Sections 3 and 4 of Document 10/105a (DotEcon's report on the "*Inclusion of the 1800 MHz band in a joint award of spectrum in the 800 MHz and 900 MHz bands*") discussed the early liberalisation option and the potential rebate for the residual licence period with regard to both the 900 MHz and 1800 MHz bands.

A. The early liberalisation option

A 6.377 In Document 10/105a, DotEcon noted that in both the 900 MHz and 1800 MHz bands, the existing GSM licensees would have the option of acquiring liberalised usage rights for the remaining term of their licence, and Section 3.3 of the DotEcon report (10/105a) discussed a potential mechanism by which an existing licensee could obtain a liberalised 1800 MHz licence for some or all of its current 1800 MHz assignments via a competitive award process.

A 6.378 In discussing this potential mechanism, DotEcon highlighted that, while an existing GSM 1800 MHz licensee could choose to release a subset of its GSM spectrum assignment, there should be certain constraints around this release. It proposed that an existing licensee should release spectrum in a manner compatible with the released spectrum being reassigned using 2 × 5 MHz blocks.[290]

A 6.379 Having given due consideration to the advice of DotEcon and in light of responses received to Consultation 09/99, ComReg noted that the early liberalisation option would provide a reasonable and proportionate means by which to achieve earliest liberalisation of the entire band in a manner that would minimise distortions, and it therefore considered that the early liberalisation option should be provided in the proposed auction. In this regard, ComReg believed that the same early liberalisation rules should, in the interests of the efficient use and effective management of spectrum, apply for both the 900 MHz and 1800 MHz bands and ComReg was therefore minded to adopt the early liberalisation approach as discussed in section 3.7 of Consultation 10/105. ComReg sought views on this proposal as follows:

[290] In addition, in Consultation 10/105 ComReg noted that *"any un-liberalised GSM spectrum retained by the existing GSM licensee would be required to comply with the technical requirements as set down in the EC Decision and the GSM raster plan and these constrains may affect the total amount of GSM channels usable in the un-liberalised spectrum block."*

Q.8 (of Consultation 10/105): Do you agree with ComReg's proposal to adopt an early liberalisation approach for both the 900 MHz and 1800 MHz bands? Please provide reasons for your view.

B. The potential rebate for the residual licence period.

A 6.380 In considering the potential rebate for the residual licence period, ComReg noted that this issue was discussed in section 12.2.4 of Consultation 09/99 in the context of the 900 MHz band.

A 6.381 Having reviewed the responses received to Consultation 09/99, in Consultation 10/105 ComReg noted that various views were expressed in support and against the possibility of a rebate to Meteor. These views were expressed solely in relation to Meteor as it was the only existing GSM licensee encompassed by the early liberalisation option proposal in the 900 MHz band.

A 6.382 A number of respondents agreed in principle with a rebate and reasons cited by these respondents were that:

- The principle of a rebate was objective and justified;
- It was appropriate to base a rebate on the original purchase terms; and
- A rebate would incentivise early liberalisation.

A 6.383 On the other hand, a number of respondents disagreed with the principle of a rebate and the reasons cited by these respondents included that:

- It was not objectively justified or necessary in the context of the 900 MHz band to provide a rebate, as there are sufficient incentives for the incumbent to liberalise;
- A rebate offered an unfair advantage in the competition and that it could therefore be considered a form of State aid; and
- It would allow Meteor to obtain a liberalised 900 MHz spectrum licence cheaper than other participants in the auction.

A 6.384 For the reasons set out in Consultation 09/99 and having considered the views of respondents to Consultation 09/99, ComReg remained of the view that it would be appropriate to issue a rebate for the residual time remaining on a GSM licence if an operator was to opt for early liberalisation, and that this should apply to both 900 MHz and 1800 MHz GSM licensees.

A 6.385 In addition, ComReg believed that the calculation of the proposed rebate should be based on the methodology as set out in Consultation 09/99, i.e. it should be based upon the original purchase price of the spectrum adjusted for inflation (using consumer price index ("CPI")), the amount of spectrum being released and the remaining term of the licence.

A 6.386 Table 4 of Consultation 10/105 (as set out below) presented ComReg's proposed rebate for each operator based upon November 2010 CPI rates and the assumption that an operator is choosing to avail of the early liberalisation option for its full spectrum assignment. ComReg noted that rebates for the early liberalisation of partial spectrum assignments would be calculated on a *pro-rata* basis.

Operator	Spectrum Band & Assignment & Start Date	Original Access Fees Paid	Proportion Of Licence Foregone	Proportion Of Access Fee Foregone (€1= Ir£0.787564)	CPI Adjustment (From Start Date Of Gsm Licence To Nov 2010)	Proposed Rebate
Vodafone	1800 MHz 2 × 14.4 MHz Jan 2000	IR£5.69m[291]	2 years/ 15 years	€963,308	132.8%	€1,279,273
O2	1800 MHz 2 × 14.4 MHz Jan 2000	IR£5.686m[292]	2 years/ 15 years	€962,631	132.8%	€1,278,374
Meteor	1800 MHz 2 × 14.4 MHz July 2000	IR£7.5m[293]	years/ 15 years	€1,587,173	127.8%	€2,028,407
Meteor	900 MHz 2 × 7.2 MHz July 2000	R£3.75m[294]	years/ 15 years	€793,586	127.8%	€1,014,203

Table 4 of Consultation 10/105: Proposed Rebate for an operator who chooses to avail of the early liberalisation option for its full spectrum assignment.

A 6.387 ComReg sought views on this proposed rebate as follows:

[291] See ComReg Press Release PR070999a

[292] See ComReg Press Release PR070999a

[293] See ComReg Press Release PR190698

[294] See ComReg Press Release PR190698 and ComReg Document 01/04

Q.9 (of Consultation 10/105): Do you agree with ComReg's "rebate" proposal for 900 MHz and 1800 MHz GSM licences? Please provide reasons for your view.

Views of Respondents

A 6.388 The following sets outs the views of respondents received on ComReg's early liberalisation option proposal and, in particular, the responses received to the specific consultation questions contained in Consultations 09/99 and 10/105.

Responses to Consultation 09/99

A 6.389 In Consultation 09/99, two questions were asked on the early liberalisation option proposal for the 900 MHz band.

Question 2 of Consultation 09/99

A 6.390 This question sought views on applying a rebate in respect of the early liberalisation option. Five responses were received to this question and from these responses:

- three respondents, Digiweb, eircom/Meteor and O2, were in favour of ComReg's proposal; and
- two respondents, H3GI and Vodafone, did not support this proposal.

A 6.391 Of the three respondents who supported ComReg's proposal:

- eircom/Meteor expressed the view that the rebate proposal would help avoid competitive distortions (as discussed in Document 09/99c) and create incentives to bring liberalisation to the band earlier, conferring any associated benefits on consumers and operators and supporting the goals of the EC Decision and the GSM Amendment Directive;
- Digiweb agreed that a rebate in respect of the remaining term of a license should be provided for in ComReg's auction design; and
- O2 believed that, in general, where an existing licence is foreshortened, it is correct to allow a rebate based on the original purchase terms. However, O2 added that the proposed treatment of Meteor would give it an unfair advantage over other bidders in an auction, as it would be in a position to decide whether it would play or not depending on the price bid by other bidders in the auction.[295]

[295] O2 stated that *"Meteor must be required to decide and declare whether they are to participate in the auction before any bids are placed. Bidders will need to know the number of lots available as this could impact on their valuation and bids. Meteor would have an unfair advantage over other bidders if they could choose during the auction whether they wish to play or not depending on the price bid by competitors. It would be fundamentally unfair and a distortion of competition to allow Meteor a one-*

A 6.392 Of the two respondents who disagreed with ComReg's proposal:

- H3GI stated that the rebate *"confers an unfair commercial advantage on Meteor contrary to Article 107 of the Treaty on the Functioning of the European Union ("TFEU")."*
- H3GI added that if ComReg grants Meteor a rebate it will be providing funds to:
  - acquire liberalised spectrum below its full value (if Meteor uses the liberalised spectrum for 3G purposes); and/or
  - use liberalised spectrum for GSM purposes, which Meteor would have done anyway.
- Additionally H3GI believed that Meteor has sufficient incentive to liberalise early.
- Vodafone believed that the rebate proposal is neither objectively justified nor necessary. It believed that the proposed option for Meteor to make a contingent offer would be sufficient, in the absence of any additional compensation or "rebate" measure, to incentivise early release of this spectrum by Meteor.[296]

A 6.393 In addition Vodafone submitted that:

- The lack of details on the working of the proposed rebate scheme considerably limited the ability of consultation respondents to comment effectively; and
- DotEcon and ComReg have failed to address how the proposed rebate to Meteor for the remaining term of its existing licence would be funded. Vodafone considered that it would be entirely unjustified, disproportionate, and distortive if any rebate to Meteor were to be funded, either directly or indirectly, by other telecoms operators.

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way bet - where they knew that they could not lose any spectrum, but only gain some if the bidding worked out to their advantage."

[296] In support of this view:

- Vodafone believed that the incremental value of a liberalised 2 × 5 MHz spectrum block is likely be high enough to induce early release of at least 2 × 2.2 MHz of Meteor's existing 2 × 7.2 MHz spectrum allocation for liberalised use in the 900 MHz band, and it considered this partial release of 2 × 2.2 MHz of Meteor's existing spectrum usage rights as having a high likelihood of occurring; and
- Vodafone believed that the concern around Meteor's bid potentially being based on the "upgrade" value of a liberalised licence relative to its existing licence as opposed to a non-GSM operator's bid being based on the full value of a licence, and the claim that this would give too little incentive for Meteor to release its licence early did not provide an adequate rationale for a rebate. Vodafone noted that in this case Meteor would be making a contingent offer to release 2 × 2.2 MHz of unliberalised spectrum to obtain 2 × 5 MHz of spectrum on a liberalised basis and it would not only be the "upgrade" value of liberalised versus unliberalised spectrum that would be relevant to Meteor's valuation and associated bid, but the fact that a much larger amount of additional spectrum would be available to it.

Question 3 of Consultation 09/99

A 6.394 This question sought views on factors that ComReg should consider in calculating any such rebate and five responses were received to this question. From these responses:

- two respondents, O2 and H3GI, referred ComReg to their response to Question 2 of Consultation 09/99, and did not provide any further detail on the factors to consider in calculating a rebate;
- Vodafone believed that a rebate is neither objectively justified nor proportionate (for the reasons as set out in its response to Question 2 of Consultation 09/99) and as such the factors that ComReg should consider in calculating any such rebate are not relevant;
- Digiweb expressed the view that the value of the potential loss of revenue for the residual term should be a factor considered in calculating the rebate; and
- eircom/Meteor agreed with the ComReg and DotEcon proposals for an objectively justified and simple rebate calculation based on the original purchase price, its remaining term and an amortisation schedule. In addition, eircom/Meteor submitted a methodology for calculating this rebate based upon:
  - the purchase price;
  - the portion of the purchase prices that is attributable to Meteor's 900 MHz licence [**Confidential Text Removed**];
  - the cost of capital [**Confidential Text Removed]**; and
  - the unexpired period of the licence.[**Confidential Text Removed**].
- [**Confidential Text Removed**]

Responses to Consultation 10/71

A 6.395 While ComReg did not ask a question on the early liberalisation option in Consultation 10/71, both eircom/Meteor and O2 submitted views on this issue.

A 6.396 O2, similar to its view submitted to Consultation 09/99, believed that Meteor would have an unfair advantage over other existing GSM operators, and it would distort competition if Meteor was permitted to effectively retain spectrum and choose during the auction whether they wish to play or not depending on the price bid by competitors.

A 6.397 Eircom/Meteor, while anticipating a consultation on the complete set of auction rules in due course, outlined some principles that should be applied with regard to auction design. It submitted that:

- eircom/Meteor should have the right to bid for these same lot combinations as other bidders, without prejudice to its decision whether or not to liberalise one or both of its existing spectrum lots;
- eircom/Meteor should not be required to choose whether or not to liberalise its 900 MHz licences until it knows whether it has won further spectrum lots in the auction;
- eircom/Meteor's decision whether or not to liberalise its 900 MHz spectrum depends on how much 900 MHz spectrum it wins in the auction. Requiring eircom/Meteor to face this decision in the absence of price discovery and the outcome of the primary bid rounds, would degrade the efficiency of the spectrum award.

Responses to Consultation 10/105

A 6.398 In Consultation 10/105, two questions were asked on the early liberalisation option proposal in respect of the 900 MHz and 1800 MHz bands.

Question 8 of Consultation 10/105

A 6.399 This question sought views on ComReg's proposal to adopt an early liberalisation approach for both the 900 MHz and 1800 MHz bands. Four responses were received to this question and from these responses:

- All four respondents (eircom/Meteor, H3GI, O2 and Vodafone) supported ComReg's proposal to adopt an early liberalisation approach in the 900 MHz and 1800 MHz bands[297];

A 6.400 In support of the above view:

- Vodafone noted that the early liberalisation option should effectively encourage earliest possible liberalisation of the entire 900 MHz and 1800 MHz bands and minimise potential competitive distortions arising from restricted access to liberalised spectrum; and
- eircom/Meteor noted that flexibility of this nature is welcome in principle as operators are best placed to determine the evolution of technology within their spectrum holdings.

A 6.401 O2, similar to its response to Consultation 10/71 and Question 2 of Consultation 09/99, believed that there might be a difficulty in the process proposed by DotEcon where an existing GSM licensee would have the ability to decide whether to liberalise their spectrum or not upon knowing the result of each bidding round.[298]

[297] O2 stated that *"we reserve our final position until the mechanism to be used, including activity rules have been fully documented and explained."*

[298] O2 stated that *"this means that bidders will not know how many lots of spectrum are available in each band for each bidding round in advance of placing their bid. This is a necessary piece of*

Question 9 of Consultation 10/105

A 6.402 This question sought views on ComReg's rebate proposal for the 900 MHz and 1800 MHz bands as set out in Consultation 10/105. Four responses were received to this question:

- two respondents (Vodafone[299] and O2) were supportive of ComReg's rebate proposal;
- eircom/Meteor was supportive of ComReg's proposal to issue a rebate, but did not support ComReg's proposed calculation. It submitted views on this issue as outlined below; and
- the remaining respondent, H3GI, did not agree with ComReg's rebate proposal. In support of its view, it re-iterated the comments that it had made in its response to Question 2 of Consultation 09/99, namely that:
  - "*the rebate confers an unfair commercial advantage on Meteor contrary to Article 107 of the Treaty on the Functioning of the European Union ("TFEU")"*;
  - If ComReg grants Meteor a rebate it will be providing funds to:
    - acquire liberalised spectrum below its full value (if Meteor uses the liberalised spectrum for 3G purposes); and/or
    - use liberalised spectrum for GSM purposes, which Meteor would have done anyway; and
    - Meteor has sufficient incentive to liberalise early.

A 6.403 In addition to the above, Vodafone, similar to its response of Question 2 of Consultation 09/99, submitted a view in relation to how the proposed rebate would be administered. It believed that:

- the rebate should take the form of a discount off any up-front fees and/or annual spectrum fees that would otherwise be required to be paid by the licensee arising from any spectrum usage rights allocated to them as an outcome of the award process; and
- the payment of the rebate to any licensee should not be funded by other spectrum licensees or licence applicants, either directly or indirectly.

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information for bidders to determine how best to place bids in order to maximise their chance of achieving their preferred outcome. Its absence could lead to an inefficient outcome"

[299] Vodafone added that "*Vodafone considers that, in the context where there would be no liberalisation of existing licences at 900 MHz and 1800 MHz, the benefit of early access to liberalised spectrum would on its own be likely to be a sufficient incentive for Meteor to avail of the early liberalisation option in respect of at least 2 ×2.2 MHz of its existing 2 × 7.2 MHz in the 900 MHz band. However in order to effectively encourage take-up of the early liberalisation option by the current 1800 MHz licensees in respect of most or all of their existing spectrum usage rights, a rebate on the basis of the remaining terms of the licences as currently proposed by ComReg would be both objectively justified and necessary*."

Eircom/Meteor's views on the calculation of the rebate

A 6.404 eircom/Meteor stated that ComReg's proposed methodology as set out in Consultation 10/105 did not appear to take account of its response to Question 3 of Consultation 09/99, and it therefore re-iterated its views on the matter and submitted further information as follows:

- ComReg's proposed approach significantly understates the value of the spectrum to eircom Group and does not allow for a reasonable return on eircom Group's investment in spectrum. This is because the allowance for inflation converts nominal spectrum fees from 2000 into 2010 terms, but does not allow for the expected return on investment over the time period;[300]
- there is a sound basis for arguing that operators have reasonable expectation of higher returns in the last two years of the licence compared with the earlier years of licence, therefore forgoing the final two years could result in greater loss than a pro rata calculation suggests;
- given the complexity and subjectivity of undertaking a full loss of profits calculation, eircom Group believes that it is reasonable to use the cost of capital as a proxy. Indexing with the cost of capital provides a conservative estimate of the impact on operators' loss of the final period of licence; and
- based on a cost of capital of 10.2% (as used by ComReg in reserve and SUF calculations), the proposed rebate should be calculated for eircom Group as detailed in **Table 5**.

[300] eircom group stated that "*eircom Group notes that ComReg's approach is inconsistent with the use of the cost of capital to set reserve fees between time slices and the conversion of 50% of the reserve price into annual Spectrum Usage Fees (SUFs). ComReg's proposed approach does not take account of eircom Group's investment in spectrum. In essence, eircom Group purchased spectrum based on the expected returns over the 15 year licence period. The licence fee represented an investment by eircom Group and like any investment, eircom Group expected to earn returns from this investment. ComReg's proposed approach to calculating compensation is to allow eircom Group only a zero real return (i.e. compensation for inflation only).*"

Operator	Spectrum Band & Assignment Start Date	Original Access Fees Paid (IR£)	Proportion Of Licence Forgone (Years)	Proportion Of Access Fee Forgone (€1= IR£0.787564)	Cost Of Capital Adjustment From Start Date Of GSM Licence To November 2010	Proposed Rebate
Eircom Group	900MHz 2×7.5MHz July 2000	£3.75m	2.5/15	€ 793,586	270.6%	€2,147,610
Eircom Group	1800 MHz 2×14.4 MHz July 2000	£7.5m	2.5/15	€1,587,173	270.6%	€4,295,222

Table 5: Calculation of rebate for eircom Group (as submitted by eircom Group in its response to Consultation 10/105)

A 6.405 eircom/Meteor stated that it believed that ComReg's proposed rebate approach:

- would under-compensate eircom Group (and other operators with licences subject to early liberalisation); and
- is likely to adversely impact the efficiency of the auction process for 800 MHz, 900 MHz and 1800 MHz spectrum and the broader development of the mobile market.

A 6.406 In relation to the latter point:

- eircom/Meteor asserted that ComReg's proposed approach introduces a bias in eircom Group's decision about whether to surrender spectrum for early liberalisation or to retain spectrum on an un-liberalised basis. This bias will distort the values that operators with existing 900 and 1800 MHz spectrum will be prepared to buy and could result in inefficient auction outcomes;[301]
- eircom/Meteor asserted that ComReg's proposed approach would unjustifiably affect eircom Group in terms of the compensation available to it to a significantly greater extent than other operators and as such is discriminatory. This is because eircom Group has greater amounts of spectrum subject to potential liberalisation as compared to other operators; and
- eircom/Meteor stated that it appeared to them that ComReg's proposed approach is in this respect a classic case of "regulatory opportunism",

[301] eircom stated that *"If eircom Group liberalises its spectrum early, it will then be bidding to buy the spectrum based on the expected returns from the use of the spectrum in the first time slice. This will be based on the expected returns over this period i.e. based on expected net revenues discounted at eircom Group cost of capital. This means that eircom Group will receive compensation for early surrender of the licences based on the rate of inflation, but have to buy spectrum based on expected returns subject to the cost of capital."*

where ComReg is proposing to change the term of the licence without offering eircom Group full compensation for the value of the licence in the final 2.5 years. It believed that this will adversely impact willingness to pay for future licences and may undermine investment in the telecommunications sector.

DotEcon's Commentary

A 6.407 In Section 8 and 9 of DotEcon's latest report to ComReg Document 11/58, DotEcon provide a commentary on:

(a) the early liberalisation option for existing licence holders;

(b) the calculation of the rebates; and

(c) the implementation of the early liberalisation option

a) The early liberalisation option for existing licence holders

A 6.408 Section 8.1 of Document 11/58 sets out the background to the early liberalisation option as discussed in DotEcon's previous reports (09/99c, 10/105a) and ComReg's previous consultations (09/99 and 10/105).

A 6.409 DotEcon set out the respondents' views received to ComReg's consultations in Section 9.2 of its report.

A 6.410 Section 9 also set out the views received in relation to Consultation 09/99 and among other items, DotEcon note that:

- *"no operator objected to the provision of an early liberalisation option"* and
- *"there were mixed views expressed by operators on the subject of a rebate in response to consultation 09/99"*

A 6.411 In addition section 9 discusses the views received to Consultation 10/105 where DotEcon note that:

- *"All four respondents were broadly in favour of ComReg's proposed approach providing for early liberalisation of spectrum in the 900MHz and 1800MHz band."* and
- *"Three of the four respondents to this consultation agreed with ComReg's proposal regarding rebates for 900MHz and 1800MHz licences. The fourth respondent, H3GI, re-iterated its views on rebates as expressed in its response to 09/99."*

A 6.412 DotEcon's commentary in relation to these views is set out in section 9.3 of the report.

A 6.413 In addressing the issue of "conferring an advantage upon Meteor in some way" and in summary DotEcon are of the view that, "we do not believe that this option confers any advantage within the auction, as it would reimburse Meteor only for the asset that it were to relinquish as part of the process of being exchanging spectrum for liberalised spectrum in the 900MHz band in the first time slice and not doing so could have negative consequences for future spectrum licensing 'exchanges'."

A 6.414 DotEcon consider the issue of "*Meteor's incentive to liberalise early*" and in summary, note that, the argument that Meteor would have sufficient incentive to liberalise its existing 900MHz holdings in the absence of a rebate for its existing spectrum usage rights in the band is far from clear.[302]"

A 6.415 DotEcon then consider the issue "how the auction process might be affected by Meteor's rebate option" and note that:

- It will be clear to all bidders prior to the auction how many lots are available in the 900MHz band for the period over which Meteor currently holds a licence;
- There will be five 2×5MHz lots – Meteor will occupy the further lots, regardless of whether it wins liberalised usage rights for this spectrum or not; and
- Meteor's spectrum cap will reflect that it is occupying two 2×5MHz lots for the relevant period.
- This information should provide sufficient certainty for bidders in assessing potential demand and actual supply of spectrum for calculating their valuations for the spectrum available.

A 6.416 Further, Meteor will face the same conditions in terms of bidding and in terms of potentially winning as other bidders.

A 6.417 Using a combinatorial clock auction format, both Meteor and all other bidders will be presented with a price per lot of liberalised spectrum in each of the open rounds. During each round, all bidders including Meteor will have to state their demand for liberalised spectrum given these stated prices. These statements of demand, in combination with the round prices for the associated lots, constitute bids that are binding.

A 6.418 While Meteor will be guaranteed to have some spectrum at the end of the auction in the 900MHz band in the first time slice, its bids to liberalise this spectrum will be combined with all other bidders as part of the winner determination process. Therefore, whether Meteor is awarded liberalised spectrum rights for its existing spectrum holdings will be determined on the same basis as whether these rights are awarded to other bidders."

[302] *"As an aside, it is noteworthy that ensuring that incentives are adequate for individual operators to liberalise their existing licences where this becomes possible is not within ComReg's statutory objectives, and as such is a secondary issue to ComReg."*

A 6.419 DotEcon's overall view on the early liberalisation option is that, "Overall, and applying the same principles set out above to the 1800 MHz band, therefore, our view on this issue is unchanged; that is, existing operators in the 900MHz and 1800MHz bands should be permitted to liberalise existing spectrum holdings, and where this option is taken up, receive a rebate based on purchase price and time remaining on the licences for the spectrum usage rights relinquished in return."

b) The calculation of the rebates

A 6.420 Section 9.4 of Document 11/58 considers the calculation of the rebates calculation and notes that eircom/Meteor made specific proposals in its response to Consultation 09/99 and 10/105 on this issue.

A 6.421 DotEcon outline the objective of the rebate calculation as being, "DotEcon's proposal, as adopted by ComReg, is that the rebate for the residual term of a licence should be related to the price originally paid for a licence. That is, the intention of the rebate is solely to place an existing licensee who gives up the residual term of a licence in a comparable situation to that it would have faced had it originally bought a licence of shorter duration."

A 6.422 In relation to eircom/Meteor's proposal, DotEcon states that, "This is not a reasonable approach as, at the second step in calculating the rebate (before accounting for loss of profits), there is no reason whatsoever to assume that the value of spectrum should grow at the cost of capital."

A 6.423 DotEcon's proposed approach expresses as a proportion of the original 15 year licence price, the proportionate impact of the curtailment in year N terms.

The implementation of the early liberalisation option

A 6.424 Section 9 of Document 11/58 discusses the implementation of the early liberalisation option.

A 6.425 In setting out the rationale for providing this level of information at this stage of the process, DotEcon note that:, "two operators (Meteor and O2) have raised queries about the bidding process in the case that a bidder holds a licence for spectrum in the first time slice and the mechanics of how such a bidder would have the option to bid to liberalise this spectrum within the auction." and "Given that information on how this would work in practice has not yet been covered in detail and the relevant information is spread across a number of documents, in this section, therefore, we describe the auction process with regard to this issue."

A 6.426 The remainder of this section sets out the detail in relation to the implementation of the early liberalisation option in the proposed auction, and considers three main areas:

- bidding procedure with no existing spectrum holdings;
- bidding procedure with existing spectrum holdings;

- determining winners and prices.

ComReg's Views

A 6.427 Over the course of ComReg's previous consultations, respondents have submitted views on various aspects of ComReg's proposed early liberalisation option and this section considers these views under the following categories.

- The inclusion of an early liberalisation option for existing GSM licences in the proposed auction;
- The application of a rebate in respect of the residual term of a GSM licence and its calculation; and
- Auction implementation issues surrounding the early liberalisation option.

A 6.428 ComReg's overall position is set out at the end of this section.

The Inclusion of an Early Liberalisation Option for Existing GSM licences in the Proposed Auction

A 6.429 In considering this issue, ComReg notes that, while respondents had differing views on various aspects of ComReg's proposal, all respondents generally supported the inclusion of an early liberalisation option in the award process.

A 6.430 A number of reasons in support of this option were provided by the respondents and by DotEcon in their various reports, including the fact that:

- It would minimise a potential distortion of competition issue where an existing GSM operator may not have access to liberalised spectrum until their existing GSM licence expired;
- It would assist in achieving the earliest liberalisation of the 900 MHz and 1800 MHz bands;
- It would provide flexibility to the GSM operator who can then determine how best to plan for the evolution of technology within their existing spectrum holdings.

A 6.431 ComReg notes that the above reasoning is in keeping with its previous proposals as set out in Consultation 09/99 and 10/105, and therefore believes that it is appropriate to include an early liberalisation option for both the 900 MHz and 1800 MHz bands in the proposed auction.

The Application of a Rebate in Respect of the Residual Term of a GSM Licence and its Calculation.

A 6.432 Over the course of ComReg's previous consultations, ComReg notes that respondents were generally in favour of the application of a rebate in respect of the residual term of a GSM licence and its calculation, although:

- H3GI did not support the application of a rebate as it believed that:
- Meteor has sufficient incentive to liberalise early;
- the rebate confers an unfair commercial advantage on Meteor contrary to Article 107 of the Treaty on the Functioning of the European Union ("TFEU"); and
- if ComReg grants Meteor a rebate it will be providing funds to:
  - acquire liberalised spectrum below its full value (if Meteor uses the liberalised spectrum for 3G purposes); and/or
  - use liberalised spectrum for GSM purposes, which Meteor would have done anyway.
- Vodafone, in its response to Consultation 09/99, stated that it did not agree with ComReg's rebate proposal as it believed that Meteor had sufficient incentives and it was therefore neither objectively justified nor necessary. However, in its reply to Consultation 10/105 Vodafone supported ComReg's rebate proposal for the 900 MHz and 1800 MHz bands.
- Digiweb suggested that the value of the potential loss of revenue should be a factor.
- eircom/Meteor did not support ComReg's proposed rebate calculation. Eircom/Meteor proposed a calculation based upon a cost of capital interest rate of 10.2% per annum; and
- eircom/Meteor believed that ComReg's proposed rebate approach:
- will under-compensate eircom Group (and other operators with licences subject to early liberalisation); and
- is likely to adversely impact the efficiency of the auction process for 800 MHz, 900 MHz and 1800 MHz spectrum and the broader development of the mobile market.

A 6.433 These comments are now considered in turn.

Meteor (or any existing GSM licensee) has sufficient incentives and a rebate is not necessary

A 6.434 In relation to the incentives for Meteor (or any existing GSM licensee) to liberalise early, ComReg notes that the application of a rebate should be

considered in light of ComReg's statutory objectives as set out in Annex 1 of this document, and not necessarily the incentives of any one operator.[303]

A 6.435 While the incentives of operators was one issue that was discussed in Consultation 09/99 and DotEcon's Report Document 09/99c, the rebate was proposed in light of the rights of the existing licensee to have its existing GSM licence honoured and the "exchange" nature of the early liberalisation option. The early liberalisation option and rebate proposal seeks to achieve this by ensuring that:

- any liberalised spectrum obtained in "exchange" for relinquished GSM spectrum rights is priced at the opportunity cost for that spectrum as per the auction results; and
- the rebate for the relinquished GSM spectrum rights would be calculated in a manner that would place the licensee in a comparable situation to one that it would have faced had it originally bought a licence of shorter duration.

A 6.436 The details of ComReg's proposed rebate calculation are discussed further below.

Article 107 TFEU (State Aid).

A 6.437 As ComReg has noted previously, for a measure to be classified as State Aid, the following four cumulative criteria must be met: 1) there must be an intervention by the State or through State resources which entails a financial burden on the State; 2) the measure must confer a selective advantage on an undertaking carrying on an economic activity; 3) the measure must distort or threaten to distort competition; and 4) there must be an effect or potential effect on trade between Member States.

A 6.438 By way of preliminary point, ComReg wishes to emphasise that given that an 'exchange' is occurring, commercial and business principles dictate that the person divesting itself of something is entitled to some type of payment in return from the party taking receipt of the divested asset or right. The State aid argument presented by this respondent ignores the fact that such licensees would be relinquishing rights of quantifiable value, and the State is, in turn, obtaining the benefit of the early relinquishment of these rights.

A 6.439 In the context of State aid, ComReg notes that, typically, for criterion (1) to be satisfied, the State must forego some income from the grant of licenses that it would otherwise receive or assume some other type of burden. ComReg is satisfied that the structure of the proposed auction mechanism would ensure that

[303] Despite the above, ComReg notes DotEcon's advice as set out in its latest report (Document 11/58) which discusses Meteor's incentives. DotEcon are of the view that it is far from clear whether Meteor would have sufficient incentive to liberalise early, as among other items, the duration of the first time slice is now shorter than that proposed in Consultation 09/99, and this may reduce Meteor's incentives to liberalise its existing 900 MHz spectrum holdings early.
While DotEcon did not explicitly discuss the incentives of the existing GSM 1800 MHz licensees, ComReg believes that the above rationale would also be valid for the GSM 1800 Mhz licensees.

the 'gross' fee paid for liberalised spectrum will fully reflect its market value (this fact does not appear to have been disputed by any respondent to the consultation process). It could be argued that, if existing GSM licensees are over-reimbursed for relinquishing existing GSM rights of use, and assuming that an off-setting approach is taken to rebate administration (see, for example, Vodafone's proposal below), then the net fee paid by such licensees for liberalised rights of use would be below market value and the State would, therefore, be foregoing some income from the grant of licences that it would otherwise receive. However, ComReg is satisfied that the methodology proposed by DotEcon for setting the rebate ensures that the value of same does nothing more than place the licensee in a comparable situation to one that it would have faced had it originally bought a licence of shorter duration. In that light, the rebate would not over-reimburse licensees and the State would, therefore, not have foregone some income from the grant of licences that it would otherwise receive or assume some other type of burden. The State, acting through ComReg, would simply be making a carefully calculated payment to a GSM licensee in return for the early relinquishment of rights of use. As such, the first criterion required for State aid to be present would not be satisfied.

A 6.440 For (2) to be satisfied, the measure must confer a selective advantage on an undertaking carrying on an economic activity. While, H3GI may be in competition with the GSM licensees for customers, it is not in a comparable legal and factual situation as it does not possess an existing GSM licence in either the 900 MHz or 1800 MHz band. The only persons who are in a comparable legal and factual situation in the light of this issue are the existing holders of GSM licences in the 900 MHz and 1800 MHz bands. ComReg's proposes to treat these persons in a non-discriminatory fashion by offering and applying the rebate in a uniform manner to all existing non-interim GSM licences in the 900 MHz and 1800 MHz bands.

A 6.441 Given the above, and contrary to H3GI's assertions, ComReg is of the view that the proposed rebate will not satisfy either of the first two State aid criteria set out above and it is therefore not necessary to discuss the third and fourth criteria.

H3GI's remaining comments

A 6.442 In response to Consultation 09/99 and 10/105, H3GI submitted that if ComReg grants Meteor a rebate it will be providing funds to:

- acquire liberalised spectrum below its full value (if Meteor uses the liberalised spectrum for 3G purposes); and/or
- use liberalised spectrum for GSM purposes, which Meteor would have done anyway.

A 6.443 It was not clear whether or not the above two observations were made by H3GI in the context of State Aid or as standalone comments. However, ComReg has considered them in the context of both State aid and as standalone comments. In relation to the first point, ComReg assumes that the term 'full value' refers to the market value of the spectrum. ComReg notes that any liberalised spectrum

obtained via the early liberalisation option would be obtained via the auction and at the opportunity cost for that spectrum. The opportunity cost for this spectrum would be set as a result of the proposed auction, and ComReg therefore believes that the liberalised spectrum would not be obtained below its 'full value'. In addition, ComReg is satisfied that the methodology it proposes for setting the rebate ensures that the value of the rebate does nothing more than place the licensee in a comparable situation to one that it would have faced had it originally bought a licence of shorter duration (in that regard, see also comments above on State aid).

A 6.444 Regarding H3GI's second point, ComReg notes that, once a licensee obtains a liberalised licence, it is permitted to use this licence for GSM purposes, as per Decision 2009/766/EC. ComReg therefore believes that the issue of whether Meteor would use this licence for GSM purposes or otherwise is somewhat irrelevant.

A 6.445 Finally, ComReg notes that, regardless of whether or not the above two observations were made in the context of State aid, it is of the view that H3GI has not demonstrated with any clarity why it believes that the proposed rebate satisfies the four cumulative criteria of Article 107 TFEU.

The potential loss of revenue should be a factor in calculating the rebate

A 6.446 ComReg notes that Digiweb suggested that the rebate calculation for the early liberalisation option should include a factor based upon the potential loss of revenue. ComReg disagrees with this suggestion as the introduction of the early liberalisation option does not imply that there will be a loss of spectrum rights or a loss of revenue.

A 6.447 The early liberalisation option proposed by ComReg is a contingent offer where an existing GSM licensee would only relinquish its GSM spectrum rights if it obtains liberalised spectrum rights in the first time slice. Furthermore, if an existing GSM licensee avails of the early liberalisation option and obtains a liberalised licence, it is then permitted to use this licence to continue to provide GSM services. It is therefore not apparent to ComReg how there could be a potential loss of revenue as the existing GSM licensee would be in a position to continue to provide GSM services as the early liberalisation option cannot result in a loss of spectrum rights for the GSM licensee.

A 6.448 Additionally, it should be noted that ComReg is not mandating the use of the early liberalisation option, but instead it is a commercial decision for each existing licensee to consider during the course of the proposed auction.

A 6.449 Given the above, ComReg believes that it would not be appropriate to include a factor based upon the potential loss of revenue in the rebate calculation for the early liberalisation option.

The rebate calculation should be based upon a cost of capital interest rate of 10.2% per annum

A 6.450 In considering this issue, ComReg notes that two of the existing GSM licensees, O2 and Vodafone, supported ComReg's rebate proposal and that the other GSM licensee, Meteor, supported ComReg's rebate proposal with the exception of the amortisation rate. eircom/Meteor propose that the amortisation rate should be based upon the cost of capital interest rate of 10.2% per annum.[304]

A 6.451 ComReg notes that DotEcon has considered the above proposal and in summary, DotEcon advises that:

- there is no reason whatsoever to assume that the value of spectrum should grow at the cost of capital; and,
- the intention of the rebate is solely to place an existing licensee who gives up the residual term of its licence in a comparable situation to that it would have faced had it originally bought a licence of shorter duration.

DotEcon's Approach

A 6.452 DotEcon also provides an approach which expresses as a proportion of the original 15 year licence price, the proportionate impact of the curtailment in year N terms. This calculation does not correct for inflation as the result is in year 2000 prices (the start date of the licences) and any inflation the start of the licence and year N has to be applied in addition to the effects of compound interest.

A 6.453 DotEcon note that there are no inconsistencies between this proposal and those used in the benchmarking exercise for rebasing the prices of licences to account for differences in licence length.

A 6.454 Furthermore, DotEcon compares its own calculation of terminal values with that put forward by meteor and with that previously proposed by ComReg and concludes that "Overall, ComReg's conservative approach yields terminal values closer to what we would propose as appropriate terminal values rebates".

Eircom/Meteor's remaining comments

A 6.455 ComReg notes that eircom/Meteor believed that ComReg's proposed rebate approach:

- will under-compensate eircom Group (and other operators with licences subject to early liberalisation); and
- is likely to adversely impact the efficiency of the auction process for 800 MHz, 900 MHz and 1800 MHz spectrum and the broader development of the mobile market and is a case of "regulatory opportunism".

[304] ComReg notes that the rebate proposal from Eircom/Meteor has varied over time and its proposal in response to Consultation 10/105 is now in agreement with Consultation 10/105 with the exception of the amortisation rate.

A 6.456 In relation to the first point, ComReg notes that:

- the issue at question is the rate of amortisation to account for the intervening period since the licence was first awarded, as all existing GSM licensees have supported ComReg's proposal to base the rebate upon the original purchase prices and the residual term.
- that two of the existing GSM licensees, Vodafone and O2, supported ComReg's proposed use of the CPI, while one existing GSM licensee, eircom/Meteor, did not.
- Eircom/Meteor proposed that the rebate calculation should be based upon a cost of capital interest rate of 10.2% per annum. As discussed above, this proposal has been analysed by DotEcon. In its expert opinion, DotEcon note that there is no reason to assume that the value of spectrum should grow at the cost of capital and furthermore DotEcon propose that it is appropriate to adjust the original price paid for a licence for inflation using the CPI.

A 6.457 Given the above, ComReg believes that ComReg's proposed rebate approach will not under-reimburse the GSM licensees including eircom Group.

A 6.458 In relation to the second point, ComReg refutes eircom/Meteor's suggestion that ComReg's proposed rebate approach is a case of "regulatory opportunism" and that it is likely to adversely impact the efficiency of the auction process for 800 MHz, 900 MHz and 1800 MHz spectrum and the broader development of the mobile market. ComReg's proposed rebate calculations have been the subject of considerable consultation and the views of all respondents have been analysed by both ComReg and ComReg's expert economic advisors, DotEcon. ComReg's proposed rebate calculations have taken consideration of all the respondents' views and reflect DotEcon's advice. Furthermore ComReg is not mandating the use of the early liberalisation option and it is a matter for the GSM licensees to decide whether it wishes to avail of this option or not.

Auction Implementation Issues Surrounding the Early Liberalisation Option

A 6.459 At various stages in the consultation process, eircom/Meteor and O2, submitted views querying how the early liberalisation option would be implemented in the proposed auction. ComReg notes that DotEcon has addressed these issues in sections 8 and 9 of its report (Document 11/58).

A 6.460 In relation to these comments ComReg notes DotEcon's commentrary in section 9.3 (11/58).

A 6.461 Furthermore, ComReg notes that chapter 9 of DotEcon's report (Document 11/58) details the proposed bidding procedure where a bidder has existing spectrum in a band or bands, making clear how this differs from a situation where a bidder has no existing spectrum in that band or bands.

A 6.462 While ComReg will fully address such issues in the Information Memorandum to be published in advance of the proposed auction, ComReg is of the view that O2

and Meteor's implementation queries have been addressed in the current DotEcon Report.

A 6.463 In addition, ComReg notes that Vodafone submitted a view in relation to how the rebate should be administered and it proposed that the rebate should take the form of a discount off any up-front fees and/or annual spectrum fees that would otherwise be payable by the licensee for any liberalised spectrum usage rights assigned to them following the proposed auction process.

A 6.464 While ComReg will finalise such issues in the Information Memorandum to be published in advance of the proposed auction, ComReg is of the preliminary view that Vodafone's proposal is reasonable and appropriate.

ComReg's Overall Position

A 6.465 Having considered the views expressed by respondents above and having assessed its current proposals on this matter in light of its statutory objectives generally, ComReg believes that its proposed early liberalisation option and associated rebate proposal set out below are in line with its statutory objectives and are objectively justified, transparent, non-discriminatory and proportionate.

A 6.466 ComReg, however, also accepts that the approach as outlined by DotEcon in its report is also a valid approach but that given that there is no material difference in the outcome, ComReg proposes to maintain its current approach.

A 6.467 Absent compelling reason to adopt the alternative approach, ComReg proposes to:

- Include an early liberalisation option for the 900 MHz and 1800 MHz bands in the proposed auction;
- Apply a rebate in respect of the residual term of the existing GSM licence; and
- To adopt a conservative approach to calculating the rebate in which the rebate will be based upon the original price paid for licence, adjusted by the proportion of licence foregone and then this amount adjusted for Euribor[305].

Operator	Spectrum Band & Assignment & Start Date	Original Access Fees Paid	Proportion Of Licence Foregone	Proportion Of Access Fee Foregone (€1= IR£0.787564)	Adjustment For Euribor (From Start Date Of GSM Licence)	Proposed Rebate
Vodafone	1800 MHz 2 × 14.4 MHz Jan 2000	IR£5.69m	2 years/ 15 years	€963,308	42.7%	€1,374,640
O2	1800 MHz 2 × 14.4 MHz Jan 2000	IR£5.686m	2 years/ 15 years	€962,631	42.7%	€1,373,674

[305] Euribor is used as a proxy for a reasonable rate of return had the money forgone been invested.

Meteor	1800 MHz 2 × 14.4 MHz July 2000	IR£7.5m	2.5 years/ 15 years	€1,587,173	43.8%	€2,282,354
Meteor	900 MHz 2 × 7.2 MHz July 2000	IR£3.75m	2.5 years/ 15 years	€793,586	43.8%	€1,141,177

A 6.468 **Table 6** below presents ComReg's proposed rebate for each operator based upon the assumption that an operator is choosing to avail of the early liberalisation option for its full spectrum assignment. Rebates for the early liberalisation of partial spectrum assignments would be calculated on a pro-rata basis.

Operator	Spectrum Band & Assignment & Start Date	Original Access Fees Paid	Proportion Of Licence Foregone	Proportion Of Access Fee Foregone (€1= IR£0.787564)	Adjustment For Euribor[306] (From Start Date Of GSM Licence [307])	Proposed Rebate
Vodafone	1800 MHz 2 × 14.4 MHz Jan 2000	IR£5.69m[308]	2 years/ 15 years	€963,308	42.7%	€1,374,640
O2	1800 MHz 2 × 14.4 MHz Jan 2000	IR£5.686m[309]	2 years/ 15 years	€962,631	42.7%	€1,373,674
Meteor	1800 MHz 2 × 14.4 MHz July 2000	IR£7.5m[310]	2.5 years/ 15 years	€1,587,173	43.8%	€2,282,354
Meteor	900 MHz 2 × 7.2 MHz July 2000	IR£3.75m[311]	2.5 years/ 15 years	€793,586	43.8%	€1,141,177

Table 6: ComReg's Proposed Rebate for an operator which avails of the early liberalisation option for its full spectrum assignment[312].

A 6.469 Finally it should be noted that:

- should a GSM licensee avail of the early liberalisation option and relinquish the residual part of its licence, the spectrum usage fees associated with the existing GSM licences will be adjusted to coincide

[306] Based on the 12 month Euribor rate.

[307] This figure will be updated in due course to reflect the most recent data available at the time ComReg's rebate proposal is finalised.

[308] See ComReg Press Release PR070999a

[309] See ComReg Press Release PR070999a

[310] See ComReg Press Release PR190698

[311] See ComReg Press Release PR190698 and ComReg Document 01/04

[312] The period of the rebate used in this table is for illustrative purposes only. Any actual rebate would be based on the actual number of days by which the original licence is curtailed.

with commencement date of the early liberalisation licence (i.e. they would apply for the period up to 1st February 2013)[313];

- any spectrum retained for GSM purposes will have to conform with the co-existence rules of the Decision 2009/766/EC and Decision 2011/251/EU and the GSM channel raster plan. This is discussed in further detail in Annex 6c (Full assignment Round) and Annex 8d (Licence Conditions)

A 6.470 ComReg is satisfied that the above proposed early liberalisation option and associated rebate proposal are in line with its statutory objectives and are objectively justified, transparent, non-discriminatory and proportionate.

6.7 System of Eligibility Points in an Auction Activity Rule

A 6.471 An auction activity rule is a means of constraining bidders' activity in an auction. They are commonly used in multi-round auction formats such as a simultaneous multiple-round ascending auction (SMRA) or a combinatorial clock auction (CCA). An activity rule is intended to discourage strategic behaviour by bidders and promote simple, continual, meaningful bidding and thus price discovery.[314]

A 6.472 An activity rule addresses strategic bidding by making the right of a bidder to continue bidding in future rounds of the auction contingent on the bidder's activity in any given round. A common method of monitoring a bidder's activity is to assign "eligibility points" to each lot category in the auction.

A 6.473 In this Response to Consultation and Draft Decision, ComReg proposes a single auction of the 800 MHz, 900 MHz, and 1800 MHz spectrum bands. This Section considers the number of eligibility points to assign to blocks of spectrum in each band.

ComReg's Position as Set out in Previous Consultations

A 6.474 Consultations 08/57 and 09/14 did not consider auction format and therefore activity rules and a system of eligibility points were not considered in those consultations.

Consultation 09/99

A 6.475 In Consultation 09/99 ComReg proposed an auction based upon a sealed bid format. In a sealed bid auction, bids are collected in a single round and activity rules between rounds and a system of eligibility points are not required. Consequently, the use of eligibility points was not discussed in Consultation 09/99.

[313] Further details are contained in Chapter 7 on the possibility of advanced commencement of liberalised licences.

[314] Harsha P and Barnhart C., *"Strong Activity Rules for Iterative Combinatorial Auctions"* www.eecs.harvard.edu/~hq/papers/HBPZ2009.pdf

A 6.476 However, in arriving at this proposed auction format ComReg had considered the advice of its independent consultant DotEcon, as set out in Document 09/99c. Section 6 of Document 09/99c examined four potential auction formats and a method of implementing an activity rule through a system of eligibility points was set out in section 6.2.1:

A 6.477 "A common method of implementing this type of activity rule is through a system of eligibility points:

- Before the commencement of the auction, each lot is assigned a number of eligibility points by the auctioneer (which remains constant during the auction). Attributing different numbers of eligibility points to different lots is often used as a method of reflecting differences in the estimated value of different lots;
- Each bidder begins the auction with an 'initial eligibility' of a specified number of eligibility points requested by the bidder as part of the bidder application process and approved by the auctioneer. This initial eligibility will limit bidders' subsequent ability to make bids (as described below);
- The activity of a bidder in a round is equal to:
  - In round 1, the eligibility points associated with the lots upon which it places a bid; and
  - In round 2 onwards, the net number of eligibility points associated with:
  - lots where the bidder held a standing high bid at the start of the round;
  - plus lots where the bidder did not hold a standing high bid at the start of the round and for which the bidder submits a bid in this round;
  - less lots where the bidder withdraws a standing high bid.
- In any one round, the activity of a bidder cannot exceed that bidders eligibility level, that is, the number of eligibility points associated with it, at the start of that round;
- Where a bidder's activity in a round is less than its eligibility, this bidder's
- eligibility is adjusted downward. The amount of the downward adjustment of eligibility points depends on the activity rules of the auction;
- The most straightforward activity rule is that the activity of a bidder in a round
- must be equal to its eligibility level at the beginning of the round. In this case, the bidder's eligibility level at the start of a round would be reduced by the full amount of the difference between the bidder's eligibility level and its activity in the previous round;
- However, in order to allow bidders to switch between lots of different numbers of eligibility points during the auction as information is

revealed about the relative prices of lots, a more flexible activity rule can be adopted – that the activity of a bidder in a round must be equal to a proportion of its eligibility level at the beginning of the round;

- Where the more flexible activity rule is employed, the proportion of its eligibility level that a bidder's activity must constitute increases as the auction progresses. This 'activity requirement' must be 100% before the auction can end.

A 6.478 In addition to the 100% activity criterion, in order for a round to constitute the last round of the auction, the round must close with no new bids having been placed and no withdrawals being made for any lots."

Consultation 10/71

A 6.479 In Consultation 10/71, ComReg proposed to release liberalised 800 MHz spectrum in a joint award with liberalised 900 MHz spectrum. In section 4 of that consultation, ComReg proposed the use of a combinatorial clock auction (CCA) format, instead of the sealed bid format proposed in Consultation 09/99. A CCA format involves multiple bidding rounds and hence the proposal to use this format brought the issue of activity rules and a system of eligibility points into consideration.[315]

A 6.480 In arriving at its proposal to use a CCA auction format, ComReg again considered the advice of its independent consultant DotEcon, set out in Document 10/71a. This report considered a number of detailed aspects of the proposed auction, including the lot categories, the ability to switch bids between lot categories, and the appropriate eligibility points ratio.

A 6.481 Section 4.2.2 of Document 10/71a is headed "Band-specific lot categories" stated that in order "to achieve efficient allocation we need to treat the bands as separate categories and allow their relative prices to vary above a set common minimum price" Dotecon advised that there should be four distinct lot categories:

- 800 MHz lots in the first time slice (6 lots);
- 800 MHz lots in the second time slice (6 lots);
- 900 MHz lots in the first time slice (5 lots); and
- 900 MHz lots in the second time slice (7 lots).

A 6.482 Section 4.2.2. of Document 10/71a addressed the issue of switching bids between lots and stated: "Bidders would have a total amount of eligibility to bid in each time slice, and would not be able to increase bidding in one time slice as a result of reducing bidding activity in the other. However, within a time slice, a bidder would be able to switch its bidding between 800MHz and 900MHz lots subject to bidding eligibility for that time slice capping the number of bids it may make across the two bands. Given the similarities of 800MHz and 900MHz spectrum, we would propose that eligibility is counted simply as the number of 2×5MHz

[315] See Annex 6.2 for a discussion on the details of the award format.

lots bid for (i.e. equal weight is given to 800MHz and 900MHz categories). The number of bids made in each time slice could not be increased from one primary bid round to the next, but within a time slice bids could be switched between 800MHz and 900MHz bands “

Consultation 10/105

A 6.483 In Consultation 10/105, ComReg proposed including the 1800 MHz spectrum band in its joint award of the 800 MHz and 900 MHz bands. ComReg expressed its view that substitutability between the three spectrum bands should be allowed in the proposed auction in order to obtain the full benefits of including the 1800 MHz band in the same auction as the sub-1GHz spectrum.

A 6.484 Section 3.9.1 of Consultation 10/105 discussed activity rules and eligibility points and stated that, “In order to provide incentives for bidders to reveal information about their valuation through their bidding behaviour (which is the main reason for adopting an open auction format), bidders should be required to comply with activity rules that are set to encourage bidders to reveal their demand as the auction progresses. Without rules governing bidder activity there is the risk that bidders could act strategically, for example by “hiding” their demand by not bidding on as much spectrum as they wish to win at round prices in the earlier rounds in an attempt to avoid pushing up prices on those lots that they want to win. This incentive is normally addressed through activity rules that make the right of a bidder to continue bidding in future rounds contingent on the bidder’s activity in any given round”.

A 6.485 If all lots in the proposed auction were identical, the simplest activity rule relates to the number of lots a bidder bids for in a round. This is the case proposed for the 800 MHz and 900 MHz bands where a straightforward 1:1 activity rule is proposed, and the eligibility to bid in the following round is based on the number of lots bid in the current round.

A 6.486 With the proposed inclusion of the 1800 MHz band, this issue is complicated as the valuation of an 1800 MHz lot is likely to be lower than a sub-1GHz lot. In such situations, undesired strategic behaviour can occur as bids could be placed on relatively cheap lot categories in order to dampen demand for the more expensive lots. However, as noted above such behaviour is risky, as any bid at any time is potentially binding.

A 6.487 In order to set an adjustment that takes account of value differences across spectrum bands, it is necessary to attribute weights to the lots of spectrum in the different bands that represent their relative value. These relative values can then be represented by a number of eligibility points attributed to lots in each band. The activity rules of the auction would then work in the same way as in the simple case of the 1:1 valuation, with the exception that demand in a round, and the corresponding eligibility to bid in the following round, is measured not by the numbers of lots, but by the number of eligibility points.

A 6.488 This issue has been considered by DotEcon in section 6 of its report (ComReg Document 10/105a). It is worth noting that the eligibility weights do not have to be set at the exact relative value between the 1800 MHz band and sub-1GHz spectrum, as this relative value will only become known as a result of the auction. Instead, a reasonable approximation of the relative values is sufficient to set the eligibility weights, and the results of the 1800 MHz fees benchmarking study suggest that the value of a lot of spectrum in the 1800 MHz band is approximately half of that of a lot of sub-1GHz spectrum."

A 6.489 Given the above, and in line with DotEcon's recommendation, ComReg believes that the simplest way to implement these eligibility weights across the spectrum bands is to assign twice as many eligibility points to the sub-1GHz lots as compared to lots in the 1800 MHz band, as depicted in **Table 7** below."

Band	Number Of Eligibility Points For a 2 × 5 MHz Lot
800 MHz band	2
900 MHz band	2
1800 MHz band	1

Table 7 of Consultation 10/105: The proposed eligibility points for a 2 × 5 MHz lot

A 6.490 ComReg therefore proposed to assign twice as many eligibility points to the sub-1GHz lots as compared to lots in the 1800 MHz band, and invited views from interested parties on above proposal as follows:

> Q11. (from Consultation 10/105) Do you agree with ComReg's proposal to set a 2:1 ratio in relation to the eligibility points awarded to lots in the sub-1GHz and 1800 MHz bands, whereby twice as many eligibility points would be awarded for sub-1GHz lots as for lots in the 1800 MHz band? Please provide reasons for your view.

Views of Respondents

A 6.491 Three respondents, eircom Group, O2 and Vodafone, responded to Q11 of Consultation 10/105. All three supported the use of eligibility points though and varying views were submitted in relation to the number of eligibility points to assign to lots in each spectrum band.

A 6.492 eircom Group responded to Q.11 as follows:

- "Where underlying value substantially deviates from the eligibility ratio chosen, the activity rule is less effective and bidders have incentives to

behave strategically. eircom Group believes that the ratio of eligibility between the sub 1 GHz bands and the 1800 MHz should reflect the underlying value of the spectrum bands. This will:

- -Encourage appropriate price trade-offs by bidders across the three bands
- -Discourage parking of bids on low value spectrum bands to hide truthful valuations."

A 6.493 Vodafone responded to Q.11 as follows:

- "Vodafone agrees that switching between 1800 MHz and sub-1 GHz spectrum must be allowed in an auction and we consider that different weightings for eligibility points between 1800 MHz and sub-1 GHz spectrum is a reasonable approach in principle. However it must be emphasised that the appropriate value differential between the 1800 MHz and sub- 1 GHz spectrum bands will be determined by the auction process, not by the minimum price or the relative valuation that could be inferred from the proposed ratio in eligibility points between the lot types"

A 6.494 O2 responded to Q.11 as follows:

- "O2 agrees that the eligibility points for the 800MHz and 900MHz bands should have a ratio of 1:1. We also agree that the ratio of eligibility points for 800MHz/900MHz and 1800MHz might well be correctly set at greater ratio than 1:1 – there will be a material difference in value, however O2 believes ComReg has overestimated the value of 1800MHz spectrum relative to 800MHz/900MHz. While it is not necessary to set the eligibility ratio precisely corresponding to the ratio of valuation, O2 believes it is not possible to comment on whether 2:1 is the correct ratio until the auction process, minimum prices, and activity rules have been further clarified. For example, it is necessary to know if 100% of eligibility points must be used in each round in order to be retained for subsequent rounds.
- It is noted that in the upcoming Swiss multiband auction an eligibility point ratio of 3:1 has been set for 800MHz/900MHz and 1800MHz. In Hong Kong it is 2:1, and in the 2010 German auction it was 1:1."

DotEcon's Assessment and Recommendation

A 6.495 DotEcon's current stated view, as set out in Section 7 of its report [ComReg Document 11/58), is that "given the positive views expressed on this issue, and the relatively uncontroversial nature of the proposal based on the number of responses to the relevant part of the related ComReg consultation (Q11 of 10/105), we view that the proposed 2:1 ratio should be adopted for sub-1GHz and 1800MHz spectrum".

ComReg's Proposal

A 6.496 ComReg notes that the principle of constraining bidding flexibility through the use of activity rules has been supported by all three respondents.

A 6.497 The value of the different spectrum bands was commented upon by all respondents, with Vodafone emphasising that the appropriate value of the spectrum bands would be determined by the auction and could not be inferred from the minimum price or eligibility ratio. ComReg is also of the view that the value of the spectrum bands will be determined by the auction process, and for this reason the proposed minimum price per lot shall be set on a conservative lower bound basis (please see Annex 9 - spectrum fees)

A 6.498 In relation to the number of eligibility points to be assigned to each spectrum band, while O2 supported the setting of an equal eligibility ratio between 800 and 900 MHz lots, no other respondent commented on the appropriateness of the proposed 2:2:1 ratio. However respondents provided general comments on factors to consider in setting the eligibility points per spectrum band.

A 6.499 eircom Group suggested that the eligibility ratio between the sub-1GHz bands and the 1800 MHz band should reflect the underlying spectrum values. ComReg notes that the benchmarking study of DotEcon (ComReg 11/xx) considered the valuation of each of the spectrum bands in the proposed auction and concludes that it is reasonable to treat 800 MHz and 900 MHz on a par for setting minimum prices, while the 1800 MHz band should have a minimum price setting of 45-60% of that of the sub-1Ghz spectrum.

A 6.500 This benchmarking exercise suggests that a 2:2:1 eligibility point ratio would be a reasonable reflection of the value of the spectrum in each of the three bands.

A 6.501 O2 asserted that "it would not be possible to comment on whether 2:1 is the correct ratio until the auction process, minimum prices, and activity rules were further clarified". On this point ComReg notes that O2 acknowledged that the eligibility ratio need not precisely correspond to the valuation ratio and various differing eligibility weights (3:1, 2:1 and 1:1) have been applied in other countries.

A 6.502 Having taken into account the views of respondents and the advice of DotEcon, ComReg maintains the view that bidders should be allowed to switch their bidding demand between spectrum bands in the proposed auction. To mitigate against strategic behaviour, ComReg proposes to apply an auction activity rule through a system of eligibility points. ComReg considers it unnecessary to set eligibility points that exactly reflect the relative values of the different bands. In relation to the number of eligibility points to be assigned to each spectrum band, ComReg proposes a 2:2:1 ratio whereby twice as many eligibility points would be assigned to the 800 MHz and 900 MHz lots as against the 1800 MHz lot category, as set-out in

A 6.503 Table **8 below.**

Band	Number Of Eligibility Points For A 2 × 5 MHz Lot
800 Mhz Band	2
900 Mhz Band	2
1800 Mhz Band	1

Table 8: ComReg's proposed eligibility points for a 2 × 5 MHz lot

A 6.504 ComReg maintains its view that that eligibility points will not be transferrable between time slices, i.e. bidders would not be able to increase their eligibility in one time slice as a result of reducing its bidding activity in the other time slice.

A 6.505 Additionally, ComReg notes that the information memorandum associated with the proposed auction will set out further detail on the activity rules, auction processes etc.

Annex 7

Transitional Issues

A 7.1 On the basis of ComReg's proposed use of 2 temporal lots for the award of liberalised rights of use in each of the 800 MHz, 900 MHz and 1800 MHz bands, this annex discusses:

- ComReg's proposals to address transitional issues that would arise from the time of the proposed joint award until the proposed commencement of liberalised licences in the first temporal lot for the 900 MHz and 1800 MHz bands;
- ComReg's proposals to address transitional issues that would arise between the two proposed temporal lots for the 800 MHz, 900 and 1800MHz bands; and
- ComReg's proposal for the grant of preparatory licences in each of the 800 MHz, 900 MHz and 1800 MHz bands, in advance of the commencement of liberalised licences in the first temporal lot.

A 7.2 In relation to the discussion of each of these proposals, the following structure is adopted:

- a summary of ComReg's previous views as regards the proposal is set out;
- a summary of the views of interested parties received and other relevant material is then provided[316]; and,
- finally, ComReg's current view of the matter is set out.

7.1 Additional Matters Raised by Interested Parties

A 7.3 ComReg notes that a number of additional matters were raised by some interested parties as part of their responses, which are not relevant to the consideration of transitional issues. Accordingly, such matters are addressed by ComReg elsewhere in this document. These additional matters include:

- Eircom/Meteor's submission that ComReg had not yet addressed its response to Question 9 of Consultation 09/99[317] and that ComReg had

[316] Responses to these questions and, in one case, subsequent correspondence, were received from the following interested parties: Digiweb Limited, ("Digiweb"); LM Ericsson Limited ("Ericsson"); Hutchison 3G Ireland Limited ("H3GI") ; Imagine Communications Group Limited ("Imagine"); Telefónica Ireland Limited ("O2"); Eircom Group/Meteor Mobile Communications Limited ("Eircom/Meteor"); Qualcomm Ireland Limited ("Qualcomm"); RTE; UPC Ireland Limited ("UPC"); and Vodafone Ireland Limited ("Vodafone").

[317] Q9 of Consultation 09/99:

i) In the event that Meteor's existing frequency assignment must be adjusted post auction, please provide an estimate of the costs which might reasonably be incurred by Meteor in doing so?

yet to definitively address what would happen if Meteor was required to implement a frequency shift of 200 kHz of its existing GSM 900 MHz spectrum assignment. These issues are addressed in Annex 6.4 of this document;

- Vodafone's proposal to address what it saw as complications arising from ComReg's temporal lot approach. This proposal is addressed in Annex 6.3 (Temporal Lots);
- H3GI's and Qualcomm's view that transitional activities should not delay the release of liberalised 900MHz and alternative proposals in this regard. These issues and proposals are addressed in Annex 7 and Chapter 6 of this document.

7.2 Transitional issues in the 900 and 1800 MHz bands – from proposed joint award in 2011 until commencement of liberalised spectrum rights

ComReg's Position - 900 MHz Band (per Consultation 10/71)

A 7.4 In Consultation 10/71, ComReg noted:

- as a result of its proposed "full band" auction approach to the release of liberalised spectrum in the 900 MHz band, it is possible that existing GSM 900 MHz licensees could be required to either relocate[318] or re-tune[319] from their current spectrum assignments;
- from the date of the proposed spectrum award (then considered likely to be held 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 (until expiry of its GSM 900 MHz licence in mid-2015) to make a similar transition assuming it does not avail of early liberalisation[320];
- in order to assess the scale of the work and time required for any relocation and/or retuning activities conducted in the 900 MHz band (and in response to comments received from interested parties in relation to Consultation 09/99[321]), that it had commissioned independent expert technical advice from Red-M/Vilicom to detail the process steps and

ii) Please identify any proposal as to whether and, if so how, Meteor should be fairly and reasonably compensated for any such costs, having particular regard to ensuring that costs would be objectively justified, proportionate and independently verifiable.

[318] "Relocate" or "Relocation", in this context, refers to an operator moving to a different part of the band in question following the proposed auction.

[319] "Retune", in this context, refers to an operator addressing the issue of having a reduced spectrum allocation following the proposed auction (e.g going from an existing assignment of 2 × 7.2MHz to an assignment of 2 × 5MHz).

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

[321] Consultation 09/99, Questions 8 and 9.

estimated timeframes that could be associated with various transitional scenarios.[322] These scenarios were:

- Scenario 1: An existing GSM licensee obtains 2 × 10 MHz of 900 MHz spectrum but is required to move to a different part of the 900 MHz band ("relocation");
- Scenario 2: An existing GSM licensee obtains 2 × 5 MHz of 900 MHz spectrum ("retuning"); and
- Scenario 3: Whilst maintaining its existing 900 MHz spectrum bandwidth of 2 × 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 use by a licensee acquiring liberalised rights of use;[323]

- In relation to scenarios 1 and 2, there was a wide range of variables to consider and, as such, some basic assumptions had to be made to render modelling feasible. ComReg also considered that the model used by Red-M/Vilicom focused on a conservative "worst case" situation, for a hypothetical 'average' operator for both scenarios. In addition, while the Red-M/Vilicom 900 MHz report provided guidance to ComReg, in practice, it was considered highly unlikely that the worst-case scenarios discussed in the report would materialise as existing 900 MHz licensees are likely to use all technical and non-technical means at their disposal to address any transitional issues. The Red-M/Vilicom 900 MHz 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;
- the above notwithstanding, the findings of the Red-M/Vilicom 900 MHz report provide useful guidance to ComReg that:
  - the worst case timeframe associated with Scenario 1 (where an existing GSM licensee obtains 2 × 10 MHz of 900 MHz spectrum in a different part of the band) should not exceed 7 months;[324]
  - the worst case timeframes associated with Scenario 2 varies from 15 months to 2 years for 90% of the required new-build.[325] Where

[322] Readers are referred to Red-M/Vilicom's 900 MHz report (ComReg Document 10/71c).
[323] Scenario 3 purely provides an independent assessment of the direct costs and timescales involves in a minor (200kHz) retune of the Meteor 900MHz GSM network. This is discussed in the context of ComReg's full assignment round proposal (see Annex 6.4).
[324] 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.
[325] 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.

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 the sites that would take more than 2 years to deploy would 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).

A 7.5 In light of the above, ComReg considered that the time between its proposed joint award (then considered to be in mid-2011) and proposed commencement of liberalised 900 MHz licences (then considered to be early 2013) would be sufficient to allow for existing GSM 900 MHz licensees to complete any necessary transitional activities.[326]

A 7.6 ComReg also noted that to facilitate such transition activities, it may be necessary for ComReg to vary the terms of existing GSM 900 MHz licences (for instance by varying the frequencies that an operator is permitted to use) and that it would consider requested variations on a case-by-case basis.

A 7.7 ComReg consulted on its proposed approach to the 900 MHz band as follows:

> Q.18. (from ComReg 10/71): 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.

ComReg's Position - 1800 MHz Band (per Consultation 10/105)

A 7.8 In Consultation 10/105, ComReg set out its understanding of the scale of the work and time likely to be required for any relocation activities[327] conducted in the 1800 MHz band.

A 7.9 In that regard, ComReg referred to analysis on this issue from Red-M/Vilicom on this issue, which relevantly included that:[328]

- band reassignment (relocation) activity for all 3 existing GSM 1800 MHz licensees could be completed in approximately 5 months;

[326] 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.

[327] Retuning possibilities at 1800 MHz were not considered by Red-M/Vilicom for reasons set out in its report – ComReg Document 10/105b. This included the increased number of potential scenarios involving reduction of available spectrum at 1800 MHz as compared to 900 MHz and the lower 'scarcity factor' of 1800 MHz spectrum compared to 900 MHz.

[328] Readers are referred to Red-M/Vilicom's 1800 MHz report (ComReg Document 10/105b) - which also took into account the relevant responses received in relation to Consultation 10/71.

- a relevant consideration for 1800 MHz relocations is that relocations within the 900 MHz band might have preceded the operation. Accordingly, Red-M/Vilicom noted that a shorter planning phase may be required for a relocation in the 1800 MHz band, of perhaps 1 month's duration instead of 4 months and that this shorter planning phase would be appropriate in the case where an operator has recently completed an identical relocation activity at 900 MHz. The shorter period is appropriate since the required processes would already have been tested during the 900 MHz band reassignment;
- at the same time, Red-M/Vilicom considered the possibility of a simultaneous GSM900 and GSM1800 retune / relocation for an operator. In that regard, it noted:
  - although it is possible to implement the GSM900 and GSM1800 changes simultaneously on the operator network, this is unlikely to be their preferred approach. The likely best case time estimate here is for an operator to implement their GSM900 changes and a month later, implement their GSM1800 changes. This would extend the complete retune / relocation for all operators by one month;
  - for a worst case estimation of the duration, the GSM900 changes would be implemented by all operators and then the GSM1800 changes would be implemented by all operators. This would effectively double the time required for retuning/relocation in both bands compared to the case of one band only.

A 7.10 In similar fashion to its proposed position on transitional activities in the 900 MHz band, ComReg noted that:

- it may be necessary to vary the terms of the existing GSM 1800 MHz licences, where the holders did not avail of the early liberalisation option, to facilitate such transition in advance of the commencement date of the newly liberalised licences; and
- such transitional arrangements are dependent on the outcome of the auction, and, therefore, ComReg would consider requested variations to existing GSM 1800 MHz licences on a case-by-case basis.

A 7.11 ComReg consulted on its proposed approach to the 1800 MHz band as follows:

> Q.13. (from ComReg 10/105): Do you agree with ComReg's proposed approach in relation to transitional issues that may arise in the 1800 MHz band in the period leading up to 1800 MHz availability? Please provide reasons for your view.

Views of Respondents - 900 MHz Band Proposal

A 7.12 ComReg received mixed views from interested parties on its proposal as set out in Consultation 10/71.

A 7.13 Of those interested parties which supported ComReg's overall approach and/or specific aspects of same, reasons cited included that:

- effective transitional arrangements are an indispensable element of ComReg's current proposed licensing approach and must therefore form an integral part of the final 800 MHz and 900 MHz spectrum licensing decision [Vodafone];
- a flexible approach to necessary transitional activities (re-tuning and other re-location) within the 900 MHz band will be necessary as it would be impractical, and likely insufficient, to seek to set out in advance the precise steps that would have to be undertaken by licensees in each of the wide range of outcomes that may be realised from a joint award process for the 800 MHz and 900 MHz spectrum bands [Vodafone]; and
- Vodafone considered that, to the fullest extent possible, it should be left to the operators themselves to co-ordinate to complete required transitional activities although ComReg may have a useful mediating role in many circumstances. Vodafone considers that ComReg must be able to intervene in the event that co-ordination between operators may not take place to the degree required. However in this case a high degree of interaction between licensees and ComReg, including detailed discussions prior to final decisions by ComReg on any disputed matters would maximise the prospects for effecting an efficient transition.

A 7.14 Of those interested parties which did not support ComReg's overall approach and/or specific aspects of same, reasons cited included that:

- H3GI disagreed with the *"flexible"* approach to transition issues and instead called for ComReg to set out a *"sufficiently robust and transparent process to ensure prompt completion of transitional activities by Vodafone, O2 and Meteor."* In that regard, H3GI suggested:
  - the setting of milestones for specific tasks;
  - sufficiently robust and transparent mechanisms to monitor compliance with milestones;
  - appropriate sanctions for non-compliance; and
  - that it *"is imperative that the process adopted by ComReg includes the involvement of third party operators such as H3GI and /or its advisors, having regard to the protection of commercially sensitive information."*
- Vodafone submitted that the projected timelines for completion of retuning and/or relocation activities in the case of Scenario 2 do not, in fact, represent a conservative 'worst case' scenario'. In summary, reasons provided in support of this view included that:
  - a range of simplifying assumptions have been made in order to carry out the modelling exercise in the technical report (ComReg document

10/71c) which have the effect of significantly understating the challenges posed;[329]

- even the findings of the current model simulation used in the technical report conclude that in Scenario 2 only approximately 90% of the required additional sites to effect transition would be built within a 2 year period;
- it disagrees with ComReg's assessment that it is highly unlikely that the worst case scenarios discussed in the technical report would materialise given the technical and non-technical measures claimed to be at the disposal of existing licensees to address any transitional issues;[330]
- with respect to other technical and non-technical measures referred to by ComReg such as the use of alternative spectrum and national roaming, among others, Vodafone has previously explained in the response to ComReg document 09/99 the ineffectiveness of these measures in maintaining unaffected service provision to end users, particularly where limited time is available for implementation; and
- the limitations of the analysis conducted in the technical report means that the risk that an orderly transition under Scenario 2 may not be concluded in the 15-20 month period provisionally concluded by ComReg to be sufficient is significantly understated. Accordingly Vodafone believes that the importance of adoption of a flexible approach by ComReg to facilitate effective transition by existing 900 MHz licensees is further underlined.

- On the other hand, ComReg notes that H3GI does not consider that it could reasonably take an existing 2G incumbent operator up to two years to transition. In that regard, H3GI referred to its previous submissions that:
  - in recent years both H3GI and O2 have completed RAN infrastructure swaps without disruption to customers. H3GI completed its RAN

[329] In that regard, Vodafone noted that:

- "the simulation exercise carried out is not based on an assessment of the country as a whole but on an extrapolation from two sample areas;
- the nominal network plan used assumed an idealised network with base station sites equally distributed over the relevant coverage area without regard to real world constraints, such as those related to obtaining the necessary planning consents from local authorities, that preclude a site deployment approach of this kind from being implemented. As Red-M and Vilicom themselves concede, the model assumption of an equal distribution of sites would obviously not be possible for a real network and the outline methodology is not truly representative; and
- a modelling approach that fully reflected real world constraints, including delays in securing planning permission, would likely conclude that a significantly larger number of additional sites and a longer period of time than the 15-20 months currently regarded as appropriate by ComReg may potentially be required to ensure an orderly transition and the seamless maintenance of communications services to end users under Scenario 2."

[330] Vodafone noted: **[Confidential Text Removed]**

infrastructure swap within six months. O2 completed two major swap-outs of both its 2G and 3G networks within two years;

- all GSM handsets have had dual band 1800/900 capability for the last number of years and the majority, if not all, of existing GSM sites are dual band;
- any coverage holes could be covered by a national roaming agreement with another operator to facilitate continuation of service to its customers; and,
- the transitional issues proposal gives unfair consideration to the 2G incumbents once again;

- H3GI also referred to the ability of Elisa in Sweden to complete its transition activities in 1 year (see H3GI's response to Consultation 11/11 and Value Partner's Report attached to same).

A 7.15 Other views raised by interested parties to ComReg's position on transitional activities leading up to the first proposed time slice in the 900 MHz band included that:

- Meteor assumed that a request to vary an existing GSM licence can only be made by the holder of that licence and as such ComReg's proposal appears reasonable [Meteor];
- A practical aspect of transitional activities that will need to be considered in detail by ComReg is managing the transition in areas close to the border with Northern Ireland. In that regard, O2 submits:
  - re-tuning of networks will be particularly difficult in this area as the use of spectrum must be coordinated and shared between all operators on both sides of the border in addition to both administrations;
  - this spectrum sharing effectively means that operators only get to use about half of their assigned spectrum meaning there is no spare capacity available. It will not be possible to maintain service and also reduce the number of channels in use for the purpose of retuning; and,
  - it might be necessary for ComReg to provide additional spectrum in this area on a temporary basis to provide "parking space" while re-tuning is implemented. This would need to be part of a coordinated plan agreed by all of the interested parties.

Views of Respondents - 1800 MHz Band Proposal

A 7.16 Views received from interested parties on ComReg's 1800 MHz proposal, as set out in Consultation 10/105, included that:

- eircom Group refers to its previous submissions in respect of transitional issues in the sub1GHz bands and maintains those positions in respect of the 1800MHz band;

- O2 agrees, in principle, with ComReg's proposed approach to the transitional issues in the period leading up to the availability of newly licensed 1800MHz spectrum. As ComReg rightly points out, the precise details of these transitional issues will not be known until after the auction has been completed, and it might be necessary to revisit the issue then;
- Vodafone agreed that a flexible approach to necessary transitional activities (re-tuning and/or re-location) within the 1800 MHz band, as currently proposed, is both appropriate and necessary. In that regard, Vodafone submitted:
  - it would be impractical, and likely insufficient, to seek to set out in advance the precise steps that would have to be undertaken by licensees in each of the wide range of outcomes that may be realised from a joint award process for the 800 MHz and 900 MHz spectrum bands; and
  - a flexible approach is even more necessary in respect of a joint award process extended to also include the 1800 MHz band given the even wider range of possible auction outcomes that could arise.
- In addition, Vodafone noted:
  - It has no objection to the actual findings of the analysis carried out in ComReg document 10/105b in terms of the steps, timescales, and costs involved in completing re-tuning and/or relocation of spectrum assignments by existing licensees in the 1800 MHz band;
  - there is no certainty that all of the existing licensees will obtain new licences for a minimum of 2 × 15 MHz of 1800 MHz as assumed in the Red-M/Vilicom report, and it is the scenarios where existing licensees would obtain a reduced, or no, new 1800 MHz spectrum allocation that would lead to substantial costs, delays, and the risk of potential disruption to, or degradation of the quality of, communications services provided to end users;
  - the reasons set out by Red-M/Vilicom in section 2.5 of their report as to why no quantification of these scenarios has been undertaken and the very high complexity of such an exercise is a justifiable basis for not doing so;
  - in light of the limited scope of the assessment of transitional arrangements carried out, Vodafone considers that ComReg does not have sufficient evidence to conclude that the timeframes associated with the joint award process would be sufficient for the operators to address necessary transitional arrangements in relation to relocation within the 1800 MHz band. Accordingly, it is imperative that ComReg adhere to the flexible approach to transition as set out in section 4.2 of Consultation 10/105.

Other Relevant Material - Red-M/Vilicom's Current Report – 900 MHz and 1800 MHz

A 7.17 In ComReg Document 11/57**,** Red-M/Vilicom consider the views of interested parties provided in relation to ComReg documents 10/71 and 10/71c, 10/105 and 10/105c and 11/11 relevant to the issue of transitional activities for the 900 MHz and 1800 MHz band.

A 7.18 In particular, Red-M/Vilicom consider whether the responses received to these various documents would, in their opinion, lead them to believe that any update or re-write of ComReg report 10/71c or 10/105b is required.

A 7.19 In summary, Red-M/Vilicom state that they do not believe that any such update or re-write of these reports are required. Given the detailed analysis contained in Document 11/57, ComReg does not propose to summarise the findings here and instead refers readers to this report. ComReg does, however, consider certain aspects of Red-M/Vilicom's analysis in the context of its preliminary conclusions on this issue as set out below.

ComReg's Preliminary Conclusion – Transitional Issues – from proposed joint award until commencement of liberalised licences in the 900 MHz and 1800 MHz bands

A 7.20 ComReg notes that interested parties would generally appear to recognise the importance of existing GSM 900 MHz and 1800 MHz licensees efficiently and effectively completing required transitional activities in the lead up to proposed commencement of liberalised licences in early 2013 so as to ensure that spectrum currently occupied by existing GSM licensees can be made available for liberalised use.

Scenario 2 – "retuning activities" in the 900 MHz and 1800 MHz bands

A 7.21 First, ComReg notes the divergence between the views of interested parties among themselves, and between the views of interested parties and Red-M/Vilicom, regarding the likely timeframe for completion of transitional activities relating to Scenario 2 in the context of the 900 MHz band. In particular, Vodafone submits that a longer period than that identified by Red-M/Vilicom would be required whereas H3GI submits that a shorter period would be required.

A 7.22 In that regard, ComReg firstly would make the following observations in relation to Vodafone's various submissions about Red-M/Vilicom's Scenario 2 analysis in the 900 MHz band:

- in order to use flexible[331] (whether modular or Software Defined) base stations on the 900MHz band for UMTS and ultimately mobile broadband, operators would have to replace any single band antennas that are currently in operation. Therefore, based on Section 6 of the joint

[331] As detailed in ComReg 10/71c, Section 6.

technical report 10/71c[332], one could assume that this would delay the minimum time of 5 months, in proportion to the amount of labour required to install the new multiband antennas. ComReg also believes that the overall radio planning for a UMTS 900 network may have to be completed, after the antenna installation,

- as stated in the joint technical report, the grid planning approach was performed with a traffic density based on subscriber numbers [333], as supplied to ComReg by the incumbent MNOs,
- ComReg does not have any sight of the MNOs' use of Adaptive Multi Rate (AMR) coding or synchronised frequency hopping (SFH). Therefore, to be consistent across the industry, it must assume that these are not being used and that any traffic offload can only occur from a subsequent increase in site density. In that regard, see section 2.1 of the joint technical report; and
- planning exemptions[334], are used where possible by MNOs, when deciding upon new sites and therefore, on balance, the two year 90% estimate for completion seems a reasonable target, given that this qualification is given in both joint technical reports.

A 7.23 In addition, ComReg would make the following observations in relation to H3GI's submissions regarding Red-M/Vilicom's Scenario 2 analysis in the 900 MHz band:

- the example given by Value Partners and RRA (on behalf of H3GI) of Elisa, in Finland[335] is addressed by Red-M/Vilicom in detail in Section 3.4.3 of the joint technical report;[336] and
- following consideration of that analysis, ComReg does not consider that the example provided is comparable to, or would be instructive in respect of, the Irish situation due to, amongst other things, the larger amount of spectrum available to that organisation which would have provided considerably greater flexibility in addressing the transitional activities required under this scenario.

A 7.24 More generally, ComReg observes in relation to Scenario 2 in the context of the 900 MHz band that:

- Red-M/Vilicom's analysis is based on an "average" Irish MNO. Whilst the analysis is certainly useful in terms of setting out estimates of timeframes, it is not, and indeed does not claim to be, conclusive of the actual timeframes that would be involved in such a scenario in respect of a specific existing GSM 900 MHz licensee;

[332] The technical information given in Section 6 of the Joint Technical Report ComReg Document 10/71c is based on the submissions made by operators prior to licence renewal.
[333] As supplied by the MNO's and assuming that these were factually correct at the time of writing.
[334] The Planning and Development Regulations 2001, S.I. No. 600 of 2001, Schedule 2, Part 1 Exempted Development, Class 31.
[335] See ComReg 11/27
[336] See Section 3.4 ComReg 11/57 for further details.

- assuming that ComReg's proposed joint award process is completed by the end of 2011, ComReg recognises that there would now be less time for an operator to complete any necessary transitional activities than was contemplated in Consultations 10/71 and 10/105;
- ComReg notes that the Red-M/Vilicom reports do not fully take account of the ability of an affected operator to avail of other technical and non-technical means of addressing this scenario, the effects of which again cannot be predicted with certainty at this point in time;[337]
- moreover, the likelihood of this scenario arising is also unclear although there are a number of factors which would suggest to ComReg that it is unlikely in respect of Vodafone and O2 (noting that Meteor would, in any event, have 900 MHz rights of use until 2015 occupying at least its current bandwidth):
  - the proposed joint award of spectrum rights in the 800 MHz band (being an additional 6 2×5 MHz blocks of sub-1GHz spectrum) with the 900 MHz band should reduce bidding pressure on 900 MHz spectrum in the first temporal lot; and
  - the potential effects of ComReg's proposed 2 × 10 MHz sub-cap for 900 MHz spectrum in the first temporal lot (see Annex XX of this document).

A 7.25 In light of all these uncertainties, it would appear sensible for ComReg to adopt a flexible approach to any Scenario 2 occurrence, particularly so as to reduce/avoid any undue negative effects on consumer services during any transition period. At the same time, ComReg appreciates the likely incentives of an existing GSM 900 MHz licensee facing a Scenario 2 transition to seek to retain existing GSM 900 MHz rights of use for as long as possible under these circumstances (and potentially longer than would be necessary). In light of these likely incentives, ComReg also sees merit in incorporating aspects of H3GI's suggested approach, such as:

- the setting of milestones for specific tasks;
- a sufficiently robust and transparent mechanisms to monitor compliance with milestones;
- appropriate financial measures to dissuade non-compliance with milestones; and

[337] For example, in Section 3.2 of the joint technical report (11/57), Red-M/Vilicom state:

"Scenario 2 of 10/71c did not assume the use of any of the mitigating techniques outlined above, as there was no operator information available on which to base realistic assumptions. The mitigating steps were included to illustrate that there were a range of additional potential options that could be used."

- that, the process adopted by ComReg reasonably includes the involvement of affected third parties, having regard to the protection of commercially sensitive information.

Scenario 1 – "Relocation Activities" in the 900 MHz and 1800 MHz bands

A 7.26 In light of ComReg's proposed "full assignment round" approach to the 800 MHz, 900 MHz and 1800 MHz bands (see Annex 6.4), there is a real possibility that one or more existing GSM licensees would be required to "relocate" existing spectrum assignments in one or both of the 900 MHz or 1800 MHz spectrum bands.

A 7.27 ComReg notes that there was relatively little comment and no disagreement with Red-M/Vilicom's assessment of the likely timescales involved for a Scenario 1 transition for the 900 MHz and 1800 MHz bands, singularly and combined.

A 7.28 At this point in time, ComReg remains reasonably confident that there would be sufficient time for Scenario 1 activities to be completed by all existing GSM licensees in both the 900 MHz and 1800 MHz bands between the completion of ComReg's proposed joint award process and the proposed commencement of liberalised licences in early 2013. On this basis, and in light of the need to incentivise timely completion of Scenario 1 activities prior to the proposed commencement of liberalised licences in early 2013, ComReg is proposing, in principle, the following mechanisms to achieve this outcome.

ComReg's in principle proposal to incentivise timely completion of Scenario 1 relocation activities prior to proposed commencement of liberalised licences in early 2013 (and any Scenario 2 retuning activities) in the 900 MHz and 1800 MHz bands

A 7.29 Following completion of the proposed joint award process, the nature and extent of Scenario 1 relocation activities (and any Scenario 2 retuning activities) required to be completed by existing GSM licensees in the 900 MHz and 1800 MHz bands would become clear[338].

A 7.30 At this point, ComReg proposes to discuss with existing GSM licensees and all winners of liberalised 900 MHz and 1800 MHz rights of use how best to complete such activities in a timely and orderly manner - with a view to the establishment and publication of a relocation "Project Plan" that would clearly identify project milestones and related deliverables.[339] Whilst ComReg would hope that all affected parties would be able to come to agreement on such matters, ComReg recognises that there may be inconsistent incentives between existing GSM licensees and new entrants to the 900 MHz and 1800 MHz bands and that such

[338] This would include the extent, if any, of the GSM channel realignments needed in border areas and these would be handled in the normal manner under the published GSM MoU with the UK. http://www.comreg.ie/_fileupload/publications/ComReg1150f.pdf

[339] Clearly, ComReg would protect genuinely confidential information provided by all parties during this process in accordance with ComReg's guidelines on the treatment of confidential information.

differences may frustrate such an agreement being reached. In such circumstances, ComReg would envisage itself (and/or its advisor/s) playing a mediating role, at first instance, and would also reserve the right to make a final and binding decision on any disputed matters where a mediated solution can not be achieved in a reasonable time.

A 7.31 Furthermore, to incentivise the timely achievement of agreed/determined project milestones, ComReg also envisages the Project Plan identifying liquidated damages payable by parties where such parties fail to discharge their obligations in accordance with the milestones set out in the proposed Project Plan. At this stage, ComReg would envisage that such liquidated damages would relate to the loss of spectrum usage fees (SUFs) that would otherwise have been obtained by ComReg from liberalised use of the affected spectrum blocks if the delays had not occurred. In light of ComReg's proposed advanced commencement of certain 900 MHz blocks, such liquidated damages could also relate to the loss of advanced commencement SUFs resulting from non-compliance with the project plan milestones.

A 7.32 ComReg would envisage prospective bidders seeking to participate in the proposed joint award process agreeing to comply with a final decision in respect of the project plan and to the regime of liquidated damages.

A 7.33 Whilst it is ComReg's intention to set out more details of this proposal in the draft information memorandum relating to the proposed joint award, ComReg would, of course, welcome any views from interested parties on this proposal at this time.

A 7.34 In addition, ComReg considers that, where appropriate to facilitate transition activities, it should retain its discretion to consider requests to vary an existing GSM licence by the holder of that licence and from other parties.

Potential transitional issues in the 800 MHz, 900 MHz and 1800 MHz bands: between proposed "time slice 1" and "time slice 2"

ComReg's proposal for a joint 800 MHz and 900 MHz award as set out in Consultation 10/71

A 7.35 In Consultation 10/71, ComReg noted:

- there is the possibility 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 × 10 MHz of 900 MHz spectrum in the period between 2013-2015 and rights to 2 × 10 MHz of 800 MHz spectrum from 2015-2030;
- 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;

- its proposal to 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;[340]
- its preference 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 reflected ComReg's belief that affected parties should be incentivised and indeed better placed to manage and address these issues;
- its proposal 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; and
- it would consider requested variations to liberalised licences as necessary to address such transitional issues on a case-by-case basis.

A 7.36 ComReg consulted on its proposed approach as follows:

> Q.19. (from Consultation 10/71): 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.

ComReg's position for 800 MHz, 900 MHz and 1800 MHz bands - per Consultation 10/105

A 7.37 In Consultation 10/105, ComReg refined its proposed approach as set out in Consultation 10/71 and noted that:

- the proposed use of two temporal lots for each of the 800 MHz, 900 MHz and 1800 MHz bands could give rise to transition issues between these lots;
- it had asked DotEcon to consider what reasonable and proportionate auction mechanisms could be implemented so as to reduce the

[340] This position reflected ComReg's view 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.

probability and extent of necessary "relocation"[341] activities of winners of rights of use between the proposed two time slices (that is, ensure continuous spectrum across time slices) for these bands. The issue is considered in detail by DotEcon in Section 4.3 of ComReg Document 10/105a;

- it did not appear appropriate to delay overall availability of liberalised rights in the proposed second temporal lot to address any "retuning" activities required by a bidder which won different amounts of spectrum between the temporal lots. ComReg stated this view in Consultation 10/105 because it considered that such a bidder has, through its bidding strategy, created this situation for itself and, in such circumstances, it would not appear appropriate for other winners of liberalised spectrum to be adversely affected by these choices;
- DotEcon had considered potential mechanisms to minimise relocation activities between the two proposed temporal lots in two contexts, being:
- where bidders obtained the same quantum of spectrum in a band; and
- where bidders obtained a different amount of spectrum in a band.

Same quantum of spectrum

A 7.38 In relation to this scenario, DotEcon recommended a mechanism whereby only assignment options that ensured continuous spectrum assignments across time slices for bidders winning the same amount of spectrum in the two time slices would be presented to bidders. Whilst it was recognised that such a constraint, by definition, reduces the number of bidding options, this would be offset by the benefits to the individual bidder (by removing the possibility of relocation activities between time slices) and other winners of rights of use in the band in the second time slice by removing the potential delay to availability of spectrum rights in the second time slice that could otherwise occur.

A 7.39 Accordingly, ComReg proposed to only present assignment options for continuous spectrum assignments across time slices for bidders winning the same amount of spectrum in the two time slices for the 800 MHz and 900 MHz bands.

Different quantum of spectrum

A 7.40 In relation to this scenario, DotEcon noted that a potential mechanism could be applied whereby the number of assignment options presented to bidders winning

[341] ComReg noted that DotEcon referred to "retune" in its text. For the avoidance of doubt and in the interests of consistency with previous consultation papers, "retuning" is defined in this consultation paper to mean activities required by an operator to adjust its network to deal with different quantum of spectrum in a band (e.g. from 7.2MHz to 5 MHz) whereas "relocating" is defined to mean activities required by an operator to move the same quantity of a spectrum assignment to a different part of the band (which can either be a partial relocation or complete/full relocation). It is additionally noted that Red-M/Vilicom use the terms retuning and relocation interchangeably in the context of a move of frequency assignments within the 1800 MHz band.

different numbers of blocks in a band in the two proposed time slices could be limited to only those options involving a partial relocation. DotEcon also found that such a constraint would only be worth considering if:

- the cost to an operator of relocating its frequencies within a band is not constant (that is, there are additional cost savings through a partial, as opposed to a full, relocation); and
- these perceived additional benefits outweigh the cost of reducing assignment options for other bidders (i.e. bidders with the same number of blocks in the two proposed time slices).[342]

A 7.41 In that regard, ComReg noted:

- Red-M/Vilicom's study of relocation activities in the 1800 MHz band (ComReg Document 10/105b) suggests that there is unlikely to be any significant cost difference between a partial and full relocation in the 1800 MHz band;[343] and
- Red-M/Vilicom's study of relocation activities in the 900 MHz band (10/71c) suggests that there may be some preference for a partial rather than a full relocation.[344]

A 7.42 Accordingly, ComReg proposed not to limit assignment options to only those involving a partial relocation for the 1800 MHz band (and that it was not presently minded to implement same for the 800 MHz and 900 MHz bands).

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[342] In this regard, DotEcon noted:

- It is not presently aware of evidence that preferences for partial relocation over full relocation are strong;
- Where such preferences are moderate, then bidders would, even without the constraint, still be able to express their preference for partial relocation assignment options; and
- The imposition of this additional constraint may considerably reduce assignment options for other bidders where there are a larger number of winners in the band or where there are more lots to be assigned (such as in the 1800 MHz band).

[343] For instance, a full relocation of 2 × 15 MHz was estimated to take 4 – 5 months to complete and involve a maximum cost of €240,000 (for 1 relocation) and €255,000 (for 2 relocations in quick succession).

[344] In particular, Scenario 1 (involving an incumbent obtaining 2 × 10 MHz and being required to conduct a full relocation) was estimated to take 5 months to complete. The study concludes that the engineering costs for a 'typically' sized Irish network would be of the order of €500,000 (having stated some clear assumptions around the amount of labour required, its costs and relevant equipment costs). In contrast, Scenario 3 (involving Meteor retaining 2 × 7.2 MHz GSM 900 MHz but being required to shift its existing assignment by 200 kHz (i.e. a partial relocation)) was estimated to take 4 months to complete and with a maximum estimated cost of €300,000. At the same time, ComReg noted it was *important to bear in mind, however, the following points from Red-M/Vilicom 900 MHz estimates:*

- Although the same approach has been used, the cost estimates for Scenario 3 are lower than for Scenario 1, because the former project is a 'retuning' project, and there is no requirement to deal with issues specific to 'relocation' such as replacement of some band selective repeaters; and
- As Scenario 3 would only ever apply to the Meteor network, the network size assumed can reflect the (smaller) Meteor network rather than the 'typical Irish network' used to produce the cost estimates for Scenario 1.

1800 MHz proposed approach

A 7.43 In light of its proposals with regards to ensuring continuous spectrum assignments across time slices, ComReg set out its proposed position in Consultation 10/105 that it would not delay availability of 1800 MHz spectrum blocks in the second time slice to make allowance for any transition arrangements to be completed. That is, affected parties would be required to fully address such issues during the first time period.

A 7.44 In addition, ComReg recognised that, even if transitional issues were to arise, (notwithstanding its proposals), affected parties would have, assuming a joint award in 2011, approximately 4 years (until July 2015) with which to prepare for, and complete, the necessary transitional arrangements in time for the commencement of the proposed second time slice.

A 7.45 ComReg also proposed to apply its MoU approach to the 1800 MHz band and that it would consider requested variations to liberalised licences as necessary to address such transitional issues on a case-by-case basis as set out in Consultation 10/71.

A 7.46 ComReg consulted upon these proposals as follows:

> Q.14. (from Consultation 10/105): Do you agree with ComReg's proposal for ensuring continuous spectrum assignments across time slices for the 800 MHz, 900 MHz and 1800 MHz bands where a bidder wins the same amount of spectrum in the two time slices? Please provide reasons for your view.
> Q.15. (from Consultation 10/105): Do you agree with ComReg's proposal that it is not appropriate that the assignment options presented to bidders are only limited to those options involving a partial relocation? Please provide reasons for your view.
> Q.16. (from Consultation 10/105): Do you agree with ComReg's proposed approach in relation to transitional issues that may arise in the 1800 MHz band (between time slices)? Please provide reasons for your view.

Views of Respondents – Consultation 10/71

A 7.47 9 interested parties provided views on ComReg's proposed approach as set out in Consultation 10/71.

A 7.48 Reasons cited by interested parties in favour of ComReg's approach (or particular elements of same) included that:

- in principle that a Memorandum of Understanding should be established to provide a basis for addressing any transitional issues arising between time slices. This must be established, following due consideration, in advance of the auction process so that all participants are aware of their potential obligations and duties [Meteor];
- it would not be appropriate to delay availability of spectrum blocks in the second time slice to make allowance for these transition arrangements to be completed. In that regard, this respondent stated that as the

requirement for such transition arrangements would arise solely as a result of a winning bidder's own decisions in an auction process, they should be fully incorporated in a bidder's plans and therefore no allowance should be made (in terms of delayed availability of spectrum blocks in the second time slice) for this [Vodafone];345 and

- it is unlikely that any transitional issues will arise between times slices in the 800 MHz and 900 MHz band and its proposal to use an industry-led approach to deal with resolving whatever issues might possibly arise is a sensible and proportionate one [Ericsson].

A 7.49 On the other hand, H3GI did not support ComReg's approach and submitted that in the interests of certainty and investment, ComReg should proactively regulate these matters.

Views of Respondents – Consultation 10/105

Proposed constraint on assignment options to ensure contiguous spectrum assignments across temporal lots where same quantum of spectrum

A 7.50 All four respondents to this issue supported ComReg's proposal. Reasons cited by these parties include that:

- as it is desirable that the probability of a requirement for re-location of spectrum assignments in each band between time slices is minimised, the proposed constraint is "objectively justified and proportionate and must be incorporated in the auction design."[Vodafone] ;
- having the option of choosing non-continuous spectrum assignments across the two temporal lots therefore appears to have very little, if any, value. Indeed provisions to ensure continuous spectrum assignments, by minimising the potential for further costs in re-tuning and/or relocation prior to the commencement of licences for the second time slice, would be of unambiguous benefit to licensees [Vodafone];
- this is an economically efficient approach [H3GI];
- this gives the most efficient result overall [O2]; and
- ComReg's proposal will:
  - provide continuous assignment across T1 and T2 which promotes efficiency and investment; and
  - reduce the complexity of options at the assignment stage and the potential for strategic bidding [eircom Group].

[345]Vodafone's and Qualcomm's submissions relating to temporal lots as part of their respective response on this issue is addressed in Annex 6.3 and Chapter 4.

No proposed constraint on assignment options where different quantum of spectrum between time slots for each of the 800 MHz, 900 MHz and 1800 MHz bands

A 7.51 All four respondents to this issue supported ComReg's proposal to not impose a constraint. Reasons cited by these parties include that:

- eircom Group notes that partial relocation cannot be assured in all cases as evidenced by DotEcon's example outcome shown in Section 4.3 of ComReg Document 10/105a. Furthermore, it could, in theory, be possible to define a rule that provides for partial relocation for compatible outcomes, whilst detailing specific extensions to the rule for outcomes where partial relocation cannot be guaranteed. Such extensions to the rule would generate a longer list of assignment options for each bidder to ensure no single bidder was disadvantaged. However we note that such a rule would be complex to define in a robust manner to deal with both compatible and non-compatible outcomes. This would reduce the transparency of the auction process. Given the information available in the primary and supplementary bid rounds, bidders would have no certainty during the main stage that partial relocation would be assured. Therefore eircom Group agrees with ComReg's proposal not to limit assignment options to those offering partial relocation between the first and second time slices;
- it appears that this might be a marginal issue that can be resolved by the assignment round of the auction [O2];
- there is unlikely to be a significant difference in the costs to licensees between partial and full relocation of frequencies within the 1800 MHz band. Consequently any benefit of the proposal to limit assignment options to bidders to those involving a partial relocation would be significantly outweighed by the cost of the reduction in the choices and flexibility available to bidders in the auction process. This latter cost would raise the risk of sub-optimal outcomes from the proposed joint award process. [Vodafone]

Views in relation to ComReg's 1800 MHz proposed approach

A 7.52 All three respondents to this issue supported ComReg's proposal. Reasons cited by these parties include that:

- it would not be appropriate to delay availability of spectrum blocks in the second time slice to make allowance for transition arrangements to be completed [Vodafone];
- in principle that a Memorandum of Understanding should be established to provide a basis for addressing any transitional issues arising between time slices. This must be established, following due consideration, in advance of the auction process so that all participants are aware of their potential obligations and duties [eircom Group]; and

- it should produce the most efficient outcome. ComReg's commitment to consider variations to licences that are necessary to facilitate a pragmatic approach to network transitioning is sensible [O2].

Other Relevant Material – DotEcon Current Report

A 7.53 In Section 11.2 of its current report (11/58), DotEcon states that "…given the benefits of the proposed option, and the unanimous agreement by consultation respondents that a constraint imposing that spectrum assignments be continuous in the specified case should be implemented, our view that this should be implemented is unchanged."

ComReg's preliminary conclusions –transitional issues – between proposed temporal lots - in the 800 MHz, 900 MHz and 1800 MHz bands

A 7.54 ComReg proposes a constraint on assignment options to ensure contiguous spectrum assignments across temporal lots where the same quantum of spectrum will be held in any or all of the 800 MHz, 900 MHz and 1800 MHz bands

A 7.55 ComReg welcomes the responses received to its proposal.

A 7.56 Having regard to the analysis presented in this Annex and previous consultation documents, the analysis and recommendations of DotEcon and the views of interested parties, ComReg's preliminary conclusion is that a constraint whereby only assignment options that ensured contiguous spectrum assignments across the proposed two temporal lots for bidders winning[346] the same amount of spectrum rights in a given spectrum band in each of these temporal lots would be offered presented to bidders. Factors informing this preliminary conclusion include that:

- whilst it is recognised that such a constraint would, by definition, reduce the number of bidding options presented to a bidder, the overall value in having options of choosing non-continuous spectrum assignments across the two temporal lots is not apparent;
- indeed, any disadvantage associated with such a constraint would, in ComReg's opinion, be offset by the benefits to such an individual bidder (by removing the possibility of relocation activities between temporal lots) and other winners in the band by removing the potential delay to availability of spectrum rights in the second temporal lot that could otherwise occur;
- such a constraint would also reduce the complexity of options at the assignment stage;
- accordingly, the imposition of such a constraint would be justified in terms of, inter alia, economic efficiency and encouraging efficient spectrum use; and

[346] This concept of "winning" would include the situation where Meteor continues to hold 900 MHz spectrum at the end of the first temporal lot having opted not to avail of the early liberalisation option

- these factors are supported by the analysis and recommendation of DotEcon and the views received from interested parties.

Potential constraint on assignment options applying to only those involving partial relocation where different quantum of spectrum between temporal lots for the 800 MHz, 900 MHz and 1800 MHz bands

A 7.57 ComReg welcomes the responses received to its position on this issue as set out in Consultation 10/105.

A 7.58 Having regard to the analysis presented in this Annex and previous consultation documents, the analysis and recommendations of DotEcon and the views of interested parties, ComReg's preliminary conclusion is that no such constraint should be implemented for the 800 MHz, 900 MHz and 1800 MHz bands. Factors informing this preliminary conclusion include that:

- although Red-M/Vilicom's study of relocation activities in the 900 MHz band suggests that there may be some preference for a partial rather than a full relocation, the submissions of interested parties on this issue, being in this case mobile operators who would be particularly knowledgeable on this matter, would indicate that any benefit of the potential constraint would be significantly outweighed by the cost of the reduction in the options and flexibility available to bidders in the auction process;
- the potential constraint could be complex to define in a robust manner, could reduce the transparency of the award process and create the risk of inefficient outcomes;
- these factors are informed by the views received from interested parties and the analysis and recommendation of DotEcon and Red-M/Vilicom.

Proposal to not delay availability of spectrum blocks in the second temporal lot to make allowance for transition arrangements to be completed for the 900 MHz and 1800 MHz bands

A 7.59 ComReg welcomes the responses received to its position on this issue as set out in Consultation 10/71 and Consultation 10/105.

A 7.60 Having regard to the analysis presented in this Annex and previous consultation documents, the analysis and recommendations of DotEcon and the views of interested parties, ComReg's preliminary conclusion is that it should not delay availability of spectrum blocks in the proposed second temporal lot to make allowance for these transition arrangements to be completed. Factors informing this preliminary conclusion include that:

- winners of liberalised rights who are required to complete such transition activities 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;
- there would, in any event, be considerable time the conclusion of the proposed joint award and proposed commencement of the second temporal lot with which to prepare for and complete any such transitional arrangements; and
- these factors are informed by the views received from interested parties.

Proposed memorandum of understanding and potential variations to liberalised licences

A 7.61 In relation to the *memorandum of understanding*, as proposed in Consultations 09/99, 10/71 and 10/105, ComReg's preferred approach remains that of facilitating an industry-led approach to dealing with transitional issues.

A 7.62 ComReg now believes, however, that its proposed memorandum of understanding is redundant in light of its in principle proposal to incentivise timely completion of Scenario 1 relocation activities prior to proposed commencement of liberalised licences in early 2013 (and any Scenario 2 retuning activities) in the 900 MHz and 1800 MHz bands.

A 7.63 In addition, ComReg proposes to consider requested variations to liberalised licences as necessary to address genuine transitional issues on a case-by-case basis.

Proposed Issue of Preparatory Licences in the 800 MHz, 900 MHz and 1800 MHz Bands

A 7.64 ComReg's position as previously set out in Consultations 10/71 and 10/105 in relation to this issue is detailed below in this subsection, followed by the responses received from interested parties, analysis and ComReg's draft final position.

A 7.65 In Consultations 10/71 and 10/105, ComReg proposed to grant preparatory licences to winners of liberalised spectrum rights in the 800 MHz and 900 MHz bands, and in the 1800MHz band, respectively. Specifically, ComReg proposed that all such winners would be issued with a licence under the Wireless Telegraphy Act, 1926[347] which would enable holders to install networks and associated equipment but which would not allow any wireless telegraphy transmissions. ComReg proposed that such licences would be granted as soon as

[347] By way of background: Section 3(1) of the Wireless Telegraphy Act, 1926 makes it an offence for any person to possess any apparatus for wireless telegraphy (as defined) in the State without a licence granted under the same Act; and 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 the commencement date of new liberalised-use licences.

practicable following completion of the proposed joint award and would operate until the commencement date of new liberalised-use licences. Furthermore, ComReg stated its intention, during this period, to consider and grant, where possible, 'test licences' to facilitate the testing of these networks and equipment.[348]

A 7.66 ComReg consulted on its proposals as follows:

> Q. 20. (from ComReg 10/71): 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 and;
> Q. 17. (from ComReg 10/105): Do you agree with ComReg's proposal to issue 'preparatory licences' to winners of liberalised spectrum rights of use in the 1800 MHz band? Please provide reasons for your view.

Views of Respondents

A 7.67 In summary, there was considerable support from interested parties to ComReg's proposal to issue preparatory licences for winners of liberalised spectrum rights for each of the 800 MHz, 900 MHz and 1800 MHz bands.

A 7.68 Reasons cited by such respondents included that:

- [it] will allow operators to begin building networks in advance of the "switch-on" day in January 2013, and ensure that no time is wasted between the assignment process and the commencement of service. This is a practical proposal by ComReg that will be beneficial to both licensees and consumers. It should mean that there will be no material impact caused by delaying the availability of the spectrum to a common commencement date [O2];
- given the amount of preparatory network deployment work and associated testing that will need to take place in advance of this date, it would therefore be both sensible and appropriate to issue all 800/900 MHz operators with 'preparatory licences' which would be valid from shortly after the conclusion of the licence award process and operate until the commencement date of the new liberalised-use licences [Ericsson]; and
- installation of equipment for use of spectrum in the 1800 MHz band must be facilitated sufficiently in advance of the commencement date of proposed new 1800 MHz licences so as to ensure the earliest possible provision of advanced mobile broadband services to the benefit of end users [Vodafone].
- ComReg notes that two respondents, Qualcomm and H3GI did not support ComReg's proposal, insofar as the proposal was accompanied by

[348] See Section 5.4 of 10/71 and section 4.4 of 10/105.

the proposal to delay the availability of liberalised 900 MHz spectrum until 800 MHz availability (and thus delay the introduction of mobile broadband in the 900MHz band for 2 years). Qualcomm, however, also welcomed ComReg's proposal to try to minimise the deployment delay beyond these self-imposed two years. ComReg also notes that

A 7.69 ComReg also notes the following other issues raised by interested parties:

- testing would be required to ensure that broadcast services are not interfered with [RTE]; and
- one party welcomed the opportunity to review and comment on the draft terms of such licences [Meteor].

Other Relevant Material – Current DotEcon Report

A 7.70 In Section 5.2 of its current report (11/58), DotEcon set out a number of reasons as to why it considers the preparatory licence proposal (in conjunction with the proposal for advanced commencement of certain 900 MHz and 1800 MHz blocks) to be of benefit. These include:

- all other things [being] equal, advanced data services would be made available in Ireland earlier than might otherwise be the case. This is a potentially significant benefit of this proposal; and
- it would insure against delays of availability of 800MHz spectrum. Whilst DotEcon note that there is no reason to consider at this point that availability of 800MHz spectrum will be delayed, it also notes that ComReg is not in a position to guarantee its availability by January 2013. Therefore, DotEcon consider there is value in ensuring that advanced data services will be provided in Ireland as soon as possible and regardless of availability of 800MHz spectrum.

ComReg's Preliminary Conclusion – preparatory Wireless Telegraphy licences for winners of liberalised spectrum rights in the 800 MHz, 900 MHz and 1800 MHz bands

A 7.71 ComReg welcomes the responses received to its proposal.

A 7.72 ComReg notes the substantial support from interested parties to its proposal and also notes that the reasons put forward by these parties, and by DotEcon, would accord with those put forward by ComReg.

A 7.73 ComReg also notes that the issues raised by H3GI and Qualcomm in relation to availability of liberalised 900 MHz spectrum rights is addressed by ComReg in Chapter 6 and Annex 7.

A 7.74 In relation to the other issues raised, ComReg notes that:

- to the extent that ‘test licences’ can be issued by ComReg to facilitate the testing of networks and equipment then ComReg cannot see why any such testing could not also involve testing coexistence with broadcast services; and
- it is ComReg’s intention to publish the draft terms of proposed preparatory licences in its information memorandum to which interested parties would be able to comment.

A 7.75 On the basis of the reasons put forward by ComReg, interested parties and DotEcon in support of the proposed issue of preparatory licences, noting that no outstanding concerns remain, ComReg’s preliminary conclusion is that:

- all winners of liberalised rights of use in the proposed joint spectrum award would be issued with a “preparatory licence” under the Wireless Telegraphy Act, 1926 as soon as practicable following completion of the proposed joint award;
- such licences would enable recipients to install networks and associated equipment but would not allow any wireless telegraphy transmissions in any of the relevant bands;
- during this period, however, ComReg would consider and grant, where possible, ‘test licences’ to facilitate the testing of these networks and equipment; and
- preparatory licences would operate until commencement of the licensee’s liberalised 800 MHz, 900 MHz and/or 1800 MHz licence/s.

Annex 8

Licence Conditions

8.1 Coverage and Roll-Out Obligations

Introduction

A 8.1 Throughout the consultation process, ComReg has considered the issue of attaching coverage and roll-out obligations to new liberalised licences. This Annex discusses ComReg's proposals and respondents views, as set out in previous Consultations, for the implementation of coverage and roll-out obligations in new liberalised licences in the 800 MHz, 900 MHz and 1800 MHz frequency bands.

A 8.2 In Consultation 09/99 ComReg presented a draft RIA, which considered whether such conditions were necessary and proportionate. In light of the analysis contained in the Draft RIA, ComReg was of the view that setting appropriate coverage and roll-out obligations would ensure the efficient use of the 900 MHz band by ensuring that the spectrum is used to deploy services to a wider geographic range than may otherwise be the case. Over the course of this consultation process, ComReg has also discussed the specifics of any coverage and roll-out obligations which could be imposed.

A 8.3 Although coverage and roll-out obligations were originally proposed in the context of 900 MHz licenses, the proposed inclusion of the 800 MHz band and subsequently the 1800 MHz band, in the spectrum release, has not changed ComReg's view significantly but has led to some minor amendments, for example, in relation to the frequency bands that could be used to meet coverage and roll-out obligations and a minimum deployment level in these bands.

A 8.4 This Annex provides an overview of the issues addressed throughout the consultation process with regard to coverage and roll-out obligations, the views of respondents, and ComReg's current position. In particular, this Annex first sets out ComReg's previous proposals on coverage and associated roll-out periods followed by respondents' views and ComReg's current position. The Annex has been divided into a number of subsections namely:

- should ComReg impose coverage and roll-out obligations;
- whether coverage and roll-out obligations should differ depending on the status of licensees (i.e. symmetric/asymmetric obligations);
- the coverage level;
- the timing of roll-out;
- whether multiple frequency bands should count toward coverage obligations;

- whether national roaming should count toward coverage obligations;
- the proposed metrics for measuring coverage; and
- the inclusion of performance guarantees against coverage and roll-out obligations.

Should ComReg Impose Coverage and Roll-Out Obligations?

Summary of ComReg's proposals in previous Consultations

A 8.5 In consultations 08/57, 09/14 and 09/99 ComReg proposed the following in relation to coverage and roll-out obligations:

- In Consultation 08/57 ComReg stated its intention to continue its practice of attaching coverage and roll-out obligations as licence conditions when issuing new liberalised 900 MHz licences[349]; In Consultation 09/14 ComReg reiterated its view that it would be appropriate to include licence conditions in new 900 MHz licences and asked for respondents' views on which licence conditions should be included, with the following question:

> Question 11 (Consultation 09/14): It is ComReg's intention to include conditions in any new 900 MHz licences issued.
> a. Should the conditions be limited to existing services such as voice and text or be broadened to include other services such as broadband?
> b. What kind of conditions (e.g. Coverage, Roll-Out, Quality of Service etc.) should be included?
> c. At what level should these conditions be set?
> Please provide reasons for your view.

A 8.6 In Consultation 09/99 ComReg undertook a draft RIA to consider whether coverage and roll-out obligations are necessary or appropriate. In the draft RIA ComReg considered 2 options:

- Option 1 – impose no coverage obligation; and
- Option 2 – impose an obligation to provide a coverage level over a roll-out period.

A 8.7 ComReg proposed that operators may benefit under Option 1 since they could choose where to roll-out their networks and thus lower rollout costs. Furthermore, they could differentiate themselves from their competitors on the basis of their coverage level. If coverage obligations were imposed (Option 2) at a very high level to be reached in an overly ambitious timeframe this could lead to an unnecessary burden on operators. However, ComReg was of the view that operators would not face difficulties in meeting any coverage requirements since

[349] See Section 7.3.3 of 08/57.

they were all meeting or exceeding the GSM coverage requirements of between 90-98% population coverage.

A 8.8 Furthermore, ComReg noted that, provided requirements were not out of line with operators' investment plans (both incumbents and new entrants), a coverage obligation would be unlikely to have a negative impact on competition. However, ComReg was cognisant of the fact that without any coverage obligations competition may be focused only on the densely populated areas and this may result in a reduced level of competition or even none in the other areas.

A 8.9 As set out in the draft RIA, ComReg was of the view that if it did not set any coverage obligations (Option 1), consumers in low population density areas would not have any certainty of services being available to them. However, under (Option 2) consumers would be guaranteed the provision of mobile services in a specified minimum percentage of the geographic area of the country. Under Option 2, ComReg also considered that consumers could face higher prices if coverage obligations were set over and above what an operator would choose to offer and these additional costs were passed onto consumers.

A 8.10 Based on the results of the draft RIA, ComReg considered that there would be reasonable grounds for setting coverage and roll-out conditions in future licences for liberalised 900 MHz spectrum as a safeguard to ensure that consumers are provided with an acceptable level of coverage and that this coverage would be maintained. ComReg's view was that setting appropriate coverage and roll-out obligations would ensure the efficient use of the 900 MHz band by ensuring that the spectrum is used to deploy services to a wider geographic range than may otherwise be the case. Such obligations would also contribute to the widespread availability of open access, affordable, always on, broadband infrastructure and services for businesses and citizens.

A 8.11 In Consultations 10/71 and 10/105 ComReg remained of the view that it was appropriate to impose coverage and roll-out obligations on liberalised licences following the proposed addition of the 800 MHz and 1800 MHz frequency bands respectively to the award.

Summary of Respondents Views

Consultation 09/14

A 8.12 Of the eight responses (Digiweb, H3GI, Ireland Offline, Ericsson, Meteor, O2, UPC and Vodafone) to Question 11 of Consultation 09/14, those who commented specifically on coverage and roll-out conditions were generally supportive and expressed the following views:

- proper deployment coverage in this field is a requirement (Ireland Offline[350]);

[350] "Proper actual deployment coverage. [sic] monitored by 3rd parties or by Comreg [sic] in the field is a requirement here" – Ireland Offline's response to Question 11 of Consultation 09/14.

- coverage and roll-out should be considered in consultation with the industry (Ericsson[351]);
- ComReg should include some conditions to ensure spectrum is brought into use (O2[352]);
- coverage obligations should be included as a condition in licences (Vodafone[353]).

A 8.13 However, two respondents (Digweb and Meteor) expressed reservations and concerns:

- coverage and roll-out conditions may deter any potential new applicants from bidding for spectrum due to the cost of national roll out (Digiweb[354]);
- extreme caution will be required to ensure that any coverage obligations remain reasonable and equitable (Meteor[355]).

Consultation 09/99 (Question 12)

A 8.14 In Consultation 09/99 ComReg sought the views of respondents on its draft RIA in Question 12 :

> Question 12 (Consultation 09/99)
> Do you agree that it is appropriate that coverage and roll-out licence conditions should be included in future licences for liberalised 900 MHz spectrum?

A 8.15 Six respondents (BT, Digiweb, eircom, H3GI, O2, and Vodafone) provided a response to Question 12. No respondent opposed ComReg's proposal, with four respondents (O2, Digiweb, H3GI and Vodafone) expressing full support while two respondents (Meteor and BT), although expressing concern, did not raise specific objections.

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[351] "Ericsson is of the view that Coverage, Roll-Out, Average end user speed and average end user latency should be considered in consultation with the industry..." – Ericsson's response to Question 11 of Consultation 09/14.

[352] "In the interests of efficiency, ComReg should include some conditions to ensure that the spectrum is actually brought into use. These should be basic or minimum conditions and not overly prescriptive." – O2's response to Question 11 of Consultation 09/14.

[353] "...coverage obligations should be included as conditions of licences." – Vodafone's response to Question 11 of Consultation 09/14.

[354] "Considering the financial implications for new applicants entering the band, Digiweb's position is that Coverage and Roll-Out conditions may deter any potential new applicants from bidding for spectrum as the cost of a full scale national Roll-Out may be cost prohibitive." Digiweb's response to Question 11 of Consultation 09/14

[355] "...extreme caution will be required to ensure that any coverage obligations remain reasonable and equitable, i.e. it must be clearly demonstrated that any coverage obligations will be economical to achieve by operators in the absence of subvention from the State." – Meteor's response to Question 11 of Consultation 09/14.

A 8.16 The comments made in support of ComReg's proposal included:

- It is appropriate that coverage and roll-out licence conditions should be included in future licences for liberalised 900 MHz spectrum (H3GI[356] and Digiweb[357]);
- ComReg is right to include coverage requirements in the licences given the importance of mobile communications for society and the economy (O2[358] and Vodafone[359]);
- full national coverage is only likely to be delivered using sub-1 GHz spectrum (O2);
- the inclusion of symmetric coverage obligations is objectively justified and necessary (Vodafone[360]); and
- the inability to trade spectrum may support the need for roll-out obligations (BT[361]).

A 8.17 The two respondents who expressed concern commented:

- care must be taken to ensure that appropriate targets are established (Meteor[362]);
- it is not clear what criteria have been used to determine an "acceptable level of coverage" nor what assessment of competitive forces has been undertaken (Meteor);

[356] "Yes, it is appropriate that coverage and roll-out licence conditions should be included in future licences for liberalised 900 MHz spectrum" – H3GI's response to Question 12 of Consultation 09/99.

[357] "Digiweb agree that it is appropriate that coverage and roll-out license conditions should be included." – Digiweb's response to Question 12 of Consultation 09/99.

[358] "Given the importance of effective mobile communications for society and the economy, and considering that full national coverage is only likely to be delivered using sub-1 GHz spectrum, ComReg is right to include coverage requirements in the licences." – O2's response to Question 12 of Consultation 09/99.

[359] "Vodafone believes that there are major social and economic benefits to end users from the provision of electronic communications services (including voice and mobile broadband) with extensive population and geographic coverage and it is therefore appropriate that coverage and rollout conditions be included in future 900 MHz licences." – Vodafone's response to Question 12 of Consultation 09/99.

[360] "This inclusion of symmetric coverage obligations, as proposed by DotEcon, is therefore both objectively justified and necessary" – Vodafone's response to Question 12 of Consultation 09/99.

[361] "...we consider that the inability to trade spectrum may be a factor that might give support to the use of roll-out obligations." – BT's response to Question 12 of Consultation 09/99.

[362] "...Meteor does not in principle object to continued application of coverage obligations, however, care must be taken to ensure that appropriate targets are established. Meteor agrees with ComReg's view that "if the coverage level is set at an inappropriate level, the competition for a new 900 MHz licence may be reduced as some potential licensees may not be able to meet this requirement"." – Meteor's response to Question 12 of Consultation 09/99.

- if the obligations are too great, this might depress the spectrum value significantly (BT);
- there will be strong commercial incentives to provide extensive coverage, as is already the case with the present networks (BT[363]);
- the necessity for roll-out obligations was not clear (BT[364]).

A 8.18 There were no additional comments specifically with regard to the RIA analysis.

ComReg's Position

A 8.19 ComReg may only attach such conditions to rights of use of spectrum as are listed in Part B of the Schedule to the Authorisation Regulations[365]. Item 2 of Part B of the Schedule includes an obligation to provide a service or to use a type of technology for which the rights of use for the frequency has been granted including, where appropriate, coverage and quality requirements. Any attachment of conditions under Regulation 10(1) shall be non-discriminatory, proportionate and transparent and in accordance with Regulation 17 of the Framework Regulations[366]. Therefore, ComReg is entitled to attach coverage requirements to spectrum rights of use, in accordance with ComReg's statutory powers and objectives and, in particular, the above provisions.

A 8.20 ComReg's draft RIA (chapter 3 of this document) concluded that if ComReg does not set any coverage obligation then consumers in low population density areas would have less certainty of services being available to them. Ultimately, the level of competition in the market will determine the extent of the coverage that operators will provide. If high coverage is considered by consumers to be an important factor, then operators may have an incentive to compete on this differentiating factor by offering coverage levels above that of their rivals in order to gain a competitive advantage.

A 8.21 However, even in a highly competitive market there is no guarantee that competition will deliver and maintain an acceptable level of coverage across the country that is in line with consumer expectations, or that this coverage would be provided in a timely manner. One or more operators may instead choose to 'cherry-pick' the market, focusing on the most profitable market segment only. If the level of coverage is not deemed to be acceptable, and if ComReg wants to ensure that consumers enjoy services in at least the minimum specified percentage level of the country, then regulatory intervention is required in the form of a licence condition specifying a certain minimum level of coverage.

[363] "We note that if the obligations are too great this might depress the spectrum value significantly and also that there will anyway be strong commercial incentives to provide extensive coverage, as is already the case with the present networks..." – BT's response to Question 12 of Consultation 09/99.

[364] "We are not convinced roll-out obligations are necessary but do not specifically object to those proposed." – BT's response to Question 12 of Consultation 09/99.

[365] S.I. 335/2011: European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011, Regulation 10(1).

[366] S.I. 333/2011, Regulation 10(2).

A 8.22 Therefore, ComReg is of the view that there are reasonable grounds for setting coverage and roll-out conditions in future licences for liberalised spectrum as a safeguard to guard against 'cherry picking' and to ensure that consumers are provided with a reasonable level of coverage and that this coverage is maintained.

A 8.23 In respect of the potential impact on prospective new entrants to the mobile market, ComReg considers that setting the demographic coverage at a reasonable level with an appropriate timescale for roll-out, as proposed, could be achieved by a new entrant, and in this regard it is notable that the GSM and 3G licensees have all deployed networks in excess of the licence levels.

Should coverage and roll-out obligations differ depending on the status of licensees? (symmetric or asymmetric obligations)

Summary of ComReg's proposals in previous Consultations

Consultation 09/99

A 8.24 In Consultation 09/99 ComReg discussed whether coverage and roll-out conditions should be the same for all new 900 MHz licences (i.e. symmetric coverage obligations) or whether it would be appropriate to have varying conditions for different licences (i.e. asymmetric coverage obligations).

A 8.25 ComReg noted that DotEcon had considered this issue in its report[367] and that it had considered international practice in setting coverage obligations in spectrum bands comparable to those being considered by ComReg at the time. DotEcon expressed a preference for symmetric licence conditions advising that there would not be much benefit gained from using asymmetric coverage conditions and that any approach with asymmetric conditions would run some risk of complaint that differentiation of licence conditions was not justified. DotEcon recommended that any coverage obligations should apply homogenously to all licences and that this would require coverage and roll-out obligations appropriate for new entrants so as not to unfairly impede entry. ComReg further considered the issue by identifying three categories of potential 900 MHz licensee:

- existing 900 MHz mobile operators (Vodafone, O2 and Meteor);
- existing non-900 MHz mobile network operator (H3GI); and
- new entrants.

A 8.26 ComReg was of the view that from the perspective of promoting interests of consumers, the application of asymmetric conditions would encourage the widest availability of services, particularly if they could be constructed so as to facilitate the three categories of licensee identified. ComReg commented that if symmetric coverage obligations were to be imposed, they would have to be set at levels that

[367] See sections 14.4.7 and 15.1.3 of ComReg Document 09/99c.

suited a new entrant so as not to discourage entry, but a coverage level lower than that currently provided by incumbent operators could result in them reducing coverage in order to reduce costs. ComReg noted the need to strike a balance such that the coverage level would not be set so high as to discourage investment in network infrastructure (particularly by new entrants), nor to set it too low so that it fails to act as an incentive to roll out services beyond high-population / low-cost areas.

A 8.27 ComReg considered the current status of each of the three types of potential 900 MHz licensee, and was of the view that:

- existing 900 MHz mobile operators have already deployed networks that exceed minimum coverage conditions proposed and consequently they would be in a position to meet a coverage condition that matched or exceeded their obligations under their current GSM licences;
- an existing non-900 MHz mobile network operator also currently exceeds the minimum coverage required of them. Consequently they should be in a position to meet a coverage obligation that exceeds their current 2100 MHz coverage obligation, should coverage in the 2100 MHz band count toward a 900 MHz coverage obligation; and
- a new entrant would have no existing network in place.

A 8.28 Before outlining its specific proposals on the matter ComReg sought views of respondents on whether the same coverage obligation should be applied to the three categories (i.e. symmetric obligations) or different (i.e. asymmetric obligations).

> Question 14 (Consultation 09/99) In relation to each category of future new 900 MHz licensee - (1) existing 900 MHz mobile network operators, (2) existing non-900 MHz mobile network operators, and (3) new entrants - should there be symmetric or asymmetric coverage and roll-out conditions?

A 8.29 ComReg stated its view that an appropriate coverage and roll-out condition for licences for liberalised 900 MHz spectrum that are granted to incumbent 900 MHz licensees, would be to achieve and sustain a 90% geographic coverage within 3 years of the licence commencement date. A timeframe of 3 years was proposed as ComReg believed that this would allow an operator sufficient time to meet this obligation.

> Q.17. Provided that asymmetric coverage obligations are set in the 900 MHz competition, do you agree with ComReg's proposal that the existing 900 MHz mobile network operators should meet a minimum coverage level of 90% geographic coverage within 3 years of the licence commencement date?

Consultation 10/71

A 8.30 Having given due regard to the responses received to Document 09/99, and to the new circumstances in relation to 800 MHz, ComReg revised its view on the appropriate coverage and roll-out obligations which should apply to new liberalised-use licences issued in the 800 MHz and 900 MHz bands and proposed to do the following:

- 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. ComReg proposed that the rollout period would be 3 years for a licensee who has an existing mobile network (i.e. Vodafone, O2, Meteor or H3GI) and 7 years for a new entrant to the Irish mobile market. A shorter timeframe was 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 was 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. A minimum of 50% of the coverage (i.e. 35% population) 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.
- Measure coverage with a methodology that is broadly the same as that set out in ComReg Document 09/99 with the exception that ComReg was also considering the use of the Ec/Io[368] metric in respect of the UMTS technology.

A 8.31 Question 15 of Consultation 10/71 sought the views of interested parties on these amendments to the coverage and roll-out licence conditions:

> Q. 15 (Consultation 10/71) 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

[368] Ec/Io is analogous to Carrier to Interference (C/I) ratio in GSM, and for a useable coverage Ec/Io must be greater than or equal to -8dB.

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.

Consultation 10/105

A 8.32 In Consultation 10/105 ComReg consulted on the addition of the 1800 MHz band into the broader spectrum release proposal.

A 8.33 In considering the coverage and roll-out obligations that should apply to the 1800 MHz band, ComReg commissioned DotEcon to analyse the international experience of coverage obligations for mobile frequencies. Section 8 of DotEcon's report[369] set out its recommended coverage obligations for 1800 MHz spectrum. In carrying out this analysis DotEcon studied three different scenarios:

i. a bidder wins 1800 MHz and sub-1 GHz rights of use;

ii. an existing mobile network operator with a 2.1 GHz network only wins 1800 MHz rights of use; and

iii. a new entrant to the mobile market only wins 1800 MHz rights of use.

A 8.34 Considering a coverage obligation less than or equal to that being proposed for sub-1 GHz spectrum (70% population) DotEcon commented that an entrant (or incumbent) winning sub-1GHz and 1800 MHz spectrum in the auction would necessarily meet its 1800 MHz coverage obligation when it met those of its sub-1GHz licence. If a licensee were to win only 1800 MHz spectrum, but already had an existing 2.1GHz licence, the coverage of its 2.1 GHz network should count significantly toward the proposed coverage obligation for 1800 MHz. In the case of a new entrant winning only 1800 MHz spectrum, given the proposed coverage level and the roll out time (7 years for new entrants), DotEcon noted that this would be a less onerous obligation than those that were set (and achieved) in the 2.1 GHz licences and should therefore be achievable.

A 8.35 Having discussed each in turn and assuming that the sub-1 GHz coverage and roll-out obligation as proposed in Consultation 10/71 remained, ComReg was of the view that there would be no need to set a separate coverage obligation for 1800 MHz spectrum, and the coverage obligations proposed in Consultation 10/71 for sub-1 GHz spectrum should apply to all spectrum bands in the award including the case where an operator wins only 1800 MHz spectrum.

A 8.36 Aside from including the 1800 MHz frequency band into the list of frequency bands licensed in the auction, no changes were made to the coverage and roll-out obligations that were proposed in Consultation 10/71, other than to allow coverage obligations to be met using the 800 and 900 MHz bands and now the 1800 MHz band.

[369] ComReg Document 10/105a.

A 8.37 ComReg sought the views of respondents on these amendments to the coverage and roll-out licence conditions:

> Q12 (Consultation 10/105) Do you agree with ComReg's proposal regarding coverage and roll-out obligations? Please provide reasons for your view.

Summary of Respondents Views

Consultation 09/99

A 8.38 In response to Question 14 of Consultation 09/99 on whether coverage and roll-out obligations should be symmetric or asymmetric for the three categories of potential licensees, three respondents (BT, Digiweb and H3GI[370]) were of the view that coverage and roll-out conditions should be asymmetric, while three respondents (O2, Vodafone and Meteor) argued for symmetric roll out obligations.

A 8.39 Those respondents in favour of symmetric coverage and roll-out obligations noted that:

- if ComReg were to impose different licence conditions depending on who is the winning bidder in the auction then the lots on which bids are placed would not be identical and the integrity of the auction would be undermined (O2[371]);
- symmetrical licence conditions avoid long term competitive distortions, simplify the award process and reduce risk of bias in auction design (Meteor);
- the application of asymmetry would distort the market and ultimately have an adverse impact on the provision and availability of services (Meteor);

[370] H3GI was of the view that *"There should be asymmetric coverage and roll-out obligations"* but did not provide any further reasoning for its view – (pg 17 of H3GI response to 10/21r).

[371] "If ComReg were to impose different licence conditions depending on who the winning bidder is then the lots on which bids are placed are not identical and the integrity of the auction is undermined. ComReg can only use an auction as the assignment mechanism if the licence conditions are the same regardless of who the winner is." – O2's response to Question 14 of Consultation 09/99.

- symmetric roll out coverage conditions would encourage new entrants to match the current high levels of coverage within a reasonable timeframe (Meteor[372]); and
- ComReg can only hope to realise the potential benefits from new entrants or new users if it applies demanding coverage conditions to them (Vodafone[373]).

A 8.40 The respondents who favoured an asymmetric approach made the following points:

- the coverage and roll-out conditions should be set appropriately for all operators, and should take full consideration of the advantage some operators have by virtue of their existing networks (BT);
- both the financial cost and the time taken to rollout a network are significant and this should be recognised by the coverage and roll-out conditions imposed on a new operator. Otherwise there will be market distortion which will discourage such new operators from applying for a licence (BT[374]); and
- [**Confidential Text Removed** [375])]

A 8.41 Respondents returned to the issue of symmetric and asymmetric obligations in their responses to questions regarding the level and timing of any obligations imposed, as discussed below.

A 8.42 In response to Questions 17 and 19 of Consultation 09/99 on ComReg's proposal to impose a 90% geographic minimum coverage with an asymmetric roll-out period for incumbent MNOs and new entrants (three years and ten years

[372] *"...symmetrical licence conditions avoid long term competitive distortions, simplify the licence award process and reduce the risk of introducing bias in the auction design... Although the widest availability of services must and should be encouraged, Meteor fails to understand or to be convinced that the use of asymmetry of licence conditions is the appropriate regulatory tool to achieve this aim. Wholly to the contrary Meteor would argue that the application of asymmetry would, in fact, distort the market and ultimately may have adverse impact on the provisions and availability of services. Indeed, in order to maintain the current competitive dynamic thereby meeting ComReg's social objectives, symmetrical rollout and coverage conditions would encourage new entrants to match the high levels of coverage we see today, within a reasonable timeframe"* – Meteor's response to Question 14 of Consultation 09/99.

[373] In its response to Question 14 of Consultation 09/99, Vodafone referred back to its response to Question 12 of Consultation 09/99 in which it commented, "*Comreg [sic] can only hope to realise the potential benefits from new entrants or new users (on which it relies to justify the auction approach) if it applies demanding coverage conditions to them.".*

[374] *"The coverage and roll-out conditions should be set appropriately for all operators, and should take full consideration of the advantage some operators have by virtue of their existing networks. Both the financial cost and the time taken to rollout a network are significant, and this should be recognised by the coverage and roll-out conditions imposed on a new operator, otherwise there will be market distortion which will discourage such new operators from applying for a licence. Consequently we believe that the conditions should not be equal for all operators, i.e. they should be asymmetric."* – BT's response to Question 14 of Consultation 09/99.

[375] **[Confidential Text Removed:**].

respectively), three respondents (eircom, O2 and Vodafone) did not agree. They provided the following arguments in support of their position:

- coverage obligations must be equal in order to ensure the integrity of the auction process (O2[376]);
- asymmetric coverage obligations between licensees in a 900 MHz competition are neither appropriate nor justified (Vodafone[377]);
- asymmetric licences obligations would not be appropriate. (Meteor[378]).

Consultation 10/71

A 8.43 Two respondents disagreed with ComReg's revised proposal for an asymmetric roll-out obligation for incumbent MNO's and new entrants (three years and seven years respectively) stating:

- if licence conditions vary depending on the winner of the lot, this will impact on relative valuations in the auction (O2[379]); and
- asymmetric obligations create risks of distortion both in terms of the effective operation of the award process in the near term and to the competitive functioning of the market in the longer term (eircom[380]).

Consultation 10/105

A 8.44 Three of the four respondents (H3GI, Meteor, O2 and Vodafone) to consultation 10/71 answered Q. 12. Beyond referring to its views previously expressed on this issue eircom did not expand on the proposal. O2 supported ComReg's proposal

[376] *"Coverage obligations must be equal in order to ensure the integrity of the auction process"* – O2's response to Question 17 of Consultation 09/99.

[377] *"For the reasons set out in the response to Questions 12 and 14, Vodafone does not believe that asymmetric coverage obligations between licensees in a 900 MHz competition are either appropriate or justified"* – Vodafone's response to Question 17 of Consultation 09/99.

[378] Reiterating its response to Question 14, Meteor commented, "*Meteor does not believe that asymmetrical licence conditions would be appropriate.*" – Meteor's response to Question 17 of Consultation 09/99.

[379] *"...if an auction is to determine the most efficient assignment outcome, then each bidder must be bidding on the same lots. This cannot be the case where the lot is a licence whose conditions will vary depending on who the winning bidder is. ComReg's proposal to allow a longer roll-out time for the winning bidder if they happen to be a new market entrant would have the impact of increasing the relative value of a lot for a new entrant over an existing market player. By the same token, allowing an existing market player to count network already deployed as contributing towards their coverage would increase the relative value of a lot for the existing operator over a new entrant."* – O2's response to Question 15 of Consultation 10/71.

[380] *"eircom does not agree that an asymmetric roll-out period has been objectively justified. In our view asymmetric obligations create risks of distortion both in terms of the effective operation of the award process in the near term and to the competitive functioning of the market in the longer term, as set out in the response to ComReg 09/99."* – eircom's response to Question 15 of Consultation 10/105.

and believed it was a pragmatic approach[381]. Vodafone stated that it had set out its general position on coverage and roll-out obligations in its response to 10/71. It agreed with ComReg's proposal to set a symmetric coverage obligation for all licences, irrespective of the frequency band.[382]

ComReg's Position

A 8.45 Taking note of the responses received to Consultations 09/99, 10/71 and 10/105 and the reports prepared by its consultants, ComReg's position remains that it is appropriate to set the same coverage requirement for all categories of licensee but with asymmetric roll-out targets to facilitate new entrants to the market.

Coverage Level

Summary of ComReg's proposals in previous Consultations

Consultation 09/99

A 8.46 In Consultation 09/99 ComReg proposed a symmetric coverage level for all three licensee types of 90% geographic coverage. DotEcon was of the view[383] that if the objective is to provide coverage where it is most valued then specifying a coverage obligation in terms of geography, rather than population, leaves it up to network operators to decide where subscribers are most likely to be and to provide coverage at locations most likely to meet customers' needs effectively. In contrast, a population-based coverage obligation provides a further incentive to prioritise areas with high population density. Second, a clear disadvantage of population-based coverage requirements is that it requires detailed data on the location of population in order to determine whether or not the obligation has been met. Measuring geographical coverage is much simpler, as population-density data is not needed.

Consultation 10/71

A 8.47 Having given due regard to the views expressed by respondents to Consultation 09/99 and to the new circumstances in relation to the 800 MHz band ComReg revised its coverage and roll-out obligations in Consultation 10/71. ComReg's proposed coverage and roll-out obligations contained a number of differences compared to those outlined in Consultation 09/99.

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[381] *"Yes, O2 agrees with the proposal and believes ComReg has taken a pragmatic approach to this issue."* – eircom's response to Question 15 of Consultation 10/105.

[382] *"Vodafone set out its general position in respect of coverage and roll-out obligations to be attached to the proposed new licences for sub-1 GHz spectrum for assignment in a joint award process in our response to ComReg document 10/71. Our views in respect of the coverage and roll-out obligations to apply to the new 1800 MHz licences now proposed to be included in the spectrum award process are consistent with our previously stated views in respect of sub-1 GHz spectrum."* – in response to Q12 on pg 15 of its reponse in document 11/10.

[383] See Document 09/99c, Section 15.1.9.

- In Consultation 10/71, ComReg maintained its view on applying a symmetric coverage level regardless of the licensee type but proposed a new coverage level at 70% population coverage, revised from the 90 % geographic coverage proposed in Consultation 09/99. Furthermore, this would apply equally to all licensees in the band. In Section 4.6.3 of Consultation 10/71, ComReg expressed its view that while obtaining the required level of coverage would be a matter for a licensee, a 70% demographic coverage level would be a level that a new entrant to the mobile market could reasonably achieve in addition to the fact that a 70% demographic coverage obligation would be sufficient to provide coverage in all townlands in Ireland with over 50 inhabited houses.[384,385] Furthermore, this proposed coverage level was consistent with the range of 50-70% proposed by DotEcon.[386]

Summary of Respondents Views

Consultation 09/14

A 8.48 In their responses to Question 11 of Consultation 09/14, three respondents (Ericsson, Vodafone, Meteor) provided specific proposals on what they considered to be an appropriate coverage level as follows:

- same as the current GSM licences (Ericsson[387]);
- higher levels of population and geographic coverage than are set out in existing 2.1 GHz licences (Vodafone[388]); and
- carry over existing coverage obligations on a frequency neutral basis (Meteor[389]).

[384] In ComReg Consultation 10/71 this was stated to be 50 inhabitants rather than 50 inhabited houses. This was an error.

[385] This is based on CSO data (from the 2006 census) which indicates that just under 70% of the population live in towns with 50 inhabited houses or more.

[386] In Section 16.2 of DotEcon's report (09/99c), DotEcon recommended that the coverage obligation be set at a medium level such that operators should have area coverage sufficient to serve 50-70% of the population.

[387] *"Ericsson is of the view that Coverage, Roll-Out, Average end user speed and average end user latency should be considered in consultation with the industry...We would suggest something like: Coverage: Same as current GSM Licences….. Roll-Out: Around 24 months"* – Ericsson's response to Question 11 of Consultation 09/14

[388] "...coverage obligations should be included as conditions of licences. Vodafone considers that it is also appropriate that coverage conditions in licences should also specify higher levels of population and geographic coverage than are set out in existing 2.1 GHz licences." – Vodafone's response to Question 11 of Consultation 09/14.

[389] *"While there may be justification for a carry-over of existing coverage obligations (on a frequency neutral basis) extreme caution will be required to ensure that any coverage obligations remain reasonable and equitable"* – Meteor's response to Question 11 of Consultation 09/14.

Consultation 09/99

A 8.49 In response to ComReg's proposal to set a 90% geographic coverage obligation:

- one respondent agreed (Digiweb);
- one respondent argued in favour of a lower obligation. Vodafone suggested a 70% geographic coverage level on the basis that this would reflect the "improved economics" of providing wide area coverage using the 900 MHz band as well as allowing operators to differentiate themselves on the basis of coverage[390]; and
- one respondent (eircom) disagreed with the 90% coverage level for the following reasons:
- the proposed geographic target of 90% gives rise to questions of discrimination and inequity if applied asymmetrically. Even if applied symmetrically, eircom maintained the liberalisation of the 900MHz band is likely to result in enhanced coverage without the need for regulatory intervention; and
- in addition eircom noted that if ComReg could objectively justify coverage and rollout obligations, the targets should be set in accordance with DotEcon's recommended coverage in the region of 50-70% of the population.[391]

Consultation 10/71

A 8.50 In response to ComReg's revised proposal to set a 70% population coverage, of the 11 responses received to Question 15 of Consultation 10/71, seven (Digiweb,

[390] *"The implementation of symmetric coverage obligations requiring all licensees to meet a minimum 70% geographic coverage level would reflect the improved economics of providing wide area coverage for advanced mobile broadband services using the 900 MHz band relative to, for example, the 2.1 GHz band. With a 70% geographic minimum coverage requirement there would also be effective incentives for operators to differentiate themselves on the basis of coverage, with licensees likely to significantly exceed the minimum coverage obligations set down in their licences. Existing licensees in the 900 MHz band will maintain their current very high levels of geographic coverage gjven [sic] the value that mobile subscribers attach to national coverage."* – Vodafone's response to Question 17 of Consultation 09/99.

[391] *"Meteor disagrees with ComReg's proposal to establish an ultimate minimum coverage obligation of 90% geographic coverage. The proposed geographic target of 90% gives rise to fundamental questions of discrimination and inequity if applied asymmetrically. Even if applied symmetrically it would still be likely to fail a proportionality test, given that the existing coverage obligations have been overtaken by market forces while the liberalisation of the 900MHz band is likely to result enhanced coverage without the need for regulatory intervention. In paragraph 643 of the DotEcon report, a medium level coverage obligation is recommended, sufficient to provide service to 50% to 70% of the population which could apply to the provision of voice and/or mobile broadband services...Meteor would tend to agree with DotEcon's recommendations in this respect, to the extent that coverage obligations can be demonstrated to be necessary."* – Meteor's response to Question 19 of Consultation 09/99.

eircom[392], ESBN, H3GI, O2, Qualcomm and Vodafone) were in favour of the proposed symmetric coverage obligation and made the following points in support of the proposal:

- these measures should provide the appropriate incentives for efficient and sustainable infrastructure based competition between licensees to the benefit of consumer welfare and the national economy (Vodafone[393]);
- ComReg's proposal strikes a balanced practical approach to the considerations (O2[394]);
- covering 70% of the population may appear high but the exceptional penetration quality of the 800 MHz band should allow for this condition to be reached (Digiweb[395]);

A 8.51 In addition, respondents who agreed with the proposals made the following points:

- To enable coverage in sparsely populated areas of France the regulator had enabled infrastructure sharing in underserved areas (Qualcomm[396]);
- In the absence of allocation of dedicated spectrum to facilitate a Utility Optimised Telecommunications network ESBN would require guaranteed network coverage significantly greater than 70% to meet its operational requirements (ESBN[397]).

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392 *"eircom agrees with ComReg's proposal to set a symmetric obligation to provide coverage to 70% of the population which is consistent with our own previously expressed views. We also agree with Comreg that a holistic approach to coverage should be applied, whereby coverage from other bands (currently 2100 and 1800 MHz) could be combined with 800/900 MHz coverage."* – eircom's response to Question 15 of Consultation 10/71.

393 *"Vodafone agrees with ComReg's proposals to set a symmetric population coverage obligation to all licences, to allow multiple frequencies bands to count towards the coverage obligations subject to a minimum 50% coverage obligation being met by the 800/900 MHz bands, and to not allow coverage via national roaming to count towards the coverage and roll-out obligations. These measures should provide the appropriate incentives for efficient and sustainable infrastructure based competition between licensees to the benefit of consumer welfare and the national economy."* – Vodafone's response to Question 15 of Consultation 10/71.

394 "*O2 agrees that ComReg's proposal strikes a balanced practical approach to the considerations."* – O2's response to Question 15 of Consultation 10/71.

395 *"Yes – Digiweb believe those conditions to be acceptable. Covering 70% of the population may appear high but the exceptional penetration quality of the 800 MHz band should allow for this condition to be reached."* – Digiweb's response to Question 15 of Consultation 10/71.

396 *"Qualcomm underlines that France, a sparsely populated country by European standards, will achieve near ubiquitous mobile broadband coverage (98 percent population by 2011 and 99.3 percent by the end of 2013) through, amongst other measures, allowing infrastructure sharing in underserved areas."* – Qualcomm's response to Question 15 of Consultation 10/71.

397 *"ESBN agrees with this proposal with the exception that in the absence of allocation of dedicated spectrum to facilitate a Utility Optimised Telecommunications network, ESBN would require guaranteed network coverage significantly greater the [sic] 70% to meet its operational requirements."* – ESBN's response to Question 15 of Consultation 10/71.

A 8.52 Four respondents (Ericsson, Imagine, RTÉ, UPC) did not support ComReg's proposal for 70% population coverage. A number of respondents argued it was too low:

- if the proposed liberalisation aims to deliver a dividend then the proposal should aim to have high(er) geographic coverage (UPC[398]);
- Ericsson stated that "With the mobile operators not obliged to provide any coverage in excess of the extremely modest 70% population target, it is unlikely that the operators will make any effort to go beyond this target" and continued that if operators choose not to replace their 2G network infrastructure using their 800/900 MHz spectrum allocations, then their existing coverage footprints could shrink significantly compared to their existing 2G footprints[399](Ericsson).

A 8.53 One respondent argued that the population coverage requirement was too high, stating that the proposal would greatly reduce prospects for new entry to the market (Imagine[400]).

A 8.54 Two respondents made additional comments:

- a roll out obligation on the lower 800 MHz blocks could result in deployment in areas where broadcasting services are most susceptible to interference due to the broadcast frequency plan (RTÉ[401]); and

398 *"These requirements again should be split and while 70% coverage appears reasonable for a Greenfield build by a new entrant, if the proposed liberalization plans aim to deliver a dividend then the proposal should aim to have high(er) geographic coverage. As discussed earlier there should be a dual licensing structure and the existing incumbents in their licensing should bear the obligation to meet this coverage"* – UPC's response to Question 15 of Consultation 10/71.

399 *"With the mobile operators not obliged to provide any coverage in excess of the extremely modest 70% population target, it is unlikely that the operators will make any effort to go beyond this target. It is at least arguable that the same outcome would have occurred in relation to the availability of 2G mobile services had the mobile operators not been obliged to offer full nationwide coverage within a short timeframe. An outcome whereby liberalised 800/900 MHz communications services do not have to extend beyond 70% coverage could have serious detrimental effects over the medium term. In time the mobile operators will move to completely decommission their 2G equipment and if they choose not to replace this with network infrastructure providing liberalised communications services (e.g. voice, text and advanced data services) using their 800/900 MHz spectrum allocations, then their existing coverage footprints could shrink significantly compared to their existing 2G footprints."* – Ericsson's response to Question 15 of Consultation 10/71. Ericsson's response to this question was quite extensive and interested parties are referred to the full response published in ComReg document 10/103R.

400 *"Imagine does not agree with this proposal as it greatly reduces the prospects of new entry to this market. The coverage requirement should be relaxed to no more than 50% population coverage. National roaming should also be facilitated through the licensing regime to enable national coverage for any new entrant"* – Imagine's response to Question 15 of Consultation 10/71.

- Ericsson proposed that ComReg in association with DCENR should draw up specific service zones within the country where active equipment or spectrum sharing would be allowed. Such zones would be the more rural and remote parts of the country and operators would be obliged to provide coverage in these zones before they can be commercially active in other zones.

A 8.55 In addition to the views expressed, O2 requested clarification on the following points:

- the obligation is per operator and not per lot – so it is assumed that an operator holding 2 lots of sub-1GHz spectrum could meet the obligation by providing coverage using either lot or both combined (O2);
- as licences will be service and technology neutral, it is assumed that there is no technology specific obligation (O2);
- the coverage obligation referring to the percentage of the population should be defined by an outdoor signal level equivalent to what was required for the 3G licence at 2100MHz (O2).

Consultation 10/105

A 8.56 In responding to Question 12 of Consultation 10/105 on coverage obligations, there were three respondents (eircom, O2 and Vodafone). Both O2[402] and Vodafone[403] stated their agreement with ComReg's proposals to set a symmetric population coverage obligation of 70%. eircom simply made reference to their views as set out in previous submissions.[404]

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[401] *"A roll-out obligation on the lower 800MHz blocks would encourage licensees to deploy their networks in the Dublin and east coast areas early in their network rollouts to meet coverage targets. These areas are among those where broadcasting services are most susceptible to interference due to the broadcast frequency plan. While geographic roll-out obligations could be designed to limit early implementation of the lowest blocks in areas where broadcasting services are most vulnerable to this new type of interference, this would most likely be viewed as being over-prescriptive."* – RTÉ's response to Question 15 of Consultation 10/71.

[402] *"Yes, O2 agrees with the proposal, and believes ComReg has taken a pragmatic approach to this issue."* – O2's response to Question 12 of Consultation 10/105.

[403] *"Vodafone agrees with ComReg's proposals to set a symmetric population coverage obligation of 70% to all licences (whether for sub-1 GHz or 1800 MHz spectrum usage rights), to allow multiple frequencies bands to count towards the coverage and roll-out obligations, and to not allow coverage via national roaming to count towards fulfilment of these obligations.." – Vodafone's response to Question 12 of Consultation 10/105. In addition, Vodafone commented that "Our views in respect of coverage and roll-out obligations to apply to new 1800 MHz licences now proposed to be included in the spectrum award process are consistent with our previously stated views*" – pg 15 of its response to consutlaiton 10/105 in document 11/10.

[404] *"eircom Group's position in relation to coverage obligations is as set out in previous submissions, to which we refer*." – Meteor's response to Question 12 of Consultation 10/105.

ComReg's Position

A 8.57 ComReg's position on this issue is informed by a draft 'Coverage' RIA which can be found at the end of this Annex.

A 8.58 In light of the submissions of respondents to the consultations and the reports prepared by its consultants, ComReg is minded to adopt a minimum symmetric population coverage requirement of 70% (but with differing timing for roll-out).

A 8.59 This is intended to prevent licensees from focusing network deployments on high-density urban areas only. It is also modest enough to avoid any risk of forcing excessive duplication of networks in low population density areas which would be inefficient and costly.

A 8.60 The risk of roll-back of voice coverage appears quite limited for the following reasons:

- in the short term, existing 900MHz licensees will need to offer legacy GSM services at 900MHz until nearly all handsets are upgraded;
- coverage has been an important competitive differentiator, and one that has been given prominence in advertising and marketing. On the basis of competition between networks, the first MNO to roll back voice coverage would create significant opportunities for rivals to win its customers;
- a practical commercial proposition offering high value data services without a voice service appears unfeasible.

A 8.61 Furthermore, the coverage obligations in 3G licences (and the greater coverage levels actually achieved under competition) underpin voice coverage levels. Therefore, the risk of mobile voice coverage being rolled back is limited. Regardless of this, policymakers maintain the ability to intervene if such a problem were to arise at some point in the future.

A 8.62 ComReg is of the view that the proposed 70% minimum level is proportionate, reasonable and appropriate having regard to ComReg's statutory objectives. Actual coverage levels are likely to significantly exceed this amount, for the following reasons:

- a 70% population coverage[405] level is sufficient to provide coverage in all the townlands in Ireland with 50 inhabited houses or more.[406] At the same time mobile network operators will have both the opportunity (through substantially reduced costs) and the incentive (through strong

[405] It is at the discretion of the individual operator to determine the geographic 'map' for its network to ensure the proposed level is met, thereby providing flexibility to each operator. Therefore, unless each operator chooses an identical 'map', which seems highly unlikely, then even the minimum coverage obligation should lead to a higher population coverage than a 70% level might suggest.

[406] Based on CSO data which indicates that just under 70% of the population live in townlands with 50 inhabited houses or more.

competition on coverage) to provide a service over an area similar to the current voice network;

- the existing GSM and 3G mobile networks have higher levels of coverage than 70%, meaning that these operators could leverage their existing network infrastructure enabling them to offer coverage levels in excess of 70%; and
- the proposed level is without prejudice to the possibility of legitimate operator co-operation (such as network sharing) arising in the future which would appear, in principle, to be a more efficient means of serving sparsely populated areas. So long as there remains competition between networks, such co-operation allows operators to minimise their costs and avoid any inefficient infrastructure duplication.

A 8.63 Therefore, ComReg proposes that a minimum coverage obligation of 70 % coverage should be applied to all liberalised licences.

Timing of Roll-Out

Summary of ComReg's proposals in previous Consultations

A 8.64 In Consultation 09/99 ComReg proposed an asymmetric roll-out period depending on the licensee type as follows:

- an incumbent 900 MHz licensee, or an existing non-900 MHz MNO, must meet the coverage level within 3 years of the licence commencement date; and
- a new entrant, must meet[407]:
  - 30% geographic coverage within 4 years of the licence commencement date;
  - 70% geographic coverage within 7 years of the licence commencement date;
  - 90% geographic coverage within 10 years of the licence commencement date.

A 8.65 In setting out these proposals, ComReg was of the view that existing licensees would be able to achieve and sustain a 90% geographic coverage within three years of the licence commencement date as they would have access to existing infrastructure. However a new entrant would not have access to any existing GSM or 3G network and would require more time to meet its coverage and roll out obligations compared to other licensees. Hence a longer time frame was proposed for new entrants.

[407] In considering the coverage and roll-out obligations for new entrants, ComReg noted that it had taken note of DotEcon's recommended coverage range and the phased approach. In Section 16.2 of its report (Document 09/99c), DotEcon recommended that a coverage obligation be set at a medium level such that operators must have coverage sufficient to serve 25-35% if the population within 3 years of licence commencement, and 50-70% population coverage within 5 years.

A 8.66 ComReg asked for respondents' views on the proposed coverage level and asymmetric roll out obligations:

> Question 17 (Consultation 09/99) Provided that asymmetric coverage obligations are set in the 900 MHz competition, do you agree with ComReg's proposal that the existing 900 MHz mobile network operators should meet a minimum coverage level of 90% geographic coverage within 3 years of the licence commencement date?
>
> Question 18 (Consultation 09/99) Provided that asymmetric coverage obligations are set in the 900 MHz competition and the aggregation of coverage across multiple frequency bands is allowed, do you agree with ComReg's proposal that the existing mobile (non-900 MHz) network operators should meet a minimum coverage level of 90% geographic coverage within 3 years of the licence commencement date?
>
> Question 19 (Consultation 09/99) Do you agree with ComReg's proposal that a new entrant should meet a minimum coverage level of 30% geographic coverage within 4 years of the licence commencement date, 70% geographic coverage within 7 years of the licence commencement date, and 90% geographic coverage within 10 years of the licence commencement date?

Consultation 10/71

A 8.67 Having revised its view in Consultation 10/71, in light of responses to 09/99, on the appropriate coverage and roll-out obligations which should apply to new liberalised-use licences issued in the 800 MHz and 900 MHz bands, ComReg also made revisions to the roll-out obligations for new entrants. ComReg proposed that new entrants would have 7 years to reach the newly proposed lower coverage level of 70% population, removed the staggered network roll-out requirement and set 7 years as the end-date for achieving the coverage level, on the basis that the coverage level had been reduced. In Question 15 of Consultation 10/71 ComReg sought the views of interested parties on these amendments:

> Q. 15 (Consultation 10/71) 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.

Consultation 10/105

A 8.68 ComReg's proposals on coverage and roll out obligations were unchanged from those proposed in Consultation 10/71.

Summary of Respondents Views

Consultation 09/14

A 8.69 In their responses to Question 11 of Consultation 09/14, two respondents (Ericsson, and Vodafone) provided specific proposals on the roll-out obligations that they felt should be considered. The proposals put forward included:

- a roll-out time of around 24 months (Ericsson[408]); and
- coverage commitments should be met on a phased basis over time (Vodafone[409]).

Consultation 09/99

A 8.70 In Consultation 09/99 ComReg proposed to require coverage obligations to be met within 3 years of the licence commencement date for existing MNOs and within 10 years of the licence commencement date for new entrants.

A 8.71 Three respondents (O2, and Meteor) did not comment specifically on the roll-out periods, but all maintained their view that they were only in favour of symmetric obligations. In relation to the proposal relating to existing non-900 MHz licence holders, H3GI stated its disagreement with the proposal outlining that given the more extensive networks of the existing 900 MHz mobile operators a period of 5 years from licence commencement date would be more appropriate for existing non-900MHz licence holders.[410]

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[408] *"Ericsson is of the view that Coverage, Roll-Out, Average end user speed and average end user latency should be considered in consultation with the industry...We would suggest something like: Coverage: Same as current GSM Licences ….. Roll-Out: Around 24 months"* – Ericsson's response to Question 11 of Consultation 09/14.

[409] *"...coverage obligations should be included as conditions of licences. Vodafone considers that it is also appropriate that coverage conditions in licences should also specify higher levels of population and geographic coverage than are set out in existing 2.1 GHz licences. Vodafone must emphasise however that the time frames to be set down for achievement of ultimate coverage obligations should be reasonable in the context of the periods that would be required, for example, for a new entrant to roll-out a new network at 900 MHz, or for existing 900 MHz licensees to deploy UMTS technologies in the band and transition their existing customer base to the provision of mobile broadband and other advanced data services using these frequencies. Vodafone considers that it may be appropriate that population coverage and geographic coverage commitments should be met on a phased basis over time."* – Vodafone's response to Question 11 of Consultation 09/14.

[410] *"No, 3 does not agree with ComReg's proposal that the existing mobile (non-900 MHz) network operators should meet a minimum coverage level of 90% within 3 years of the licence commencement date. Given the more extensive networks of the existing 900 MHz mobile network operators, a period of 5 years from the licence commencement date would be more appropriate."* – H3GI's response to Question 18 of Consultation 09/99.

A 8.72 In relation to the proposed timeframe for a new entrant to meet a minimum coverage level three respondents provided views:

- Vodafone disagreed with the proposal. Whilst referring to previous arguments in relation to asymmetric obligations, it outlined a strong disagreement with ComReg's proposal that a new entrant would have a coverage obligation under its licence that would require it to achieve only a very low level of geographic coverage for up to the first 6 years of its licence[411];
- H3GI stated that the proposed obligations were disproportionate and discriminatory and argued for more stringent roll out obligations for new entrants, namely a 3 year period to achieve 30% geographic coverage, 5 years to achieve a 70% geographic coverage and a period of 7 years to achieve 90% geographic coverage[412];
- **[Confidential Text Removed[413]]**

Consultation 10/71

A 8.73 In Consultation 10/71, ComReg revised its roll-out obligations to 3 years for an existing mobile network operator and 7 years for a new entrant to the mobile market.

A 8.74 Six respondents provided their views to the relevant Question 15 of 10/71. Two respondents (H3GI[414], UPC[415]) agreed with ComReg's coverage and roll-out obligation proposals. The four respondents (eircom, Ericsson, O2 and Vodafone)

[411] *"Vodafone strongly disagrees with ComReg's proposal that a new entrant should have a coverage obligation under its licence that would require it to achieve only a very low level of geographic coverage for up to the first 6 years of the licence."* – Vodafone's response to Question 19 of Consultation 10/71.

Vodafone had also commented on this response to an earlier question, "*The current proposal for a low coverage obligation for new entrants for an extended period from the outset of the licence undermines ComReg's arguments that incumbents can use roaming on new entrant networks to mitigate disruption."* – Vodafone's response to Question 14 of Consultation 10/71.

[412] *"[ComReg's proposed] obligations are disproportionate and discriminatory. As a new market entrant we were only given 5 years to achieve 85% demographic coverage in our 3G licence. We believe that a period of 3 years from the licence commencement date would be more appropriate in terms of achieving 30% geographic coverage, a period of 5 years from the licence commencements date would be more appropriate in terms of achieving 70% geographic coverage and a period of 7 years from the licence commencement date would be more appropriate in terms of achieving 90% geographic coverage. This would also address the apparent problem posed by ComReg's proposal that a licensee for the period 2011 – 2015 would not have any minimum coverage obligation."* – H3GI's response to Question 19 of Consultation 09/99.

[413] [**Confidential Text Removed]**

[414] *"H3GI agrees with ComReg's proposed coverage and roll-out obligation"* – H3GI's response to Question 15 of Consultation 10/71.

[415] *"As it takes new entrants longer to build they should be given more time than that provided and suitable regulated roaming agreements should be applied for the period of the build to allow them to readily compete prior to completion."* – UPC's response to Question 15 of Consultation 10/71.

that did not support ComReg's proposal for asymmetric roll-out obligations put forward the following arguments:

- the proposal to allow a new entrant to potentially offer only a very low level of coverage for up to the first 6 years of the licence term is contrary to ComReg's statutory obligations to ensure the efficient use of the spectrum and to promote competition (Vodafone[416]);
- it would be more consistent with ensuring efficient utilisation of spectrum to require licensees to meet progressively higher roll-out targets by specified dates prior to achieving the proposed final target of 70% population coverage within 7 years of licence award (Vodafone[417]);
- providing such a new entrant with a longer timeframe to meet the proposed modest coverage requirement of 70% of the population is unlikely to be of any benefit, either to the operator or to consumers as it simply delays the completion of nationwide rollout for several years and means that the new operator could continue to have an inferior network footprint compared to established players for several years (Ericsson[418]).

Consultation 10/105

A 8.75 In response to Question 12 of Consultation 10/105, Vodafone restated its disagreement with an asymmetric roll-out obligation[419] while O2 was in agreement with the proposed roll-out obligations.[420]

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416 *"The proposal to allow a new entrant to potentially offer only a very low level of coverage for up to the first 6 years of the licence term does not adhere to ComReg's statutory regulatory obligations to ensure the efficient use of the spectrum and to promote competition."* – Vodafone's response to Question 15 of Consultation 10/71.

417 *"If, despite Vodafone's view, ComReg nonetheless determines that an asymmetric roll-out obligation for new entrant is appropriate then it would be more consistent with ensuring efficient utilisation of spectrum to require licensees to meet progressively higher roll-out targets by specified dates prior to achieving the proposed final target of 70% population coverage within 7 years of licence award. For example an obligation to roll-out coverage to 30% of the population after 3 years and to 50% of the population after 5 years would be a superior way of specifying an obligation for new entrants, in terms of achieving ComReg's statutory regulatory objectives, than the current proposal."* – Vodafone's response to Question 15 of Consultation 10/71.

418 *"Providing such an operator with a longer timeframe to meet the proposed modest coverage requirement of 70% of the population is unlikely to be of any benefit, either to the operator or to consumers as it simply delays the completion of nationwide rollout for several years and means that the new operator could continue to have an inferior network footprint compared to established players for several years*." – Ericsson's response to Question 15 of Consultation 10/71.

419 "We disagree with ComReg's proposal that an asymmetric roll-out obligation should apply to licences, with those licensees with an existing mobile network being required to meet the coverage obligation within 3 years of licence award, while new entrants to the Irish mobile market would be allowed 7 years to reach the same 70% population coverage target." – Vodafone's response to Question 12 of Consultation 10/105.

420 "Yes, O2 agrees with the proposal, and believes ComReg has taken a pragmatic approach to this issue." – O2's response to Question 12 of Consultation 10/105.

ComReg's Position

A 8.76 Having considered the respondents' submissions and the reports of its consultants, ComReg proposes that the roll-out period to meet the obligation to provide coverage to at least 70% of the population of Ireland (symmetric across all licences) should be 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 without an existing mobile network. The 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. However, to ensure that a reasonable level of coverage is achieved by new entrants in the early years an interim coverage requirement is proposed that half of the target coverage level for new entrants be achieved after three years.

Should multiple frequency bands count towards coverage?

Summary of ComReg's proposals in previous Consultations

A 8.77 In addition to the coverage level and roll-out periods, ComReg also considered whether use of multiple frequency bands should be allowed to count toward a 900 MHz band coverage obligation. ComReg noted DotEcon's recommendation[421] that coverage conditions should be service related and frequency neutral in order to allow operators flexibility to optimise their spectrum holdings. ComReg was of the view that from a consumer perspective, allowing the use of multiple frequency bands would provide a better service as a network operator would have more resources at its disposal and could therefore select the best frequency band to service the needs of its customers. Although there would be a possibility that without an obligation to use the 900 MHz band to meet coverage the 900MHz band would be under-utilised, as the licensee may use its other frequency holding to meet the conditions of its licence, ComReg was of the view that this would be most unlikely given the very favourable propagation characteristics of 900 MHz spectrum.

A 8.78 ComReg held the view that the benefits of allowing use of multiple frequency bands would outweigh the drawbacks and as such proposed to allow the use of multiple frequency bands to count towards a 900 MHz band coverage obligation and invited views of respondents on this proposal.

Consultation 10/71

A 8.79 In response to respondents' calls for clarity on the use of multiple bands to meet the coverage and roll-out obligations, in Consultation 10/71 ComReg proposed that licensees would be required to provide a minimum of 50% of the required

[421] See Sections 14.4.1 and 16.1 of DotEcon's report – ComReg Document 09/99c.

coverage using the 800/900 MHz bands in order to ensure a minimum deployment level in these bands.

Consultation 10/105

A 8.80 ComReg reevaluated its proposal in Consultation 10/71 in light of the addition of 1800 MHz spectrum to the spectrum award[422]. ComReg determined that "there is no need to set a separate coverage obligation for 1800 MHz spectrum, as the coverage obligations proposed in Consultation 10/71 for sub-1 GHz spectrum should apply to all spectrum bands in the joint award, including the case where an operator wins only 1800 MHz spectrum".

Summary of Respondents Views

Consultation 09/99

A 8.81 ComReg's proposal was to allow multiple frequency bands to count towards a 900 MHz coverage obligation. Five of the six respondents to Question 15 of Consultation 09/99 (Digiweb, eircom, H3GI, O2 and Vodafone) [423] agreed with the proposal on the basis that:

- the proposal would allow operators be flexible and to manage services, technology and coverage across licensed bands in the most appropriate and efficient way (Vodafone[424] and O2[425]); and
- the WAPECS framework recognises that operators may utilise multiple frequencies and technologies in their network to support the provision of electronic communications services to end-users (eircom).

A 8.82 One respondent (BT) did not agree with ComReg's proposal. BT was of the view that the measurement across multiple frequency bands might be more appropriate if the auction were to consist of blocks of spectrum of several bands, and hence there could be a degree of substitution of blocks in different bands, but in the

[422] See Section 3.10.4 of Consultation 10/105

[423] Digiweband H3GI did not provide any supporting comments in their responses.

[424] "*Yes. Vodafone agrees that licence holders should be permitted to use multiple frequency bands in order to meet any coverage conditions imposed in licences for spectrum in the 900 MHz band. This proposal will allow operators the flexibility to use the various spectrum holdings and infrastructure that they have to maximise the efficiency with which they provide services to consumers."* – Vodafone's response to Question 15 of Consultation 09/99.

[425] *"This is a sensible approach for ComReg to take and it allows operators to manage services, technology and coverage across licensed bands in the most appropriate and efficient way. This approach does raise some conflict with the fundamental reasoning for use of an auction – all bidders must be bidding on identical lots*." – O2's response to Question 15 of Consultation 09/99.

context of a 900 MHz only award the license conditions should apply only for that band.[426]

Consultation 10/71

A 8.83 eircom did not agree with the proposal that a minimum of 50% of the required population coverage must be achieved with 800/900 MHz spectrum, instead recommending that the coverage target is maintained at 70% with the choice of spectrum being driven by the market and customer requirements.[427] However, Vodafone agreed with ComReg's proposal.[428]

A 8.84 Further clarification was required by some respondents:

- eircom stated that it is not clear whether ComReg was proposing to allow multiple frequency bands to count towards coverage and roll-out as two options are presented. eircom assumed however, that a minimum of 50% coverage would be required using the 800/900MHz bands, and that ComReg was proposing that multiple frequencies would count towards compliance with obligations. eircom stated its support for this approach, but welcomed further clarification from ComReg in this regard.[429]

[426] *"If conditions are to be applied to a licence in a particular band, then we believe that the coverage obligations should apply in that band. The measurement across multiple frequency bands might be more appropriate if the auction were to consist of blocks of spectrum several bands, and hence there could be a degree of substitution of blocks in different bands..in the circumstances, ComReg is offering licences for the 900 MHz band (only), and hence the licence conditions should apply for that band."* – BT's response to Question 22 of Consultation 09/99.

[427] "*eircom disagrees, however, with the requirement that a minimum of 50% population coverage target must be achieved with 800/900 MHz...Urban areas will predominantly use frequencies above 1 GHz for both capacity and coverage, with limited use of sub 1 GHz frequencies Sub 1 GHz spectrum use will be where it is most required, i.e. the less dense rural network...The requirement to reach a minimum of 35% demographic coverage will therefore result in much higher population coverage than 70%. For example, if an operator uses frequencies above 1 GHz to provide mobile broadband for towns with a population of 6000 and associated areas or above, there will be approximately 57% population coverage. If the coverage obligation requires at least 35% population coverage, this 35% will be in the hard to serve rural network and will require an overall coverage of 92% (57+35). 57% population coverage is equivalent to approximately 6% of land area. The next 35% of population coverage could be equal to the next 50% of land area (approx)...eircom recommended that the coverage target is maintained at 70%, but the choice of spectrum is driven by the market and customer requirements."* – Eircom's response to Question 15 of Consultation 10/71.

[428] *"Vodafone agrees with ComReg's proposals to set a symmetric population coverage obligation to all licences, to allow multiple frequencies bands to count towards the coverage obligations subject to a minimum 50% coverage obligation being met by the 800/900 MHz bands*" – Vodafone's response to Question 15 of Consultation 10/71.

[429] *"ComReg document 09/99 made an explicit proposal to allow multiple frequency bands to count towards 900MHz band coverage. In the current consultation ComReg states that its view is to:*

'allow coverage and roll-out obligation to be met using the 800/900MHz frequency band or the 800/900MHz frequency band in combination with the other frequency bands....'.

- O2 noted that the obligation applies to all sub-1GHz spectrum held by an individual licensee – so it is assumed that if a licensee holds 1 lot of spectrum in the 800MHz band and 1 lot of spectrum in the 900MHz band, the obligation will be no different than that which applies for an operator holding two lots in a single band.[430]

ComReg's position

A 8.85 ComReg takes note of the various responses, support for the proposals, requests for clarification and reports of its external consultants. Regarding the use of multiple frequency bands, other frequency bands (namely the 2100 MHz band) could count towards the 70% coverage obligation, provided that a minimum of half of the 70% coverage level (i.e. 35% population coverage) is provided via spectrum in the 800/900/1800 MHz spectrum bands.

A 8.86 The coverage obligation will apply per licence, and not per lot, and will include all spectrum holdings within that particular licence.

Should national roaming count towards coverage?

Summary of ComReg's proposals in previous Consultations

Consultation 09/99

A 8.87 ComReg, being aware that two of the existing GSM and 3G operators currently had a national roaming agreement with another operator, which facilitated these operators in providing nationwide coverage, also invited views on whether coverage via national roaming agreements should count towards the proposed coverage obligations.

Question 20 (Consultation 09/99) Do you believe that coverage via national roaming agreements should be allowed to count towards a 900 MHz coverage obligation and if so, to what extent?

A 8.88 Having taken into account views of respondents and the newly proposed coverage level in Consultation 10/71 ComReg set out its view that coverage via national

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It is not clear to eircom whether ComReg is proposing to allow multiple frequency bands to count towards coverage and roll-out as two options are presented. It is assumed, however, with the subsequent proposal, that a minimum of 50% coverage would be required using 800/900MHz bands, and that ComReg is proposing that multiple frequencies will count towards compliance with obligations. eircom supports this approach, but would welcome clarification of ComReg's intention in this regard.

eircom would welcome clarification as to what is meant by "a minimum of 50% coverage" to be provided using the 800/900MHz bands. Is ComReg proposing a minimum of 50% population coverage using the sub 1GHz bands or 50% of the 70% target (i.e. 35% population coverage)?" – Eircom's response to Question 15 of Consultation 10/71.

[430] O2's response to Question 15 of consultation 10/71.

roaming would not be permitted to count towards the coverage obligation. ComReg noted that the higher 90% geographic coverage, proposed in ComReg Document 09/99, had been proposed in light of allowing national roaming to count towards the coverage obligation. [431]

Summary of Respondents Views

Consultation 09/99

A 8.89 In Consultation 09/99, ComReg invited respondents' views on whether national roaming could be used to count towards a 900 MHz coverage obligation. Six respondents (BT, Digiweb, eircom, H3GI, O2 and Vodafone) provided views in response to Question 20 of Consultation 09/99.

A 8.90 Two respondents (Digiweb and BT) agreed for the following reasons:

- It could be applied in medium population areas where multiple operators currently offer services (Digiweb);
- for established operators national roaming agreements could be a valid means to enable customers to obtain service in those rural areas where they do not provide coverage. For new entrants, the availability of access to other networks would be even more important over a greater geographic extent (BT).

A 8.91 Four respondents (Eircom, H3GI, O2 and Vodafone) did not believe that national roaming should be allowed to count towards a 900 MHz coverage obligation and put forward the following arguments:

- this would not be efficient use of spectrum (H3GI[432]);
- coverage obligations should be met either primarily, or wholly, on the basis of each individual licensee's own frequency assignments and network infrastructure (Vodafone[433]);
- the point of specifying a roll-out requirement is to ensure that the licensed frequencies are actually used. Allowing that it can be met via

[431] Section 4.6.3 of Consultation 10/71

[432] "3 does not believe that coverage via national roaming agreements should be allowed to count towards a 900 MHz coverage obligation. Given the scarcity of liberalised 900 MHz spectrum, this would not be an efficient use of spectrum in accordance with ComReg's statutory objectives." – H3GI's response to Question 20 of Consultation 09/99.

[433] "Vodafone believes that coverage via national roaming agreements should not be allowed to count towards a 900 MHz coverage obligation, or at least should not do so to any significant extent. 900 MHz coverage obligations should be met either primarily, or wholly, on the basis of each individual licensee's own frequency assignments and network infrastructure." – Vodafone's response to Question 20 of Consultation 09/99.

national roaming would not require that the spectrum be used at all (O2[434]); and

- this proposal runs counter to ComReg's objective of promoting the use of spectrum. However operators should not be precluded from relying on some degree of national roaming coverage in areas where the economics of self provision are questionable (Meteor[435]).

Consultation 10/71

A 8.92 In Consultation 10/71, ComReg stated its intention not to allow national roaming to count toward coverage and roll-out obligations.

A 8.93 In its response to Question 15 of Consultation 10/71, Vodafone welcomed ComReg's proposal[436] as did eircom.[437] However, in its response Qualcomm noted how France had achieved very high mobile broadband coverage by allowing infrastructure sharing in underserved areas.[438] Imagine was of the view that national roaming should be allowed so as to enable a new entrant to achieve national coverage.[439]

[434] *"O2 does not agree with the proposal. The whole point of specifying a roll-out requirement is to ensure that the licensed frequencies are actually brought into use. There would be little point in including a roll-out condition, but then allowing that it can be met via national roaming – which would not require that the spectrum is used at all*"–. O2's response to Question 20 of Consultation 09/99.

[435] *"Meteor does not believe that coverage via national roaming should be allowed to count towards spectrum licence coverage obligations. If the intended aim of the regulator is to promote use of the spectrum then including coverage via national roaming runs contrary to that aim."* – Meteor's response to Question 20 of Consultation 09/99.

[436] *"Vodafone agrees with ComReg's proposals to set a symmetric population coverage obligation to all licences, to allow multiple frequencies bands to count towards the coverage obligations subject to a minimum 50% coverage obligation being met by the 800/900 MHz bands, and to not allow coverage via national roaming to count towards the coverage and roll-out obligations. These measures should provide the appropriate incentives for efficient and sustainable infrastructure based competition between licensees to the benefit of consumer welfare and the national economy."* – Vodafone's response to Question 15 of Consultation 10/71.

[437] *"eircom agrees with ComReg's view that coverage via national roaming should not count towards coverage and rollout obligations, consistent with our views expressed in response to ComReg 09/99."* – Page 26 of eircom's response to Consultation 10/71.

[438] *"Qualcomm notes that ComReg proposes not to allow coverage via national roaming to count towards the coverage and roll-out obligation. Qualcomm underlines that France, a sparsely populated country by European standards, will achieve near ubiquitous mobile broadband coverage (98 percent population by 2011 and 99.3 percent by the end of 2013) through, amongst other measures, allowing infrastructure sharing in underserved areas"*. Page 22 of Qualcomm's response to Consultation 10/71.

[439] *"National roaming should also be facilitated through the licensing regime to enable national coverage for any new entrant."* – Imagine's response to Question 15 of Consultation 10/71.

Consultation 10/105

A 8.94 In its response to Question 12 of Consultation 10/105, Vodafone stated that its views in respect of the coverage and roll-out obligations for the 1800 MHz band were consistent with its previously stated views on sub-1GHz spectrum. Vodafone also referred to H3GI's response to 10/71 where it indicated a requirement for early allocation of liberalised 900 MHz spectrum in order to eliminate dependence on national roaming. Vodafone argued that this showed national roaming to be an alternative to spectrum access as opposed to a complement and used this to support their view that national roaming should not be allowed to count toward coverage targets.[440]

ComReg's position

A 8.95 In light of the responses to the previous consultation documents and the reports of ComReg's consultants, ComReg maintains its proposal that coverage via national roaming will not be allowed to count towards the coverage and roll-out obligation.

Proposed Metrics for measuring coverage

ComReg's position in previous Consultations

Consultation 09/99

A 8.96 In Consultation 09/99 ComReg proposed to define a distinct minimum field strength level for each type of technology deployed in the liberalised 900 MHz band. An area would be considered to be covered by a technology if this field strength was exceeded throughout that area. . In setting the level of coverage that a licensee would be obliged to achieve, either in terms of population or geographic area, ComReg was cognisant of the importance of setting a level that would be clear, easily measured, and which can be verified.

A 8.97 Specifically, ComReg proposed to apply the field strength levels required in existing licences for GSM and 3G technologies to the new licences in the 900 MHz band,[441] and to add objectively justified and proportionate field strength

[440] *"In relation to the issue of National Roaming counting towards the coverage requirements we note Hutchison 3G Ireland's (H3GI) previous consultation response where it indicated that it required an early allocation of liberalised 900MHz spectrum in order to eliminate its dependence on National Roaming. In this context it would appear that national roaming is an alternative to spectrum access rather than a complement to it.* ***[Confidential Text Removed]*** *This supports Vodafone's view that it would not be appropriate to allow national roaming to count towards coverage targets."* – Vodafone's response to Question 12 of Consultation 10/105.

[441] In the 900 MHz GSM licences, the required field strength level has been set to 46 dBµV/200kHz, while in the 3G licences it has been set to 58 dBµV/m/5MHz. An area is considered to be covered when the requisite field strength level is present in over 95% of that area for 95% of the time.

conditions for additional types of technologies that can co-exist with GSM and UMTS if and when they are deployed in the future.[442]

> Question 13(Consultation 09/99) Do you agree with ComReg's proposal to define a distinct field strength level for each type of technology deployed in the liberalised 900 MHz band

Consultation 10/71

A 8.98 In Consultation 10/71 ComReg proposed to measure coverage as set out in Consultation 09/99 with the exception that ComReg is also considering the use of the Ec/Io[443] metric in respect of UMTS technology.

Consultation 10/105

A 8.99 In Annex 3 of Consultation 10/105 ComReg set out its proposed measurement metrics for coverage in the 1800 MHz, 900 MHz and 800 MHz frequency bands. These were based upon the measurement practices for technologies in the existing mobile licences, and the relevant standards for new technologies.

> Q. 12. Do you agree with ComReg's proposal regarding coverage and roll-out obligations? Please provide reasons for your view.

Views of respondents

Consultation 09/99

A 8.100 There were six responses (BT, Digiweb, eircom, H3GI, O2 and Vodafone) to Question 13 of 09/99, of which all but one respondent agreed with ComReg's proposals.

A 8.101 In disagreeing with ComReg's proposal eircom stated that coverage should be defined on the basis of the availability of services offered by an undertaking, provided that the minimum internationally recognised service quality measures apply. It believed that this would also simplify the assessment of coverage obligations while ensuring that targets remain customer-centric regardless of the service on offer or the underlying technology that is being used.

[442] In Section 15.5.4.1 of Consultation 09/99 ComReg proposed for other technologies: for measurement purposes – an average field strength of "X" measured outdoors at a height of 1.5m; for propagation prediction systems – a field strength of "X" over 95% of the area during 95 % of the time. The value of "X" would be set by ComReg at a level that is sufficient for the provision of services with this technology in a manner that is objectively justified, proportionate and non-discriminatory.

[443] Ec/Io is analogous to Carrier to interference (C/I) ratio in GSM, and for a useable service Ec/Io must be greater than or equal to -8dB.

Consultation 10/71 and 10/105

A 8.102 ComReg did not ask a specific question on the proposed metrics in ComReg 10/71 and 10/105. However eircom made a detailed submission in its response to both Consultations 10/71 and 10/105 on the proposed metrics, and its comments are summarised below:

- eircom was supportive of the proposed metrics in respect of GSM and UMTS.[444];
- the coverage metrics for UMTS are in line with existing licence conditions for UMTS at 2100MHz, but modified for the relevant frequency (i.e. 900 MHz and 1800 MHz). The measuring height has been changed from 1.7m to 1.5m, but overall eircom agreed with the proposed metrics for UMTS operation;
- when looking at the target electric field strengths for 3G, ComReg has simply proposed the electric field strength currently used for 3G at 2100 MHz. However, the relationship between power level and electric field strength is dependent on frequency and so different target values should be used at 800, 900 and 2100 MHz;
- with regard to LTE the figures proposed appear extremely high and we do not accept the figure proposed by ComReg.

A 8.103 In addition to clarification on issues raised in its response to Question 12 of Consultation 10/105, eircom sought clarification on the following matters:

- ComReg is also proposing to use Ec/Io for UMTS. eircom expressed concern that ComReg is introducing a technology-specific parameter to measure coverage that is not currently used in any existing ComReg licences, and asked for clarification on how this approach is used internationally within the industry for coverage measurement and how a technology neutral approach can be used on a harmonised basis;[445]
- how would Ec/Io be measured and under what conditions (e.g. under what load)?;[446]
- the coverage obligation referring to the percentage of the population should be defined by an outdoor signal level equivalent to what was required for the 3G licence at 2100MHz.[447]

[444] *"In terms of the proposed means to measure coverage we are generally supportive of this proposal in respect of GSM and UMTS...eircom Group agrees with the proposed metrics for GSM operation...overall we would agree with the proposed metrics for UMTS operation."* – Meteor's response to Question 12 of Consultation 10/105 in document 11/10.

[445] See page 22 of Meteor's response to Consultation 10/71- in document 10/103r.

[446] See page 22 of Meteor's response to Consultation 10/71 - in document 10/103r.

[447] See page 31 of O2's response to Consultation 10/71 - in document 10/103r.

A 8.104 In addition eircom sought further clarity on the relationship between the basic capabilities to be supported, such as GSM voice, and the related coverage metrics.[448]

ComReg's position

A 8.105 ComReg notes the broad support from respondents for the proposed metrics. In relation to the suggestion to measure coverage via the availability of a service, ComReg understands the principle and agrees that linking coverage to a consumer service is a good aim, particularly relevant when advertising a service to customers. However, there are some difficulties with this approach. For example, a recognised quality standard is needed for every service offered by a licensee, such as voice, broadband, etc., and it is not always clear what the internationally recognised quality standard is.

A 8.106 Even where such an internationally recognised quality standard exists, it is likely that this quality standard will actually be translated into a received signal level or some other technical parameter in order to measure it in the field, or when planning the network. Therefore, measuring via the availability of a service may not simplify how coverage is measured and ultimately it is likely to result in the setting of a technical measure such as field strength level, an Ec/Io ratio or similar as appropriate.

A 8.107 Overall, ComReg, while reserving its right to specify any appropriate standards that emerge in relation to particular technologies having consulted thereon, believes that the field strength approach for measuring coverage in the existing licences for the GSM and 3G technologies has worked well in the past and therefore can be applied in the future.

A 8.108 ComReg believes that it is also appropriate to take the Ec/Io metric into account as this is a common metric used to assess coverage for UMTS (3G) networks. 3G services can normally be accessed once an Ec/Io ratio of -8dB is exceeded[449]. Therefore, an Ec/Io ratio of -8dB should count towards coverage even if the received signal strength level is below that specified for coverage.

A 8.109 ComReg notes that eircom considers the proposed approach as too specific, i.e. not technologically neutral, and furthermore notes that eircom has failed to

[448] *"eircom Group requests ComReg to clarify:*

- The basic capability to be supported by the coverage metric used and the link between this basic capability and the coverage metric to be used. For example, in ECC Report 118, the basic capability for GSM is voice, the coverage metric is RxLev ≥ - 92 dBm, which is equivalent to an electric field strength of 44.7 or 50.5 dBµV/m for 900 or 1800 MHz respectively.

- The international technical standards or reports from bodies such as the ECC or CEPT that have been used for determining the appropriate Electric field strength as a coverage metric?

- What is meant by an LTE pilot signal?" – eircom's response to Question 12 of Consultation 10/105

[449] This figure is based upon ComReg's own field measurements and ETSI TS 125 101 "UMTS; User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101 version 5.9.0 release 5) which discusses the minimum RF characteristics of the FDD mode of UMTS.

comment on the generic case, as presented, which details the generally well accepted principles involved. ComReg reiterates that its objective in setting coverage metrics is to set technology specific metrics, for each technology deployed, that provide a good proxy for the availability of services to users while allowing relatively simple objective measurement. Such metrics must, of their nature be technology specific.

A 8.110 In all cases ComReg is proposing a mixed approach, which balances the benefits of both Carrier to Noise ratio (CNR) i.e. interference/noise limited coverage, as well as the more traditional field strength (dBµV/m))[450] measurement methodology. ComReg believes that the combined approach defines coverage more flexibly and less prescriptively than measuring the field strength alone. ComReg notes that requiring operators to achieve administratively set signal levels, which may not be required to deliver services, would appear to be disproportionate.

A 8.111 This proposal is based on ComReg's 5½ years of field measurement experience on UMTS technology and takes into account comments received in this regard from the MNOs, including eircom, some of whom have previously pointed out that a good service may be obtained by a user at a field strength of 10dB below those specified for coverage in the licence.

A 8.112 ComReg is cognisant that in the particular case of UMTS, Ec/Io is well defined in European Harmonised standards, particularly with respect to network planning[451] and is widely used during comparative drive testing by Irish MNOs to assess how well their network performs. The required target value in Ec/Io[452] varies between that required to set up a channel (-10dB) and that required to give a reasonable standard of coverage. A typical loading factor for voice simulation would be that 95% of users achieve a value of within -0.5dB of the target value specified as recommended in the standard simulation guidelines.

A 8.113 As there is no practicable way in which indoor coverage can be verified on a large scale, all coverage obligations should be taken as the percentage of population coverage achieved with the target field strength level measured outdoors. ComReg notes that MNOs typically have coverage maps on their web sites showing both indoor and outdoor coverage. ComReg believes that these maps are of limited value, particularly with products such as Mobile Broadband (HSDPA) and would be best replaced by similar colour coded maps where signal differences are noted by six dB drops (i.e. with maybe four to six different intensities of colour, representing a 24 to 30dB range in signal) and text explaining the relationship between the colour intensities and the service expected.

[450] Currently defined in the 3G licences as an outdoor field strength of 58dBµV/m measured at a height of 1.7m, over 95% of the area for 95% of the time.

[451] 3GPP TR 25.942, 25.101 and associated specifications.

[452] Measured on the Common Pilot Channel, CPICH.

Distinct Field Strength for 900 MHz band

A 8.114 The proposed UMTS 900MHz field strength value was obtained by applying a frequency dependent correction factor[453] to the standard 2100MHz parameters contained in the current 3G licences. Furthermore, as stated previously the incorporation of Ec/Io into the definition of coverage leads to a more realistic interpretation of whether there is actual working coverage or not.

Field strengths and carrier-to-noise ratio for LTE

A 8.115 In general terms, ComReg has tried to adopt a standards led approach where possible. In response to comments that ComReg should use CEPT and ECC reports, these tend to focus more on compatibility studies between different technologies in different bands and, other than for co-ordination or protection of other services, these reports are not strictly of relevance in this context.

A 8.116 To ensure consistency between measurements across different technologies and, as outlined previously, ComReg has adopted a combined approach in the method used to define coverage. In the case of LTE at 1800MHz the figure was calculated from a 700MHz band full bandwidth reference signal of median quality in a coverage simulation. That value has been corrected for both frequency and bandwidth (1MHz), to enable extrapolations to be easily performed. Therefore, the 62dbµV/m/MHz figure, while it looks high, actually corresponds to a figure of approximately 48dbµV/m for a 5MHz bandwidth[454] at this frequency which is as expected due to OFDM coding and as such is lower than that used for UMTS 1800.

A 8.117 In general terms, the aim of the carrier-to-noise ratio (CNR) target is to ensure a 10^{-2} Block Error Rate (BLER) at the User Equipment (UE) on the Physical Downlink Control Channel (PDCCH)[455]. This should offer a reasonable quality channel for both data and voice. ComReg notes that while a CNR is not currently defined in the ETSI standards *per se*, it would be necessary to define it for each modulation scheme. So, although CNR is easier to measure directly than BLER, the BLER metric may be more useful in the interim period. As such, the application of Ec/Io in this case is inappropriate for LTE but the overall principle remains the same. As LTE is still an evolving technology ComReg will review these figures on an evidential basis as required.

A 8.118 On the observation made by eircom that the measuring heights for UMTS have changed from 1.7 metres to 1.5 metres ComReg notes out that this is now the standard antenna height used for mobile user equipment in ECC reports[456].

[453] 20log(900/2100), i.e. 20log(fNew/fRef).

[454] It should be noted that for equipment emitting a constant power when the bandwidth increases, for example from 5MHz to 20MHz, the field strength will decrease proportionately.

[455] This was incorrectly referred to as the pilot channel.

[456] See, amongst others, ECC Reports 45, 82 and 96.

Therefore 1.5 metres has been adopted by ComReg as the appropriate height for UMTS coverage measurements.

A 8.119 On the basis of all of the above ComReg is proposing to proceed with the metrics for coverage as set out in Consultations 09/99, 10/71 and 10/105 and detailed in Annex 8 of this document.

Performance Guarantees on coverage and roll-out obligations

ComReg's position in previous Consultations

Consultation 09/99

A 8.120 In Consultation 09/99 ComReg put forward its proposals for penalties and performance guarantees in respect of coverage and roll-out obligations. ComReg was of the view that for any new spectrum licences where conditions are imposed, it would be necessary to have a range of appropriate sanctions in the event of non-compliance with those conditions. Given the importance of coverage and roll-out conditions in the provision of services to consumers, ComReg proposed to include a performance guarantee of €2 million against the coverage and roll-out obligations and sought the views of respondents on the matter.

Question 21 (Consultation 09/99) Do you agree with ComReg's proposal to include a €2 million performance guarantee against the coverage and roll-out obligations in any new 900 MHz licence issued?

Views of respondents

Consultation 09/99

A 8.121 ComReg received five responses (Digiweb, eircom, H3GI, O2 and Vodafone) to Question 21 of Consultation 09/99).

A 8.122 Three Respondents (Digiweb[457] , O2[458] and Vodafone[459] agreed with ComReg's performance bond proposal. Two respondents (eircom, H3GI) did not agree with a performance bond, stating:

[457] "*Digiweb agree with the need for a performance guarantee"* – Digiweb's response to Question 21 of Consultation 09/99 in document 10/21r.

. However, **[Confidential Text Removed].**

[458] *"If ComReg can find an appropriate coverage obligation for inclusion in the licence, then it should be supported by a performance guarantee. €2m would seem to be the minimum that could have any effect."* – O2's response to Question 21 of Consultation 09/99 in document 10/21r.

[459] *"Yes"* – Vodafone's response to Question 21 of Consultation 09/99 in document 10/21r.

- a €2 million performance guarantee is unnecessary to ensure compliance with ComReg's proposed coverage and roll-out obligations (H3GI[460]); and
- such a requirement would create an unnecessary overhead for the licensees. Instead the threat of a fine coupled with the ultimate threat of licence withdrawal would be equally effective while carrying a far lower overhead cost of regulation than that which would result from guarantees (Meteor[461]).

ComReg's position

A 8.123 In the case of coverage and roll-out obligations a non-compliance event is one where the licensee fails to comply with the specific coverage obligation in the timeframe specified in the schedule to its licence.

A 8.124 In order to enforce a licence condition it is appropriate to have a range of credible and enforceable penalties which are appropriate in light of the non-compliance. Regulations 16 and 17 of the Authorisation Regulations 2011 (SI 335 of 2011) set out provisions relating to enforcement of licence conditions, including the suspension or revocation of licences. In addition, future licences for liberalised 800 MHz, 900 MHz and 1800 MHz spectrum will be granted under regulations made by ComReg pursuant to section 6 of the Act of 1926, and those regulations will include enforcement provisions related to non-compliance with licence conditions.

A 8.125 DotEcon, in Section 15.5 of its report 09/99c, put forward the view that operators should face appropriate consequences if they fail to meet a licence condition and proposes that a performance bond guarantee of around €2 - 3 million may be appropriate for minor licence compliance breaches, which result in the loss of some or all of the bond.

A 8.126 ComReg concurs with DotEcon's view and considers that for any new spectrum licences where conditions are imposed it is necessary to have a range of appropriate sanctions available in the event of non-compliance with those conditions.

A 8.127 The advantages of performance guarantees include that they:

[460] *"3 does not agree with ComReg's proposal to include a €2 million performance guarantee against the coverage and roll-out obligation in the new 900 MHz licence issued. 3 does not believe that a €2 million performance guarantee is necessary to ensure compliance with ComReg's proposed coverage and roll-out obligations in new 900MHz licences issued."* – H3GI's response to Question 21 of Consultation 09/99 in document 10/21r.

[461] "Such a requirement would merely create un-necessary overhead for the Licensees and indeed ComReg in maintaining and ultimately releasing these guarantees. In Meteor's view the threat of a fine coupled with the ultimate threat of licence withdrawal would be equally effective while carrying a far lower overhead cost of regulation than that which would result from guarantees." – Meteor's response to Question 21 of Consultation 09/99 in document 10/21r..

- provide a more moderate compliance action than a licence curtailment/withdrawal action;
- can also be a first stage in a compliance action, and would be used before the licence curtailment/withdrawal stage; and
- provide the correct incentives to the licensee to reach the licence obligation targets.

A 8.128 ComReg is of the view that performance guarantees are an appropriate sanction in the event of non-compliance with licence conditions. As part of the 3G licence competition applicants provided voluntary performance guarantees well in excess of what is proposed in this consultation process. ComReg has not had to exercise these performance guarantees to date. ComReg is of the view that performance guarantees incentivise compliance with licence conditions and given the relative value of the performance guarantees contemplated and the spectrum rights of use being acquired, ComReg believes that the proposed level of performance guarantees would constitute a proportionate measure.

A 8.129 Therefore, given the importance of coverage and roll-out conditions for the provision of services to consumers, ComReg proposes to include a performance guarantee of €2 million against the coverage and roll-out obligations.

Summary of ComReg's Position

A 8.130 ComReg is proposing to proceed with the following coverage and roll-out obligations:

- a 70% population coverage obligation to be met within 3 years for an existing operator and within 7 years for a new market entrant without an existing network; and,
- other frequency bands (namely the 2100 MHz band) could count towards the 70% coverage obligation, provided that a minimum of half of the 70% coverage level (i.e. 35% population coverage) was provided via spectrum in the 800/900/1800 MHz spectrum bands;
- the coverage obligation will apply per licence, and not per lot, and will include all spectrum holdings within that particular licence;
- coverage via national roaming will not be allowed to count towards the coverage; and roll-out obligation;
- the 70% population coverage obligation is service neutral, i.e., the licensee can provide any service they wish such as voice, broadband etc, in order to meet this obligation; and
- licences will be technology and service neutral and as such no technology specific obligations will apply other than what may be required to meet coverage and roll-out obligations.

8.2 Draft Coverage RIA

Introduction

A 8.131 This section sets out ComReg's draft 'Coverage' RIA which assesses the appropriate minimum level of coverage that should be set as part of a coverage licence condition for new liberalised licences in the 800, 900 and 1800 MHz spectrum bands.

Structure of the Draft RIA

A 8.132 As set out in ComReg's RIA Guidelines, there are five steps to a RIA. These are:

- Step 1: Identify the policy issue and identify the objectives;
- Step 2: Identify and describe the regulatory options;
- Step 3: Determine the impacts on stakeholders;
- Step 4: Determine the impacts on competition; and
- Step 5: Assess the impacts and choose the best option.

A 8.133 Each of these steps is considered in turn below.

Policy issues to be addressed and relevant objectives (Step 1)

Objectives

A 8.134 As noted in Chapter 3, a RIA is an appropriate tool for assessing and ensuring compliance with many of ComReg's core objectives in relation to the management of Ireland's radio frequency spectrum.

A 8.135 The focus of this draft 'Coverage' RIA is to assess the impact of the proposed minimum coverage level on stakeholders, and on competition. In that way it will allow ComReg to identify and impose the most appropriate and least burdensome level, which still allows ComReg to achieve its objectives.

A 8.136 ComReg's objectives in relation to this spectrum release process are set out in Chapter 3.

Policy Issues

A 8.137 Before setting out the policy issues in relation to coverage it is first worth differentiating between:

- the level of coverage specified as a licence condition imposed on an individual operator;

- the actual level of coverage provided by each individual operator via its own network;
- the level of coverage perceived by a customer of an individual operator, which may include coverage obtained as a result of national roaming agreements; and
- the actual level of coverage provided by the market as a whole when the coverage area of all of the operators network is combined.

A 8.138 To date, in Ireland, coverage obligations have been applied in a particular manner. At the individual operator level, a coverage obligation attached as a licence condition sets a minimum level of coverage that an operator must provide over its own network either on a population/geographic basis (an operator is not permitted to rely on higher levels of coverage obtained as a result of a roaming agreement with another network operator to fullfil this obligation). This minimum level does not specify a particular 'network map'. Operators are free to choose the geographic area covered by their network, provided the minimum level of coverage is met. Operators are then free to choose to offer higher levels of coverage via their own network or choose to negotiate a roaming agreement on other networks to provide a higher level of coverage than is required using their own network rollout.

A 8.139 Coverage obligations imposed as a licence condition will not necessarily reflect the actual coverage levels provided by the market as a whole and in fact are highly unlikely to do so for a number of reasons including:

- each individual operator can choose its own network, hence the areas covered by each network may not all overlap; and
- there are incentives for operators to offer greater levels of coverage than those specified by their licence conditions as a means of differentiating themselves, and providing a potential additional revenue stream in the form of wholesale roaming charges to other operators.

A 8.140 From the consumer's perspective, the actual level of coverage available to the consumer as a customer of a network operator (including coverage available to the consumer as a result of national roaming agreements) is what is important, not the minimum coverage level set by way of a licence condition.

History of coverage obligations in Ireland

A 8.141 Maximising the benefit for users in terms of price, choice and quality, is a core ComReg objective. ComReg is of the view that generally consumers of mobile services value the ability to use their mobile devices whenever they want and wherever they are, so long as these services are available at a reasonable price. In other words, consumers value high levels of coverage across the length and breadth of the country.

A 8.142 However, mobile operators may not provide coverage to the level desired by consumers and past experience has shown that regulatory intervention may be

required to achieve this/address these market failures. There are a number of ways in which coverage levels can be adjusted by means of regulatory intervention, e.g. licence condition attached to spectrum licence as described above, or direct subsidies to provide coverage in certain designated 'not-spot' areas, as discussed below. Both of these have been used in the past in Ireland.

A 8.143 When the GSM spectrum bands were awarded regulatory commitments were provided by the licensees as part of the beauty contests used to award the spectrum. This was at the very early stages of the development of the mobile market in Ireland. At that time there was a clear risk of market failure, hence high coverage obligations were very important in terms of ensuring that widespread coverage was provided by the market. Without these obligations there would likely have been little incentive for operators to roll-out extensive networks. In addition, coverage licence conditions may also have been used as a means to ensure that spectrum was put to use, and not hoarded for strategic reasons. As a result of the licence conditions, GSM coverage is almost ubiquitous with the market providing over 99% population coverage.

A 8.144 In relation to 3G coverage, even though relatively high coverage obligations (between 83% population and 90.2% population) were put in place across the 4 MNOs to which 3G licences were granted between 2002 and 2007, there was evidence of market failure. Consumers in certain areas were unable to obtain a mobile broadband service as no operator provided coverage in these areas. As a result the Government intervened with the establishment of the NBS[462] and later the RBS[463].

Present Market

A 8.145 The market situation now is very different to when the GSM licences, and the 3G licences were awarded:

- there is now a relatively mature mobile market, with four MNOs with extensive network infrastructure in place, rather than an industry in its early stages.
- ComReg intends to use a fully market based mechanism to award spectrum usage rights in this case, and not an administrative process (as used for GSM and 3G) ; and
- in awarding these spectrum bands, ComReg is of the view that it is not necessary to use a coverage licence condition as a means to ensure the efficient use of spectrum or to avoid the potential for hoarding as other measures that are key features of the award process e.g. minimum price,

[462] The National Broadband Scheme (NBS) is a scheme that obliges the NBS service provider to roll-out its network to cover the 10% of the population who did not have access to broadband services and obliges it to allow reasonable requests for wholesale access to this network. The total value of the investment required to implement the NBS is estimated at circa €223m, of which the Government is contributing €79.8m.

[463] The DCENR recently announced the Rural Broadband Scheme (RBS), which is a scheme that aims to ensure that universal broadband access is provided in Ireland by the end of 2012.

spectrum cap, are effective measures to ensure that the spectrum is efficiently used.

A 8.146 Nevertheless, ComReg has a number of concerns relating to coverage, albeit different concerns than those that may have existed previously.

A 8.147 First, one of ComReg's statutory objectives is to promote competition. The award of the three spectrum bands creates a unique opportunity for new entry into the Irish mobile market. In setting a minimum coverage level it is important to realise that a high coverage level could act as a barrier to entry and thereby damage competition. The higher the minimum coverage level the higher the associated network rollout costs for an operator. The four incumbent MNOs have a natural advantage in this regard as they each already have existing infrastructure in place to meet high coverage levels. However for a new entrant, each additional % of population required to be met by a coverage licence condition, adds to the network roll-out costs. This is a particular issue given the population distribution in Ireland, with one-third of the Irish population living in very rural areas – in very small towns and one-off houses.[464] Therefore high minimum coverage levels, whilst at face value may be seen as a pro-consumer tool to ensure ubiquity of cover could result in a reduction in competition.

A 8.148 A related point regarding high coverage levels is that this could result in inefficient network investment in areas of low population density. It could raise the costs across the industry without any obvious benefit for consumers. Enabling greater flexibility for legitimate operator co-operation (such as network sharing) which would appear to be a more efficient means for operators to serve sparsely populated areas compared to a requirement for multiple network roll outs.

A 8.149 Both of these factors would suggest that high coverage levels, imposed as symmetric licence conditions across all new licensees, may not be in the best interests of industry stakeholders, competition or consumers.

A 8.150 On the other hand, in awarding new liberalised licences, ComReg is concerned about not eliminating the type of urban/rural cross-subsidisation which currently exists in the mobile market. The current MNOs use a system of cross subsidisation whereby they can use the excess profits earned from their urban infrastructure to cover the costs of rural infrastructure. As each of the current MNOs is required as a result of their licence conditions to meet a minimum level of coverage, this cross-subsidisation issue occurs. Setting coverage levels which are very low, or non-existent, could reduce or eliminate this practice amongst operators and thereby negatively impact on competition and consumers.

A 8.151 It is worth exploring how this could occur. An operator(s) who obtained liberalised spectrum, with low/no coverage obligation attached, could choose to only roll out a network in what could be described as 'urban areas, for instance, the 5 large cities (which cover 34% of the population) and their hinterlands, and

[464] See CSO 2006 Census data available at www.cso.ie/census/documents/census2006_Table_7and_12.pdf page 123, 'Remainder of country' figure taken as a percentage of 'State'.

perhaps a number of large towns nearby by building a 'hub-and-spoke' type network. With a very small geographic footprint, and hence very low roll-out costs, this could enable such an operator(s) to offer a high-speed, low-cost mobile broadband service, using a negotiated roaming agreement to provide coverage in other areas.

A 8.152 On face value, this may be seen as a pro-competitive/pro-consumer development. However if this operator(s) was very successful and ultimately attracted a large tranche of consumers away from the existing operators, this could destabilize their existing business models which rely on cross-subsidization of rural infrastructure with revenues from services provided in urban areas. With less revenues generated in urban areas, and in the face of potentially intense competition for 'urban-based consumers, this could force operators to roll back on their existing rural infrastructure which they would not otherwise do if this type of operator was not permitted to exist (assuming that these operators were no longer subject to any coverage requirements associated with their 3G licences, which could also potentially be unattractive for operators, and returned to ComReg). This would reduce the geographic area covered by these operator(s) network(s). If one operator started to scale back the footprint of its network, this could lead other operators to do the same. The end result could be that the overall level of coverage provided by the market could be much reduced from current levels. This would potentially be very damaging for consumers who would no longer have the ubiquity of mobile coverage in rural areas that they are accustomed to. To protect consumers against such potential developments, this would require coverage levels to be set for each new licensee at a level which prevented an operator(s) from eliminating the cross-subsidisation business practices currently employed.

A 8.153 Therefore, taking these two policy issues together it is clear that there are factors which would push up the ideal minimum coverage level set as a licence condition, and factors which would push it down, in the best interest of stakeholders, competition and consumers. Ultimately ComReg is of the view that each licence awarded should have with it a requirement for a minimum level of coverage that would:

- not discourage entry by new players (including from other Member States) and/or entry into the mobile market by existing operators in the Irish market; and/or
- not result in inefficient infrastructure investment from spectrum rights holders

A 8.154 Whilst, at the same time, ensuring that users can access services in a substantial part of the State.

A 8.155 The purpose of this draft RIA therefore is to consider a range of options in order to determine the level of coverage licence condition that is optimal in light of these conflicting policy issues.

Regulatory Options (Step 2)

A 8.156 In this draft RIA, ComReg considers the following options:

Option 1— Impose no obligation on coverage.

A 8.157 This would mean that each new licensee would have full flexibility to choose how extensive their network coverage would be regardless of what mix of spectrum they won across the three bands. An operator could choose only to provide services in high density areas or choose to differentiate itself as a provider with an extensive network footprint.

A 8.158 This option was considered (and discounted) in the draft RIA provided in Consultation 09/99, but is reconsidered again here in the interest of completeness.

Option 2 — Impose a coverage obligation which would require all new licensees to provide a minimum level of area coverage sufficient to serve less than or equal to 50% of the population.

A 8.159 Whilst not having the same degree of flexibility as Option 1, Option 2 would still afford new licensees a high degree of flexibility in choosing their network coverage. Option 2 would involve setting a coverage obligation to provide a level of area coverage sufficient to serve < or equal to 50% of the population. Under this option an operator would be free to choose how it intended to meet the coverage obligation. A 'network map' would not be specified.

A 8.160 The upper end of this range (50%) equates to the population of the 5 main cities (Dublin, Cork, Galway, Limerick and Waterford) plus the 40 largest towns in Ireland (each of which have a population of over 9000 or more), based on CSO census data. Approximately half of these large towns lie within the hinterlands of the 5 main cities. Thus a minimum coverage level of 50% population would enable an operator to deploy a ‘hub-and-spoke’ type network, as described above.

Option 3 — Impose a coverage obligation which would require all new licensees to provide a minimum level of area coverage sufficient to serve 50%-70% of the population.

A 8.161 This range was proposed by Dotecon as a suitable range for a coverage obligation in Document 09/99c.[465]

A 8.162 This option would afford less flexibility to licensees than Option 2.

A 8.163 The lower end of this range (50%) is as described above. Setting a coverage obligation at this level would mean a new licensee could deploy a hub-and-spoke type network.

[465] See Section 15.1.9 of Dotecon Report (Document 09/99c).

A 8.164 Looking now at the mid-point of this range (60%). Based on CSO census data, there are 165 towns with a population of more than 1,500 people, and together with the 5 big cities, this equates to 60.7% of the total population. Setting a coverage obligation at this level would mean that a new licensee would not be able to adopt a purely hub-and-spoke type network and would instead have to cover a much wider geographic area. This would more than likely remove the risk of destabilising the existing urban/rural cross-subsidisation model.

A 8.165 Looking now at the top end of the range (70%). An extra 10% of population equates to approximately 400,000 people. Based on CSO census data, of this 400,000, approximately 120,000 live in towns with between 500 — 999 people, and a further 100,000 people live in towns under 500 people but with at least 50 (inhabited) houses. This leaves a further 180,000 people who live in very small towns/villages/single housing in Ireland that would be included to bring up the total to 70% population. Setting a coverage obligation at this level would mean that each licensee would have to extend their network significantly beyond a hub-and-spoke type network. This would completely remove any risk of destabalising the current equilibrium.

Option 4— Impose a coverage obligation which would require all new licensees to provide a minimum level of area coverage sufficient to serve 71%-90% of the population.

A 8.166 The upper bound of the range proposed for Option 4 is 90%. The NBS provides a broadband network to 10% of the population which did not previously have access to broadband services (1028 out of 3440 electoral divisions) and there is a wholesale access obligation on the NBS provider. The 'last' 10% of the population is therefore considered/recognised to be commercially unviable in terms of the provision of 3G coverage.

Factors common to Option 1, 2, 3 and 4

A 8.167 There are a number of associated issues with Options 1, 2, 3, and 4 in terms of the implementation of the symmetric minimum coverage level:

1. Should a symmetric roll-out period for all licensees be imposed or should there be an asymmetric roll-out period for existing MNOs and new entrants?
2. Should licensees be permitted to meet the coverage obligation on new licenses using any spectrum band suitable for mobile services (e.g. 800/900/1800, 2.1) in the interests of spectrum efficiency?
3. Should there be a minimum deployment level set for individual bands to prevent spectrum hoarding/ in the interests of spectrum efficiency?
4. Should licensees be permitted to use national roaming on another operator's network to count towards the coverage level or must it be met using a licensee's own network build out?

A 8.168 For the purpose of the draft RIA these issues are not of direct relevance in terms of choosing the appropriate level, and are considered elsewhere in this Annex.

Option 5 —Auction high coverage and low coverage blocks.

A 8.169 ComReg does not propose considering any option involving a symmetric coverage obligation above 90% within the draft RIA as it would undoubtedly result in inefficient duplication of infrastructure investment. It would be unnecessary and disproportionate to require multiple networks to cover areas with extremely low population density. In addition, it would have a very strong probability of deterring entry. For these main reasons, this would not meet ComReg's statutory obligations.

A 8.170 Were a coverage obligation beyond 90% to be considered ComReg is of the view that this could only reasonably be applied/implemented if different coverage conditions were attached to different blocks, i.e. high coverage blocks and low coverage blocks, such that blocks of spectrum within a particular band were heterogenous, as opposed to homogenous as per Options 1, 2, 3 and 4 above.

A 8.171 This would require consideration of a number of issues:

- How much spectrum should be awarded with a 'high coverage' obligation?
- Would a different minimum price be set for the 'high coverage' spectrum compared to other spectrum? It would seem likely that the minimum price for the higher coverage spectrum would have to be lowered from that proposed in Annex 9. Given that the NBS involved a subsidy of €223 million in order to provide broadband coverage for the 10% of the population that did not have access to broadband services, awarding spectrum with a 'high coverage' obligation could in fact require the minimum price to be dropped altogether.
- Would the winner(s) of the 'high coverage' spectrum be required to accept a roaming obligation so as to allow other providers to serve areas where it may be uneconomic for more than one operator to deploy base stations and other network equipment. Given the legal framework for setting licence conditions, as set out in Annex xx, it may not be legally possible to impose any such obligation.
- What coverage level would be set for the 'high coverage' blocks (e.g. close to 100%) and what level would be set for the 'lower coverage' blocks (e.g. in line with that proposed under Option 1,2,3, 4)?

Impact on Stakeholders and Competition (Steps 3 and 4)

A 8.172 The focus of this section of the draft 'Coverage' RIA is to assess the impact of the various regulatory options available to ComReg on:

- industry stakeholders (being existing operators and potential new entrants),
- competition, and
- consumers.

Impact on industry stakeholders

A 8.173 Existing operators and new entrants are clearly in very different circumstances when it comes to meeting a coverage obligation. There is a clear advantage for existing operators with existing networks in place. Therefore the impact of a coverage obligation on new entrants is particularly important in the impact analysis that follows.

A 8.174 First the case of existing operators is considered. Whilst existing operators may value the flexibility afforded by a very low coverage obligation, meeting a moderate-to-high coverage level is unlikely to have a significant impact on such operators, given that they each have existing networks in place. The value that existing operators would place on flexibility would only kick-in at a much higher level of coverage than for a new entrant. This would suggest that existing operators are likely to be indifferent as to coverage levels that are set at a low-medium level.

A 8.175 However, the higher the coverage level, the greater the chance that this would act as a barrier to entry for a new entrant. This would suggest that existing operators may have a preference for a high minimum coverage level, as a means of limiting competition. Accordingly, existing operators are likely to prefer a minimum coverage level be set towards the upper end of Option 3 range or the lower levels of the Option 4 range. This would enable existing operators to easily meet the obligation using their existing network and would provide such operators with a generous level of flexibility to use operator cooperation/network sharing to provide coverage in very low-density areas while acting as a deterrent to new entry.

A 8.176 ComReg is of the view that a minimum coverage level above 71% is very likely to impact on the entry decision for potential entrants. A small increase in required population coverage at these levels would have a large impact on network rollout costs, given the low population density. The higher the coverage level for individual network build, the more likely this would negatively impact on the willingness of potential new entrants to participate in the auction.

A 8.177 However this preference for a high coverage obligation as an entry deterrent would be balanced against existing operators desire to have as much flexibility as possible in providing coverage to very rural areas via network sharing etc. In terms of Option 4, moving upwards along the range (71-90%) would result in an existing operator being forced to rollout /maintain very extensive networks when it could be more efficient to enable legitimate co-operation between operators and network sharing rather than multiple network roll-outs to areas with very low population density and very low demand. For this reason, existing operators would be unlikely to favour a minimum coverage level at the higher end of Option 4 as it could result in inefficient duplicative infrastructure build and investment by each of the existing operators.

A 8.178 Any minimum coverage requirement will have an impact on new entrants as it will dictate the minimum cost of their network roll-out. Therefore, new entrants are likely to prefer an option with as low a coverage requirement as possible (i.e.

Option 1 would be the best option, followed by Option 2, then Option 3, with Option 4 being the worst of the four). With a very low minimum coverage level, a new entrant could choose to roll out their new networks so as to provide coverage in densely populated areas only thus minimising network rollout costs by limiting their network to as small a geographic area as possible (and rely instead on roaming agreements). Under Option 1, for example, if a potential entrant wanted to enter the Irish market and only provide services in the 5 main cities (which covers approximately 34% of the population) and the surrounding areas, they would not be prevented from doing so.

A 8.179 Option 2 would afford a high level of flexibility to new entrants, but not to the same extent as Option 1. In ComReg's view, a new entrant may well deem 50% to be a minimum level at which its network would need to cover in order to be an effective competitor, which is in line with a hub-and spoke, city-based type network. As such, the business plans and investment decisions of a new entrant(s) are likely to account for a coverage level of at least 50% population. If this is the case, a coverage obligation of up to 50% would be unlikely to have any significant impact on a new entrant, as it would not alter the approach that such an entrant would have taken in the absence of this requirement, and accordingly, should not affect the entry decision.

A 8.180 The likelihood of whether Option 3, with a 50%-70% range, would affect the decision of a potential entrant to enter or not would depend on the type of business strategy the new entrant intended to adopt. The lower end of this range, close to 50%, is unlikely to affect the entry decision. Extending coverage along this range of 50-70% may lead to a point which goes beyond what a new entrant would independently choose to provide. For example, a potential new entrant with a hub-and-spoke, city-based type network in mind would be precluded from doing so if a minimum coverage level was set much above 50%. Even though it could potentially be more cost effective for such an operator to provide coverage in low population density areas via a roaming agreement, this would not be permitted to count towards achieving the minimum coverage obligation.

A 8.181 The upper end of this range, 70%, would require a licensee to provide coverage in all the towns in Ireland with at least 50 (inhabited) houses, plus an additional 180,000 people. The business plans and investment decisions of a new entrant(s) may account for a coverage level at this level, but there is no guarantee. For instance UPC expressed the view that a 70% population coverage level would be suitable for a new entrant. In Dotecon's view, the network roll-out costs associated with the 50-70% range would not act as an entry deterrent for new entrants. However, Imagine expressed a different view and said that the minimum coverage level should be set no higher than 50% so as not to deter entry. This indicates that there is at least some uncertainty regarding whether or not the mid-to-upper end of this range could affect new entry. Therefore in ComReg's view, with Option 3 there is a risk that this could deter certain types of entry/business models.

A 8.182 Option 4 would impact negatively on and therefore not be favoured by new entrants as the network roll-out costs could be considerable compared to the use of a roaming agreement.

Option 5 would create the potential for winners and losers.

A 8.183 If Option 5 was pursued it would be reasonable to assume that it is far more likely that the winner of the high coverage blocks would be an existing operator rather than a new entrant given that the existing operators have networks in place and so the costs for an existing operator to meet the obligation would be much lower than for a new entrant (particularly if, as part of the 'high coverage' obligation, this required the minimum level to be met within a very short period of time, which would make it extremely difficult for a new entrant to achieve).

A 8.184 The existing operators may all be keen to be the winner of the high coverage spectrum as it could bring a number of advantages to the operator(s) who won these block(s). The winner could potentially win sub 1 GHz spectrum licences at a lower price than through a full CCA, and meeting the very high coverage obligation may be relatively easily due to their existing, extensive networks. The winner could potentially be the sole provider in certain areas and may be able to recoup some of the additional investment costs by setting a "rental" price for other operators to roam on its network.

A 8.185 From the perspective of new entrants, Option 5 may not be deemed attractive. Given their obvious disadvantage in terms of winning the high coverage blocks, this would mean that there would be a reduced amount of spectrum effectively available in the award for new entrants thus making entry harder than would otherwise be the case.

A 8.186 Another relevant factor when considering the impact of Option 5 on industry stakeholders is that under Option 5 all blocks within a band would no longer be homogenous. This may result in increased complexity for bidders in the proposed auction with regard to their bidding strategy. All operators may have a preference for the other options in which the auction process is less complex.

Impact on Competition

A 8.187 The level of competition in the downstream retail market is an important factor in terms of determining how extensive the level of coverage provided by the market, beyond the minimum level set as a licence condition. Evidence from the mobile market to date has shown that operators have consistently exceeded the coverage obligations imposed on them in their respective licences. This illustrates how important coverage is as a competitive tool.

A 8.188 All of the options considered in this draft RIA are likely to impact on competition in different ways as explained below.

A 8.189 As noted above, Option 1 and 2 are not likely to deter a new entrant from entering the market, all other things being equal. Under Option 1 a new entrant could

choose its own coverage level and consumers would then make choice of supplier based on information from the operators. In a similar manner, Option 2 would also provide a high level of flexibility to new entrants.

A 8.190 However Option 1 and Option 2 could distort the current equilibrium as regards urban/rural cross subsidisation. As explained above, competition may become focused on the densely populated areas and result in a rollback of existing rural infrastructure. The market could stabilise at a level of coverage where there is no incentive for any operator to increase their coverage above this Ievel. However, this level may not necessarily be the level of coverage desired by consumers or result in a competitive market outside of urban areas..

A 8.191 In terms of Option 3, as noted above, there is a risk that a minimum coverage level set toward to the mid-to-upper end of the Option 3 range could affect entry. This would negatively impact on competition. The mid-to-upper end of the range could be beyond what a new entrant would choose to deliver independently. There is a risk that setting a coverage obligation too high will act as a disincentive for a potential new entrant whose strategy may be to build their own network to cover the large cities and towns in Ireland but not every small village in the country as it may be more efficient to have a roaming agreement in place for the very rural areas. A potential new entrant may determine that they would be unable to be an aggressive competitor if they were to be tied to meeting coverage requirements and network build rather than customer acquisition. Deterring participation in the award and subsequent entry into the Irish mobile market would negatively impact on competition at the retail level. However, on the plus side, Option 3 would be less likely to distort the equilibrium as regards urban/rural cross subsidisation when compared to Option 2 or 1 and consequentially may go further towards ensuring competition outside of urban areas.

A 8.192 In the case of Option 4 and 5, whilst neither would distort the current equilibrium, as would be the case with Option 1 and 2, and potentially Option 3, they would however raise serious competition problems as both are very likely to deter entry.

A 8.193 In the case of Option 4, each operator would be required to have a network that covered at least 71% and up to 90% of the population. This would have a neutral impact on competition between existing players given the current footprint of their networks. However it is likely to deter entry. As noted above, even the mid-to-upper end of the Option 3 range could raise problems in terms of deterring entry. Therefore in the case of Option 4, the higher the level, the greater the likelihood that this could deter entry as roll out costs become too high, and highly inefficient for a new entrant who could otherwise negotiate a roaming agreement with one of the other existing network providers. Therefore Option 4 is highly likely to reduce participation ‘for’ the market (as this concept is described in Chapter 3). A reduction in competition at the auction will in turn likely reduce competition in the downstream market for mobile services.

A 8.194 Option 5 would raise a number of negative implications for competition.

- First, as noted above, as existing operators are much more likely to win the 'high coverage' blocks, Option 5 would favour existing operators. It would reduce the number of blocks available in the auction for new entrants. This could deter entry, therefore reducing competition in the market.
- Option 5 creates the potential for there to be one operator with almost ubiquitous coverage. It may not legally be possible to impose a wholesale roaming agreement on this operator (if the 'high coverage' blocks were awarded using a competitive assignment process). This could ultimately result in the award of a monopoly position in certain geographic areas.
- Option 5 could prevent an efficient outcome in auction as a result of moving away from homogenous lots to heterogeneous lots. By setting aside certain spectrum in the award this is likely to result in greater demand for the remaining blocks within the auction (similar to the effects of Option 2A in the draft 'Assignment Process' RIA contained in Chapter 3). The high coverage block(s) may inflate the prices of other blocks over and above what they would have been if all blocks were homogenous. There is also a risk that the high coverage spectrum could go unsold if the price is unattractive to bidders compared to price of low coverage blocks.

A 8.195 Having all blocks homogenous in a licence competition, as is the case under Option 1, 2, 3 or 4 is more likely to result in an efficient outcome than Option 5 since bidder strategies would be less complex and it is more likely that spectrum blocks will be awarded to those who value it the most.

Impact on consumers

A 8.196 As set out in Step 1 above on Policy Issues, generally consumers of mobile services value the ability to use their mobile devices whenever they want and wherever they are, so long as these services are available at a reasonable price. In other words, consumers value high levels of coverage across the length and breadth of the country. In addition, as competition drives coverage beyond the minimum levels set by a licence condition, it is in the best interest of consumers that competition would not be negatively impacted.

A 8.197 There are a number of important issues worth reiterating before considering the impact on consumers of the various options:

1. As noted above, minimum levels of coverage set as a licence condition and the actual level of coverage provided by the market are unlikely to be the same.
2. A very high coverage obligation does not necessarily equate to the best/preferred option for consumers. If a high minimum level was applied symmetrically across all licensees, it would raise costs across the industry, result in inefficient investment, without any obvious benefits for consumers. To achieve industry wide, ubiquitous cover that

consumers value does not require that all operators build a network that is by itself capable of providing such ubiquity.

A 8.198 Both Option 4 and Option 5 have a number of features which could be detrimental to consumers. As noted above, both Option 4 and 5 could deter entry, thereby decreasing competition in the auction and in downstream retail market. Option 4 could also result in inefficient investment/duplication of networks. Imposing a high minimum coverage level would raise costs across the mobile industry with no added benefit for consumers. Option 5, as noted above, would not necessarily lead to an efficient auction outcome as spectrum may not be awarded to the operators who value it the most, and the high coverage spectrum could remain unsold/unassigned.

A 8.199 From the perspective of consumers, whilst Options 1 and 2 are likely to make entry more attractive compared to the other options, these options would distort the current equilibrium, which could be detrimental to consumers since access to services outside of urban areas may ultimately become reduced. Setting no minimum coverage level or coverage at a very low minimum level would enable an operator(s) to adopt a hub-and-spoke type network, based around the 5 main cities. If this model was very successful this could result in more intensive competition in urban areas and cause rural coverage to be scaled back as explained above. There is a risk that geographic areas which have a low population density and/or where there is low/sporadic demand may not be covered and/or base stations could be removed. Although ComReg is of the view that this risk of such destabilising effects occurring may be relatively low[466] nonetheless it is a risk that ComReg does not consider appropriate to take as it would not be in the best interests of consumers. The current level of coverage provided by the market is very high and consumers are accustomed to this ubiquity.

A 8.200 In this regard ComReg also notes that if reductions in overall coverage occurred this would have an impact on access to the emergency services and is of the view that this would have the potential to be of material detriment to consumers.

A 8.201 Having considered each of the other options, and the various negative implications they could cause for consumers, Option 3 appears to offer a safeguard against the risk of rural coverage being scaled back which may occur under Option 1 and 2, whilst not seriously impacting on the likelihood of new entry, as would be the case under Option 4 or 5. ComReg is of the view that coverage set within the Option 3 range would be in the best interest of consumers.

Assessment and the Preferred Option (Step 5)

A 8.202 As set out in the analysis above, existing operators are likely to have a preference for a medium-to-high level of coverage. This would act as a deterrent to new

[466] Coverage is currently an important factor for consumers, and this is not likely to change; and as these operators already have networks rolled out with the necessary infrastructure in place, the capital investments in these sites are sunk costs, it is reasonable to assume that they will not be shut down, at least in the short term.

entry, as it would be at a level such that their existing network would already adequately cover, whilst at the same time providing a generous level of flexibility to provide coverage in low population areas through cooperation/network sharing. New entrants are likely to prefer as low a minimum level as possible, as this would provide them with the greatest level of flexibility.

A 8.203 In terms of the impact on competition, and by extension, the impact on consumers, there were two factors which framed the analysis - on the one hand, an option could deter entry which would clearly be bad for competition and consumers, whilst on the other hand, an option could potentially destabilize the current equilibrium that exists as regards urban/rural cross-subsidisation, again negatively impacting on the level of coverage that consumers are accustomed to. Having considered these issues, ComReg is of the view that Option 3 would be the best option on competition grounds, and by extension, in the best interest of consumers, as it is unlikely to have a significant impact on the potential for entry, all other things being equal, and at the same time, would be unlikely to destabilize the current equilibrium. Each of the other options was deemed to have particularly negative impacts on competition, as a result of one or the other of these issues.

A 8.204 Clearly determining the ideal level at which to set a minimum coverage level involves a number of trade-offs, between new entrants who would prefer a low level, and consumers who would prefer as high a level as possible that did not deter entry, result in inefficient investment or destabilize the current equilibrium.

A 8.205 Having considered each of the options in turn, the analysis in this draft RIA suggests that a minimum coverage level within the range of Option 3 would best meet ComReg's objectives.

A 8.206 A minimum coverage level within this range, from 50% to 70% is unlikely to significantly deter entry but this is a risk at the upper end of the range. It is unlikely to result in inefficient infrastructure investment but again there is a risk at the upper end of the range.

A 8.207 However, the higher up the range, the more it removes any risk of the current equilibrium level of coverage being distorted via a destabilizing effect on the cross-subsidization model which in turn would adversely affect competition in the rural services market and consumers. For this reason, ComReg is of the view that in the best interest of consumers, it is preferable to err on side of caution, given the importance of ubiquitous cover to consumers. Therefore, for this reason, ComReg favours the top end of this range, 70%.

A 8.208 To reduce the likelihood of the point in the range deterring entry, ComReg is of the view that this should be combined with a longer roll-out period for a new entrant, as discussed in this Annex.

8.3 Quality of Service[467]

A 8.209 Throughout this consultation process, and in particular in Consultation 09/99, ComReg has discussed the issue of imposing Quality of Service ("QoS") conditions on new liberalised licences.

A 8.210 In Consultation 09/99, ComReg considered whether it was appropriate to attach QoS conditions to new licences and ComReg conducted a Draft RIA which analysed this issue. ComReg believed that there were circumstances where it could be appropriate to impose QoS conditions and in the light of the Draft RIA analysis ComReg formed the view that it would be reasonable to attach such conditions to any new licence.

A 8.211 Consultation 09/99 discussed a number of specific service areas in which QoS conditions might be imposed, as follows:

- the availability of services on a network;
- voice calls;
- broadband; and
- billing.

A 8.212 Consultations 09/99 and 10/71, additionally considered:

- performance guarantees; and
- review of QoS standards.

A 8.213 Consultations 10/71 and 10/105 proposed the inclusion of the 800 MHz and 1800 MHz bands into a multi-band award process with the 900 MHz band. As discussed in Annex 6 the 800 MHz and 900 MHz bands in particular are considered to be largely substitutable for one another and it is considered likely that similar technologies and services will be provided over all three bands. ComReg thus formed the view that the QoS conditions obligations proposed in Consultation 09/99 should apply equally to all three bands in the award process. Consultations 10/71 and 10/105 did not discuss the proposed QoS conditions in detail but referenced the details as set out in Consultation 09/99.

A 8.214 This Annex discusses in turn the following matters:

- whether QoS conditions should be imposed at all and if so, how should they be imposed?
- ComReg's proposals relating to specific QoS conditions for voice calls and the availability of services.[468]
- additional relevant considerations relating to performance guarantees, and review of QoS standards.

[467] For clarity ComReg's QoS proposals are without prejudice to the terms of any existing licences the obligations in which will continue to apply for the term of such licences.

The Imposition of QoS Conditions on Sectrum Rights of Use

A 8.215 This section considers whether it is appropriate to attach QoS conditions to any new licences granted in respect of the 800 MHz, 900 MHz and 1800 MHz spectrum bands.

Summary of ComReg's proposals in previous consultations

A 8.216 ComReg first proposed of attaching QoS conditions to all new licences in the 900 MHz band in Consultation 08/57 (Section 7.3.3). In that consultation, ComReg stated that it intended to continue its practice of attached QoS conditions in order to ensure that consumers can avail of a reasonable service and to ensure the efficient use of 900 MHz spectrum. ComReg proposed that such QoS conditions would relate to voice and text services and that they would be the minimum necessary to ensure that licensees could maximise the use of the spectrum assigned to them while providing an adequate service to their customers.

A 8.217 While Consultation 08/57 did not ask a specific question on QoS conditions, two respondents (eircom Group and H3GI) commented on this issue in their responses. Neither respondent objected to the attachment of QoS conditions. Specifically eircom Group stated that whilst it did not object to the continued attachment of QoS conditions *"over the near term",* eventually it believed that there would be no need for such conditions as the very essence of liberalisation is to inject greater flexibility into spectrum licensing and use. H3GI stated that QoS conditions should reflect the services being provided by the licence holder.[469]

A 8.218 In Consultation 09/14, ComReg did not discuss QoS conditions within the main body of the paper. However in Question 11 , ComReg reiterated its view that it intended to attach licence conditions to new 900 MHz licences and ComReg sought respondents' views as to what type of licence conditions to attach and at what level should such conditions be set. Respondents to Consultation 09/14 were broadly supportive of ComReg's proposal to attach QoS conditions. [470]

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[469] H3GI added that *"i.e. if 3G services are being provided by means of 2G spectrum, licences should reflect the coverage and quality of service licence obligations contained in the licence holder's 3G licence."* Page 3 (and page 10) of H3GI's response to Consultation 08/57

[470] "Question 11 (of Consultation 09/14): It is ComReg's intention to include conditions in any new 900 MHz licences issued.

a. Should the conditions be limited to existing services such as voice and text or be broadened to include other services such as broadband?

b. What kind of conditions (e.g. Coverage, Roll-Out, Quality of Service etc.) should be included?

c. At what level should these conditions be set?

Please provide reasons for your view."

Consultation 09/99

A 8.219 Section 15.6 of Consultation 09/99 set out ComReg's detailed consideration of the QoS conditions that could be attached to new licences in the 900 MHz band.ComReg first noted that over the course of the consultations and bilateral meetings, nine respondents provided submissions on QoS and six of the nine supported the attachment of appropriate QoS conditions to licences for liberalised 900 MHz spectrum.[471]

Draft RIA Analysis

A 8.220 A draft RIA analysis, which considered whether it would be appropriate to attach QoS conditions to licences for liberalised 900 MHz spectrum, was set out in Consultation 09/99.[472] Two options were considered:

- Option 1 – Impose no QoS conditions; or
- Option 2 – Impose QoS conditions.

A 8.221 The draft RIA analysis stated that "even in competition [sic] markets there may be circumstances where minimum QoS standards may still be needed in order to prevent a potential market failure. In telecommunications markets, a potential market failure could arise as a result of an information problem whereby consumers may not be in a position to identify the quality of different operators' services and if there is a problem with the quality of the service it may not be possible for the customer to attribute the source of the problem to a particular operator. This can give incentives for operators to compete on a very low level of quality. In these circumstances we believe that it is appropriate to set minimum QoS standards to overcome this information problem."

A 8.222 ComReg sought respondents' views on the outcome of the Draft RIA in Consultation 09/99:

Question 22 (Consultation 09/99): Do you agree with the outcome of the draft RIA that QoS standards should be imposed as a safeguard measure to overcome the potential market failure which may exist in communications markets?

Setting potential QoS obligations – General issues

A 8.223 Having regard to its statutory functions and objectives and the outcome of the draft RIA, ComReg was of the view that there were reasonable grounds to attach QoS conditions to future licences for liberalised 900 MHz spectrum, particularly to protect the interests of users. The next issue considered in Consultation 09/99 was areas where QoS conditions may be required. ComReg considered whether to attach symmetric or asymmetric QoS conditions, and whether it would be

[471] See Meteor, Vodafone, Digiweb, H3GI, O2, and UPC responses to consultation 08/57 and 09/14.

[472] See section 15.6.2 of Consultation 09/99

appropriate to allow a QoS condition to be met using multiple bands or using just the 900 MHz band.

A 8.224 On the first issue, ComReg stated there did not appear to be any reason for attaching applying different QoS conditions to different licences. ComReg proposed that the same QoS conditions should apply to all new licences. Question 23 of Consultation 09/99 sought respondents' views on this proposal:

> Question 23 (Consultation 09/99): Do you agree with ComReg's proposal to apply the same QoS obligations to each new licensee in the band?

A 8.225 In relation to the second issue - whether QoS standards should be applied to the 900 MHz band in isolation or imposed across multiple bands - ComReg considered that from a consumer perspective it would be more appropriate to attach QoS conditions on the basis of the services being offered, rather than on the basis of the particular spectrum being used to provide such services. In forming this view, ComReg noted that services can be provided over multiple frequency bands and customers are indifferent as to which frequency band is used to provide a particular service. Question 24 of Consultation 09/99 sought respondents' views on this proposal.

> **Q.24. (Consultation 09/99):** Do you agree that the QoS standards should be set on the basis of the service offered rather than in relation to spectrum used to provide this service?

A 8.226 With the exception of Question 30, which asked respondents whether QoS measures would be better addressed as a licence condition or as part of the General Authorisation, the remaining issues are discussed later in this Annex.

> **Q.30. (Consultation 09/99):** Should QoS measures at a consumer level (e.g. billing) be addressed as a licence condition in the 900 MHz licence or as part of a General Authorisation?

A 8.227 In Consultations 10/71 and 10/105, ComReg expressed the view that the proposed inclusion of the 800 MHz and 1800 MHz bands would have no material effect on ComReg's views regarding the attachment of QoS conditions to future licences in those bands, and in the 900 MHz band. ComReg sought respondents' views on specific QoS conditions, which are discussed later in this Annex.

Views of respondents

Consultation 09/99 (Question 22)

A 8.228 In response to Question 22 of Consultation 09/99, regarding the outcome of the Draft RIA, two respondents (Digiweb and H3GI) agreed that attaching QoS

conditions to new licences was appropriate, while three (eircom Group, O2, Vodafone) disagreed with the proposal.[473]

A 8.229 The two respondents who agreed with the proposal noted:

- The imposition of QoS conditions would act as a safeguard against potential market failure that might exist in the communications market (H3GI[474]);
- Minimum QoS conditions should be set to ensure that consumers have a reasonable service (Digiweb[475]).

A 8.230 The three respondents who did not support ComReg's proposal (eircom Group, Vodafone, O2) put forward the following arguments:

- QoS conditions are neither proportionate nor objectively justified (Vodafone[476]);
- it is not credible for ComReg to suggest that consumers would not be able to tell their service provider was delivering a poor service (O2[477] and eircom Group[478]);
- the market is sufficiently competitive as to ensure that an acceptable QoS standard will be maintained (eircom Group[479], Vodafone[480], O2[481]);

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473 None of these three respondents had disagreed with the imposition of QoS obligations in their responses to Consultation 09/14.

474 *"Yes, 3 agrees with the outcome of the draft RIA that QoS standards would be imposed as a safeguard measure to overcome the potential market failure which may exist in communications markets."* H3GI's response to question 22 of Consultation 09/99 in document 10/21r.

475 *"Digiweb believe that a minimum QoS should be set to ensure that consumers have a reasonable service."* Digiweb's response to question 22 of Consultation 09/99 in document 10/21r.

476 *"The inclusion of QoS standards in new 900 MHz licences is neither proportionate nor objectively justified"* Vodafone's response to question 22 of Consultation 09/99 in document 10/21r.

477 *"…it is not credible to suggest that consumers would be unable to be able to determine that a service provider was delivering a poor quality service"* O2's response to question 22 of Consultation 09/99 in document 10/21r.

478 *"In ComReg's Regulatory Impact Assessment (RIA) one of the disadvantages posed with respect to not having Quality of Service (QoS) obligations is that consumers may be unable to identify whether poor QOS[sic] is on their host network or other networks. Meteor would argue that this argument is weak, as consumers can generally distinguish between on-net and off-net calls. If anyone network were to offer a degraded service quality, this should become immediately apparent, resulting in a poor reputation for the network in question. Therefore the market would be efficient in ensuring a generally high level of quality.*" eircom Group's response to question 22 of Consultation 09/99 in document 10/21r.

479 *"It is generally accepted that quality of service is driven by the highly competitive nature of a given market."* eircom Group's response to question 22 of Consultation 09/99 in document 10/21r.

- ComReg failed to demonstrate any failure with respect to QoS to date and the imposition of QoS conditions is unnecessary and would be highly disproportionate (eircom Group[482]); and
- if ComReg considers that there is a potential market failure in respect of QoS then there are alternative and more appropriate and effective means of addressing such issues than the inclusion of QoS conditions (Vodafone[483]).

Consultation 09/99 (Question 23)

A 8.231 In response to Question 23 of Consultation 09/99, which asked whether the same QoS conditions should apply to each new licensee in the band, four respondents (H3GI[484], O2,[485]Digiweb[486] and eircom Group[487]) agreed with ComReg's

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480 *"Vodafone considers that there is robust competition in the provision of mobile communications services and that this is sufficient to ensure that acceptable QoS standards will be maintained for those services (voice, mobile broadband etc.) that can be provided using spectrum in the 900 MHz band"* Vodafone's response to question 22 of Consultation 09/99 in document 10/21r.

481 *"The mobile communications market is competitive – one operator is unlikely to be able to bring down the overall quality of service for all operators"* O2's response to question 22 of Consultation 09/99 in document 10/21r.

482 *"ComReg has not demonstrated any failure with respect to quality of service to date therefore in the same vein as Meteor's response to the previous questions, we believe that it has been demonstrated under the legacy licensing regime that such measures are not necessary and would be highly disproportionate."* eircom Group's response to question 22 of Consultation 09/99

483 *"If ComReg considers that there is a potential market failure in respect of QoS then there are alternative, and more appropriate and effective means of addressing this than the inclusion of QoS conditions in licences for use of specific frequency bands. Vodafone would note that ComReg's proposed approach would lead to QoS conditions being imposed on only some market participants (holders of the particular spectrum licences in which QoS conditions are included) but not on others (those who do not hold licences for the spectrum). This would not effectively address any issue of a market failure in respect of QoS that was common across the market, and would involve a serious risk of distorting the basis of competition between operators."* Vodafone's response to question 22 of Consultation 09/99 in document 10/21r.

484 *"Yes, 3 agrees with ComReg's proposal to apply the same QoS obligations to each new licensee in the band."* H3GI's response to question 23 of Consultation 09/99 in document 10/21r.

485 *"O2 has stated it's [sic] belief already in this document that only minimum QoS conditions should be included in the licence. Where obligations are imposed, they must be the same for all bidders, as it would fundamentally undermine the rationale for use of an auction as the assignment method if ComReg were to impose different conditions depending on who the licence is assigned to."* O2's response to question 23 of Consultation 09/99 in document 10/21r.

486 "*Agree"* Digiweb response to question 23 of Consultation 09/99 in document 10/21r.

487 Whilst Meteor did not believe that QoS obligations could be justified it agreed with the proposal that the same QoS obligations should apply to all new licensees "*...Meteor does not believe that QoS obligations can be justified, however if in spite of these observations, ComReg is ultimately able to justify these obligations, it should apply the same obligations to each licensee in the band."* Meteor's response to question 23 of Consultation 09/99 in document 10/21r.

proposal while one respondent (Vodafone) did not agree, in line with its general disagreement with QoS conditions as noted above.[488]

Consultation 10/71

A 8.232 Whilst Question 16 of Consultation 10/71 sought respondents' views on specific QoS proposals which are discussed below, a number of respondents made some general comments which are relevant to this discussion and so are addressed here.

A 8.233 Three respondents (Imagine,[489] ESBN[490] and O2[491]) agreed with ComReg's proposed QoS conditions . O2 added that whilst it generally agreed with ComReg's proposal to attach QoS licence conditions (subject to seeing the detailed proposals), the imposition of such conditions on one platform would be contrary to ComReg's statutory objectives not to distort competition in any market. O2 stated objected to any conditions on its future mobile licences which would add to its operating costs and which would not be imposed on its competitors in the same market.[492]

A 8.234 Vodafone was of the view that ComReg's proposal would result in QoS conditions being imposed only on some market participants (holders of particular spectrum licences to which QoS conditions are attached) but not others (those who did not hold spectrum). Vodafone also noted that MVNOs are currently not subject to the licence conditions of their hosts and that any licence conditions beyond those that can be directly imposed on an MVNO would be discriminatory.[493]

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[488] Vodafone provided an identical response to both question 22 and question 23 of Consultation 09/99 in document 10/21r. (see above)

[489] *"Imagine agrees in principle with setting minimum quality metrics in the licence"* Imagine's response to question 16 of Consultation 10/71 in document 10/103r.

[490] "*ESBN agrees with this proposal"* ESBN's response to question 16 of Consultation 10/71 in document 10/103r.

[491] *"O2 generally agrees with ComReg's approach to QoS and licence conditions subject to seeing the detailed proposals."* O2's response to question 16 of Consultation 10/71 in document 10/103r.

[492] *"Given the increased convergence of offers in the market, the imposition of licence conditions on one platform would be contrary to ComReg's statutory objectives not to distort competition in the market. O2 would object strongly to any conditions being placed in future mobile licences which add costs to its operation and which are not imposed on other competitors in the same market."* O2's response to question 16 of Consultation 10/71 in document 10/103r.

[493] *"ComReg's proposed licence conditions would lead to QoS conditions being imposed on only some market participants (holders of the particular spectrum licences in which QoS conditions are included) but not on others (those who do not hold licensed for the spectrum). Vodafone also notes that MVNOs are not subject to the licence conditions of their hosts and that any licence conditions beyond those that can be directly imposed on a MVNO would be discriminatory."* Vodafone's response to Question 16 of Consultation 10/71 in document 10/103r.

Consultation 09/99 (Question 24)

A 8.235 Question 24 of Consultation 09/99 which asked whether QoS standards should be set on the basis of the service offered rather than in relation to spectrum used to provide this service. Of the five responses four respondents (Digiweb[494], eircom Group[495], H3GI[496], and O2[497]) agreed that standards should be set on the basis of the service offered, while one respondent (Vodafone), reiterated its overall disagreement with QoS licence conditions.[498]

Consultation 10/71 (Question 16)

A 8.236 In response to Question 16 of Consultation 10/71, Vodafone, which disagreed in general with having QoS licence conditions, sought clarification on ComReg's proposed QoS conditions. Vodafone stated that it was unclear whether the proposed QoS conditions would apply only to the end-user of services using the licensed bands, or whether they would apply to all similar end-user services offered by the licensee with spectrum allocations in multiple bands irrespective of the spectrum over which the service is actually provided. Vodafone further stated that if the proposed conditions applied only to end user services using these licensed bands then clearly there would be a differentiation in conditions

494 "*Agree"* Digiweb response to question 24 of Consultation 09/99 in document 10/21r.

495 *"[If] ComReg can objectively justify quality of service obligations, Meteor would then agree that they should be set on the basis of this service offered rather in relation to spectrum used to provide the service. This is of course without prejudice to the terms of the existing 3G licences in which case the existing 3G licence obligations must apply."* Meteor Group's response to question 24 of Consultation 09/99 in document 10/21r.

496 *"Yes, 3 agrees that QoS standards should be set on the basis of the service offered rather than in relation to spectrum used to provide this service."* H3GI's response to question 24 of Consultation 09/99 in document 10/21r.

497 *"O2 will need to continue to use 900MHz spectrum to provide GSM service for a number of years. A licence QoS condition specifying aspects of a mobile broadband service would clearly be irrelevant in this case, so ComReg must either tailor the QoS obligations according to the service provided, or have only a minimum set of requirements. Tailoring the QoS obligations poses a number of practical difficulties:*

ComReg will not know what services will be provided during the lifetime of the licence so will be unable to specify the QoS obligations in advance of the auction, but bidders will need to know these in order to develop their spectrum valuations

In tailoring the obligations, ComReg would need to ensure it was not providing an advantage to one type of service or technology over another – this would be a difficult task

ComReg should include only the minimum conditions in the licence." O2's response to question 24 of Consultation 09/99 in document 10/21r.

498 Vodafone referred back to its response to Question 22 of Consultation 09/99 in document 10/21r, in which it stated that the inclusion of QoS standards on new 900 MHz licences would be "*neither proportionate nor objectively justified*".

pertaining to equivalent end user services provided by an operator based solely on the band in which they might be carried from time to time.[499]

Consultation 09/99 (Question 30)

A 8.237 Question 30 of Consultation 09/99 asked if QoS measures at a consumer level (e.g. billing) should be addressed as a licence condition in the 900 MHz licence or as part of a General Authorisation. Of the five responses, four respondents (eircom Group, H3GI, O2 and Vodafone) were of the view that consumer level QoS measures would be more appropriately addressed in the General Authorisation rather than as licence conditions. One respondent (Digiweb) stated that QoS measures at a consumer level should be addressed as a licence condition as per the existing 3G and GSM licences.

ComReg's Position

A 8.238 The revised EU Regulatory Framework sets out the conditions which may be attached to licences by national regulatory authorities ("NRAs"). These are set out in Part B of the Authorisation Regulations 2011.[500] Under subsection 1, specific reference is made to quality requirements:

"Part B. Conditions which may be attached to rights of use

1. *Obligation to provide a service or to use a type of technology for which the rights of use for the frequency has been granted including, where appropriate, coverage and quality requirements."*

A 8.239 ComReg is of the view that certain matters which were previously addressed by way of licence conditions are now more appropriately addressed by means of the General Authorisation. Such matters should apply to all undertakings and not just to those issued with specific licences. Hence in this section, ComReg has carefully considered each of the QoS conditions proposed in its previous consultations, in order to determine whether such conditions should be attached to specific licences or form part of the General Authorisation, or even removed entirely. This matter is discussed in more detail below.

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499 *"In addition a question arises as to the extent of any proposed quality of service licence conditions. It is unclear whether they would apply only to end-user services using the licensed bands or whether they apply to all similar end-user services offered by the licensee with spectrum allocations in multiple bands irrespective of the spectrum over which the service is actually provided. If the latter is intended then it is not clear whether there is a basis for ComReg to impose a condition in one spectrum license which has the effect for services carried separately licensed spectrum. However, if the proposed conditions would apply only to end user services using these licensed bands then clearly there would be a differentiation in obligations pertaining to equivalent end user services provided by an operator based solely on the band in which they might be carried from time to time."* Vodafone's response to question 16 of Consultation 10/71 in document 10/103r.

500 See S.I. No. 335/2011 — European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011, Part B.

A 8.240 In a competitive market with low switching costs, QoS standards should be reasonably good as consumers can respond quickly and easily if the QoS does not meet their expectations. However, there are situations even in a competitive market where, due to information asymmetries, setting minimum QoS standards may be necessary in order to protect consumers. ComReg has considered specific service areas to determine whether such information asymmetries may exist. These are discussed in more detail below - "QoS Standards at a service level".

A 8.241 In general, QoS in the mobile market appears to be of a good standard. All of the existing GSM licences and 3G licences contain a number of conditions which relate to QoS. These conditions were set back in 1995 when the first GSM licences were granted and when the mobile market was very different compared to today. Although it is not possible to conclusively state that the existence of these QoS conditions has ensured that QoS has remained at an acceptable level over the duration of the GSM licences (and 3G licences), it is reasonable to assume that they have played a part in setting what are now acceptable levels of quality. ComReg monitors the QoS of current licensed MNOs on a regular basis and it is evident that the MNOs generally operate to QoS standards which surpass those set by the conditions attached to their licences. . However that fact does not of itself obviate the need for QoS conditions for new liberalised licences, nor does it answer the question of whether the attachment of QoS conditions would be a proportionate measure.

A 8.242 ComReg does not intend to attach conditions to new liberalised licences purely on the basis that they were attached to in previous licences. Each QoS issue will be considered on its own merits. ComReg has considered specific areas where there may be a potential for a market failure and where a QoS condition could be used to avoid such failure. These are set out below.

A 8.243 ComReg is of the general view that QoS conditions can benefit users (as set out in Consultation 09/99, in the Draft RIA), as follows:

- they can act as a safeguard for consumers against poor service quality;
- consumers would be guaranteed a minimum QoS from each operator in the market based on specific metrics;
- they ensure that all consumers receive a reasonable standard of service without being reliant on understanding the various service offerings available;
- as the regulator would act as a watchdog for consumers, consumers would have a form of redress to the regulator if these standards are not met;
- licensees would be assured that no other licensee could avoid meeting these minimum standards, thus ensuring that investments in QoS by licensees are not wasted.

A 8.244 However, attaching QoS conditions to licences may result in compliance costs for the licensees and regulatory costs ComReg, the licensor. . In order to ensure that QoS conditions are only imposed where they are necessary, proportionate, and

objectively justified, ComReg has looked at each specific service area on a case by case basis. These are set out below.

A 8.245 ComReg considers that all consumers, including those obtaining a service via an MVNO, are entitled to services that meet a minimum QoS standard. It is not reasonable for some consumers to enjoy a lesser QoS in respect of voice quality and network availability as a result of a commercial agreement between a host MNO and an MVNO. Therefore ComReg proposes that every liberalised licensee would be obliged to ensure that all relevant services provided using the spectrum rights identified in their particular licence comply with the QoS conditions identified above. For the avoidance of doubt, this is proposed to include all relevant services of the licensee and those provided by any third party/s via contractual or other arrangements with the licensee.

A 8.246 Wireless Telegraphy (WT) licenses only permit the use of specific frequencies, as such any QoS inserted in WT licenses apply only to the services provided on licensed frequencies.

A 8.247 ComReg does not intend to specify what services can be deployed in the bands for award. All operators that are granted new liberalised licences are free to provide such services as they wish. However if ComReg does set QoS standards for a particular service, by means of attaching conditions to the corresponding licence and an operator then chooses to provide that service, then the QoS conditions would take effect and would have to be met. ComReg thus considers that it is appropriate to set minimum standards for certain services, which operators may or may not choose to deploy. The specific services to which QoS should apply at present are addressed in more detail below. For the avoidance of doubt, ComReg reserves the right to apply QoS conditions in relation to new services during the term of the licences.

QoS Standards at a Service Level

A 8.248 ComReg will not specify what electronic communications services may be deployed under future licences for liberalised spectrum in any or all of the 800 MHz, 900 MHz or 1800 MHz bands. In Consultation 09/99 ComReg maintained that any QoS conditions that are attachwed to such licences should only apply where a particular service is offered, but that there should be no compulsion on operators to provide particular services. ComReg considered two service areas where it may be appropriate to set QoS standards and sought respondents' views on each, namely voice call services and broadband services.

A 8.249 ComReg is proposing not to impose a QoS condition Broadband Service and this is addressed later in this Annex.

QoS Proposal for Voice call Service

Summary of ComReg's proposals in previous consultations

ComReg's position in Consultation 09/14

A 8.250 In Consultation 09/14, ComReg sought respondents' views on licence conditions to be included in new 900 MHz licences. With regard to voice calls, Question 11a of Consultation 09/14 is relevant:

> Question 11 (Consultation 09/14): It is ComReg's intention to include conditions in any new 900 MHz licences issued. Should the conditions be limited to existing services such as voice and text or be broadened to include other services such as broadband? What kind of conditions (e.g. Coverage, Roll-Out, Quality of Service etc.) should be included? At what level should these conditions be set? Please provide reasons for your view.

ComReg's position in Consultation 09/99

A 8.251 In Consultation 09/99, ComReg considered whether QoS obligations for voice calls should be attached to liberalised licences. As set out in Consultation 09/99, voice calls can originate and terminate on different networks and, due to Mobile Number Portability, customers do not know which network they are calling. Therefore customers who experiences poor voice call quality cannot determine whether the problem relates to their own network or to the network of the person on the other end of the line. Therefore ComReg expressed the view that it would be appropriate to set minimum QoS standards for voice calls, in order to safeguard consumers, and to set such standards at a uniform level across all new licensees.

A 8.252 ComReg proposed Voice (non-VoIP) QoS licence conditions as set out in **Table 9** below which specified minimum requirements for the maximum number of blocked calls, dropped calls and sound transmission quality for every 6 month period of the licence duration. These specifications were based on the existing GSM /3G licences.

Proposed QoS licence condition for Voice Calls **If a licensee offers a mobile voice call service, it must comply with the following requirements.**		
	Average	**Worst Case**
Maximum Permissible Blocking Rates This refers to the maximum percentage of total call attempts which are unsuccessful during the time consistent busy hour.[501]	2%	4%
Maximum Permissible Dropped Call Rates This refers to the maximum percentage of total originating calls which are prematurely released by the network within 3 minutes of the call being made.	2%	4%
Transmission quality The licensee shall ensure that the speech transmission quality is as good or better than the speech quality associated with the GSM Standard and GSM Technical Specifications of ETSI. The licensee shall ensure that appropriate echo treatment equipment is used and that it is properly configured.		
Licensees must measure and report compliance with these requirements to ComReg every 6 months.		

Table 9: Proposed Voice (non-VoIP) QoS licence condition

A 8.253 ComReg sought views on its proposal for voice call QoS standards.

> Q.25. (Consultation 09/99): Do you agree with the ComReg's proposed voice calls QoS licence condition and the three proposed QoS metrics for measuring the voice call service?

A 8.254 In Consultation 09/99 ComReg also considered the issue of Voice over IP ("VoIP") calls and whether a QoS standard for voice calls should also include VoIP calls. ComReg noted the upward trend in the use of VoIP.[502] In addition, ComReg also noted that the forthcoming revised EU Regulatory Framework Directive would change the definition of "voice call provider" such that it covers all providers of voice calls which can be made to any numbers in a national numbering plan (as opposed to the distinction which existed between a Publicly Available Telephone Service ("PATS") provider and a ECS provider.[503]

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501 **"**Time consistent busy hour" means the period of one-hour starting at the same time each day for which the average traffic of the network concerned is greatest over the days under consideration. The 'Time consistent busy hour' is determined from the operator's voice traffic. The blocked call rates are measured for the same one-hour period during each review period (i.e. 6 months). The one-hour period is determined by the operator and is subject to ComReg's approval.

502 VoIP calls are not covered by existing GSM / 3G licenses

503 Directive 2009/140/EC, since transposed into Irish law by the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (SI. 333/2011)

A 8.255 Recognising these changes and the growing importance of VoIP, ComReg expressed the view that it may be appropriate to set minimum QoS standards for VoIP calls and sought the views of respondents.

Question 26 (Consultation 09/99): Should metrics be set for VoIP voice calls? If so, what QoS standards do you believe are appropriate? How would these standards be measured and monitored?

ComReg's position in Consultation 10/71

A 8.256 Having regard to the responses received to Consultation 09/99, in Consultation 10/71 ComReg proposed setting QoS for all non-VoIP voice calls, and hence did not propose to apply a minimum QoS standard for VoIP call services.

Views of Respondents

Consultation 09/99 (Question 25)

A 8.257 Question 25 of Consultation 09/99 asked interested parties if they agreed with the ComReg's proposed voice calls QoS licence condition and the three proposed QoS metrics for measuring the voice call service. Of the five respondents, two (Digiweb[504] and H3GI[505]) agreed and three (O2, Meteor and Vodafone) disagreed. The views expressed by those who disagreed were in line with their views on the matter of QoS conditions more generally, as described above, namely that:

- the inclusion of QoS conditions is neither proportionate nor objectively justified. (Vodafone);[506]
- setting individual QoS conditions would be contrary to the principle of service neutrality (O2);[507] and
- additional QoS conditions are not necessary given the existing licence conditions that are currently in place, and which have been consistently exceeded (Meteor).[508]

504 "*Agree"* Digiweb's response to question 25 of Consultation 09/99

505 "*Yes 3 agrees with ComReg's proposed voice calls QoS licence condition and the three proposed QoS metrics for measuring the voice call service."*H3GI's response to question 25 of Consultation 09/99

506 "*No. Please see the answer to question 22 above"* Vodafone's response to question 25 of Consultation 09/99

507 *"No, O2 does not agree with the proposal to include individual QoS conditions – this is contrary to the principle of service neutrality."* O2's response to question 25 of Consultation 09/99

A 8.258 No additional views were presented by respondents on ComReg's proposal for Voice (non VoIP) QoS conditions in responding to Consultations 10/71 and 10/105.

Consultation 09/99 (Question 26)

A 8.259 Question 26 of Consultation 09/99 asked interested parties if they agreed that metrics should be set for VoIP calls, and if so, what standards are appropriate and how would such standards be measured and monitored. Of the five respondents three ((O2, Vodafone and Meteor) did not agree with setting QoS standards for VoIP calls , for the following reasons:

- ComReg should not include QoS conditions (O2[509]);
- VoIP is an emerging service so it would be premature to consider QoS standards. There is no objective justification for setting QoS metrics for VoIP service calls (Vodafone[510]);
- due to the complications associated with VoIP, excessive voice QoS conditions in the new licences should not be imposed. (Meteor[511])
- The respondents also provided more general comments regarding QoS for VoIP calls:
- ComReg should monitor VoIP call quality and deal with any QoS issues that may arise via the General Authorisation as it affects both fixed and mobile calls (H3GI[512]);

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508 *".....a threshold for voice quality of service may be necessary in order to define coverage for voice services just as a speed threshold may be appropriate for establishing broadband coverage, however, Meteor does not believe that additional quality of service obligations are necessary given that the existing licence commitments which in some case match those currently being proposed, have been consistently exceeded."* Meteor's response to question 25 of Consultation 09/99 in document 10/21r

509 *"No, ComReg should not include QoS obligations, except for emergency service calls."* O2's response to question 26 of Consultation 09/99 in document 10/21r

510 *"...demand for VoIP services is still only at an emerging stage and it is premature to consider specifying QoS standards for VoIP voice calls at this time. There is no objective justification for the setting of QoS metrics for VoIP service calls unless there is evidence of anti-competitive discrimination or consumer harm. There is no evidence that such discrimination or consumer harm is present in Ireland."* Vodafone's response to question 26 of Consultation 09/99 in document 10/21r

511 *"The complications that are introduced by VoIP lends to the argument against excessive voice quality of service obligations in the new licences. Meteor believes that voice services offered through VoIP will have to meet the same high standards that are being achieved today if they are to succeed as a mainstream offering in the mobile market. Because voice represents such an integral element of the mobile service offering Meteor does not envisage a situation whereby the general quality of voice calls could be dragged down as a result of a small number of operators through a "race to the bottom" approach to voice quality, whether through VoIP or indeed the legacy voice platforms."* Meteor's response to question 26 of Consultation 09/99 in document 10/21r

- the service offered to consumers should be independent of the technology delivered thereby applying a similar set of QoS for each technology (Digiweb[513]); and
- QoS obligations (on VoIP) should only apply for emergency service calls (O2[514]).

Draft RIA on the imposition of QoS on Voice services

Step 1 - Policy issues to be addressed and relevant objectives

ComReg's statutory functions, objectives and relevant duties in relation to radio spectrum

A 8.260 ComReg's statutory functions and objectives in relation to radio frequency spectrum, a State-owned resource, are set out in **Annex 1** of this paper. These functions and objectives, and the degree to which these may be met under each of the different options, are discussed in more detail below.

Objectives in the context of the RIA analytical framework

A 8.261 The focus of the draft RIA is to identify the impact of the proposed measure on stakeholders (including existing operators, potential new entrants, and consumers) and on competition and, in so doing, to identify the option that would best achieve ComReg's objectives in a proportionate manner.

A 8.262 The various RIA guidelines provide limited guidance as to how much weight should be given to the positions and views of each stakeholder group. Accordingly, ComReg has been guided by its statutory objectives which it is obliged to seek to achieve when exercising its functions and which are described further in Annex 1. These objectives include:

- promotion of competition;
- contributing to the development of the internal market; and
- promotion of the interests of EU citizens.

The primary objective to **promote competition** includes, amongst other things:

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512 *"As the quality of VoIP calls is an issue that affects both the fixed and wireless industries, ComReg should monitor the quality of VoIP calls and deal with any QoS issues by way of amendment to the General Authorisation"* H3GI's response to question 26 of Consultation 09/99 in document 10/21r

513 *"Digiweb believes that the service offered to consumers should be independent of the technology delivered, thereby applying the similar set of QOS metrics to each technology. Albeit that the ETSI set of standards referenced may be aligned to the technology in question."* Digiweb response to question 26 of Consultation 09/99 in document 10/21r

514 *"ComReg should not include QoS obligations, except for emergency service calls."* O2's response to question 26 of Consultation 09/99 in document 10/21r

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

A 8.263 General Policy Direction No.1 of 2 April 2004 also states that ComReg shall focus on the promotion of competition as a key objective, including the promotion of new entry.

A 8.264 ComReg, in pursuit of these objectives, must apply the objective, transparent, non-discriminatory and proportionate regulatory principles described in Annex 1 of this document.

A 8.265 In addition, in determining its preferred option, ComReg must also have regard to relevant Policy Directions.

Policy issue

A 8.266 The policy issue to be addressed is what, if any, QoS conditions for voice calls should be imposed to ensure that all users are offered a minimum service level by operators who are granted licences for liberalised 800 MHz, 900 MHz and 1800 MHz spectrum bands.

Step 2 - Regulatory options

A 8.267 The regulatory options being considered are as follows:

- **Option 1**: no QoS conditions on any voice service
- **Option 2**: QoS conditions on non-VoIP voice services as proposed in 10/71 (in line with existing GSM license standards for sound quality, dropped calls and blocked calls)

Step 3 Impact on stakeholders

Impact on operators

A 8.268 **Option 1** would have least impact on operators as it would not involve any compliance costs. However, it is possible that having no voice call QoS conditions could result in at least one operator engaging in behaviour (e.g. lack of investment or poor network planning) which resulted in a reduction in the quality of its voice calls from current levels.

A 8.269 Other operators might then have less incentive to maintain their QoS and may allow the quality of their voice calls to fall, as they would not be able to isolate the higher quality standards applied to voice calls on their own network, from the lower quality standards applied on other networks. Such an overall reduction in quality could result in lower consumers demand for voice calls, which in turn would negatively impact on all providers of voice call services, though no

individual provider would have an incentive to increase quality back to previous levels.

A 8.270 For that reason, operators may prefer **Option 2,** as the imposition of minimum QoS conditions for voice calls would ensure that all licensees would be subject to the same standard and as such, each would be assured that no other licensee could avoid meeting these minimum standards. In this way, investments in voice call QoS would not be jeopardised by the possibility of competing operators offering low quality voice call services.

Impact on consumers

A 8.271 Consumers would likely prefer **Option 2** as this would ensure that the standards under current GSM licences are maintained for future licences for liberalised spectrum. **Option 1** may result in consumers receiving lower voice call QoS than that to which they have become accustomed.

A 8.272 Under **Option 1,** it is possible that consumers would suffer from a lower QoS than that to which they are currently accustomed.

Step 4 - Impact on competition

A 8.273 Neither option is likely to materially impact on the level of competition between mobile operators (including MNOs and MVNOs) provided that all such operators are subject to similar obligations. Option 1 could, however, result in operators competing at a lower level of voice call quality than would occur under Option 2, for the reason described above.

Step 5 - Preferred Option

A 8.274 Based on its Draft RIA, ComReg considers that **Option 2** - setting reasonable minimum voice call QoS standardsby means of conditions attached to future licences - would be in the best interests of consumers, for the following reasons:

1. imposing QoS standards for voice calls is appropriate because of the manner in which voice calls are transmitted. Voice calls can originate and terminate on different networks, and due to Mobile Number Portability a customer does not know which mobile network he/she is calling based solely on the customer's mobile number. Therefore a consumer who experiences poor voice call quality cannot determine whether the problem relates to his/her own network or to the network of the person on the other end of the line. . Setting QoS standards for voice calls can safeguard consumers in these circumstances.
2. ComReg imposed voice call conditions on previous GSM licences, which in some cases have now been in place for over 15 years (taking account of the interim 900 MHz licences granted to Vodafone and 02). Consumers now reasonably expect standards for their voice calls that are in line with the standards imposed by past and current GSM licences. ComReg considers that attaching similar standards to future licences for

liberalised spectrum is appropriate and in the interest of consumers as it would ensure a minimum QoS standard that is in line with current expectations.

3. The proposed QoS conditions for voice calls would not seem to place an onerous burden on operators, as they would likely have to deliver voice call services of this quality in any event in order to meet consumer expectations.

ComReg's Position

A 8.275 Based on the draft RIA, ComReg considers it appropriate to set voice call QoS conditions for all non-VoIP voice calls, in line with GSM standards for all liberalised licences. This would seem objectively justifiable, given present day user expectations as to the quality of voice calls and the risk that a lack of prescribed conditions might lead to a reduction in quality standards.

A 8.276 In the case of VoIP calls, ComReg considers that it would not be appropriate to set QoS conditions for VoIP voice call services. ComReg set out its position in relation to VoIP services in its Information Notice 10/91[515]:

"ComReg agrees with Analysys Mason's view (R14 and R17) [as set out in its Report 10/91a [516]] that monitoring the Next Generation Voice (NGV) market situation is the correct approach at this time, including monitoring customer complaints. This approach could change if BEREC or the European Commission publishes conclusions that intervention should be undertaken in some respect."

A 8.277 ComReg's proposed voice call QoS licence conditionconditionconditionand metrics are as set out in Table 2 below.

A 8.278 These specifications are based on the existing GSM /3G licences.

[515] ComReg Information Notice 10/91 "Future Regulatory Framework for Next Generation Voice Services including VoIP."

[516] Report for ComReg 10/91a. "Review of the regulatory framework for VoIP in Ireland"

Proposed QoS licence condition for Voice Calls If a licensee offers a mobile voice call service, it must comply with the following requirements.		
	Average	Worst Case
Maximum Permissible Blocking Rates **This refers to the maximum percentage of total call attempts which are unsuccessful during the time consistent busy hour.**[517]	2%	4%
Maximum Permissible Dropped Call Rates **This refers to the maximum percentage of total originating calls which are prematurely released by the network within 3 minutes of the call being made.**	2%	4%
Transmission quality **The licensee shall ensure that the speech transmission quality is as good or better than the speech quality associated with the GSM Standard and GSM Technical Specifications of ETSI. The licensee shall ensure that appropriate echo treatment equipment is used and that it is properly configured.**		

Table 10: Proposed Voice (non-VoIP) QoS licence condition

QoS Specific Proposal: Availability of the Network

A 8.279 In addition to proposals relating to specific service areas, ComReg also considered whether it would be appropriate to set a minimum standard in relation to the availability of the network using the spectrum.

Summary of ComReg's proposals in previous consultations

Consultation 09/99

A 8.280 In Consultation 09/99, ComReg was of the view that it would be appropriate to set licence conditions relating to network performance, in order to protect consumers against unreasonable levels of disruption. ComReg proposed to set a minimum standard relating to the availability of the network, requiring licensees to maintain a log of system availability and to ensure that weighted service unavailability is less than 35 minutes per 6 month period. **Table 11** below details ComReg's proposal.

[517] **"**Time consistent busy hour" means the period of one-hour starting at the same time each day for which the average traffic of the network concerned is greatest over the days under consideration. The 'Time consistent busy hour' is determined from the operator's voice traffic. It is the one-hour period during which there is the highest level of traffic. The blocked call rates are measured for the same one-hour period during each review period (i.e. 6 months). The one-hour period is determined by the operator and is subject to ComReg's approval.

Proposed Network QoS licence condition **The licensee shall maintain a log of system availability for any network using the licensed spectrum in whole or in part.** **The licensee shall ensure that service unavailability is less than 35 minutes (based on the weighting factors below) per six month period. Every six months, the licensee shall submit a compliance report to ComReg showing that the specified average network availability has been achieved.**			
Service Unavailability, Weighting Factors **(divide duration of each network event by weighting factor)**			
	Monday to Friday	Saturday	Sunday
For periods between 07.00 and 24.00	1	2	4
For periods between 00.00 and 07.00	4	8	16

Table 11: Proposed QoS conditions for network availability.

A 8.281 Question 28 of Consultation 09/99 sought the views of interested parties on this proposal.

Question 28 (Consultation 09/99) Do you agree with the ComReg's proposed QoS metrics for network performance and the level at which it is proposed to be set?

Views of respondents

A 8.282 Of the five respondents (Digiweb, eircom Group, H3GI, O2 and Vodafone) to Question 28 of Consultation 09/99, two (Digiweb[518] and H3GI[519]) agreed while three (Meteor, O2 and Vodafone[520]) disagreed.

A 8.283 Reasons provided by respondents who disagreed included:

- The proposed metrics would be contrary to service neutrality (O2[521]).
- Specifying network availability criteria in spectrum licences would be unnecessary as network operators have a clear incentive to provide a reliable service to their customers. Failure to provide a reliable service

[518] "*Agree"* Digiweb's response to question 28 of Consultation 09/99. Digiweb had also commented in response to question 11 of Consultation 09/14, "*The Quality of Service conditions should be set on a network level. This ensures that the consumers are likely to benefit from a good quality network."*

[519] "*Yes 3 agrees with ComReg's proposed QoS metrics for network performance and the level at which it is proposed."* H3GI's response to question 28 of Consultation 09/99 as in document 10/21r.

[520] Vodafone did not comment on the specific proposal but referenced its response to question 22 of Consultation 09/99 that it did not consider that ComReg had objectively justified the imposition of QoS obligations.

[521] *"O2 does not agree that ComReg should set QoS metrics in the licence as proposed – this is contrary to service neutrality."* O2's response to question 28 of Consultation 09/99 as in document 10/21r.

would lead to customer dissatisfaction and migration of those customers to competing service providers. (Meteor[522]).

- In conjunction with the Department of Communications, Energy and Natural Resources, ComReg has established procedures for reporting on network incidents, as provided for in legislation, which renders obsolete ComReg's proposed conditions maintenance of network logs (Meteor).

Draft final RIA on the imposition of QoS on service availability of the Network

Policy issues to be addressed and relevant objectives

ComReg's statutory functions and objectives in relation to radio spectrum

A 8.284 ComReg's statutory functions and objectives in relation to radio frequency spectrum are set out in **Annex 1.** These functions and objectives, and the degree to which these may be met under each of the different options, are discussed in more detail below.

Objectives in the context of the RIA analytical framework

A 8.285 The focus of the draft RIA is to identify the impact of the proposed measure on stakeholders (principally being existing operators (including MVNOs), potential new entrants and consumers) and competition and, in so doing, highlight the option that would best achieve ComReg's objectives in a proportionate manner.

A 8.286 The various RIA guidelines provide little guidance on how much weight should be given to the positions and views of each stakeholder group. Accordingly, ComReg has been guided by the statutory objectives which it must seek to achieve when exercising its functions. These objectives, which are described in Annex 1, include:

- the promotion of competition;
- contribution to the development of the internal market; and
- the promotion of the interests of EU citizens.

A 8.287 The primary objective to **promote competition**includes, amongst other things:

522 *"Meteor does not believe that it is necessary to specify network availability criteria in spectrum licences. In the first instance network operators have a clear string [sic] incentive to provide a reliable service to their customers. Failure to provide a reliable service would lead to customer dissatisfaction and migration of those customers to alternative competing service providers. It should also be noted that in conjunction with the Department of Communications Energy and Natural Resources, ComReg has established procedures for reporting on network incidents as provided for in existing legislation which renders obsolete ComReg's proposed conditionconditionconditionfor maintenance on network logs."* Meteor's response to question 28 of Consultation 09/99 as in document 10/21r.

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

A 8.288 It is also noteworthy that Ministerial Genereal Policy Direction No. 1 of 2004, states that ComReg shall focus on the promotion of competition as a key objective, including the promotion of new entry.

A 8.289 ComReg, in pursuit of these objectives, must apply the objective, transparent, non-discriminatory and proportionate regulatory principles described in Annex 1 of this document.

Policy issue

A 8.290 The policy issue to address is what network availability conditions should be imposed, in order to ensure that all users are offered a minimum service level by holders of liberalised licences in the 800 MHz, 900 MHz and/or 1800 MHz spectrum bands.

Regulatory options

A 8.291 The regulatory options being considered are as follows:

- **Option 1** – set no QoS conditions in respect of the availability of the network
- **Option 2** – Set minimum QoS conditions in respect of the availability of the network , based on current GSM license conditions , such that each licensee shall ensure that service unavailability shall be less than 35 minutes (based on weighting factors) per six month period, as proposed in Consultation 09/99.

Impact on operators

A 8.292 Operators may prefer **Option 1** as it would allow them full discretion over the reliability of their networks and they would not incur compliance costs associated with monitoring the performance of their network in line with ComReg's requirements.

A 8.293 **Option 2** would involve compliance costs, including capital expenditure and on-going monitoring.

Impact on competition

A 8.294 Neither option is likely to impact materially on competition as any conditions imposed would apply equally to all operators.

Impact on consumers

A 8.295 Consumers would prefer **Option 2 as** the network availability – the very ability to make or receive telephone calls –is of fundamental importance to them. If a network is unavailable there is huge consumer disruption (and not only to the network which is unavailable - customers on other networks which are up and running will also be affected given that all networks are interconnected).

A 8.296 Option 1 – to impose no QoS conditions in respect of the availability of the network - could have a negative impact on the availability of operators' networks and therefore on access to emergency services.

A 8.297 **Option 2** would ensure that consumers would be protected against an unreasonable level of disruption. Under **Option 2,** customers could complain to the regulator if their service provider did not meet its obligations. The regulator would act as a watchdog for consumers by ensuring that these QoS standards are met.

Preferred Option

A 8.298 Network availability.is fundamental to consumers, because no network means no service. Accordingly, ComReg considers it objectively justifiable, proportionate and necessary to set a licence condition relating to network performance, in order to protect consumers against unreasonable levels of disruption to their services.

ComReg's Position

A 8.299 For the reasons set out above, ComReg proposes to to set a minimum QoS standard in respect of network availability.

A 8.300 In ComReg's view, such a condition is not contrary to the principle of service neutrality, as argued by O2. Indeed it has nothing to do with service neutrality. The proposed condition on network availability would not oblige an operator to provide a particular service nor would it prevent an operator from providing a service. Rather it would be a general QoS condition which would cover all licensees regardless of the service(s) they choose to provide. It would be intended to ensure that network availability is maintained at a reasonable level, irrespective of the service(s) provided.

A 8.301 ComReg proposes the following:

- that each licensee shall be required to keep a log of network availability;
- that each licensee shall be required to ensure that network unavailability is less than 35 minutes per six month period; and
- that the calculation of service unavailability shall be subject to weighting factors that take account of traffic load variations, as set out in **Table 12** below.

A 8.302 Meteor queried the reporting procedures on network incidents. These were established under section 13B of the Communications Regulation (Amendment) Act 2007 and have been superseded by the revised Regulatory framework which establishes a common EU wide reporting mechanism. ComReg does not consider that the maintenance of a log of network availability would run counter to these provisions; rather it will merely aid ComReg in addressing any network failures, going forward.

Table 12: Network Availability QoS licence obligation.

Proposed Network QoS licence condition **The licensee shall maintain a log of system availability for any network using the licensed spectrum in whole or in part.** **The licensee shall ensure that service unavailability is less than 35 minutes (based on the weighting factors below) per six month period. Every six months, the licensee shall submit a compliance report to ComReg showing that the specified average network availability has been achieved.**			
Service Unavailability, Weighting Factors (divide duration of each network event by weighting factor)			
	Monday to Friday	Saturday	Sunday
For periods between 07.00 and 24.00	1	2	4
For periods between 00.00 and 07.00	4	8	16

Additional Considerations relating to QoS: Reporting on compliance obligations

Summary of ComReg's proposal in previous consultations

Consultation 09/99

A 8.303 In Consultation 09/99, ComReg was of the view that it would be appropriate to include a reporting provision on compliance obligations in any new liberalised licence issued, to ensure compliance and enable ComReg to monitor compliance and the continuing appropriateness of the obligations, and believes that the conditions in the existing GSM and 3G licences provide a good framework.

A 8.304 Question 32 of Consultation 09/99 sought the views of interested parties on this proposal.

Question 32 (Consultation 09/99) Do you agree with ComReg's proposed reporting on compliance obligations?

Views of respondents

A 8.305 All five respondents who responded to Question 32 of Consultation 09/99 (Digiweb, H3GI, Eircom Group, O2, Vodafone) were in agreement with the proposal.

A 8.306 Respondents did not address this matter in their responses to Consultations 10/71 and 10/105.

ComReg's position

A 8.307 ComReg will provide for a compliance reporting provision in the new licences. To enable ComReg to ensure that licensees are complying with their QoS conditions and accurately reporting on their compliance, ComReg is of the view that it would be appropriate to require licensees to provide to ComReg, on request, the following:

- maps showing Coverage as defined in the licence;
- an up to date list of the locations of the base transceiver stations;
- a mechanism for identifying the base station that is handling a call at any given time;
- an adequate number of test numbers.

Additional Considerations relating to QoS: Performance Guarantees for Minimum Network QoS

Summary of ComReg's proposals in previous consultations

Consultation 09/99

A 8.308 In Consultation 09/99, ComReg stated that it would be beneficial to have a range of appropriate sanctions relating to QoS obligations. ComReg proposed a performance guarantee of €1 million against the QoS obligations.

A 8.309 Question 33 of Consultation 09/99 sought the views of respondents on this proposal.

Question 33 (Consultation 09/99) Do you agree with ComReg's proposal to include a €1million performance guarantee against the QoS Obligations in any new 900 MHZ licence issued?

Consultation 10/71 and 10/105

A 8.310 In Consultation 10/105 ComReg stated that while the issue of performance bonds in relation to QoS measures was not explicitly addressed in Consultation 10/71 it intended to finalise its view on performance bonds in relation to any QoS measures having regard to the responses received.

Views of respondents

Consultation 09/99 (Question 33)

A 8.311 Of the five responses (Digiweb, eircom Group, H3GI, O2 and Vodafone) to Question 33 of Consultation 09/99, one respondent, O2, supported the use of performance bonds (only if it is appropriate to have QoS standards),[523] while the remaining four respondents (Digiweb, eircom Group, H3GI, Vodafone[524]) did not agree with the proposal regarding performance bonds against QoS obligations.

A 8.312 The respondents that disagreed made the following points:

- the inclusion of a performance bond would create un-necessary overheads for licensees and ComReg in maintaining and ultimately releasing these guarantees (Eircom Group[525]);
- the threat of a fine and the ultimate threat of withdrawal of the licences would be equally effective while carrying a far lower overhead cost of regulation that would result from performance guarantees (Eircom Group[526]);
- performance guarantees were unnecessary to ensure compliance with the proposed QoS obligations (H3GI[527]).

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523 *"Without prejudice to O2's view that QoS obligations should not be included, O2 agrees that in the circumstances where obligations are imposed, there should be a performance guarantee bond. €1m would seem to be the minimum that could provide an adequate incentive."* O2's response to question 33 of Consultation 09/99 as in document 10/21r.

524 Vodafone did not comment on the specific proposal but referenced its response to question 22 of Consultation 09/99 that it did not consider that ComReg had objectively justified the imposition of QoS obligations.

525 In its response to question 33 of Consultation 09/99, Meteor stated its disagreement with ComReg's proposal to include a €1 million performance guarantee against the QoS obligations in any new 900 MHz licence issued, and referred to its response to question 21 in which it commented, *"...there should not be any need for such guarantees. Such a requirement would merely create un-necessary overhead for the Licensees and indeed ComReg in maintaining and ultimately releasing these guarantees.*"

526 In its response to question 21 of Consultation 09/99, Meteor also stated, "In Meteor's view the threat of a fine coupled with the ultimate threat of licence withdrawal would be equally effective while carrying a far lower overhead cost of regulation than that which would result from guarantees. Such overhead cost would only be brought to bear in the case of a default and based on ComReg's experience of the existing licensing regime, the likelihood of a default is minimal."

527 *"No, 3 does not agree with ComReg's proposal to include a €1 million performance guarantee against the QoS obligations in any new 900 MHz licence issued. 3 does not believe that a €1 million performance guarantee is necessary to ensure compliance with ComReg's proposed QoS obligations in any new 900 MHz licence issued."* H3GI's response to question 33 of Consultation 09/99 as in document 10/21r.

ComReg's position

A 8.313 ComReg is of the view that Performance Guarantees are an appropriate sanction in the event of non-compliance with licence conditions. As part of the 3G licence competition applicants provided voluntary performance guarantees well in excess of what is proposed in this consultation process. The fact that ComReg has not had to exercise these performance guarantees to date illustrates that they have acted as an incentive to ensure licence compliance. ComReg holds the view that these are a proven and relatively inexpensive tool in ensuring compliance with licence conditions and do not themselves require any third party interaction such as the courts.

A 8.314 Given the importance of ensuring a minimum network QoS standard on the provision of services to consumers, ComReg will include a performance guarantee of €1 million against the QoS obligations in any new 800MHz, 900 MHz or 1800 MHz licence issued.

Additional Considerations relating to QoS: Review of Minimum Network QoS Standards

Summary of ComReg's proposals in previous consultations

Consultation 09/99

A 8.315 In Consultation 09/99, ComReg stated that it may be appropriate to carry out a review at regular intervals to ensure that applicable QoS standards remain appropriate. ComReg cited the pace of change in communications technologies and markets, and that consumer experiences and preferences will continue to evolve markedly over the period ahead, stretching up to 2030 when the proposed new licences would expire. In this context ComReg stated that it might be appropriate therefore to anticipate a need for review of QoS standards.

A 8.316 Question 31 of Consultation 09/99 sought the views of respondents on ComReg's proposed review of QoS obligations over the lifetime of the licence.

> Question 31 (Consultation 09/99) Do you agree that it is reasonable for ComReg to review and possibly update the QoS standards over the lifetime of the licence, such as every 5 years, or as appropriate due to changes in the market?

Consultation 10/71

A 8.317 ComReg did not ask a specific question on this matter in Consultation 10/71 but sought the views of respondents on its proposals in Question 16 of 10/71.

> Question 16 (Consultation 10/71) ComReg proposes to set a quality of service condition 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.

Consultation 10/105

A 8.318 In Consultation 10/105 ComReg expressed the view that the inclusion of the 1800 MHz band in the joint award process did not affect the proposed QoS obligations and as such ComReg stated its intention to finalise its view on this issue having given due regard to the responses received.

Views of respondents

A 8.319 Ericsson stated in the bilateral meeting held on 1 July 2009 that ComReg, in conjunction with the operators, could consider establishing agreed QoS for key of services offered (e.g. voice, SMS, data) and due to the pace of change of technologies and business conditions it would be appropriate to review these QoS licence conditions at regular intervals such as every five years.[528]

Consultation 09/99 (Question 31)

A 8.320 All four respondents to Question 31 of Consultation 09/99 (Digiweb[529], eircom Group, H3GI and O2[530]) disagreed with ComReg's proposal that QoS obligations should be subject to a review over the lifetime of the licence because, for the purposes of making an investment in spectrum, a participant in the award process

528 *"Ericsson was asked how QoS could be defined in terms of a technology neutral licence regime. Ericsson responded that ComReg in conjunction with the operators could consider establishing agreed QoS for key [sic] of services offered (e.g. voice, sms, data) and due to the pace of change of technologies and business conditions it would be appropriate to review these QoS licence conditions at regular intervals such as five years."* ComReg Document 09/73 – non-confidential minutes of bilateral meetings - page 4 of Ericsson minutes

529 Digiweb stated that *"a review of QoS standards of existing services with a view to updating should not form part of a license award,"* Digiweb's response to question 31 of Consultation 09/99 as in document 10/21r.

530 O2 stated that *"ComReg's inability to know even what services would be provided (let alone what the appropriate metrics would be) is one of the drawbacks of attempting to impose service specific obligations."* O2's response to question 31 of Consultation 09/99 as in document 10/21r.

would need certainty in respect of its future licence obligations (H3GI[531] and Eircom Group[532]).

Consultation 10/71

A 8.321 In its response to Consultation 10/71 eircom Group stated that there was a clear contradiction between ComReg's statement that "we can observe the trend in mobile 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" and its proposals to intervene in respect of establishing minimum network QoS standards.

ComReg's position

A 8.322 Regulation 15 of the Authorisation Regulations 2011 makes provision, among other things, for amendments to the conditions attached to rights of use for radio frequencies.[533] Any such amendments may only be made in objectively justified cases and in a proportionate manner.

A 8.323 Given the pace of change in the telecommunications industry and the need to ensure that consumers, including disabled users, benefit from these changes ComReg is minded to include a provision to review of the QoS conditions attached to liberalised licences in the 800 MHz, 900MHz and 1800 MHz bands.

A 8.324 The review would need to take account of market developments and be justified and proportionate in light of the circumstances then prevailing, which cannot be predicted today with any certainty. Nonetheless, ComReg notes that the trend in mobile 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, along with technological innovation, have reduced reliance on administratively assured standards.

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531 *"3 does not agree that it is reasonable for ComReg to review and possibly update the QoS standards over the lifetime of a licence, such as every 5 years, or as appropriate due to changes in the market. For the purposes of making an investment in spectrum, a prospective licensee needs certainty in respect of its future licence obligations."* H3GI's response to question 31 of Consultation 09/99 as in document 10/21r.

532 *"Meteor does not consider it appropriate to provide for a review of any quality of service obligations that might be applied. This would introduce additional uncertainty to both the licence award process and the licences themselves."* Meteor's response to question 31 of Consultation 09/99 as in document 10/21r.

533 S.I. No. 335/2011 — European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 Regulation 15"*The Regulator may amend the rights, conditions and procedures concerning the general authorisation, rights of use for radio frequencies and rights of use for numbers provided that any such amendment may only be made in objectively justified cases and in a proportionate manner, taking into consideration, where appropriate, the specific conditions applicable to transferable rights of use for radio frequencies."*

A 8.325 To guard against excessive uncertainty about regulatory intentions, ComReg notes that:

- it would intend to engage in a consultation process in respect of such variations;
- any variations would be subject to the usual statutory safeguards;
- reviews would be carried out no more often than ComReg, in the proper exercise of its discretion viewed as appropriate; and
- in view of the extensive set of consultations that have informed the current Spectrum Liberalisation process, ComReg does not currently anticipate any review being necessary for the first five years at least.

A 8.326 ComReg does not now propose to include a licence provision stating that ComReg may, from time to time, carry out such reviews as it considers appropriate, including with respect to QoS, in accordance with Regulation 15 of the Authorisation Regulations 2011.

8.4 Other Licence Conditions

A 8.327 In ComReg's previous consultations on the release of the 900 MHz spectrum band (potentially coupled with the 800 MHz band or with the 800 and 1800 MHz bands), a number of licence conditions were considered. Such conditions, if implemented, would be included in the eventual licences granted by ComReg in accordance with section 5 of the Wireless Telegraphy Act, 1926, as amended. This section considers the following proposed licence conditions as, unlike other licence conditions considered elsewhere in this document, ComReg is proposing not to include these conditions in new licences issued pursuant to this assignment process for the reasons set out below:

1. Non-Ionising Radiation
2. International Roaming Capability
3. Access to Emergency Services
4. Billing
5. Broadband

Non-Ionising Radiation ("NIR")

A 8.328 Non-Ionising Radiation ("NIR") is the part of the electromagnetic spectrum below 3000 million MHz (3×10^{15} Hz). Radio waves, infrared radiation and visible light are examples of NIR.[534]

[534] NIR includes all radiations and fields of the electromagnetic spectrum that do not normally have sufficient energy to produce ionisation in matter and is characterised by energy per photon of less than about 12 eV and wavelengths greater than 100 nm. Electromagnetic waves at frequencies above 3000

A 8.329 The International Commission on Non-Ionizing Radiation Protection ("ICNIRP") is an independent body established to provide guidance and recommendations on protection from non-ionising radiation exposure.[535] As part of its remit, the ICNIRP issues guidelines on measures which should be taken by mobile network operators ("MNOs") to protect the public against the effects of NIR. To date, an obligation to comply with these measures has been set out as a condition in all licences granted by ComReg to MNOs operating in the State.

Summary of ComReg's proposals in previous consultations

Consultation 09/99

A 8.330 In Consultation 09/99, ComReg proposed to include an NIR condition in all new licences issued in the 900 MHz band identical to that found in existing licences:

"The Licensee shall ensure that non-ionising radiation emissions from the Apparatus operated by the Licensee are within the limits specified by the guidelines published by ICNIRP, any radiation emission standards adopted and published by ICNIRP, or its successors, from time to time, any radiation emission standards of the European Committee for Electrotechnical Standardization and any radiation emission standards specified by national and European Community law;

The Licensee shall ensure that the Apparatus operated by the Licensee is not installed or operated at a location in a manner which causes the aggregate non-ionising radiation emissions at that location to exceed the limits specified by any guidelines published by ICNIRP and that it complies with any radiation emission standards adopted and published by ICNIRP, or its successors, any radiation emission standards of the European Committee for Electrotechnical Standardization and any radiation emission standards specified by national and European Community law;"

A 8.331 Question 34 of Consultation 09/99 asked:

Question 34 of Consultation 09/99 Do you agree with ComReg's proposed non-ionising radiation licence condition?

Consultation 10/71

A 8.332 In Consultation 10/71, ComReg proposed to include the 800 MHz band in a joint award with the 900 MHz band. In that consultation, ComReg proposed to include the same NIR condition as set out in Consultation 09/99 in licences in the 800 MHz band. Question 17 of that consultation asked:

million MHz are known as ionising radiation and this includes X-rays and Gamma rays as well as some Ultraviolet radiation.

[535] The ICNIRP was established in 1992. It operates in co-operation with the Environmental Health Division of the World Health Organisation and the United Nations Environment Programme.

A 8.333 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.

Consultation 10/105

In Consultation 10/105, ComReg proposed to include the 1800 MHz band in a joint award with the 800 MHz and 900 MHz bands. In that consultation, ComReg proposed to include the same NIR condition as discussed in Consultation 10/71 in any new 1800 MHz licences issued. ComReg noted that it had received responses on this issue in previous consultations and that its final position would have regard to those responses already received. ComReg did not include a specific question on this issue in Consultation 10/105.

Summary of Respondents Views

Question 34 of Consultation 09/99

A 8.334 ComReg received six responses to this question, from BT, Digiweb, eircom, H3GI, O2 and Vodafone. Five respondents (BT, Digiweb, H3GI, O2, and Vodafone) were in favour of including an NIR condition in any new liberalised licences issued, while one respondent, eircom, did not support ComReg's proposal.

A 8.335 While not opposed to the principle of ComReg's proposal, eircom argued that the proposed NIR obligation already exists in the General Authorisation as provided for in the Annex to the Authorisation Directive, and therefore the inclusion of this condition in the new 900 MHz licences would result in unnecessary duplication.

A 8.336 BT provided a specific comment in relation to the ICNIRP guidelines. It believed that the guidelines should be applied in an appropriate manner and should therefore be applied specifically for those areas where the public can gain access, rather than for hypothetical cases. BT noted:

"that at some locations, base stations may be co-located with other transmitting equipment, including backhaul links with directional antennas, and there may be locations (e.g. immediately in front of a directional antenna) where the electric field strength could be higher than normal, but where there is no realistic possibility of a member of the public gaining access."

A 8.337 ComReg considers that its stated methodology for conducting NIR surveys, as set out in ComReg Document 08/51R[536], is in line with BT's view and that no further action is required in this regard.

[536] Section 1 of ComReg Document 08/51R states that: *"Each survey involves measurement and recording of NIR emission levels at the point of highest emissions (in a public area) associated with the transmitter and a subsequent comparison of the levels with the ICNIRP Limits."*

Question 17 of Consultation 10/71

A 8.338 ComReg received ten responses to this question, from eircom, Ericsson, ESBN, H3GI, Imagine, O2, Qualcomm, RTENL, UPC and Vodafone. Nine of the ten respondents (Ericsson, ESBN, H3GI, Imagine, O2, Qualcomm, RTENL, UPC and Vodafone) supported ComReg's proposal.

A 8.339 Ericsson noted that these obligations deal with a range of standard, non-controversial issues and ComReg's proposal to include them in operators' licences looks sensible.

A 8.340 UPC considered ComReg's proposal to be reasonable

A 8.341 One respondent, eircom, maintained the position which it had expressed in its response to Question 34 of Consultation 09/99.

ComReg's Position

A 8.342 From the views of respondents, ComReg notes that the majority of respondents supported the inclusion of such a condition, noting amongst other things that it covered a range of standard technical requirements and that it seemed reasonable and sensible to include it. One respondent, eircom, did not oppose the inclusion of such a condition as a general principle, but instead pointed to the fact that the condition already exists in the General Authorisation[537] and therefore its separate inclusion in the new liberalised spectrum licences would result in unnecessary duplication.

A 8.343 ComReg, having considered all submissions and having given further careful consideration to the provisions of the Authorisation Regulations and various other provisions concerning NIR, agrees with and accepts eircom's submission in this matter. Part 2, Section 8 of the General Authorisation states the following:

Electromagnetic Radiation

8.1 The Authorised Person shall comply with any radiation emission standards adopted and published by the International Commission for Non-Ionising Radiation Protection (ICNIRP) or its successors from time to time; any radiation emission standards of the European Committee for Electrotechnical Standards and any other radiation emission standards specified by law.

8.2 The Authorised Person shall ensure that non- ionising radiation emissions from apparatus operated by the Authorised Person are within the limits specified by the guidelines published by ICNIRP.

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http://www.comreg.ie/_fileupload/publications/ComReg0851R.pdf

[537] The current version of the General Authorisation is Document 03/81R3, originally published on 25 July 2003 and published in its current version on 23 March 2011

8.3 The Authorised Person shall ensure that apparatus operated by the Authorised Person is not installed or operated at a location in such a manner as to cause the aggregate of non- ionising radiation emissions to exceed the limits specified by the guidelines published by ICNIRP.

A 8.344 Under Regulation 10(1) of the Authorisation Regulations, ComReg may only attach to rights of use for radio frequencies those conditions which are listed in Part B of the Schedule to the Regulations. ComReg notes that Condition 3 of Part B states that ComReg may only attach technical and operational conditions necessary for the avoidance of harmful interference and for the limitation of exposure of the general public to electromagnetic fields, **where such conditions are different from those included in the general authorisation**. In this regard, ComReg notes that such a condition is already contained in Part 2, Section 8 of the General Authorisation, as set out above.

A 8.345 Furthermore, ComReg notes that Regulation 8(6) of the Authorisation Regulations provides that, where a requirement is specified as a condition of a licence, such a requirement must not be specified as a condition of a general authorisation in respect of the networks or services concerned. In addition, Regulation 10(3) of the Authorisation Regulations provides that, where a requirement is specified as a condition of a right of use for radio frequencies, such a requirement must not be specified as a condition of the general authorisation in respect of the right of use concerned. ComReg would note that the above two provisions, when read in light of the wording of Article 6(4) of the Authorisation Directive (to which these provisions are intended to give effect), should probably be interpreted as precluding the imposition of licence conditions where those conditions are already included in the General Authorisation.

A 8.346 It is clear from the above statutory provisions that NIR conditions may be set out in licences granted under the Wireless Telegraphy Act 1926 *or* in the General Authorisation, but should not be in both. As it is expected that all recipients of licences issued in these bands will be authorised in accordance with Regulation 4 of the Authorisation Regulations, and thus be subject to the conditions of the General Authorisation (in particular Part 2, Section 8), ComReg considers that the current NIR conditions in the General Authorisation are sufficient and that the General Authorisation is the appropriate legal instrument in which to place them.

A 8.347 For this reason, ComReg does not propose to include any NIR conditions in future licences issued in the 800, 900, or 1800 MHz spectrum bands.

A 8.348 It is especially important to note that ComReg does not consider that this decision will to any extent constitute a lessening of current obligations on providers of electronic communications network or services. ComReg is committed to ensuring that international NIR safety standards are maintained at all times by all operators in the State. The only difference would be that ComReg would impose and enforce the NIR conditions solely by application of its powers under the Authorisation Regulations.

A 8.349 In relation to the specific issue raised by BT in relation to the application of the ICNIRP guidelines, ComReg believes that its stated methodology for conducting NIR surveys as set out in ComReg Document 08/51R[538] is in line with BT's view and no further action is required.

International Roaming Capability

A 8.350 International roaming refers to the ability of mobile users to use their mobile devices both at home and abroad. International roaming services can vary by operator but generally they cover such services as voice, messaging, and data.

Summary of ComReg's Proposals in Previous Consultations

Consultation 09/99

A 8.351 In Consultation 09/99, ComReg proposed to include an international roaming capability condition in all new licences for liberalised 900 MHz spectrum. ComReg proposed that this condition would be similar to the international roaming capability condition in the existing GSM and 3G licences, which states:

1. *The Licensee shall establish and maintain as part of its Mobile Service an international roaming capability for its customers that is as wide and comprehensive as is practicable.*
2. *Where requested to do so, the Licensee shall provide to members of the public, maps from other 2G and 3G operators with whom it has international Roaming Agreements showing the Coverage provided by them.*

A 8.352 Question 35 of Consultation 09/99 asked: Do you agree with ComReg's proposed international roaming capability licence condition?

Consultation 10/71

A 8.353 In Consultation 10/71, ComReg proposed to include the 800 MHz band in a joint award with the 900 MHz band. In that consultation, ComReg proposed to include the international roaming capability condition in any future 800 MHz licences.

Question 17 of Consultation10/71 asked. 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.

[538] Section 1 of ComReg Document 08/51R states that: *"Each survey involves measurement and recording of NIR emission levels at the point of highest emissions (in a public area) associated with the transmitter and a subsequent comparison of the levels with the ICNIRP Limits."*

http://www.comreg.ie/_fileupload/publications/ComReg0851R.pdf

Consultation 10/105

A 8.354 In Consultation 10/105, ComReg proposed to include the 1800 MHz band in a joint award with the 800 and 900 MHz bands. In that consultation, ComReg proposed to include the international roaming capability condition in any future 1800 MHz licences. ComReg noted that it had received responses on this issue in previous consultations and that its final position would have regard to those responses already received. ComReg did not include a specific question on this issue in Consultation 10/105.

Summary of Respondents Views

A 8.355 This section summarises the views of respondents received on ComReg's proposed international roaming capability condition. These views were submitted in response to Question 35 of Consultation 09/99 and Question 17 of Consultation 10/71.

Question 35 of Consultation 09/99

A 8.356 ComReg received five responses to this question, from BT, Digiweb, H3GI, O2, and Vodafone.

A 8.357 Three respondents (Digiweb, H3GI and O2) were in favour of the proposal, though O2 noted that technology neutral licences may mean that a service provider might deploy a technology that has limited scope for the provision of international roaming while Digiweb submitted that this condition should be limited to voice services only.

A 8.358 Two respondents (eircom, Vodafone) did not support ComReg's proposal.

A 8.359 eircom considered that the commercial attractiveness of roaming services has already rendered the roaming conditions in the current 2G licences superfluous. It did not believe that ComReg's proposal to include such a condition in future licences could be objectively justified.

A 8.360 Vodafone considered that current competition for the provision of electronic communications services in Ireland is such that an international roaming capability provision will continue to be provided by operators on competitive terms. It therefore submitted that the proposed international roaming condition is neither proportionate nor justified.

Question 17 of Consultation 10/71

A 8.361 ComReg received nine responses to this question, from eircom, Ericsson, ESBN, H3GI, Imagine, O2, Qualcomm, UPC and Vodafone.

A 8.362 Seven of the respondents (Ericsson, ESBN, H3GI, Imagine, O2, Qualcomm, UPC) supported ComReg's proposal. For example:

- Qualcomm noted that mobile broadband international roaming for UMTS 900 will be supported for years to come and it noted that HSPA900 is commercially deployed in 18 networks and that 401 devices have been launched by 65 suppliers (source GSA);
- Ericsson noted that these obligations deal with a range of standard, non-controversial issues and ComReg's proposal to include them in operators' licences looks sensible;
- UPC considered ComReg's proposal to be reasonable; and,
- Two respondents (eircom, Vodafone) did not support ComReg's proposal and maintained their positions as set out previously in their responses to Question 35 of Consultation 09/99.

ComReg's position

A 8.363 ComReg has given further consideration as to whether such a condition would be proportionate; having regard to Regulation 10(2) of the Authorisation Regulations which stipulates that any condition attached to a right of use for radio frequencies must be proportionate and must accord with Regulation 17 of the Framework Regulations. In addition, ComReg must comply with the Policy Direction of the Minister of 21 February, 2003, on regulation only where necessary (Policy Direction No. 5), which provides that, where ComReg has a discretion as to whether to impose regulatory obligations, it shall, before deciding to impose such regulatory obligations on undertakings, examine whether the objectives of such regulatory obligations would be better achieved by forbearance from imposition of such obligations and reliance instead on market forces.

A 8.364 The power to impose a condition related to international roaming is discretionary. In exercising that discretion, ComReg must consider whether the condition is proportionate and whether the objectives of the condition would be better achieved by regulatory forbearance and reliance instead on market forces.

A 8.365 ComReg considers that the four MNOs in the current Irish market for the provision of retail mobile telephony services compete on the quality and cost of their respective services and that this includes the provision of an international roaming service. It would appear that MNOs provide such a service because their customers expect and require it, and that if any MNO did not provide such a service then it is not unlikely that many of its customers would switch to another service provider. ComReg therefore considers that there is no need to impose an international roaming condition in future licences for liberalised spectrum in the 800, 900 or 1800 MHz bands, as market forces should provide a sufficient incentive for licensees to provide such a service. ComReg has no information before it to suggest that operators licensed to use liberalised 800 MHz, 900 MHz and/or 1800 MHz spectrum under the proposed assignment process would not anyway offer voice, messaging and data international roaming services to its customers in the absence of licence condition requiring same, at least where the provision of such services were practical and continued to be demanded by its customers generally.

A 8.366 ComReg notes the comment from O2 that a licensee might deploy a technology which could have limited scope for international roaming. While ComReg considers this unlikely given the technologies that may be deployed in these bands[539], the decision not to impose any international roaming licence condition should anyway address O2's concerns.

Access to the Emergency Services

Summary of ComReg's proposals in previous consultations

A 8.367 In Consultation 09/99, ComReg proposed including conditions in new 900 MHz licences concerning access to emergency services. Under the proposed conditions, future licensees would be required to provide free access to the emergency services and to comply with two caller location requirements:

"the licensee shall make caller location information available free of charge to the emergency services as soon as the call reaches that authority handling the emergency call"; and

"ComReg may give directions in writing to the licensee in relation to the required criteria for the accuracy and reliability of the location information to be provided to the Emergency Services."

A 8.368 In proposing the above, ComReg noted that there are important societal benefits to having free access to the emergency services and that such a condition is found in existing GSM and 3G licences. ComReg also noted that it is generally recognised that accurate caller location is an important factor in helping the emergency services respond quickly and effectively, therefore saving lives and/or reducing the severity of injuries,[540] and that the proposed caller location provisions were in line with the proposed amendments to the EU Citizens' Right Directive (Directive 2009/136/EC).

A 8.369 In addition, ComReg also considered the access to emergency services for disabled end-users and in particular SMS access to the emergency services. ComReg noted that the Department of Communications Energy and National Resources (DCENR) was consulting on this issue[541] and as that consultation was on-going it was not yet clear to ComReg whether it would be appropriate to include SMS access (and its associated mobile call location information provisions) as part of this proposed licence condition.

[539] See Annex 5 which discusses the list of technologies permitted in the 800 MHz band, 900 MHz and 1800 MHz bands and lists GSM, UMTS, LTE and WiMAX as the technologies that are likely to be deployed.

[540] The need for accurate mobile caller location has also been noted by other European initiatives, such as the EC eCall initiative. COM2009/434 – 'eCall: Time for Deployment' - 28 August 2009 - http://www.parliament.bg/pub/ECD/COM_2009_434_EN_ACTE_f.doc

[541] Consultation on services for the disabled community http://www.dcenr.gov.ie/Communications/Business+and+Technology/Emergency+Call+-+112/Emergency+Call+Answering+Service.htm

A 8.370 Question 36 of Consultation 09/99 asked:

> Do you agree with ComReg's proposed licence conditions on access to emergency services and calling location information?

Consultation 10/71

A 8.371 In Consultation 10/71, ComReg proposed to include the 800 MHz band in a joint award with the 900 MHz band. In that consultation, ComReg proposed to apply the same access to emergency services conditions as set out in Consultation 09/99, with the exception that the wording of the condition would be amended to specify that information would be passed *"to the authority handling the emergency services"* instead of *"to the emergency services"*. This proposed change reflected the text of the harmonised European regulatory framework, updated in 2009, and was suggested by one respondent to Consultation 09/99.

A 8.372 Additionally, and in line with the provisions of the Universal Service Directive (as amended), ComReg stated that it proposed to consult before issuing any directions on the criteria for the accuracy and reliability of the location information to be provided to the emergency services.

A 8.373 ComReg also recognised that in the future it may be more appropriate to instead attach emergency services conditions to the General Authorisation or to rely on the provisions of the Universal Service and Users' Rights Regulations, rather than attach them as a condition to any licence granted under the Wireless Telegraphy Act, 1926.

Question 17 of Consultation 10/71 asked:

> 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.

Consultation 10/105

A 8.374 In Consultation 10/105, ComReg proposed to include the 1800 MHz band in a joint award with the 800 MHz and 900 MHz bands. ComReg also proposed that it would include in any new 1800 MHz licences the same access to emergency services conditions as proposed in Consultation 10/71. ComReg noted that it had received responses on this issue in previous consultations and that its final position would have regard to those responses already received. ComReg did not include a specific question on this issue in Consultation 10/105.

Summary of Respondents Views

A 8.375 This section summarises the views of respondents, in response to Question 36 of Consultation 09/99 and Question 17 of Consultation 10/71.

Question 36 of Consultation 09/99

A 8.376 ComReg received five responses to this question, from Digiweb, eircom, H3GI, O2, and Vodafone. All five respondents supported the principle of an access to the emergency services obligation, but had different views regarding its appropriateness as a licence condition.

- eircom and O2 were of the view that the proposed provision should be attached to the General Authorisation instead of being a condition to a licence under the Wireless Telegraphy Act, 1926.
- eircom also noted that these obligations apply generally to undertakings providing publicly available electronic communications services.
- Digiweb, H3GI and Vodafone supported the proposed condition.
- H3GI stated that *"ComReg should replicate the current Access to Emergency Service provisions in the existing GSM and 3G licences in any new 900 MHz licence issued"*, as "*otherwise, any operator that does not have an existing GSM or 3G licence will not have any Access to Emergency Service obligation"*[542].

A 8.377 Two respondents commented on specific matters:

- eircom submitted that the wording of the proposed condition should be more general. It stated that[543]:

"the proposed wording suggests that licensees will have full control over the availability of location information to the emergency services. However the mechanisms that are currently being put in place to provide location information to emergency services requires operators to provide sufficient information with respect to caller location to allow the authority handling the emergency call (ECAS) to convey location information to the emergency services. As licensees will not be directly providing location information to the emergency services they cannot, therefore, accept responsibility for ensuring that location information provided to the authority ultimately reaches the emergency services."

- In relation to mobile caller location information, Vodafone submitted that[544] *"ComReg consult extensively with licensees before any directions are issued so that social and public safety objectives can be achieved in the most effective and proportionate manner."*

[542] See H3GI response to consulatation 09/99 in document 10/21r.

[543] See eircom response to consultation 09/99 in document 10/21r.

[544] See Vodafone response to consultation 09/99 in document 10/21r.

Question 17 of Consultation 10/71

A 8.378 ComReg received nine responses to this question from eircom, Ericsson, ESBN, H3GI, Imagine, O2, RTE, UPC and Vodafone[545].

A 8.379 Six of the respondents (Ericsson, ESBN, H3GI, Imagine, O2, UPC) supported ComReg's proposal:

- Ericsson noted that these obligations deal with a range of standard, non-controversial issues and that ComReg's proposal to include them in operators' licences looks sensible;
- UPC considered ComReg's proposal to be reasonable;
- Two respondents (eircom, Vodafone) suggested that it would be more appropriate to attach emergency services obligations as a condition of the General Authorisation instead of as a condition of a Wireless Telegraphy licence;
- eircom stated that its view remained the same as that put forward in their response to Consultation 09/99; and,
- Vodafone modified its position somewhat when it considered this approach *"would more effectively meet ComReg's statutory objectives"* as such obligations *"would then apply, in a non-discriminatory manner, to all providers of electronic communications services rather than a subset of operators (those holding the proposed new 800 MHz and 900 MHz licences)."*

A 8.380 One respondent, RTE, did not provide a view on whether it supported ComReg's proposal, but stated that:

"the application of emergency service obligations in a frequency band with known, but not fully understood, incompatibility issues with high power services in an adjacent band would be unwise in case interference problems emerged"; and

"emergency service access implies voice services which may limit licensees in how they would like to use the spectrum".

ComReg's position

A 8.381 First, ComReg notes that the imposition of an access to the emergency services obligation does not appear to fall within any of the licence conditions allowed under Part B of the Schedule to the Authorisation Regulations.

A 8.382 Second, ComReg notes that Regulation 20 of the Universal Service and Users' Rights Regulations already provides as follows:

[545] See document 10/103r for reponses to consultation 10/71.

(1) An undertaking providing end-users with an electronic communications service for originating national calls to a number or numbers in the national numbering scheme (including public pay telephones) shall ensure that such end-users are able to call the emergency services free of charge and without having to use any means of payment by using the single European emergency call number "112" and any national emergency call number that may be specified by the Regulator.

(2) (a) Undertakings providing an electronic communications service for originating national calls to a number or numbers in a national telephone numbering plan (including public pay telephones) shall ensure that disabled end-users can enjoy access to emergency services equivalent to that enjoyed by other end-users.

(b) The Regulator may, following consultation with the Minister, specify obligations applicable to undertakings for the purpose of compliance with subparagraph (a). Any obligation specified in order to ensure that disabled end-users are able to access emergency services whilst travelling in other Member States shall be based to the greatest extent possible on, but not limited to, European standards or specifications published in accordance with the provisions of Article 17 of the Framework Directive.

(3) An undertaking providing end-users with an electronic communications service for originating national calls to a number or numbers in the national telephone numbering plan (including public pay telephones) shall make caller location information available free of charge to the authority handling emergency calls as soon as the call reaches that authority. This obligation shall apply to all calls to the single European emergency call number "112" and any national emergency call number that may be specified by the Regulator.

(4) For the purpose of paragraph (3), the Regulator shall, in consultation with the Minister, lay down criteria pertaining to the accuracy and reliability of the caller location information provided and the undertaking referred to in paragraph (3) shall comply with such criteria.

(5) The Regulator may, in consultation with the Minister, specify obligations for compliance by undertakings of any particular class or classes that may be specified by the Regulator for the purpose of ensuring that members of the public are adequately informed about the existence and use of the single European emergency call number "112", in particular through initiatives specifically targeting persons travelling between Member States.

(6) An undertaking that fails to comply with—

(a) a requirement of paragraph (1), (2), (3) or (4), or

(b) an obligation specified under paragraph (5),

commits an offence.

(7) In proceedings for an offence under paragraph (6) it is a defence to establish that—

(a) reasonable steps were taken to comply with the relevant requirement or obligation, or

(b) it was not possible to comply with the relevant requirement or obligation.

A 8.383 Regulation 20(1), of itself, imposes a clear and direct obligation upon any undertaking providing telephone services in the State to provide free access to emergency services. In this regard, ComReg notes the provisions of Regulation 8(4) of the Authorisation Regulations which prohibits the attachment of a condition to the General Authorisation any conditions which are applicable to undertakings by virtue of other law (here the Universal Service and Users' Rights Regulations). In any case, ComReg considers that there is no purpose in re-stating or re-creating such an obligation by including it as a licence condition or as a condition to the General Authorisation.

A 8.384 However, interested parties should note that ComReg shall at all times reserve the right to lay down criteria pertaining to the accuracy and reliability of caller location information (under Regulation 20(4)) or to specify obligations for the purpose of ensuring that members of the public are adequately informed about the "112" number (under Regulation 20(5)). ComReg shall only do so following consultation with the Minister. ComReg may exercise either of these powers at any time *after* new licences for liberalised spectrum have been granted subject of course to any measure it takes being necessary, non-discriminatory, justified, and proportionate.

Billing

Summary of ComReg's proposals in previous consultations

Consultation 09/99

A 8.385 In Consultation 09/99, ComReg proposed including billing conditions in the new liberalised licences equivalent to those in the current GSM and 3G licences, as ComReg considered that such conditions strike a good balance between safeguarding the interests of consumers without imposing unnecessary costs on licensees. ComReg proposed the following[546]:

- The licensee shall provide a transparent, disaggregated bill to its customers so as to allow them to determine the costs of individual services. The bill must be provided in paper format unless agreed otherwise with individual customers;
- Services which are charged based on usage (rather than on a flat rate) should clearly indicate the usage metric. Calls must be charged on a per second basis. Data services must be charged on a per usage basis.
- The licensee shall ensure that bills are accurately generated.

[546] See Section 15.6.9 of Consultation 09/99 for more details.

- The licensee shall take appropriate measures to detect cases of possible fraud including measures to identify rapidly abnormal calling patterns.

A 8.386 Questions 29 of Consultation 09/99 asked:

Do you agree with the ComReg's proposed billing obligation?

Consultation 10/71

A 8.387 In Consultation 10/71, ComReg reiterated its proposal to impose billing conditions, with one additional condition that paper bills should be specified as the standard, default format of a bill that consumers should receive from their providers, unless agreed otherwise with *"the expressed prior written consent of the customer".*[547]

A 8.388 Whilst maintaining its previous position that a billing condition should be attached to the new liberalised licences, ComReg also noted that in future it may become more appropriate to attach billing conditions to the General Authorisation rather than to licences.

A 8.389 Question 16 of Consultation 10/71 asked:[548]

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.

Consultation 10/105

A 8.390 In Consultation 10/105 ComReg expressed the view that the inclusion of the 1800 MHz band in the joint award process would not affect the proposed QoS obligations, including billing conditions. ComReg stated its intention to finalise its view on licence conditions having regard to the responses received.

[547] Section 4.6.4 of Consultation 10/71.

[548] Respondents' views on Question 16 which do not relate to billing are addressed in this Annex, as appropriate.

Summary of Respondent's views

Question 29 of Consultation 09/99

A 8.391 ComReg received five responses to Question 29 of Consultation 09/99.[549] Three respondents (O2, Meteor, Vodafone) disagreed with ComReg's proposal while two agreed (H3GI[550], Digiweb[551]).

A 8.392 The main point raised by the three respondents who disagreed (O2[552], Vodafone[553] and Meteor[554]) was that the billing conditions should be part of the General Authorisation instead of attaching them as licence conditions. In addition:

- O2 stated that the existing Authorisation Regulations set out the conditions that may be attached to spectrum rights of use and do not include a provision for billing obligations.[555]
- Vodafone stated that the billing obligations imposed on mobile operators only (resulting from their requirement for 900 MHz spectrum) places them at a competitive disadvantage vis-a-vis other telecommunication sectors and risks distorting competition in the provision of electronic communication services.

A 8.393 Respondents commented on the details of ComReg's proposed billing conditions as follows:

[549] Question 29 asked "Do you agree with the ComReg's proposed billing obligation?"

[550] H3GI noted it agreement with ComReg's proposal, subject to its views on price regulation, which are discussed below. "Subject to the following comment, 3 agrees with ComReg's proposed billing obligation. In the absence of a demonstratable need, ComReg should abstain from price regulation. Freedom of contract is a well established principle and one that should not be impinged upon lightly." H3GI's response to question 29 of Consultation 09/99 in document 10/21r.

[551] Digiweb's response to Question 29 was *"Agree"*.

[552] *"...such specific conditions should be removed from the current GSM and 3G mobile licences and any specific conditions regarding billing practice should be included in the General Authorisation where they will apply to both fixed and mobile services as is relevant."* O2's response to question 29 of Consultation 09/99 in document 10/21r.

[553] *"Such obligations should only be addressed as part of a General Authorisation where they can be applied on an impartial and non-discriminatory basis."* Vodafone's response to question 29 of Consultation 09/99 in document 10/21r..

[554] *"Meteor supports ComReg's proposals to include billing standards in the General Authorisation instead of including the in specific licences given the universal application of such standards. This would be consistent with the provisions of the Authorisation Directive which specifically provides for the inclusion of consumer protection rules specific to the electronic communications sector in General Authorisation conditions."* Meteor's response to Question 29 of Consultation 09/99 in Document 10/21r.

[555] *"ComReg should note Regulation 10(1) of the Authorisation Regulations (306 of 2003) which specifies that ComReg may only attach such conditions to wireless telegraphy licences as are listed in Part B of the schedule of the same Regulations. This part of the schedule does not include any reference to specific billing requirements, and accordingly such conditions should not be included in the radio licence."* O2's response to Question 29 of Consultation 09/99 in Document 10/21r.

- Two respondents (O2, H3GI) did not agree with ComReg's proposed requirement that calls must be charged on a per second basis or that data services must be charged on a per use basis. O2 stated that it was not necessary for ComReg to be prescriptive in this area, and that the proposal could restrict innovation.[556] H3GI advised ComReg to abstain from price regulation.[557]
- Two respondents (O2, Meteor) disagreed with ComReg's proposal to set paper bills as the standard, default bill format. O2 stated that this would be an unnecessary restriction on a service provider's ability to provide billing information in the most appropriate format, and that it should be removed. Meteor referred to a recent submission made by mobile operators through the Telecoms and Internet Federation that the provision of paper billing be made optional in order to reduce the cost to the customer and environmental costs.[558]

Question 16 of consultation 10/71

A 8.394 Three respondents (eircom, O2, Imagine) referred to ComReg's proposed billing obligation:

A 8.395 Two of these respondents (Meteor and O2) referred to the General Authorisation as being more appropriate for a billing obligation, in line with their response to Consultation 09/99. In this regard, Meteor welcomed ComReg's recognition in Consultation 10/71 that it may be more appropriate to attach a minimum standard for billing to the General Authorisation or to rely on the provisions of the Universal Service and Users' Rights Regulations, rather than to attach it as a licence condition. O2 re-stated its position that the Authorisation Regulations do not permit the inclusion of billing requirements in a radio spectrum licence and instead should be included in the General Authorisation, and that this obligation should apply to all providers of Electronic Communications Services ("ECS") including MVNOs.

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[556] *"The regulatory framework should not restrict an operator's ability to innovate in relation to price propositions through the use of different increments, time base billing, usage base billing etc."* O2's response to Question 29 of Consultation 09/99 in Document 10/21r.

[557] "*In the absence of a demonstratable need, ComReg should abstain from price regulation. Freedom of contract is a well established principle and one that should not be impinged upon lightly."* H3GI's response to Question 29 of Consultation 09/99 in Document 10/21r.

[558] *"...ComReg will be aware of the recent approach made by the mobile operators through the Telecom's and Internet Federation, seeking an alteration such that paper billing could be optimal to customers, in the interest of reducing the associated cost to customer and the environment. The proposal to move billing obligation to the General Authorisation would allow for these revisions to be introduced in advance of the introduction of the new 900MHz. Meteor would stress the importance of ensuring that such a change would apply not only to new customers but also to existing customers. Operators should be permitted to introduce the change while providing existing customers the opportunity to opt to continue to receive paper bills."* Meteor's response to question 29 of Consultation 09/99 in document 10/21r.

A 8.396 On the specific details of ComReg's proposed billing obligation, respondents expressed the following views:

A 8.397 Paper billing is outdated, and therefore, ComReg's proposal should be revised to allow e-billing as the standard billing format rather than paper bills (Imagine).[559]

A 8.398 As the current WT licence obligations establish the requirement for customer consent, but do not prescribe the means by which such consent is obtained, ComReg's requirement for written consent would be overly prescriptive (Meteor).[560]

ComReg's Position

A 8.399 ComReg is currently engaged in a separate consultation on the issue of billing – Consultation 10/96 "*Electronic, and other, itemised bill formats: Minimum requirements for itemised bills for electronic communications services*", published on 1 December 2010. This consultation considers the general principles that ComReg considers important in relation to itemised billing and, in particular, the format of bills. ComReg states in Consultation 10/96:

"ComReg presently has a range of mechanisms available to it, including consumer protection provisions that can be applied to the General Authorisation[561] *, if it were to seek to introduce specific obligations on providers of electronic communication services in respect of itemised bills, in order that obligations can be standardised across all providers of electronic communication services. ComReg also notes that Directive 2002/22/EC of the European Parliament was amended by Directive 2009/136/EC ("Amending Directive"). Articles 29(1) and 23a of this Directive provide scope, subject to transposition, for ComReg to prescribe the basic level of itemised bills to be provided by undertakings to subscribers and for ComReg to implement measures to ensure equal access and choice for people with disabilities."* And,

"ComReg looks forward to receiving inputs from all stakeholders to enlighten its formal consultation, to be conducted in Q1 2011, with respect to its regulatory approach, in the context of an evolving regulatory framework and taking account of its statutory obligations in respect of all sectors within its regulatory remit."

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559 *"Imagine believes that paper billing standard is an anachronism and should be revised to allow e-billing as standard. Efficient market entry for a new operator requires that they can operate with maximum flexibility and in a cost effective manner."* Imagine response to question 16 of Consultation 10/71 in document 10/103r

560 *"...the manner in which consents are collected does not need to be prescribed. Customer consents can be collected in a number of different and valid ways, such as IVR selection, text message, call to customer care, and are not limited to written communications only."* Meteor response to question 16 of Consultation 10/71 in document 10/103r

561 Section 18, Consumer Protection Rules, of the General Authorisation "Conditions for the provision of Electronic Communications Networks and Services", Document No, 03/81R3, revised 23 March 2011.

A 8.400 Responses have been received to this consultation and ComReg is considering further consultation on the matter.

A 8.401 Irrespective of the eventual outcome of Consultation 10/96 and any billing conditions that may be maintained or imposed as a result of that consultation, ComReg considers that such billing conditions as may be imposed on future licensees in the 900 MHz, 800 MHz or 1800 MHz spectrum bands should not be imposed under licences granted pursuant to the Wireless Telegraphy Act, 1926.

A 8.402 The reason for this is that the prescribed categories of conditions that may attach to wireless telegraphy licences, as set out in Part B to the Schedule of the Authorisation Regulations, do not include a category dealing with billing. ComReg thus agrees with the point made by a number of respondents that it is not appropriate to attach conditions on billing to licences granted pursuant to the Wireless Telegraphy Act, 1926. For that reason, ComReg is of the preliminary view that conditions related to billing shall not be attached to future licences in the 800 MHz, 900 MHz or 1800 MHz spectrum bands.

Broadband

Summary of ComReg's proposals in previous consultations

ComReg's position in Consultation 09/99

A 8.403 In Consultation 09/99 ComReg was of the view that unlike the case of voice calls, the same risks for consumers do not appear to exist in the case of a mobile broadband service. As noted by ComReg, this is because a consumer who subscribes to a broadband service has a contract with a particular service provider who is fully responsible for the delivery of that service and the quality of that service. Therefore there is no information problem. If the customer is not happy with the quality of service he/she is receiving from their broadband service provider, they can take steps to remedy the situation. Given these circumstances, ComReg sought the views of respondents on whether it was appropriate to set a mobile broadband QoS obligation.

A 8.404 ComReg also sought the views of those respondents who were in favour of a mobile broadband QoS standard whether this should be set on the basis of a minimum speed. ComReg proposed a minimum speed of 3Mb/s downlink and 384 kb/s uplink at the network level.

A 8.405 Question 27 of Consultation 09/99 asked:

Do you believe that it is appropriate to set a mobile broadband QoS obligation in any new 900MHz licence issued? If yes, do you agree with ComReg's proposal to set this obligation at the network level with minimum speeds of 3Mb/s downlink and 384 kb/s uplink?

ComReg's position in Consultation 10/71

A 8.406 Having due regard for the responses received to Consultation 09/99, in Consultation 10/71, ComReg set out its views why a minimum QoS network standard for a broadband service should not be imposed. ComReg noted that with a broadband service, if a customer experiences problems with the QoS they are receiving there should be no difficulties per se for this customer have the matter addressed by their service provider. This is different to the voice market where the QoS problem could relate to the subscriber's network or the called party's network, and it is not possible for the consumer to identify the source of the problem.

A 8.407 In Consultation 10/71, ComReg sought the views of respondents on its intention not to impose a QoS standard relating to mobile broadband, and instead consider other licence conditions to provide greater information to consumers regarding broadband speeds being provided.

A 8.408 Question 16 of Consultation 10/71 asked:

> 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.

Summary of Respondent's views

Consultation 09/14 (Question 11a)

A 8.409 Of the three respondents (H3GI, Vodafone, Ericsson) that referred specifically to a broadband QoS obligation in their responses, one respondent, H3GI, was against such an obligation, on the grounds that regulating mobile broadband would harm the development of the product,[562] and two respondents, Ericsson[563] and Vodafone[564], were of the view that minimum broadband data speeds should

[562] *"Conditions should be limited to existing services. Regulation of mobile broadband at this stage would harm the development of this product."* H3GI's response to question 11a of Consultation 09/14 in document 09/51s

[563] *"Ericsson is of the view that they should be broadened to include other services such as broadband*" Ericsson's response to question 11a of Consultation 09/14 in document 09/51s

[564] *"Vodafone considers that, in addition to licence conditions requiring the provision of existing services such as voice and text, the scope of service required to be provided by Licensees in new 900 MHz licences issued should be extended to include a requirement to provide mobile broadband services...Vodafone considers that minimum QoS licence conditions for data speeds (download and upload) would be appropriate."* Vodafone's response to question 11a of Consultation 09/14 in document 09/51s

be included as a QoS licence condition. Ericsson further commented that average end user speed should be considered in consultation with the industry, suggesting an average end user spend in the range of 2 – 5 Mb/s.[565]

Consultation 09/99 (Question 27)

A 8.410 None of the five respondents (Digiweb, eircom, H3GI[566], O2 and Vodafone) to Question 27 of Consultation 09/99 agreed with the concept of a QoS obligation for mobile broadband. This included one of the two respondents to Consultation 09/14 which had argued in favour of a mobile broadband QoS (Vodafone), whilst the other did not respond to Consultation 09/99 (Ericsson). The views of the respondents to this question can be summarised as follows:

A 8.411 A mobile broadband QoS is not necessary as competitive market forces will drive QoS (Digiweb[567], Meteor[568] and Vodafone[569])

A 8.412 There is unlikely to be a market failure in relation to mobile broadband services (O2[570]).

A 8.413 Two respondents also disagreed with the proposed minimum speeds;

- A 3Mb/s minimum broadband speed obligation would be excessive and could distort the market by imposing un-necessary cost on providers and

[565] *"Ericsson is of the view that should be [sic] considered in consultation with the industry. We would suggest something like...Average end user speed: Something in the range of 2-5 Mb/s"* Ericsson's response to question 11 of Consultation 09/99 in document 10/21r.

[566] *"3 does not believe that it is appropriate to set a mobile broadband QoS obligation in any new 900MHz licences issued"* H3GI's response to question 27 of Consultation 09/99 in document 10/21r..

[567] *"Digiweb believes that it is not necessary to set a mobile broadband QoS obligation as the market will drive the QoS in this case, unlike voice where there are no controls as to where the call might terminate and it is necessary to set QoS."* Digiweb's response to question 27 of Consultation 09/99 in document 10/21r.

[568] *"...Meteor is disappointed with ComReg's unwillingness to rely on competitive market forces and the risk of such distortion would be magnified as the immediacy of such a requirement is increased."* Meteor's response to question 27 of Consultation 09/99 in document 10/21r.

[569] Vodafone referred to their answered to question 22 of Consultation 09/99 (in document 10/21r) and its general disagreement with QoS obligations, *"Vodafone considers that there is robust competition in the provision of mobile communications services and that this is sufficient to ensure that acceptable QoS standards will be maintained for those services (voice, mobile broadband etc) that can be provided using spectrum in the 900 MHz band."*

[570] *"O2 agrees with ComReg's conclusion that there is unlikely to be a market failure in relation to mobile broadband service. For this reason...O2 does not agree that ComReg should set a QoS obligation for data services."* O2's response to question 27 of Consultation 09/99 in document 10/21r.

result in the denial of a cheaper, lower speed service to consumers who required less demanding broadband needs (Meteor).[571]

- The proposed mobile broadband speeds would have the effect of limiting choice and competition from the market for a low price data service below this threshold (O2[572]).

A 8.414 O2 also made a comment in relation to imposing mobile broadband QoS on GSM services, ""O2 will need to continue to use 900MHz spectrum to provide GSM service for a number of years. A licence QoS condition specifying aspects of a mobile broadband service would clearly be irrelevant in this case, so ComReg must either tailor the QoS obligations according to the service provided, or have only a minimum set of requirements."[573]

Consultation 10/71 (Question 16)

A 8.415 Of the three responses received (eircom, Ericsson and UPC) to Question 16 of Consultation 10/71 regarding setting a minimum QoS on broadband services, two respondents (eircom[574], UPC[575]) were of the view that this should not be imposed. One of respondents which disagreed with a QoS on broadband services (UPC) noted the difficulties that the Advertising Standards Authority of Ireland had in the past in trying to oblige operators to provide information on actual versus

[571] *"Meteor considers a 3MB/s minimum broadband speed obligation to be excessive. This could distort the market by imposing un-necessary cost on providers and result in the denial of cheaper, lower speed service to consumers with less demanding broadband needs."* Meteor's response to question 27 of Consultation 09/99 in document 10/21r.

[572] *"...O2 does not agree that 3Mbps/384Kbps is the appropriate obligation. This could have the effect to eliminate an element of choice and competition from the market – a low price data service below the threshold. ComReg has not explained how this would apply to continued use of GSM in the band, particularly where EDGE data services are provided."* O2's response to question 27 of Consultation 09/99 in document 10/21r.

[573] O2's response to question 24 of Consultation 09/99 in document 10/21r.

[574] *"eircom welcomes ComReg's confirmation that it no longer proposes minimum network standard for a broadband service"* eircom's response to question 16 of Consultation 10/71 in document 10/103r.

[575] UPC would *"caution against the introduction of any formal regulatory requirements in relation to broadband speed."* UPC response to question 16 of Consultation 10/71 in document 10/103r

realised broadband speed and cautioned against the introduction of any formal regulatory requirements in relation to broadband speeds.[576]

A 8.416 One respondent, Ericsson, was in favour of a minimum QoS for mobile broadband in the 800 MHz and 900 MHz frequency bands. It stated that the prime sub-1GHz spectrum was an important national resource and that operators who gain exclusive access rights to it must also take on obligations in relation to minimum levels of service provided across the liberalised 800/900 MHz networks. Ericsson stated that specifying a minimum average throughput network standard of 4 Mbps by 2015 rising to 8 Mbps by 2020, for any operator who acquired the maximum 20MHz of this valuable spectrum, would be a reasonable and proportionate obligation for licensed operators to have to take on in return for acquiring exclusive access rights to of spectrum in the 800/900 MHz bands. In addition, Ericsson argued that a proportionally average throughput network standard of 2 Mbps by 2015 rising to 5 Mbps by 2020 would also be justifiable.[577]

ComReg's Current Position

A 8.417 As stated in Consultation 10/71, ComReg believes that it is not appropriate to set a QoS obligation for broadband services. With a broadband service, the service provider is clearly known to the consumer and so normal customer service arrangements can be used. This is notably different to the voice market (as discussed in Annex 8B) where the quality of service problem could relate to the subscriber network or the called party's network. Consumers would not likely be negatively affected by the absence of minimum speeds for mobile broadband

[576] *"UPC understands ComReg's comments in relation to broadband speeds and quality of service have been made in the context of the current consultation however ComReg will be aware of previous attempts by ComReg and separately the Advertising Standards Authority of Ireland (ASAI) to introduce obligations on operators in relation to actual versus realised speeds. As has been pointed out by the industry in the past, there is no one size that fits all for the measurement of broadband speeds and recordings can vary depending on the topography of the network, the time of day, whether bandwidth is a shared or dedicated resource etc. This becomes even more difficult in mobile broadband where average speeds can be a subset of the peak speeds possible and the variation of indoor versus outdoor speeds are large. UPC would therefore caution against the introduction of any formal regulatory requirements in relation to broadband speeds and would highly recommend that any future considerations by ComReg in this area is an open, transparent and inclusive process with the industry which takes account of these factors."* UPC's response to question 16 of Consultation 10/71 in document 10/103r

[577] *"Ericsson is of the strong opinion that this prime sub-1 GHZ spectrum is an important national resource and that operators who gain exclusive access rights to it must, at the same time, also take on obligations in relation to minimum levels of service provided across the liberalised 800/900 MHz networks...In previous consultations, Ericsson suggested a mandatory minimum throughput of 2 Mbps with little or no resistance from other interested parties...however, users of the world's first commercial LTE network are already enjoying data speeds that are considerably higher than this. Based on this market experience, Ericsson believes that for operators who acquire the maximum 20MHz of this valuable spectrum specifying a minimum average throughput network standard of 4 Mbps by 2015 raising to 8 Mbps by 2020 would be a reasonable and proportionate obligation for licensed operators to have to take on in return for acquiring exclusive access rights to of [sic] spectrum in the 800/900 MHz bands. In addition, a proportionally average throughput network standard of 2 Mbps by 2015 rising to 5 Mbps by 2020 would similarly be justifiable."* Ericsson's response to question 16 of Consultation 10/71 in document 10/103r

because customers have little problem establishing who is responsible if they receive a poor service that does not meet their QoS expectations.

A 8.418 ComReg considers that imposing minimum broadband speeds could prevent operators from offering a low cost, low speed option leading to a reduced choice for consumers. This would particularly affect those consumers for whom speed is not a priority.

A 8.419 Whilst ComReg believes that it is not appropriate to set a QoS obligation for broadband services, ComReg recognises the importance of ensuring that consumers are appropriately informed and empowered as the broadband market continues to develop. To date, ComReg has taken a number of initiatives to address consumer concerns with respect to speeds, as follows;

A 8.420 ComReg worked closely with the Advertisement Standards Authority of Ireland (ASAI), resulting in the ASAI issuing an Advice Note on Broadband Advertising in March 2008

A 8.421 ComReg provided enhanced information with respect to the issue (including information on speed requirements; explanation of technical terms; reasons for speed differences and speed measurement options) on www.askcomreg.ie , and

A 8.422 ComReg has provided links to a number of websites offering free speed tests on www.askcomreg.ie .

A 8.423 In addition, ComReg believes that greater information on broadband speeds would be beneficial and ComReg is working with other stakeholders to implement a consumer information initiative in respect of broadband speeds.

8.5 Technology and Service Neutrality

A 8.424 Throughout this consultation process,[578] ComReg has stated that it intends to apply a technology and service neutral approach to all new licences issued in each of the spectrum bands, in line with the relevant EC Decisions. Respondents have supported this proposal. In light of the views received and any updated information, the following sets out ComReg's technology and service neutrality proposal for each spectrum band in the proposed award.

[578] This issue was discussed in section 7.4 of Consultation 08/57, section 6.1 of Consultation 09/14, section 15.4 of Consultation 09/99, section 4.6.2 of Consultation 10/71 and section 3.10.2 of Consultation 10/105.

The 900 MHz and 1800 MHz bands

A 8.425 For the 900 MHz and 1800 MHz bands, the relevant EC Decisions are Decision 2009/766/EC[579] and Decision 2011/251/EU[580].

A 8.426 These Decisions require Member States to make the 900 MHz and 1800 MHz bands available for terrestrial systems capable of providing electronic communications services ('ECS') and the annex to these EC Decisions lists the other terrestrial systems that can co-exist with GSM. Currently there are three other terrestrial system (UMTS, LTE and WiMAX) listed in the annex to the EC Decisions, and these technologies and GSM can be deployed in these bands.

A 8.427 In addition, Article 5 of Decision 2009/766/EC allows Member States to make these bands available for other terrestrial systems not listed in the annex to the EC Decisions, provided such terrestrial systems can co-exist with the listed technologies.

A 8.428 As discussed in previous consultations, and in particular section 6.1 of Consultation 09/14 and section 3.10.2 of Consultation 10/105, ComReg proposes to make these bands available for all technologies listed in the annexes to Decision 2009/766/EC and Decision 2011/251/EU and will consider submissions from operators interested in deploying other technologies which they can show can co-exist with the listed technologies.

A 8.429 However, ComReg notes that in order to minimise the potential for disruption to consumers it proposes to require a period of notice for an operator to terminate the provision of services using one technology, which the operator intends to replace with another technology.

The 800 MHz band

A 8.430 For the 800 MHz band, EC Decision 2010/267/EU[581] and the Annex thereto set out the technical parameters that are to be applied in the 800 MHz band in the form of frequency arrangements and a Block Edge Mask (BEM).

A 8.431 ComReg sets out below it's proposed technical conditions for the 800 MHz band and these are fully compatible with the parameters set out in the Annex to Decision 2010/267/EU.

[579] EC Decision 2009/766/EC of 16 October 2009 on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community

[580] EC Decision 2011/251/EU 18 April 2011, amending Decision 2009/766/EC on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community

[581] EC Decision 2010/267/EU Commission Decision of 6 May 2010 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

A 8.432 As stated in section 4.6.2 of Consultation 10/71, ComReg proposes to make the 800 MHz band available for any terrestrial systems that are capable of providing ECS in compliance with the technical parameters for the 800 MHz band as set out below.

Should ComReg require the provision of a particular service or technology?

A 8.433 In section 15.4 of Consultation 09/99, ComReg proposed that it was not necessary to mandate a particular technology or service in the 900 MHz band. This proposal was supported by all respondents to Consultation 09/99. The same proposal was made in respect of the 800 MHz band (see section 4.6.2 of Consultation 10/71) and the 1800 MHz band (see section 3.10.2 of Consultation 10/105). Respondents to these consultations also supported this approach.

A 8.434 ComReg remains of the view that it is neither necessary nor appropriate to mandate the provision of a particular service or technology.

Adjacent spectrum bands and existing users in the band

A 8.435 In order to assist potential licensees in understanding the 800 MHz, 900 MHz and 1800 MHz spectrum bands in Ireland, the following presents an overview of the adjacent spectrum bands and existing users in those bands.

The 800 MHz band and adjacent spectrum bands

A 8.436 As shown in **Figure 4** below, there are a number of spectrum bands adjacent to the 800 MHz band. This section discusses each of these adjacent spectrum bands, which are:

- broadcasting;
- the 800 MHz Duplex gap; and
- short Range Devices (SRDs),

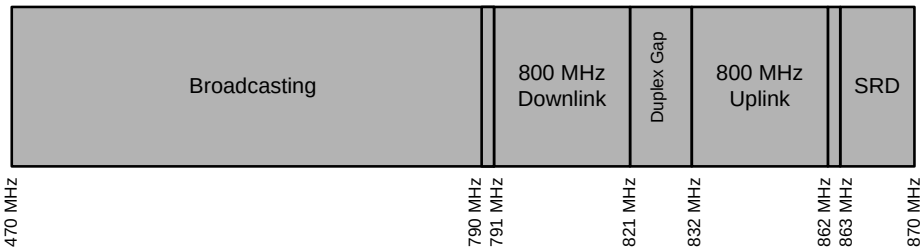

Figure 4: The 800 MHz band and adjacent spectrum bands.

The Broadcasting Service

A 8.437 CEPT Report 30[582] considered the two most likely interference scenarios between electronic communications networks operating in the 790 – 862 MHz band and terrestrial broadcasting services in the adjacent band. The outcome of these studies was the development of technical conditions and a "block edge mask" ("BEM") for electronic communications networks. These technical conditions and BEM were subsequently adopted by the European Commission for inclusion in the 800 MHz Decision as discussed in this Annex.

A 8.438 In addition, ComReg has made a number of proposals in relation to the co-existence of services between the 800 MHz licensees and the broadcasting band. These are set out in Annex 10 (other issues) of this document.

The 800 MHz Duplex GAP

A 8.439 In 2010, ComReg consulted[583] on future spectrum availability for Programme Making and Special Events (PMSE). In its consultation ComReg considered, amongst other matters, the use of part of the 800 MHz band for PMSE services on a non-interference non-protected basis. In its response to the consultation[584] ComReg stated that it *"will continue to license spectrum in 821 – 832 MHz to PMSE users until [Analogue Switch Off] ASO occurs and the future use of these frequencies for ECS is considered. For example, the adoption of the FDD duplex gap for PMSE post-switch-off will of course depend on whether a TDD or FDD scheme is employed, the level of demand for spectrum in this band and on other future technical considerations."*[585]

A 8.440 The technical conditions for PMSE in the FDD duplex gap of the 800 MHz band are set out in Annex 3, section 3 of ECC Decision 09(03)[586]. They indicate that PMSE can co-exist without interference provided that the conditions as discussed in ECC Decision 09(03) are adhered to by both providers of ECS and PMSE operators. ComReg intends to require any PMSE to comply with ECC Decision 09(03), including any amendments to this decision.

[582] Report from CEPT to the European Commission in response to the Mandate on the identification of common and minimal (least restrictive) technical conditions for 790 – 862 MHz for digital dividend in the European Union.

[583] ComReg Consultation 10/37 "Future Spectrum Availability for Programme Making and Special Events".

[584] ComReg Response to Consultation 10/68 "Future Spectrum Availability fro PMSE".

[585] As discussed in Annex 5 of this document, ComReg is proposing to grant licences to use spectrum in the 800 MHz band using the FDD arrangement.

[586] ECC Decision 09(03) "ECC Decision of October 30 2009 on harmonised conditions for Mobile, Fixed Communications Networks (MFCN) operating in the band 790 – 862 MHz.

SRDs

A 8.441 The upper end of the 800 MHz band is separated from Short Range Devices (SRDs) by a 1 MHz guard band. There are numerous different types of SRDs deployed in the 863 – 870 MHz band with permitted powers varying from 5mW ERP for non specific devices to 2W for Radio Frequency Identification (RFID) applications[587]. SRDs are licence exempt and operate on a non-interference, non-protected basis. Due to the combination of frequency separation, very low transmit powers and the location of the higher power RFID applications towards the higher frequency end of the band, SRDs in the band 863-870 MHz are unlikely to cause interference in the 800 MHz band.

The 900 MHz Band and Adjacent Spectrum Bands

A 8.442 As shown in **Figure 5** below, there are a number of spectrum bands adjacent to the 900 MHz band and this section discusses each adjacent spectrum band in turn. These adjacent spectrum bands are:

- GSM-Railway (GSM-R);
- Wide Band Digital Mobile Data Systems (WDMDS); and
- Aeronautical Distance Measuring Equipment (DME).

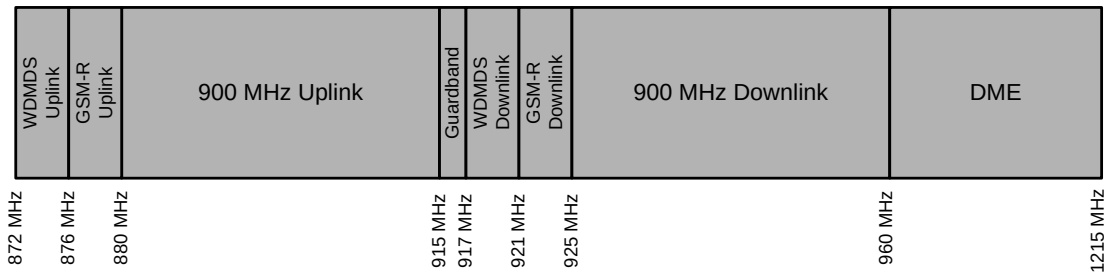

Figure 5: The 900 MHz band and adjacent spectrum bands

GSM-Railways (GSM-R)

A 8.443 To date there are no GSM-R deployments in Ireland. However in October 2010, and arising from an expression of interest by Iarnród Eireann, ComReg published an Information Notice ComReg 10/84[588] indicating its intention to make the GSM-R frequency band available for licensing.

A 8.444 In this Information Notice, ComReg considered the co-existence of GSM-R with adjacent spectrum bands, including the 900 MHz band, and:

[587] See ComReg document 02/71R5 Permitted Short Range Devices in Ireland for more information.

[588] ComReg 10/84 "Information Notice; Proposed licensing regime of GSM operations for railway spectrum"

- ComReg noted that ECC Report 146 stated that a carrier separation of 400 kHz (200 kHz between the edges of the channels) between 900 MHz multi carrier base transmit stations (MCBTS) and GSM-R is sufficient to avoid harmful interference to GSM-R downlink due to unwanted emissions from a MCBTS.
- ComReg proposed to implement the guard channel spacing recommended in the ECC Report;
- ComReg proposed to issue GSM-R licences based on spectrum allocations from the lower end of the GSM-R band (i.e. from 876 MHz paired with 921 MHz) and progressively moving towards 880 MHz paired with 925 MHz).[589]

A 8.445 Responses to Information Notice 10/84 were received in November 2010 and additionally, in its response to Consultation 10/71, H3GI submitted a comment[590] on GSM-R where it requested ComReg to determine what impact GSM-R would have on the adjacent 900 MHz spectrum.

A 8.446 Since publishing Information Notice 10/84, further studies have been carried out at a European level and in CEPT the co-existence between GSM-R systems and other services in the adjacent band has been addressed in ECC Report 96[591], CEPT Report 41[592], ECC Report 146[593], ECC Report 162[594] and ECC Decision (02)05. In addition the European Commission Radio Spectrum Committee has published a paper on GSM-R interference[595]. While full details of these reports can be obtained on the websites of CEPT and/or the EC respectively, the main conclusion of these studies in relation to co-existence between GSM-R and the 900 MHz band are set out below:

[589] ComReg noted that further work is being carried out by European Commission working groups to investigate the compatibility between GSM-R and future 900 MHz technologies and these studies could, amongst other things, conclude that greater guard band requirements may be needed,

[590] H3GI stated: – *"H3GI further notes that ComReg has issued an information notice in respect of http://www.comreg.ie/_fileupload/publications/ComReg1084.pdf. Based on experience elsewhere, ComReg needs to determine how services are provided on the GSM-R band and adjacent 900 MHz spectrum and in particular, energy spill over is dealt with and analyse the impact of this on the value of the 900 MHz adjacent to the GSM-R band in advance of the auction"* See Section 15 of H3GI's response to Consultation 10/71 in document 10/103r

[591] ECC Report 096 "Compatibility between UMTS 900/1800 and systems operating in Adjacent bands."

[592] CEPT Report 41 "Compatibility between LTE and WiMAX operating within the bands 880-915MHz/925-960 MHz and 1710-1785MHz/1805-1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands"

[593] ECC Report 146 "Compatibility between GSM MCBTS and other services (TRR, RSBN/PRMG, HC-SDMA, GSM-R, DME, MIDS, DECT) operating in the 900 and 1800 MHz frequency bands"

[594] ECC Report 162 "Practical Mechanism to Improve the compatibility between GSM-R and Public Mobile Networks and Guidance on Practical Coordination.

595 RSCOM11-05 Working Document; Commission paper on GSM-R interference issues

- ECC Report 096, published in March 2007, stated that a carrier separation of 2.8 MHz or more between a UMTS900 carrier and the nearest GSM-R carrier would be sufficient for both systems to co-exist. In practice, the implementation of the 300 kHz guard band in the GSM-R spectrum (as discussed below) will ensure that the required carrier separation is achieved.
- ECC Report 146, published in June 2010, evaluated compatibility between GSM Multi Carrier Base Transceiver Stations ('MCBTS') and other services operating in the 900 MHz and 1800 MHz bands, including GSM-R. This report stated that a carrier separation of 400 kHz (200 kHz between the edges of the channels) between 900 MHz multi carrier base transmit stations (MCBTS) and GSM-R is sufficient to avoid harmful interference to GSM-R downlink due to unwanted emissions from a MCBTS.
- CEPT Report 41, published November 2010, extended on the compatibility issues addressed in Report 096 (which only evaluated GSM-R and UMTS) by considering compatibility between GSM-R with WiMAX and LTE. This report concluded that LTE and WiMAX require a 2.8 MHz carrier separation between the GSM-R carrier and the LTE / WiMAX carrier for co-existence. In practice, this would result in a 300 kHz frequency separation between the nearest GSM-R channel centre frequency and the LTE/WiMAX channel edge (or at least 200 kHz between channel edges).
- ECC Report 162, published in May 2011, focused on the practical mechanism to improve compatibility between GSM-R and the 900 MHz band. It noted that this issue has already been studied in CEPT (ECC Reports 096 and 146 and CEPT Report 41) and ECC Report 162 complements these studies by providing practical guidance on coexistence and co-ordination.
- The EC has also discussed the issue of co-existence between GSM-R and the 900 MHz band at various Radio Spectrum Committee meetings (see RSCOM10-45, RSCOM10-58, RSCOM11-05 and RSCOM11-38)596. In its most recent document, RSCOM11-38, the EC states that ECC Report 162 provides practical guidance on co-existence and co-ordination between GSM-R and the 900 MHz band.

A 8.447 ComReg intends to ensure that Ireland's GSM-R licensing regime accords with the above CEPT studies. In this regard, ComReg notes that the more recent CEPT studies (e.g. CEPT Report 41) have not lead to greater guard band requirements than those specified in ECC Report 146, and thus the proposal as set out in ComReg Information Notice 10/84 remains valid. Moreover, ComReg notes that ETSI and 3GPP are considering development of more stringent specifications for GSM-R in order to further improve compatibility with services in adjacent bands.

[596] See http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/manage/eu/rsc/rsc_subsite/recent_meetings/index_en.htm

The finalization of that proposal should sufficiently address the co-existence of GSM-R and the 900 MHz band and the implementation of the 300 kHz guard band in the GSM-R spectrum will ensure that the required carrier separation is achieved between the respective services.

A 8.448 Finally, it should be noted that no licences have yet been issued for GSM-R in Ireland.

Wideband Digital Mobile Data Systems (WDMDS)

A 8.449 In 2005, following an auction, Digiweb Limited was awarded a national licence for the provision of Wideband Digital Mobile Data Services (WDMDS) in the 872 – 876 MHz paired with 917 – 921 MHz. Digiweb's WDMDS network is concentrated in the Fingal area of Dublin.

A 8.450 There is currently a 2 MHz guard band from 915 MHz to 917 MHz separating existing GSM services from WDMDS services.

Aeronautical Distance Measuring Equipment (DME)

A 8.451 Compatibility between UMTS/LTE/WiMAX and aeronautical DME has been studied by CEPT and the results of these studies are available in ECC Report 96[597] and CEPT Report 41.[598] and 42[599]. There are DME systems deployed and used in Ireland. Currently DME systems are mostly deployed above 977 MHz. As found in Report 42 no interference is expected from UMTS base stations into DME airborne receivers above 972 MHz.

Existing GSM Licences in the 900 MHz band

A 8.452 Meteor has a GSM 900 MHz licence assignment of 2 × 7.2 MHz with an expiry date of 12 July 2015. While Vodafone and O2 have interim GSM Licences of 2 × 7.2 MHz, these licence expire on the 31 January 2013 and before the start date of the first time slice.

A 8.453 As discussed in Annex 6.4 (full assignment round), ComReg proposes that the full assignment round will determine the location of all licences (existing GSM licences and new liberalised licences) in the 900 MHz band. In the case of any spectrum right of use that is retained by an incumbent licensee, the location and amount of spectrum that is assigned will comply with the co-existence conditions

[597] ECC Report 96: Compatibility between UMTS 900/1800 and systems operating in adjacent bands.

[598] CEPT Report 41: Report from CEPT to the European Commission in response to Task 2 of the Mandate to CEPT on the 900/1800 MHZ bands; Compatibility between LTE and WiMAX operating within the bands 800 – 915 MHz/ 925 – 960 MHz and 17010 – 1785 MHz/ 1805 – 1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands.

[599] Report from CEPT to the European Commission in response to Task 3 of the Mandate to CEPT on the 900/1800 MHz bands: Compatibility between UMTS and existing and planned aeronautical systems above 960 MHz.

detailed in Decision 2009/766/EC and Decision 2011/251/EU.[600] The co-existence conditions are discussed below.

Mobile communication services on vessels (MCV services)

A 8.454 Mobile Communication services on Vessels (MCV services) using GSM systems may be authorised for on board vessels in the 900 MHz and 1800 MHz bands in accordance with EC Recommendation 2010/167/EC[601] providing they comply with the harmonised conditions for MCV as specified in EC Decision 2010/166/EC[602]. The technical basis for Decision 2010/166/EC is CEPT Report 028[603]. MCV services may only operate on a non-interference and non-protected basis. The system providing MCV services shall not be used closer than 2 nautical miles from the baseline[604], as defined in the United Nations Convention on the Law of the Sea and only indoor base station antenna(s) shall be used between 2 and 12 nautical miles from the baseline. The EC Decision also specifies other mitigation techniques to be employed by the MCV service.

A 8.455 Provided that these conditions are complied with there should not be any interference to land-based GSM and UMTS networks operating in the 900 MHz or 1800 MHz bands.

The 1800 MHz band and Adjacent Spectrum Bands

A 8.456 As shown in the **Figure 6** below, there are a number of spectrum bands adjacent to the 1800 MHz band and this section discusses each adjacent spectrum band in turn. These adjacent spectrum bands are:

- Meteorological Satellite (METSAT);
- The 1785 – 1805 MHz Wireless Access Platform for Electronic Communications Services Licence ("All Island Licence"); and
- Digital Enhanced Cordless Telecommunications (DECT),

[600] As discussed in ComReg Document 10/71c, this can result in 22 to 24 GSM channels being assigned in a single 2 × 5 MHz block depending upon co-ordination with the neighbouring operator.

[601] EC Recommendation 2010/167/EC of 19 March 2010 on authorisation of systems for mobile communication services on board vessels (MCV services)

[602] EC Decision 2010/167/EC of 19 March 2010 on harmonised conditions of use of radio spectrum for mobile communication services on board vessels (MCV services) in the European Union.

[603] CEPT Report 028: Report from CEPT to the European Commission in response to the Mandate "Mobile Communication Services on Vessels (MCV)".

[604] The baseline is further defined in CEPT Report 028

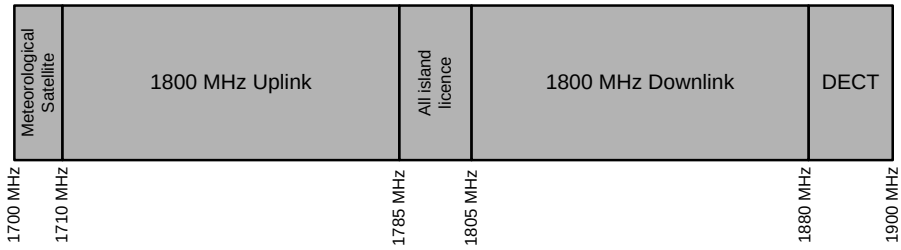

Figure 6: 1800 MHz band and adjacent spectrum bands

Meteorological Satellite (METSAT) & Digital Enhanced Cordless Telecommunications (DECT)

A 8.457 Compatibility studies between UMTS/LTE/WiMAX and DECT, and UMTS/LTE/WiMAX and METSAT, have been studied by CEPT and the results of these studies are available in ECC Report 96[605] and CEPT Report 41[606].

The 1785 – 1805 MHz Wireless Access Platform for Electronic Communications Services Licence ("All Island Licence")

A 8.458 In 2007, ComReg issued a 15-year licence to Personal Broadband UK Limited for the provision of ECS in the 1785 – 1805 MHz frequency band. This licence was issued on a technology and service neutral basis in accordance with the WAPECS principle. A number of technical conditions were placed on the licence to ensure compatibility with existing GSM 1800 deployments in the adjacent band and the technical conditions in this licence are set out in Section 4 of ComReg Information Notice 06/65R[607].

A 8.459 To date, commercial services in this band have not been launched in the State.

Existing GSM Licences in the 1800 MHz band

A 8.460 There are currently GSM licensees in the 1800 MHz band, each with an assignment of 2 × 14.4 MHz. O2 and Vodafone each has a licence that expires on 31 December 2014, and Meteor has a licence that expires on the 12 July 2015.

A 8.461 As discussed in annex 6.4 (full assignment round), ComReg proposes that the full assignment round will decide the location of all licences (existing GSM licences and new liberalised licences) in the 1800 MHz band. In the case of any spectrum right of use that is retained by an incumbent licensee, the location and amount of spectrum that is assigned will comply with the co-existence conditions detailed in

[605] ECC Report 96: Compatibility between UMTS 900/1800 and systems operating in adjacent bands.

[606] CEPT Report 41: Report from CEPT to the European Commission in response to Task 2 of the Mandate to CEPT on the 90/1800 MHZ bands; Compatibility between LTE and WiMAX operating within the bands 800 – 915 MHz/ 925 – 960 MHz and 17010 – 1785 MHz/ 1805 – 1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands.

[607] http://www.comreg.ie/_fileupload/publications/ComReg0665r.pdf

Decision 2009/766/EC and Decision 2011/251/EU.[608] The co-existence conditions are discussed further below.

Mobile communication services on aircraft (MCA services)

A 8.462 Currently GSM Mobile Communication services on Aircraft (MCA services) in the 1800 MHz band are exempted from wireless telegraphy licensing in Ireland in accordance with Statutory Instrument 178 of 2008.[609] This Statutory Instrument exempts apparatus for MCA services in accordance with EC Recommendation 2008/295/EC[610] providing they comply with the harmonised conditions for MCA as specified in EC Decision 2008/294/EC[611]. The technical basis for Decision 2008/294/EC is CEPT Report 016[612]. MCA services may only operate on a non-interference and non-protected basis and, when in operation, must prevent mobile terminals onboard the aircraft from registering with mobile networks (GSM or WCDMA) on the ground in the frequency bands 460-470 MHz, 921-960 MHz, 1805-1880 MHz and 2110-2170. The level of EIRP outside the aircraft from onboard terminals is also limited depending on the height above ground of the aircraft, as well as a limit on the maximum power any terminal is allowed to transmit in the 1800 MHz band. Provided that these conditions are complied with there should not be any interference to mobile networks in the 900 MHz or 1800 MHz bands.

A 8.463 CEPT is conducting further studies to facilitate operation of terminals onboard in the 1920-1980/2110-2170 MHz bands.

Mobile Communication Services on Vessels (MCV services)

A 8.464 MCV systems facilitate the use of mobile communications on board ships using the same frequencies as the land-based systems. Such systems may only operate on a non-interference and non-protected basis. Provided that the conditions set out in the relevant ECC[613] and CEPT[614] reports are complied with there should not be any interference to land based GSM and UMTS networks operating in the 900 MHz or 1800 MHz frequency bands.

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608 As discussed in ComReg Document 10/105b, this can result in 22 to 24 GSM channels being assigned in a single 2 × 5 MHz block depending upon co-ordination with the neighbouring operator.

609 http://www.irishstatutebook.ie/2008/en/si/0178.html

610 EC Recommendation 2008/295/EC of 7 April 2008 on authorisation of mobile communication services on aircraft (MCA services) in the European Community.

611 EC Decision 2008/294/EC of 7 April 2008 on harmonised conditions of spectrum use for the operation of mobile communication services on aircraft (MCA services) in the Community.

612 CEPT Report 016: Report from CEPT to the European Commission in response to the EC Mandate on Mobile Communication Services on board aircraft (MCA).

613 See ECC Report 122 on the Compatibility between GSM Use Onboard Vessels and Land-based Networks, Vilnius, September 2008.

614 See CEPT Report 28 "Report from CEPT to the European Commission in response to the Mandate "Mobile Communication Services on Vessels (MCV)".

Proposed Technical Conditions

A 8.465 This section sets out the technical conditions that ComReg proposes for future licences in any or all of the 800 MHz, 900 MHz and 1800 MHz bands. The proposed conditions are in line with Decision 2010/267/EU (800 MHz band) Decision 2009/766/EC (900 MHz band) and Decision 2011/251/EU (1800 MHz band).

The 800 MHz bands

A 8.466 In line with Decision 2010/267/EU[615] and in accordance with ComReg's statutory objective to ensure the effective management and efficient use of radio spectrum, and noting provisions under the Wireless Technology Act 1926 relating to harmful interference, ComReg is proposing to include the following technical conditions in any new licence issued in the 800 MHz band.

The 800 MHz band plan

A 8.467 As discussed in Annex 5 and shown in **Figure 7** below, ComReg is proposing that the 800 MHz band is assigned on a FDD duplex mode arrangement in 2 × 5 MHz block sizes. This results in the following band plan:

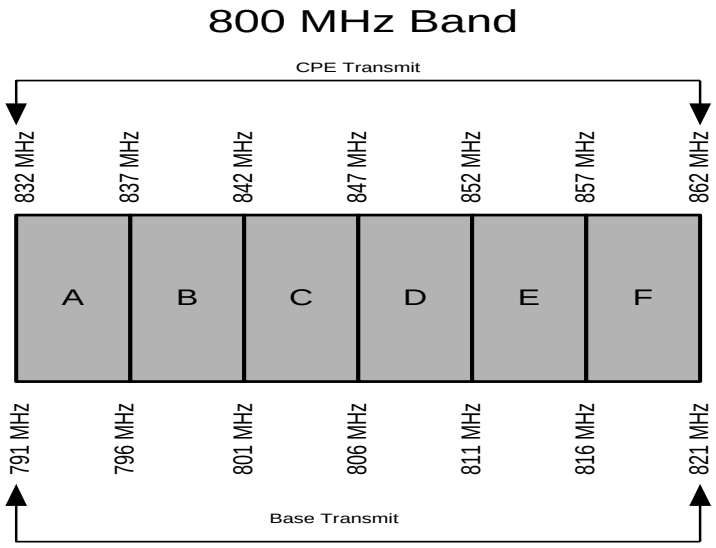

Figure 7: The 800 MHz band plan

Block Edge Mask

A 8.468 The Annex of Decision 2010/267/EU sets out the technical parameters for terrestrial systems, other than broadcasting, deployed in the 800 MHz band.

[615] EC Decision 2010/267/EU Commission Decision of 6 May 2010 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

A 8.469 In Consultation 10/71 ComReg proposed that any terrestrial electronic systems deployed in the 800 MHz spectrum band would be required to comply with the technical conditions of the 800 MHz Decision, and Question 2 of that consultation sought views on this proposal.

> Q.2 (of Consultation 10/71): 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.

Respondents Views

A 8.470 ComReg received 11 responses to its proposal to require licensees in the 800 MHz frequency band to comply with the BEM set out in Decision 2010/267/EU. All of the respondents supported ComReg's proposal.

A 8.471 One respondent, RTE/RTENL:

- expressed the view that the Case A BEM from the Annex of EC Decision 2010/267 be applied at the lower end of the 800 MHz block to protect broadcasting services below this band; and
- additionally raised concerns about potential interference into broadcasting services from services deployed in the 800MHz band and asked what additional measures ComReg would propose to take to minimise this. The detail of this issue is discussed in Annex 10 (other matters).

ComReg's Proposal on the 800 MHz BEM

A 8.472 ComReg notes that all respondents approve of the proposal to impose block edge masks on licences in the 800 MHz band in the State. ComReg further notes that Member States that make the 800 MHz band available for ECS must do so in compliance with the parameters set out in the Annex to Decision 2010/267/EU.

A 8.473 ComReg proposes to impose the following BEM technical parameters on all licences issued in the 800 MHz band which are consistent with those contained in the 800 MHz Decision. Details of these technical conditions are in **Table 13** to **Table 16** below.

Out-of-block limits

Table 13: Baseline requirements – BS BEM out-of-block EIRP limits.

Frequency range of out-of-block emissions	Maximum mean out-of-block EIRP	Measurement Bandwidth
832 – 862 MHz (Frequencies used for FDD uplink)	-49.5 dBm	5 MHz

Table 14: Transition requirements - Base Station BEM out-of-block EIRP limits per antenna over FDD downlink frequencies 791 – 821 MHz.

Frequency Range Of Out-Of-Block Emissions	Maximum Mean Out-Of-Block EIRP	Measurement Bandwidth
-10 To -5 MHz From Lower Block Edge	18 dBm	5 MHz
-5 To 0 MHz From Lower Block Edge	22 dBm	5 MHz
0 To +5 MHz From Lower Block Edge	22 dBm	5 MHz
+5 To +10 MHz From Lower Block Edge	18 dBm	5 MHz
Remaining FDD Downlink Frequencies	11 dBm	1 MHz

Table 15: Transition Requirements – Base station BEM out-of-block EIRP limits per antenna (for one to four antennas) over frequencies used as guard bands.

Frequency Range Of Out-Of-Block Emissions	Maximum Mean Out-Of-Block EIRP	Measurement Bandwidth
Guard Band Between 790 Mhz And 791 MHz	17.4 dBm	1 MHz
Duplex Gap Guard Band 821 – 832 MHz	15 dBm	1 MHz

A 8.474 The 800 MHz EC Decision sets out three sets of base line requirements (cases A, B and C) for frequencies in the 470 – 790 MHz band. As Digital Television Terrestrial (DTT) services are deployed in the 470 – 790 MHz broadcasting band and it is a protected band, ComReg is proposing to implement Case A, as detailed in Table 4 below, for all terrestrial systems operating in the 800 MHz band.

Table 16: Baseline requirements base station out-of-block EIRP limits over frequencies below 790 MHz.

Frequency Range Of Out-Of-Block Emissions	Conditions On Base Station In-Block EIRP, P dBm/Mhz	Maximum Mean Out-Of=Block EIRP	Measurement Bandwidth
470 – 790 Mhz	P≥59	0 dBm	8 MHz
	36 ≤ P 59	(P-59) dBm	8 MHz
	P 36	-23 dBm	8 MHz

A maximum mean in-block EIRP limit for 800 MHz base stations.

A 8.475 ComReg is proposing to set the maximum in block EIRP at 59 dBm/5 MHz (see Annex 10 for more detail). ComReg notes that the in block EIRP may be reviewed in the future if required.

A 8.476 ComReg has also considered the issue of additional measures that may be required to achieve co-existence between ECS in the 800 MHz band and DTT broadcasting in the adjacent channels. As discussed in Annex 10 (other matters) ComReg is not proposing any other technical measures in future 800 MHz licences other than those detailed in this document.

Compliance with International MOUs on the 800 MHz band

A 8.477 ComReg and the UK Regulator, Ofcom, have signed a number of Memoranda of Understanding ("MoU") in relation to the mitigation of cross border interference and all current and future licensees are obliged to comply with such MoUs.

A 8.478 In relation to the 800 MHz band, a draft MOU is set out in Annex 12 of this document. This draft MOU is currently under discussion between ComReg and Ofcom. ComReg expects to adopt a MOU with Ofcom on the 800 MHz band in due course that should be of substantially equivalent effect to the draft version herein.

The 900 MHz and 1800 MHz bands

A 8.479 In line with Decision 2009/766/EC and Decision 2011/251/EU and in accordance with ComReg's statutory objective to ensure the effective management and efficient use of radio spectrum, and noting provisions under the Wireless Technology Act 1926 relating to harmful interference, ComReg is proposing to include the following technical conditions in future licences issued in the 900 MHz and/or 1800 MHz bands.

The 900 MHz and 1800 MHz band plan

As discussed in Annex 5 and as shown in

Figure 8 and

A 8.480 **Figure 9** below, ComReg is proposing that the 900 MHz band and the 1800 MHz band will be assigned on a FDD duplex mode arrangement in 2 × 5 MHz block sizes.

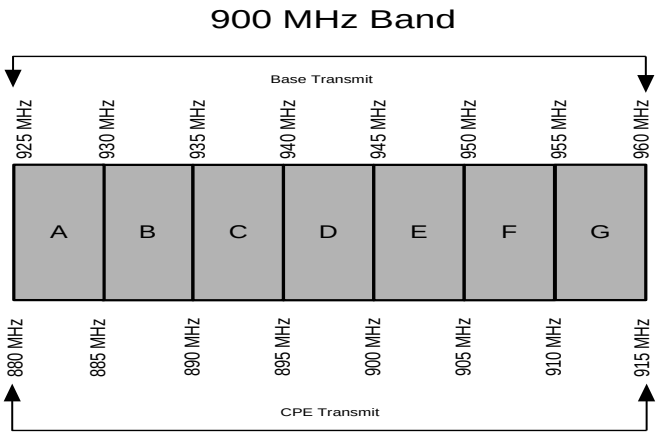

Figure 8: The 900 MHz band plan

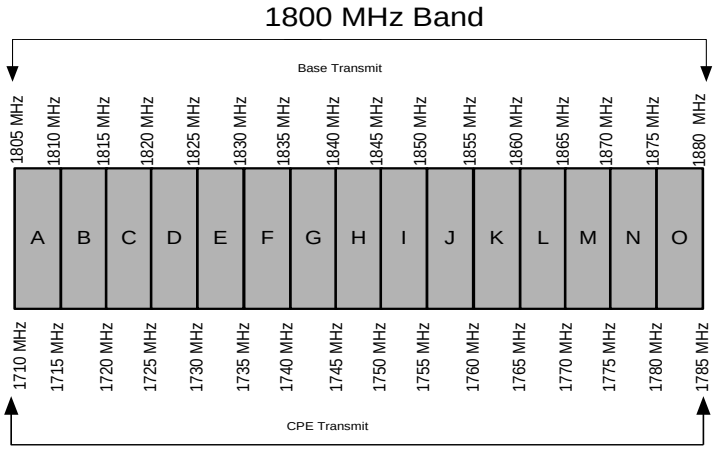

Figure 9: The 1800 MHz band plan

Co-existence of GSM with UMTS/LTE/WiMAX

A 8.481 As discussed in section 6.2.3 of Consultation 09/14 and section 3.10.3 of Consultation 10/105, ComReg considers that each new licensee in the 900 MHz and 1800 MHz band will be responsible for the management of their interference within their spectrum assignments, and no guard bands will be set aside by ComReg.

A 8.482 The annex to Decision 2011/251/EU sets out the technical conditions necessary to ensure co-existence between the terrestrial systems permitted to be deployed within the band. These technical conditions are set out in **Table 17** below. Future licensees will be obliged to meet these co-existence conditions, unless otherwise agreed in bilateral or multilateral agreements between neighbouring networks.

Table 17: Technical conditions for 900 MHz and 1800 MHz bands as per Annex to Decision 2011/251/EU

Systems	Technical Parameters
UMTS Complying With UMTS Standards, As Published By ETSI, In Particular EN 301908-1, EN 301908-2, EN 301908-3 And EN 301908-11	1. Carrier Separation of 5 MHz Or More Between Two Neighbouring UMTS Networks. 2. Carrier Separation of 2.8 MHz Or More Between A Neighbouring UMTS Network And A GSM Network.
LTE Complying With LTE Standards, As Published By ETSI, In Particular EN 301908-1, EN 301908-13, EN 301908-14, And EN 301908-11	1. A Frequency Separation Of 200 Khz Or More Between The LTE Channel Edge And The GSM Carrier's Channel Edge Between A Neighbouring LTE Network And A GSM Network. 2. No Frequency Separation Is Required Between LTE Channel Edge And The UMTS Carrier's Channel Edge Between A Neighbouring LTE Network And A UMTS Network. 3. No Frequency Separation Is Required Between LTE Channel Edges Between Two Neighbouring LTE Networks.
Wimax Complying With Wimax Standards, As Published By ETSI, In Particular EN 301908-1, EN 301908-21 And EN 301908-22	1. A Frequency Separation Of 200 Khz Or More Between The Wimax Channel Edge And The GSM Carrier's Channel Edge Between A Neighbouring Wimax Network And A GSM Network. 2. No Frequency Separation Is Required Between The Wimax Channel Edge And The UMTS Carrier's Channel Edge Between A Neighbouring Wimax Network And A UMTS Network. 3. No Frequency Separation Is Required Between Wimax Channel Edges Between Two Neighbouring Wimax Networks.

Who bears the Guard Band Responsibility?

Summary of ComReg's view in Consultation 09/99

A 8.483 In Consultation 09/99, ComReg noted that EC Decision 2009/266/EC sets out the technical parameters to be applied to ensure coexistence between neighbouring networks and stipulates a carrier separation of 2.8 MHz or more between a UMTS network and the centre frequency of a neighbouring GSM channel in adjacent spectrum, unless less stringent technical parameters are agreed among the network operators themselves.

A 8.484 ComReg stated in Consultation 09/99 that it is not possible to identify the specific nature of coordination issues which are likely to arise between licensees in the 900 MHz band until the outcome of the proposed auction is known. ComReg therefore stated that its preference is for licensees to firstly seek a mutually

acceptable solution to any matters arising and would only intervene as a matter of last resort.

Respondents View

A 8.485 In response to Consultation 09/99, one respondent, H3GI, contested that ComReg's proposal failed to meet its statutory obligations and stated goals in respect of the liberalisation of the 900 MHz band and urged ComReg to determine who should bear the responsibility of guard blocks and to propose a solution.

ComReg's proposal

A 8.486 There are three compatibility scenarios regarding neighbouring networks in the 900 MHz band;

- GSM adjacent to GSM
- UMTS/LTE/WiMAX adjacent to UMTS/LTE/WiMAX
- GSM adjacent to UMTS/LTE/WiMAX

GSM adjacent to GSM

A 8.487 In this instance, ComReg considers that the neighbouring GSM operators should share the guard band responsibility equally.

A 8.488 In practice, this should pose no difficulty to either GSM operator, as GSM channels are centred on integer multiples of 200 kHz and therefore 100 kHz at either end of a GSM operators assignment should be unused. The unused 100 kHz at the end of each GSM operator's assignment would combine to make a 200 kHz frequency separation.

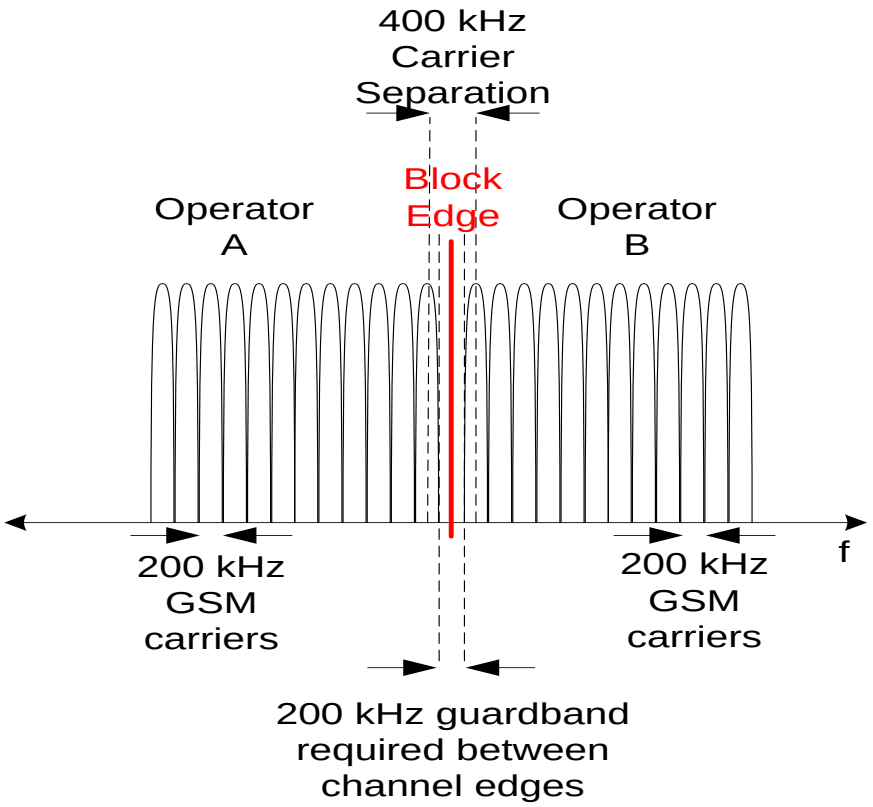

Figure 10: 400 kHz Carrier separation between two adjacent GSM operators

UMTS/LTE/WiMAX adjacent to UMTS/LTE/WiMAX

A 8.489 In this scenario ComReg considers that the neighbouring UMTS/LTE/WiMAX operators should equally share the co-existence responsibility

A 8.490 In practice, this should pose no difficulty to either UMTS/LTE/WiMAX operator as these systems are generally operated in 5 MHz channels (and multiples thereof), and the required frequency separation between neighbouring operators is 5 MHz.

A 8.491 However as the channel centre frequency, in the case of UMTS, is specified to be aligned on an integer multiple of 200 kHz (in the bands of interest) neighbouring operators would need to coordinate with each other to ensure that their carriers were both aligned at either 2.4 or 2.6 MHz above the base frequency of the channel to maintain the appropriate separation.

A 8.492 Under this scenario, and as depicted in

A 8.493 Figure **11** below, a UMTS/LTE/WiMAX operator would not need to set aside spectrum as a guard band to meet the required frequency separation requirements to neighbouring UMTS/LTE/WiMAX operators.

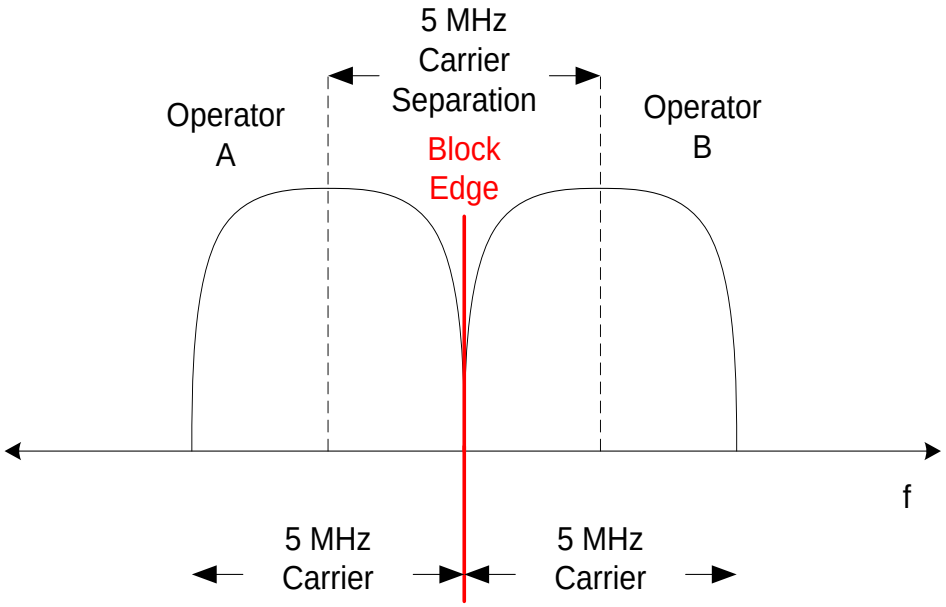

Figure 11: 5 MHz Carrier separation between two adjacent UMTS operators

GSM adjacent to UMTS/LTE/WiMAX

A 8.494 In this scenario, Commission Decision 2011/251/EU stipulates that carrier separation of 2.8 MHz or more is required between a neighbouring UMTS network and a GSM network, and a 200 kHz guard band between channel edges of WiMAX and LTE with GSM, unless less stringent technical parameters are agreed among the network operators themselves. These separation requirements assume no coordination between adjacent operators to reduce the need for a guard block between adjacent GSM and UMTS/LTE/WiMAX operator. Furthermore, CEPT Report 40, referenced in the above Decision, recommends that:when LTE/WiMAX networks in 900/1800 MHz band and GSM900/1800 networks are in uncoordinated operation, the recommended frequency separation between the LTE/WiMAX channel edge and the nearest GSM carrier's channel edge is 200 kHz or more;

A 8.495 When LTE/WiMAX networks in 900/1800 MHz band and GSM900/1800 networks are in coordinated operation (co-located sites), no frequency separation is required between the LTE/WiMAX channel edge and the nearest GSM carrier's channel edge

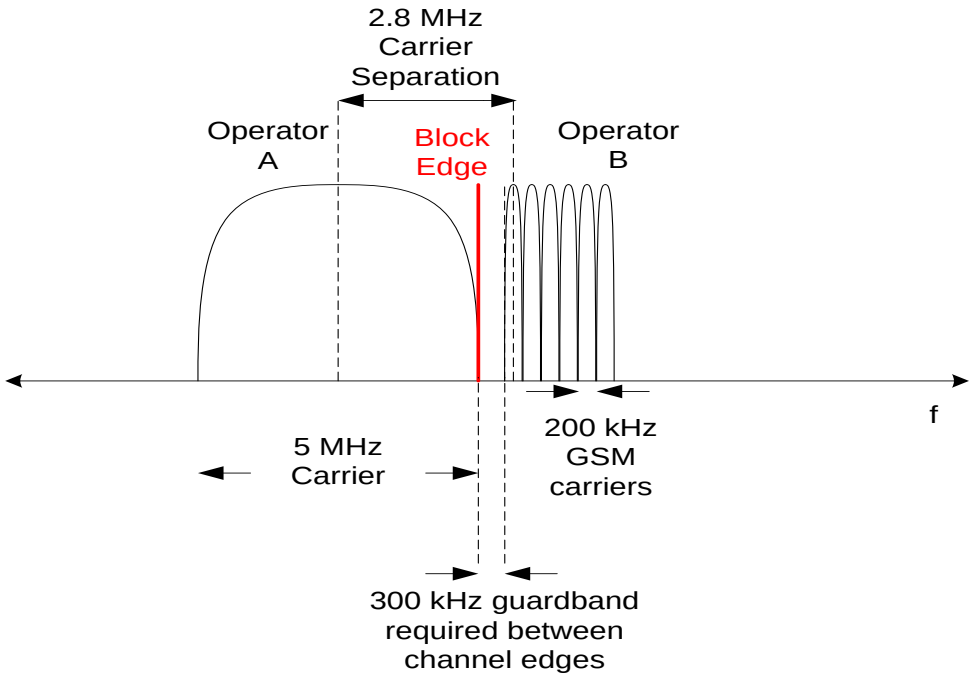

Figure 12: 2.8 MHz Carrier separation between UMTS carrier and GSM carriers

A 8.496 Therefore the scenario where prospective networks are not coordinated presents the question of who should bear this guard band? ComReg's preference would be for neighbouring operators to agree upon the guard band requirements between them. ComReg's further consideration of the issue is set out below.

A 8.497 In ComReg Document 09/99c, DotEcon considered[616] two options to address this issue:

1. The Guard band obligation falls on the GSM operator, or
2. The Guard band obligation falls on the UMTS operator.

A 8.498 In considering this issue, DotEcon noted that:

- Under Option 2, where responsibility for providing the guard blocks falls on UMTS operators, the amount of usable spectrum for UMTS only operators varies dramatically depending on the technology deployed by neighbours. The coordination risk is therefore large and this gives rise to a number of serious concerns:

[616] Chapter 5 of Document 09/99c

  - this scheme might result in outcomes where a substantial amount of spectrum is sterilised;
  - the variance in the amount of spectrum that might be usable for 3G use imposes excessive uncertainty on the value of lots for 3G operators, thus increasing the likelihood of an inefficient allocation of spectrum between bidders and unfairness for 3G-only operators;
  - it might result in opportunities for anti-competitive behaviour, where GSM operators may be able to foreclose or substantially reduce the spectrum available for 3G use by new entrants.

- Under Option 1, where responsibility for providing the guard blocks falls on the GSM operator, DotEcon noted that while there is some co-ordination risk for the GSM operator, in the sense that getting maximum possible use out of their spectrum may require co-ordination with neighbouring users, the impact on spectrum valuation is limited. The impact of failing to agree coordination measures with neighbours is typically limited to the loss of one GSM channel (200 kHz) or, in the worst case, two channels if the GSM frequency assignment is sandwiched between two UMTS/LTE/WiMAX neighbouring users. Therefore, the impact on licence valuation of GSM users needing to coordinate with neighbours is small.

A 8.499 Given the above, DotEcon recommend that ComReg clarify its view on this guard band issue prior to any licence competition and noted that the following compelling arguments for adopting Option 1:

- It would allow UMTS use to the edges of a 2×5MHz block.
- It would allow GSM use in the entirety of a licensee's frequency allocation on similar terms to current GSM licences, except for within 200 kHz of the boundaries of the allocation.
- Within 200 kHz of the boundary of a frequency allocation, GSM use would be possible only with the agreement of the neighbouring user.
- Any other technology allowed by the EC Decision would have to allow neighbouring users to deploy UMTS across their entire frequency allocation and GSM to within 200 kHz of the boundary of their allocation.

A 8.500 ComReg notes the advice of DotEcon and agrees that in this instance it would be appropriate for the guard band obligation to fall upon the GSM operator, as otherwise it could place a disproportionate burden on the UMTS operator. While it remains ComReg's preference that neighbouring operators would, in the first instance, coordinate amongst themselves in order to minimise guardband requirement, ComReg nevertheless proposes to include a condition that would require the GSM operator to meet the guard band obligation as set down in Decision 2009/766/EC and Decision 2011/251/EU.

Compliance with International MoUs on 900 MHz and 1800 MHz bands

A 8.501 Radio waves do not observe international boundaries and so it is often necessary for neighbouring spectrum management authorities to co-ordinate their use of the radio spectrum in order to minimise cross-border interference. ComReg and the UK Regulator, Ofcom, have signed a number of Memoranda of Understanding ("MoU") in relation to the co-ordination of radio services and licensees would be obliged to comply with any such MoU.

A 8.502 In relation to the 900 MHz and 1800 MHz bands, there are currently 4 MoUs in force and these are available for download from ComReg's website[617]. In line with national and international developments, ComReg and Ofcom may update these MOUs over time and licensees in the 900 MHz and 1800 MHz bands will at all times be obliged to comply in full with any such MoU affecting their licence(s).

Terminal Stations Proposals

A 8.503 The possession and use of radio equipment in Ireland is governed by the Wireless Telegraphy Act 1926, (Act No 45 of 1926), (as amended), which stipulates that an appropriate Wireless Telegraphy licence must be held, unless licence exempted[618].

A 8.504 A terminal station is a device that transmits and receives radios signals and it would require a WT licence unless licence exempted. To date ComReg exempted all terminal devices in the 900 MHz, 1800 MHz and 2100 MHz bands (i.e. the mobile bands) in Ireland[619] and this approach is in line with best international practice where terminal stations are exempted from individual licences, provided such devices adhere to certain internationally recognised technical standards.

A 8.505 As discussed in this document, ComReg proposes that new licences in the 900 MHz and 1800 MHz band will be issued on a liberalised basis and such licences will permit the use of other technologies (such as LTE, WiMAX and UMTS) as well as GSM. In addition, it is proposed that new licences in the 800 MHz band will permit the deployment of ECS.

A 8.506 Given the above, it is necessary for ComReg to update legislation in order to exempt terminal stations in the 800 MHz, 900 MHz and 1800 MHz bands in line with the ComReg's proposed licensing regime for the bands. This section discusses ComReg's proposal to create a new Statutory Instrument which would exempt 800 MHz, 900 MHz and 1800 MHz terminal devices from individual licensing, provided that such devices are in line with internationally recognised technical standards.

[617] http://www.comreg.ie/radio_spectrum/search.541.874.10003.0.rslicensing.html

[618] http://www.comreg.ie/radio_spectrum/exemptions.541.488.html

[619] S.I. 158 of 2003

The 800 MHz Band

A 8.507 As shown in **Table 18** below, Decision 2010/267/EU sets an in-block emission limit of 23 dBm for terminal stations in the 800 MHz band.

A 8.508 While recognising that Decision 2010/267/EU allows Member States to relax this limit for specific deployments, e.g. in rural areas provided other services and networks are protected and any cross-border obligations are not compromised, ComReg proposes that licence exemption for the 800 MHz band should only apply to those terminal stations complying with the in-block limits as set out in Table 18 below. ComReg proposes to introduce licence exemption legislation in due course.

Table 18: In-block Requirements for 800 MHz Terminal Stations

A 8.509	Maximum mean in-block power	**23 dBm (1)**
A 8.510	(1) This power limit is specified as EIRP for terminal stations designed to be fixed or installed and as Total Radiated Power (TRP) for terminal stations designed to be mobile or nomadic. EIRP and TRP are equivalent for isotropic antennas. It is recognised that this value is subject to a tolerance of up to + 2 dB, to take account of operation under extreme environmental conditions and production spread.	

The 900 MHz and 1800 MHz bands

A 8.511 To date the terminal stations in the 900 MHz and 1800 MHz bands have been based upon the GSM technology and existing legislation provided licence exemptions for GSM terminals in these bands.

A 8.512 ComReg proposes to update legislation in due course to licence exempt terminal stations in the 900 MHz and 1800 MHz bands in line with Decision 2009/766/EC and Decision 2011/251/EU.

8.6 Draft Schedule to the Licence

This draft schedule to the licence is provided for illustrative purposes and should be read in conjunction with Annex 8 of this document.

[DRAFT] SCHEDULE

Part 1 Licence Commencement & Termination Date

[Enter the licence commencement date & termination date]

Part 2 General

The Frequency Bands

- The "800 MHz band" means the 791-821 MHz and 832-862 MHz bands;
- The "900 MHz band" means the 880-915 MHz and 925-960 MHz bands;
- The "1800 MHz band" means the 1710-1785 MHz and 1805-1880 MHz bands.

The Licensed Frequency Blocks

The frequency block(s) within which Licensed Terrestrial Systems of the Licensee shall be designed or configured to operate under this licence (to be known as the "Licensed Frequency Block(s)") are:

- [enter the frequency details of the 2 × 5 MHz block(s) in the 800 MHz, 900 MHz and/or 1800 MHz bands that the licensee obained under ComReg's broader spectrum release proposal]

The Licensed Terrestrial Systems and Services

This licence allows the licensee, in the Licensed Frequency Block(s), in accordance with the Wireless Telegraphy Act, 1926, as amended, to keep and have possession of terrestrial systems capable of providing electronic communications services that are in compliance with the technical implementing measures adopted pursuant to Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community ("Radio Spectrum Decision") (*): (*) OJ L 108, 24.4.2002, p. 1. and in conformity with the standards referred to in parts 3 – 7 of this schedule.

Definitions of specific Terrestrial Systems

"GSM system" means an electronic communications network that complies with the GSM standards, as published by ETSI, in particular EN 301 502 and EN 301 511;

"UMTS system" means an electronic communications network that complies with the UMTS standards as published by ETSI, in particular EN 301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11;

"LTE system" means an electronic communications network that complies with the LTE Standards, as published by ETSI, in particular EN 301 908-1, EN 301 908-13, EN 301 908-14, and EN 301 908-11;

"WiMAX system" means an electronic communications network that complies with the WiMAX Standards, as published by ETSI, in particular EN 301 908-1, EN 301 908-21 and EN 301 908-22;

"Other terrestrial systems" means an electronic communications network not listed above that complies with Decision 2010/267/EU (for the 800 MHz band), and/or Decision 2009/766/EC (for the 900 MHz band and 1800 MHz band).

Termination of a terrestrial system deployed in the Licensed Frequency Block(s)

Should the licensee intend to terminate a terrestrial system that it has deployed in the Licensed Frequency Block(s), the licensee shall notify the Commission for Communications Regulation ("ComReg") in writing of this intention Six months prior to the termination date for that terrestrial system.

Provision of Maps and Data

For the purposes of carrying out coverage (see Part 4) and quality of service (see Part 5) surveys, the Licensee shall, on request, provideto ComReg the following:

(a) Maps showing Coverage as defined in Part 4 this schedule;

(b) An up to date list of the locations of the base transceiver stations;

(c) A mechanism for identifying the base station that is handling a call at any given time;

(d) An adequate number of test numbers.

Part 3 Technical Conditions

The 800 MHz band

1. The Frequency Division Duplex (FDD) method shall be used. Radio transmitters that use the 791–821 MHz frequency space shall transmit in a downlink direction (i.e. 'Base Station'[620] transmitters). Radio transmitters that use the 832–862 MHz frequency space shall transmit in an uplink direction (i.e. 'terminals' transmitters).
2. Terrestrial systems compatible with Decision 2010/267/EU can be deployed in the 800 MHz band.
3. Within a frequency block for which the licence holder has a licence, the in-block radiated power from a base station transmitter in the downlink direction must not exceed 59 dBm/5 MHz EIRP[621].
4. Outside of a frequency block for which the licence holder has a licence, the licensee shall comply with the out-of-block Block Edge Mask (BEM) as specified in **Table 19** to Table 22

[620] Repeaters are also included as a Base Station.

[621] EIRP stands for Equivalent Isotropically Radiated Power.

Table 19: Baseline Requirements – Base Station BEM out-of-block EIRP limits.

Frequency Range Of Out-Of-Block Emissions	Maximum Mean Out-Of-Block EIRP	Measurement Bandwidth
832 – 862 MHz (Frequencies used for FDD uplink)	-49.5 dBm	5 MHz

Table 20: Transition Requirements - Base Station BEM out-of-block EIRP limits per antenna over FDD downlink frequencies 791 – 821 MHz.

Frequency Range Of Out-Of-Block Emissions	Maximum Mean Out-Of-Block EIRP	Measurement Bandwidth
-10 to -5 MHz from lower block edge	18 dBm	5 MHz
-5 to 0 MHz from lower block edge	22 dBm	5 MHz
0 to +5 MHz from lower block edge	22 dBm	5 MHz
+5 to +10 MHz from lower block edge	18 dBm	5 MHz
Remaining FDD downlink frequencies	11 dBm	1 MHz

Table 21: Transition Requirements – Base Station BEM out-of-block EIRP limits per antenna (for one to four antennas) over frequencies used as guard bands.

Frequency Range Of Out-Of-Block Emissions	Maximum Mean Out-Of-Block EIRP	Measurement Bandwidth
Guard band between 790 MHz and 791 MHz	17.4 dBm	1 MHz
Duplex Gap guard band 821 – 832 MHz	15 dBm	1 MHz

Table 22: Baseline requirements - Base Station out-of-block EIRP limits over frequencies below 790 MHz

Frequency Range Of Out-Of-Block Emissions	Conditions On Base Station In-Block EIRP, P Dbm/Mhz	Maximum Mean Out-Of-Block EIRP	Measurement Bandwidth
470 – 790 MHz	P≥59	0 dBm	8MHz
	36 ≤ P 59	(P-59) dBm	8MHz
	P 36	-23 dBm	8MHz

5. The Licensee shall comply with all Memoranda of Understanding ("MoU") agreed from time to time between ComReg and the National Regulatory Authority responsible for communications matters in the UK, Ofcom or its successor, in relation to the 800 MHz band, including[622].

The 900 MHz & 1800 band

6. The Frequency Division Duplex (FDD) method shall be used.
7. In the 900 MHz band, radio transmitters that use the 925–960 MHz frequency space shall transmit in a downlink direction (i.e 'Base Station' transmitters). Radio transmitters that use the 880–915 MHz frequency space shall transmit in an uplink direction (i.e. 'Terminal' transmitters).
8. In the 1800 MHz band radio transmitters that use the 1805-1880 MHz frequency space shall transmit in a downlink direction (i.e 'Base Station' transmitters). Radio transmitters that use the 1710–1785 MHz frequency space shall transmit in an uplink direction (i.e. 'Terminal' transmitters).
9. Terrestrial systems compatible with Decision 2009/766/EC and Decision 2011/251/EU can be deployed in the 900 MHz band and/or the 1800 MHz band.
10. In the absence of bilateral or multilateral agreements between neightbouring licensees, the licensee deploying a GSM system in the 900 MHz and/or 1800 MHz band will be obliged to meet the guard band obligation as set down in Decision 2009/766/EC.
11. The Licensee shall comply with all Memoranda of Understanding ("MoU") agreed between ComReg and the National Regulatory Authority responsible for communications matters in the UK, Ofcom or its successor, in relation to the

622 See the Draft MoU regarding this band,as presented in Annex 12 of this document.

900 MHz and 1800 MHz band, including ComReg Documents 11/50c, d, e and f[623].

Part 4 Roll-out and Coverage Requirements

1. Minimum Coverage and Roll-out Requirement

[Should an existing mobile network operator obtain a new licence]

The Licensee shall ensure the attainment of, and maintain, a demographic coverage levelof a least 70% within 3 years of the licence commencement date.

[Should a New Entrant obtain a new licence]

The Licensee shall ensure the attainment of, and maintain, a demographic coverage levelof a least 70% within 7 years of the licence commencement date.

2. Definition of Coverage

Where the Licensee has deployed more than one terrestrial system in the 800 MHz, 900 MHz and/or 1800 MHz band, it is the combined coverage of these terrestrial systems that counts towards the minimum coverage and roll-out obligation set out in this licence.

The definition of coverage varies per frequency band and per terrestrial system and shall be calculated as follows:

800 MHz coverage metrics

For a LTE system:

- For measurement purposes – an average pilot signal field strength of 54 dBµV/m/MHz measured outdoors at a height of 1.5m, or a Block Error Rate (BLER) of 10^{-2} measured on the Physical Downlink Control Channel (PDCCH).
- For propagation prediction systems – a pilot signal field strength of 54dBµV/m/MHz over 95% of the area during 95% of the time.

For UMTS Technology:

- For measurement purposes – an average pilot signal field strength of 49dBµV/m/5MHz measured outdoors at a height of 1.5m or an Ec/Io ≥ -8dB
- For propagation prediction systems – a pilot signal field strength of 49dBµV/m/5MHz over 95% of the area during 95% of the time.

623 http://www.comreg.ie/_fileupload/publications/ComReg1150c.pdf , http://www.comreg.ie/_fileupload/publications/ComReg1150d.pdf , http://www.comreg.ie/_fileupload/publications/ComReg1150e.pdf and http://www.comreg.ie/_fileupload/publications/ComReg1150f.pdf

900 MHz coverage metrics

For a GSM system:

- For measurement purposes – an average pilot signal field strength of 46dBµV/m/200 kHz measured outdoors at a height of 1.5m
- For propagation prediction systems – a pilot signal field strength of 46dBµV/m/200 kHz over 95% of the area during 95% of the time.

For a UMTS system:

- For measurement purposes – an average pilot signal field strength of 50dBµV/m/5MHz measured outdoors at a height of 1.5m or an Ec/Io ≥ -8dB
- For propagation prediction systems – a pilot signal field strength of 50dBµV/m/5MHz over 95% of the area during 95% of the time.

For a LTE system:

- For measurement purposes – an average pilot signal field strength of 55 dBµV/m/MHz measured outdoors at a height of 1.5m, or a Block Error Rate (BLER) of 10^{-2} measured on the PDCCH.
- For propagation prediction systems – a pilot signal field strength of 55dBµV/m/MHz over 95% of the area during 95% of the time.

1800 MHz coverage metrics

For GSM Technology:

- For measurement purposes – an average pilot signal field strength of 54 dBµV/m/200 kHz measured outdoors at a height of 1.5m
- For propagation prediction systems – a pilot signal field strength of 54 dBµV/m/200 kHz over 95% of the area during 95% of the time.

For UMTS Technology:

- For measurement purposes – an average pilot signal field strength of 57dBµV/m/5MHz measured outdoors at a height of 1.5m, or an Ec/Io ≥ -8dB.
- For propagation prediction systems – a pilot signal field strength of 57dBµV/m/5MHz over 95% of the area during 95% of the time.

For LTE Technology:

- For measurement purposes – an average pilot signal field strength of 62dBµV/m/MHz measured outdoors at a height of 1.5m, or a Block Error Rate (BLER) of 10^{-2} measured on the PDCCH...
- For propagation prediction systems – a pilot signal field strength of 62dBµV/m/MHz over 95% of the area during 95% of the time.

Other Technologies in the 800 MHz, 900 MHz and/or 1800 MHz bands

Insofar as, over the lifetime of this licence, WiMAX or other technologies (e.g., etc.) may also be deployed in the 800 MHz, 900 MHz and 1800 MHz bands, ComReg will set a measurement standard[624] for these as and when deployed.

Such measurement standards shall be defined on whatever basis appears appropriate to ComReg having regard to international standards and recommendations, but for indicative purposes are likely to be based on:

- For measurement purposes – an average pilot signal field strength of "X[625]" measured outdoors at a height of 1.5m, or a Carrier to Interference (C/I) ratio of -YdB[626]
- For propagation prediction systems – a pilot signal field strength of "X" over 95% of the area during 95% of the time.

Coverage from licensed terrestrial systems in "other designated frequency bands"

In this paragraph, "other designated frequency bands" meansthe 2100 MHz band, which is to say, the 1900-1980 MHz and 2110-2170 MHz bands.

Where the Licensee has deployed a licensed terrestrial system(s) in "other designated frequency bands" which provides a seamless service with licensed terrestrial systems in the 800 MHz, 900 MHz and/or 1800 MHz bands, up to 35% demographic coverage (i.e. one half) of the 70% demographic coverage obligation, as set out in paragraph 1 above, can be met using coverage provided by the licensed terrestrial systems in these "other designated frequency bands".

3. Reporting of Compliance

The Licensee shall measure, and submit a compliance report to ComReg on, coverage every six months, the first such six-monthly period ending on the expiration of six months from the Licence Commencement Date. The Licensee shall, within 31 days of the date on which the coverage and roll-out obligation specified in relation the Licensee in Part 4, paragraph 1, falls to be met, notify ComReg that the Licensee has either (a) met the said obligation, or (b) failed to meet the said obligation. Failure by the Licensee to so notify ComReg shall be deemed to comprise non-compliance with the relevant obligation.

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624 As with the GSM, UMTS and LTE systems, coverage will be measured using a device matching the appropriate Users Equipment standard for the system in use.

625 Corrected for the bandwidth used but based on a harmonised European or International standard it would be confirmed following consultation with stakeholders.

626 This would be the C/I ratio giving a quasi error free channel, following a standards based approach.

4. Performance Guarantee

The Licensee shall, before the licence commencement date, put in place a programme to measure coverage and monitor compliance with the Coverage and Roll-out obligations. The programme shall include provision for reporting procedures to ComReg and shall be in such form as may be agreed with ComReg or as may be specified by ComReg from time to time.

In the event that the Licensee fails to meet the Coverage and Roll-out obligations, €2 million will be payable by the Licensee on demand to ComReg.

Part 5 Quality of Service (QoS) Obligations

1. The Minimum "Availablity of the Network" Standard

The "availability of the network" shall be measured in terms of "network unavailability".

"Network unavailability" means the average number of minutes per terminal per six month period for which services on the network are not available due to a network disturbance, failure or scheduled unavailability.

The Licensee shall ensure that service unavailability is less than 35 minutes (based on the weighting factors below) per six month period.

Table 23: Weighting Factors for Service Unavailability tracking all periods of network unavailability.

Service Unavailability, Weighting Factors (divide duration of each network event by weighting factor)			
	Monday to Friday	Saturday	Sunday
For periods between 07.00 and 24.00	1	2	4
For periods between 00.00 and 07.00	4	8	16

The Licensee shall maintain this network log in a manner that will demonstrate to the satisfaction of ComReg that such a network log is an adequate means of assessing whether the Licensee is complying with its "availability of the network" obligation under this licence.

The network log, or as may be appropriate part thereof, shall be made available on request to ComReg.

The Licensee shall calculate the network unavailability for any period specified by ComReg from the information recorded in the network log, and shall upon request and within such time as may be specified by ComReg, provide ComReg with the results of the calculation.

2. The Minimum "Voice Call" Standard

Where the licensee provides a "voice call" service on its licensed terrestrial system in the 800MHz, 900 MHz band and/or 1800 MHz Band, the licensee shall comply with the minimum "voice call" standard as set out in **Table 24** below.

Table 24: The minimum "voice call" standard for each 6 month period

	Average	Worst Case
Maximum Permissible Blocking Rates **This refers to the maximum percentage of total call attempts which are unsuccessful during the time consistent busy hour.**[627]	2%	4%
Maximum Permissible Dropped Call Rates **This refers to the maximum percentage of total originating calls which are prematurely released by the network within 3 minutes of the call being made.**	2%	4%
Transmission quality **The licensee shall ensure that the speech transmission quality is as good or better than the speech quality associated with the GSM Standard and GSM Technical Specifications of ETSI. The licensee shall ensure that appropriate echo treatment equipment is used and that it is properly configured.**		

The Licensee shall ensure that the above Quality of Service obligations are met by the Licensee and any third party providing a service via contractual or aother arrangements with the Licensee.

1. Compliance, Reporting and Performance Guarantees

The Licensee shall, before the licence commencement date, put in place a programme to measure and monitor compliance with the Quality of Service Measure obligations. The programme shall include provision for reporting procedures to ComReg and shall be in such form as may be agreed with ComReg or as may be specified by ComReg from time to time.

Every six months, the Licensee shall measure, and submit a six monthly compliance report to ComReg on, (a) network unavailability and (b) the minimum voice call

[627] **"**Time consistent busy hour" means the period of one-hour starting at the same time each day for which the average traffic of the network concerned is greatest over the days under consideration. The time consistent busy hour shall be determined from an analysis of traffic data obtained from the service and be subject to the approval of the Commission.

The 'Time consistent busy hour' is determined from the operator's voice traffic. It is the one-hour period during which there is the highest level of traffic. The blocked call rates are measured for the same one-hour period during each review period (i.e. 6 months). The one-hour period is determined by the operator and is subject to ComReg's approval.

standard, the first such six-monthly period ending on the expiration of six months from the Licence Commencement Date.

The Licensee shall, within 31 days of the date on which each relevant Quality of Service obligation falls due for compliance, notify ComReg that the Licensee has either (a) met the said obligation, or (b) failed to meet the said obligation. Failure by the Licensee to so notify ComReg shall be deemed to comprise non-compliance with the relevant obligation.

In the event that Licensee fails to meet the Quality of Service obligations, €1 million will be payable on demand to ComReg.

Annex 9

Spectrum Fees – Minimum Price & Structure of Payments

9.1 Background

A 9.1 Over the course of consultations 09/99, 10/71 and 10/105 ComReg has asked seven questions relating to the following:

1. the proposed **setting of minimum prices** for liberalised rights of use of 800, 900 and/or 1800 MHz spectrum;
2. the **benchmarking methodology** and application of same by DotEcon to inform ComReg's proposals in respect of the above proposed minimum prices. This includes the relativity analysis conducted in relation to the proposed minimum price for liberalised 1800 MHz rights of use;
3. the **structure of payments of licence fees** for liberalised rights of use to 800, 900 and/or 1800 MHz spectrum (which would include an upfront spectrum access fee ("SAF") and ongoing spectrum usage fees ("SUFs")) and the appropriate division of total fees between these two types of payment; and
4. the proposed **deferred payment scheme** including interest costs in respect of the proposed licence fees and whether other approaches to mitigate any potential for auction disruption arising from the current financial and economic climate should be considered by ComReg.

A 9.2 The questions relating to matters in points 1 and 2 above were as follows:

> Q. 4. (from ComReg Document 09/99) Do you have any comments on the setting of minimum prices or the benchmarking process employed by DotEcon and proposed to be adopted by ComReg in arriving at a minimum price?

> Q. 13. (from ComReg Document 10/71) 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.

> Q. 10. (from ComReg Document 10/105) Do you agree with the proposed methodology for setting licence fees for 1800 MHz spectrum? Do you agree with the proposed minimum price for 1800 MHz spectrum to be set at 50% of the proposed minimum price for sub-1GHz spectrum, split 50/50 between an upfront reserve price, and annual spectrum usage fees? Please provide reasons for your view.

A 9.3 The questions relating to matters in point 3 above were as follows:

Q. 5. (from ComReg Document 09/99) Do you have any comments on the structure of reserve prices and spectrum usage fees?

Q. 14 (from ComReg Document 10/71) Do you have any comments on the structure of the reserve prices and spectrum usage fees? Please provide reasons for your view.

A 9.4 The questions relating to matters in point 4 were as follows:

Q. 6. (from ComReg Document 09/99) Do you have any views on ComReg's proposed deferred payment scheme and the indexation that will apply?

Q. 7. (from ComReg Document 09/99) Are there any other approaches ComReg should consider to mitigate any potential for auction disruption arising from the current financial and economic climate?

A 9.5 Interested parties' responses reflect the evolving nature of the proposed award of liberalised rights of use to 800, 900 and/or 1800 MHz spectrum bands. Non-confidential versions of the responses have been published on ComReg's website.[628]

A 9.6 This annex presents ComReg's assessment of, and response to, the views provided by interested parties on the above questions regarding whether to set minimum prices, the appropriate benchmarking methodology, the licence fee payment structure, and the possibility of deferred payments of licence fees.

A 9.7 The views of DotEcon, ComReg's expert economic advisors, are also considered in a separate sub-section and a report by DotEcon issued alongside this paper sets out DotEcon's detailed consideration of and views in relation to the matters raised. This annex concludes by setting out ComReg's current position having considered respondents' views and DotEcon's views as they relate to and address the matters raised in the above questions.

9.2 Minimum Prices, Benchmark Methodology and Application

A 9.8 This section deals with matters raised in questions 4 (Document 09/99), 13 (Document 10/71) and 10 (Document 10/105), concerning minimum prices (for liberalised rights of use of 800, 900 and/or 1800 MHz spectrum and the benchmarking methodology.

[628] Document 11/37 on "GSM liberalisation project – public correspondence"; Document 11/10 on "Inclusion of 1800 MHz into proposed award of 800 and 900 MHz – responses to consultation & correspondence"; Document 10/103 and 10/103 R on "800, 900 and 1800 MHz spectrum – Submissions received from respondents"; Document 10/21 R – on submissions to Consultation 09/99 "liberalising the future use of the 900 & 1800 MHz spectrum bands".

ComReg's position set out in Consultations 09/99, 10/71 and 10/105

A 9.9 A key consideration in designing an auction is determining whether a minimum price is required and, if so, at what level it should be set. A further key consideration is the appropriate methodology to support the minimum price determination. These matters were consulted upon and considered by ComReg in Consultations 09/99, 10/71 and 10/105.

Overview of ComReg's original position and how it has evolved

A 9.10 In Section 13.2 of Consultation 09/99 ComReg set out its views as to whether a minimum price would be required and, if so, at what level it should be set. ComReg came to the view that a minimum price would be appropriate and the key factors informing this view were set out as follows:

- In theory, an auction could be implemented with no minimum price or a very low/nominal minimum price. …
- On the other hand, there may be reasons why a significant minimum price may be warranted. In particular, where collusive behaviour is a risk in a particular auction such as where there may likely be a limited number of participants and/or limited excess demand, setting a low minimum price may facilitate and incentivise collusive behaviour amongst participants. In this regard, an opportunity for bidders to obtain access to spectrum at a price below the real economic value of such access to bidders may provide the incentive for bidders to engage in tacitly collusive behaviour. In this context, it can be seen that setting a higher minimum price, and particularly one that would more closely reflect the real economic value of spectrum access, would reduce the opportunity/ability and incentives of bidders to engage in such behaviour. That is, the reward would be much lower for engaging in such conduct. To fully counteract the effectiveness of such a price-saving strategy, the minimum price should be set at the economic value of the spectrum to the user as this effectively dissolves any profit gain from adopting such a strategy.

A 9.11 ComReg further stated in Consultation 09/99, and subsequently in Consultations 10/71 and 10/105, some specific aims for setting minimum price levels for the proposed auction, namely:

- to deter frivolous bidders without genuine business cases whose participation may prolong the auction process and waste resources;
- to ensure that the administrative cost of the auction process is recovered;
- to disincentivise and guard against uncompetitive auction outcomes, including those which could arise from anti-competitive collusive behaviour of potential bidders;
- not setting the minimum price so high that the risk of choking off efficient demand would be significant; and

- ensuring the efficient use of spectrum.

A 9.12 In addition, ComReg's approach to the setting of the minimum prices was informed by its statutory functions and objectives, including its statutory objective, to promote competition through encouraging the efficient use and ensuring the effective management of radio frequency spectrum (please see Annex 1). ComReg has consistently remained of the view that to achieve the objective of the promotion of competition it is essential that licences for rights of use of spectrum are assigned to those who value them the most. The proposed auction process reflects this view and indeed similar approaches are becoming increasingly prevalent across Europe (see Annex 11 on International updates) and indeed worldwide.

A 9.13 DotEcon was tasked by ComReg to advise on possible methodologies for setting the minimum price. DotEcon's assessment and analysis is set out in Section 10.3 of Part C of the Document 09/99c[629] (and as discussed below, DotEcon also provided revised reports including the Document 11/59 issued alongside this Response to Consultation and Draft Decision). In undertaking this task, DotEcon had regard to ComReg's statutory functions and objectives including the requirement that the approach be proportionate and transparent. ComReg's analysis of possible methodologies, which was informed by DotEcon's views, is set out in Section 13.3 of Consultation 09/99.

A 9.14 ComReg concluded that a benchmarking exercise was preferable to other approaches and would best suit the circumstances surrounding the award of liberalised rights of use to 900 MHz spectrum.

A 9.15 Section 10.5 of Document 09/99c describes the benchmarking exercise conducted by DotEcon in order to estimate a range of conservative lower bound values for liberalised rights of use of 900 MHz spectrum. [630] The conservative lower bound range was found to be €16-34 million per 2×5 MHz lot.[631] DotEcon recommended that ComReg should consider a minimum price towards the upper end of the range of €25 -30 million and that setting a minimum price at such levels should be low enough to prevent choking off efficient demand.

A 9.16 Accordingly, having regard to the considerations outlined above (including advice from DotEcon as to what factors should be weighed by ComReg to inform the setting of the minimum price[632]) ComReg's proposal in Document 09/99 was to set the minimum price at €30 million per 2×5 MHz lot of 900 MHz spectrum.

A 9.17 The consultation process has evolved since the date of publication of Consultation 09/99. For the reasons described in Annex 3 (in particular developments in the

[629] See also paragraphs 457 to 479 in Part C of Document 09/99c for a discussion on the issues presented.

[630] See also paragraphs 489 to 522 in Part C of Document 09/99c for a discussion on the issues presented.

[631] See also paragraph 522 in Part C of Document 09/99c for a discussion of the issues presented.

[632] See also Section 10 of Document 09/99c.

availability of spectrum in the 800 MHz band including specifically the clarification effected by the Minister for Communications Energy and Natural Resources' announcement on 29 July 2010 that analogue terrestrial television will be switched-off in the State in Quarter 4 of 2012[633]) ComReg came to the view that it would be appropriate to consider whether to award liberalised 800 MHz spectrum in conjunction with liberalised 900 MHz spectrum, via a joint award.

A 9.18 In light of these developments, the details of which are set out in Consultation 10/71, DotEcon was tasked to provide ComReg with a revised report. DotEcon updated the benchmarking exercise in the revised report to reflect, among other things[634], the joint awarding of liberalised 800 and 900 MHz spectrum, including in the analysis new Gross Domestic Product ("GDP") per capita figures. In this updated report, DotEcon concluded that it would be appropriate to set a **common minimum price** in a joint award of liberalised 800 and 900 MHz spectrum. DotEcon also concluded that a combined award of liberalised spectrum in both bands altered the minimum price ranges which it had previously estimated, by increasing the recommended lower bound range from €16 to €18 million, and lowering the upper bound range from €34 to €26 million, per 2 × 5 MHz lot. The reasons for these alterations are set out in DotEcon's revised report and ComReg considers them to be reasonable noting that DotEcon addressed many of the points which respondents had raised in relation to its first report.[635]

A 9.19 ComReg remained of the view that incentives for tacit collusion between bidders could persist. ComReg therefore proposed, in Consultation 10/71, a minimum price of €25 million per 2× 5 MHz lot, for liberalised 800 MHz and 900 MHz spectrum, which remained at the upper end of the revised price range proposed by DotEcon.

A 9.20 As set out in Annex 3, there were further proposals as to what other liberalised bands might form part of the award process. The proposed inclusion of liberalised 1800 MHz spectrum was consulted upon in Consultation 10/105.

A 9.21 In Document 10/105a, DotEcon advised on the inclusion of the 1800 MHz band in the award,[636] and advised on the derivation of appropriate benchmarks for the value of liberalised 1800 MHz spectrum so as to also yield a conservative lower bound estimate of the market value of 1800 MHz spectrum.

A 9.22 In Part 7 of report 10/105a, DotEcon set out the reasoning as to why it adopted the approach of using auction data to estimate the relative market value of liberalised 1800 MHz as against sub-1 GHz spectrum. DotEcon concluded that the relative value of liberalised 1800 MHz to sub-1 GHz spectrum is between 45 - 60% of the

[633] See Document 10/59.

[634] See Document 10/71b for a discussion on the issues presented, noting that the revised report also included updated Purchasing Price Parity ("PPP") rates adjusted for US dollar ("USD") inflation.

[635] For example DotEcon updated the econometrical analysis by using updated GDP per capita input figures.

[636] See Document 10/105a.

minimum price for liberalised 800 and 900 MHz spectrum. ComReg considered this to be reasonable and appropriate and factors informing this view included:[637]

- The main purpose of the minimum price exercise is to set a starting point for the auction. The final outcome of the auction should not be impacted by this starting point unless there is no excess demand;
- DotEcon noted in Document 10/105a that the exact value of 1800MHz spectrum, relative to that of sub- 1GHz spectrum, is not crucial for this purpose, rather a good approximation of this ratio would be sufficient.[638] Where these relativities are somewhat different in reality, these will be reflected in different relative prices of sub- 1GHz and 1800MHz spectrum in the auction itself; as long as both prices constitute conservative lower bounds to actual market value of the respective spectrum, no efficient demand in either category will be choked off. Further calculations carried out by DotEcon, in particular consistency cross-checks conducted against a number of technical studies that modelled network costs using different frequency bands, indicated that the range 45 - 60% would be appropriate.

A 9.23 In light of the foregoing, and noting that this approach would be consistent with its statutory objectives and would be proportionate and transparent (particularly as it would continue to yield a conservative lower bound estimate of the market value of liberalised rights of use to 1800 MHz spectrum) ComReg proposed that the minimum price for liberalised 1800 MHz spectrum would be €12.5 million per 2 × 5 MHz lot (i.e. 50% of the value proposed in respect of the liberalised 800 MHz and 900 MHz spectrum lots).

A 9.24 Respondents' views on these matters are set out below.

Views of respondents

Overview

A 9.25 Respondents' views focused on whether there should be a minimum price and, if so, whether the benchmarking methodology and relativity analysis would be the appropriate tools to set such a price.

A 9.26 None of the eight respondents to Consultation 09/99 opposed the notion of a minimum price in the auction, with six respondents accepting that some form of

[637] See also Section 3.8.1 in Consultation 10/105 for a discussion on relativity analysis for 1800 MHz spectrum.

[638] See also paragraph 188 in Document 10/105a for a discussion on the issues presented.

minimum price would likely be appropriate. However, in the main respondents were of the view that the level of the proposed minimum price was too high.[639]

A 9.27 There were conflicting views as to whether the proposed benchmarking exercise (and the application of a relativity exercise in the case of 1800 MHz spectrum) would be the most appropriate methodology for determining the minimum price. In ComReg's view, the substantive issues raised seem to be associated with the inputs used in the benchmarking exercise and, for example, the fact that the results of auction awards and not proposed auction reserve prices were used. These matters are addressed by DotEcon in its latest report (see Document 11/59 issued alongside this Response to Consultation and Draft Decision).

A 9.28 In addition, respondents commented on ComReg's proposed level of minimum price. Respondents sought clarity as to how ComReg selected its proposed level of minimum price from DotEcon's conservative lower bound range of the market value of the 800 MHz, 900 MHz and 1800 MHz spectrum. Some respondents expressed the view that ComReg had not been clear in showing how its specific objectives in setting of the level of the minimum price had been applied. As these matters do not relate to the specific questions asked, but are of importance nevertheless, ComReg has addressed these issues later in this Annex (see "Other specific views addressed at ComReg's selection of the level of the minimum price").

Views of Respondents

A 9.29 Four respondents provided specific views on question 4 of 09/99 ("Do you have any comments on the setting of minimum prices or the benchmarking process employed by DotEcon and proposed to be adopted by ComReg in arriving at a minimum price?"). These were Digiweb, Meteor (eircom Group), Telefonica O2 (O2) and Vodafone. Another respondent, H3GI, did not answer question 4 directly but did express support for ComReg's proposal to set the minimum price using a benchmarking approach.

A 9.30 In the main, the views of the four respondents were focused firstly on what they perceived to be gaps in the benchmark methodology and, secondly on the proposed level of the minimum price. Their principal concerns with the benchmarking exercise can be summarised as follows:

1. the dataset used by DotEcon includes auction results from the year 2000 onwards, and market expectations at that time would not reflect the

[639] For example, Digiweb was of the view that the minimum price was excessive. Vodafone was of the view that the minimum price should be *"€20 million per 2 × 5 MHz lot"*. O2 was of the view that the minimum price should be at the lower end of DotEcon's range (which, later, through its submission to Consultation 10/71, it stated that ComReg should have chosen a minimum price of *"€18 million per lot prior to revision"*). Eircom Group was of the view that a 50% discount should be applied to the range (€ 16.7 to 26.1 million so as to give a range of €8.4 to € 13 million per lot) and a minimum price at the bottom end of the range should be selected. These views together with other minimum price proposals received in responses to Consultations 09/99, 10/71 and 10/105 are assessed later in this Annex.

current state of the Irish economy. Accordingly, the minimum price should be discounted by 50%;

2. benchmarks would be unreliable as they depend on obtaining a sizeable sample of comparators of similar spectrum, sold with similar terms, in a similar market in a recent time;
3. setting the minimum price at the sale price would inhibit the efficiency of the auction as a means to determine the market value of the spectrum. Other similar points on the view that the minimum price is set at 'market value' are set out below;
4. frivolous bidders would be outbid by serious bidders so there is no need to set the level so high in order to deter frivolous bidders; and
5. ComReg should reflect on its previous experience where it set the minimum price for licences in an auction for licences with rights of use to spectrum in the 26 GHz spectrum band.

A 9.31 In addition, through their submissions to Consultation 10/71 respondents also commented on DotEcon's updated benchmarking exercise for setting the minimum price. Many of the submissions were similar to those previously made, while some additional points were raised and these are summarised below (note: for ease of cross reference with the assessment that follows, all points in this section are enumerated sequentially):

6. Comparing spectrum values from awards between countries with different market sizes would be incorrect. In particular, the following views were expressed:

- O2 asserted that addressing the value of a 2 ×5 MHz lot of spectrum in Ireland using market values of spectrum from other countries *"ignores a fundamental fact that it is incorrect to draw a comparison between large and small markets."* It was further reasoned that *"Larger markets produce higher prices/MHz/pop and DotEcon should have included a correction for the relative size of the Irish market"*. Similarly, the respondent, H3GI, reasoned that the data sets in the benchmark approach did not ensure *"that like is compared to like";*
- Two respondents asserted that the use of Gross National Product ("GNP") per capita would be the most appropriate independent variable to use in the benchmark exercise in the Irish context rather than GDP per capita. It was reasoned by Vodafone that as the value of the spectrum licences would be derived from the right to use spectrum in Ireland by consumers in Ireland, GNP per capita would be a superior measure as it would reflect the actual income of Irish residents. It was reasoned by O2 that GDP per capita would not prove to be a good comparator as there would be a *"large distorting effect of non-national trade [in Ireland]".* Moreover, it argued that the income level of residents, as measured by GNP per capita, with its direct implications for consumption patterns, would be the relevant factor in spectrum valuation and not the value of the level of national output as measured by GDP per capita. Vodafone did however, welcome *"the recognition of the requirement to include updated per capita income data (although it should be based on GNP*

per capita…) to take account of structural adverse change in the economic and financial conditions that has occurred in Ireland following the credit crisis." Vodafone stressed that the benchmark report *"must"* continue to adhere to the principle of using the most up to date national income data available where possible.

7. It was asserted by O2 that there *were "a number of other significantly influential local factors that DotEcon has used incorrectly, or need to be updated in the benchmark report"*. The following were highlighted:

- The impact of the recession, as Government actions over the coming years would be set to have a deflationary impact on the economy which could limit future consumer spending and reduce spectrum value;
- The implications/influence that four network operators and four MVNOs (two of which could not have been taken into account by DotEcon as they had just been launched) might have on the minimum price, and based on the winners to bidders ratio assumed by DotEcon. O2 noting that ComReg and DotEcon estimated that the expected number of bidders would be five but it considered that at the proposed minimum price that there may only be four bidders. In light of the above, O2 contended that DotEcon should determine what influence this approach would have on the conservative lower bound price range recommended by it.

8. It was also asserted that the general value of spectrum is in decline and has been for a number of years and that DotEcon *"should have accounted for this fact by either including a coefficient or correction factor or by some other means to give an increased weighting to more recent auctions"*. and
9. H3GI also argued that DotEcon's analysis was not transparent.[640]

A 9.32 Some respondents also queried the rationale for setting the minimum price at 'market value'. It was asserted that ComReg should only set an appropriate reserve price (also understood to mean a lower yet non-trivial price) and that ComReg's proposal would be inconsistent with the proposals made by its advisors DotEcon. The following reasons were provided by respondents:

[640] H3GI was of the view that the following was not explained: (i) the analysis conducted in relation to the *"interaction effect"* of the various factors that might have an impact on spectrum value; and (ii) why DotEcon did not apply a regression analysis to the data set combining all 3G licences. As regards the former point, and as it is unclear precisely what the respondent means by 'interaction effect', ComReg considers that matters addressed later in this Annex in terms of the interplay between the level of the minimum price and the likelihood of collusion occurring, and reasons why ComReg should be more conservative in its approach to setting the level of the minimum price, might in so far as it understands, address this point. As regards the latter point, DotEcon's view is presented in Annex D2 of the Benchmarking Report (ComReg Document 11/59) and it states as follows, *"given the account already taken of 3G licences and the documented effects of the telecom bubble affecting licence prices around 2000, we consider that an "All 3G Licences" dataset would not add much informative value to deriving a conservative lower bound estimate of sub-1 GHz spectrum over and above the regression analysis on the three datasets currently used"*

10. O2 asserted that *"it has never been explained why DotEcon's predicted market value for a lot of spectrum in Ireland is being used to determine the minimum price…there seems to be no logical explanation as to why the minimum price should be set at this level"*;
11. H3GI asserted that *"the role of the minimum price is certainly not to determine the real market price of spectrum, this should only be determined by the market at auction"*; and
12. There were further assertions, by eircom Group and O2, that the proposal to set the minimum price at a level they argued to be the market value would undermine the ability of the auction to determine the price, and by consequence impact the efficiency of the assignment of the spectrum. eircom Group stated that *"ComReg treats as synonymous the proposed reserve and auction outcome, and an outcome should not be used as a benchmark for a proposed reserve price"* noting that in various auctions (in particular in the German big auction of 800, 900, 1800 and 2600 MHz bands) the reserve prices were generally well below the end prices.

A 9.33 Connected with the above assertions, there were views that a more suitable benchmark for the minimum price would be minimum prices set by other National Regulatory Authorities (NRAs) or reserve prices set in other jurisdictions rather than the final prices achieved in those award processes. For example, eircom Group's stated view was that *"…regulators do not typically set reserve price at 100% of the expected minimum price otherwise the average reported by DotEcon would be closer to this level"*. Further, it illustrated this point through its responses to Consultations 09/99, 10/71 and 10/105 using graphical plots showing the level of ComReg's proposed reserve price[641] against other auction outcomes. It asserted that this showed how high ComReg's proposal was "relative to other precedents". Further, H3GI's stated view in its response to Consultation 10/105 was that *".., in light of the reserve prices recently set by Arcep for the auction of the fourth French 3G licence, ComReg should set the minimum price at €4,203,200"*[642].

A 9.34 A further set of views on the proposed methodology for setting the minimum prices was put forward by respondents to Consultation 10/105. While this consultation focused on the proposed inclusion of liberalised 1800 MHz spectrum in the joint award, respondents made two main arguments against the benchmark approach and by implication the relativity analysis. Firstly, it was asserted that alleged errors with the benchmarking exercise had not been addressed (e.g. the use of GDP per capita figures instead of GNP per capita in the econometric analysis, and how certain awards were treated in the datasets) and hence the relativity analysis would be flawed. Secondly, it was asserted that the level of the minimum price proposed for liberalised 1800 MHz spectrum would be too high.

[641] See Section 1.2 for a discussion on the proposed structure of the minimum price, where the structure of the minimum price would include an upfront spectrum access fee (SAF) and ongoing spectrum usage fees (SUFs).

[642] This minimum price proposal is assessed in later in this Annex.

A 9.35 The reasons for those views can be related back to earlier views expressed with regard to the sub-1GHz minimum price being too high, and suggestions that the benchmarking exercise that was used to arrive at the conservative lower bound estimate for sub-1GHz spectrum would require modifications.

A 9.36 "Additional comments made by respondents include the following:[643]

13. As very few auctions had occurred where both categories of spectrum bands (i.e the 1800 MHz and sub-1 GHz spectrum bands) were awarded in a multi-band award, there were few results against which to benchmark and therefore the data samples upon which the relativity analysis would rely contained few relevant data points. It was asserted by O2 that this limited the accuracy of the approach and that *"numerous additional inclusions, exclusions, and adjustments"* would be required in order to arrive at a determination of the minimum price for the 1800 MHz spectrum that would overcome the limitation of few relevant data points. The nature and extent of the modifications, however, were not detailed further although it was asserted that the current method did not seem any more *"significantly"* reliable than taking the average of a select group of previous auctions in order to give a final result that would be within an acceptable range.
14. The Irish economic situation continued to worsen and the expected low growth would impact on the market value of spectrum. While it was acknowledged by eircom Group that DotEcon had attempted to take into account the reduction in Ireland's GDP when producing the revised lower bound estimate of the market value of sub-1 GHz (in Document 10/71b) it was argued that *"this does not take account of the larger impact of the economic crisis on GNP and the on-going impact of reduced growth forecast over the medium term"* [emphasis added].

A 9.37 In summary, the majority of respondents argued for a lower minimum price. Two respondents, Digiweb and Vodafone, were opposed to the use of a benchmarking approach to set the minimum price but other respondents stated a preference for that approach but with a lower minimum price. Many respondents argued that ComReg should take a more conservative approach to setting the minimum price level. For example, Vodafone considered that as long as the minimum price was set high enough to deter frivolous bidders the auction would determine the market value and therefore there would be no benefit to approximating a market value with a high minimum price.

A 9.38 On the matter as to whether ComReg should set a **common minimum price** for liberalised 800 and 900 MHz spectrum, four respondents provided views. Three

[643] Two other respondents to Consultation 10/105 on the inclusion of 1800 MHz spectrum in the joint award did not provide any additional views on the proposed relativity analysis, save one view that the minimum price for liberalised 2 × 5 MHz blocks of 1800 MHz should be set at 30% of the level of the 800 and 900 MHz blocks in order to insure against the risk of setting the minimum price above the efficient level and to be consistent with a cautionary / conservative pricing approach that the respondent advocated. However, no supporting material as to the establishment of a 30% level was provided.

respondents were opposed to a common minimum price, for the following reasons:

15. H3GI argued that 900 MHz spectrum would be more valuable as it is a standardised band while the future of the 800 MHz band is not as certain;
16. UPC argued that 800 MHz spectrum should be priced lower to take account of the potential time a new entrant would require to build its network and capture customers; and
17. RTÉ / RTÉNL argued that the lower blocks of the 800 MHz band should be priced higher to ensure that the lower blocks would be taken up after the spectrum in the remainder of the bands was taken up.[644]

A 9.39 Vodafone, the single respondent in favour of ComReg's proposal to apply a common minimum price to the liberalised rights of use to 800 and 900 MHz spectrum, did not provide any reasoning in support of its view.

9.3 Structure of Reserve Prices and Spectrum Usage Fees ("SUFs")

A 9.40 This sub-section deals with matters raised in Question 5 (Document 09/99) and Question 14 (Document 10/71) concerning the structure of payments of licence fees for liberalised 800, 900 and/or 1800 MHz spectrum.

ComReg's position set out in Consultations 09/99, 10/71 and 10/105

A 9.41 Following the proposal to set a minimum price for liberalised 900 MHz spectrum, informed by a benchmark exercise, ComReg considered the possibility of structuring the proposed minimum price into an upfront reserve payment and annual SUFs. In Section 13.5 of Consultation 09/99, ComReg set about determining the portion of the minimum price which should be set aside as the annual SUF and the portion which should constitute the upfront reserve payment.[645]

A 9.42 ComReg considered that SUFs should create sufficient incentive for licensees to make efficient use of spectrum, and to hand back part or all of any spectrum holdings that they no longer have any use for. ComReg also stated that it would be seeking to set the SUFs not so high as to penalise those licensees who make efficient use of their spectrum holdings.

A 9.43 Having regard to the above, and to the expert views from DotEcon as set out in Section 12.2 of Document 09/99c, ComReg proposed an even *"50/50"* division between a reserve price and annual SUFs, ComReg considered that this should

[644] Six specific minimum price proposals were provided in respect of the 800 / 900 MHz spectrum lots and two were provided in respect of the 1800 MHz spectrum lots.

[645] ComReg further considered that at least 50% of the excess of a bidder's winning price over the reserve price would need to be paid before any licence is issued, within the timeframe of the set by the auction rules (see Section 13 of Consultation 09/99).

create incentives to release and return spectrum which is not being used[646]. ComReg further considered that SUFs should be annualised using a discount factor that reflects the cost of capital of an operator.

A 9.44 In the analysis conducted by DotEcon to calculate the SUFs, a discount rate of 10.21% was assumed, being the weighted average cost of capital for eircom Group as determined by ComReg in 2008 and this would represent a proxy for the telecommunications industry operator cost of capital. [647] DotEcon also stated that given the long time period over which spectrum would be licensed, it might be prudent to build in some indexation of annual fees to take account of inflation[648].

A 9.45 Accordingly, ComReg proposed the following:

- For a licence from 2011 to 2015 (4 years) the reserve price would be €6.3 million with SUFs of €1.8 million per annum for each 2 × 5 MHz lot of liberalised 900 MHz spectrum; and
- For a licence from 2015 to 2030 (15 years) the reserve price would be €10.2 million with SUFs of €1.8 million per annum for each 2 × 5 MHz lot of liberalised 900 MHz spectrum.

A 9.46 In light of developments on the joint award of 800 and 900 MHz spectrum (considered in Consultation 10/71) and following further advice from DotEcon, ComReg revised its reserve prices and its SUFs. Table 9.0 in DotEcon Document 10/105a sets out the revised values as follows:[649]

- For a licence from 2013 to 2015 (2.5 years) the reserve price would be €3.44 million with SUFs of €1.52 million per annum for each 2 × 5 MHz lot of liberalised 800 and 900 MHz spectrum; and
- For a licence from 2015 to 2030 (15 years) the reserve price would be €8.73 million with SUFs of €1.52 million per annum for each 2 × 5 MHz lot of liberalised 800 and 900 MHz spectrum.

A 9.47 ComReg based the above proposals on its initial approach of a *"50/50"* split.

A 9.48 In its subsequent consultation on the possible inclusion of 1800 MHz spectrum in the award process (Consultation 10/105), ComReg's stated view was that the same "50/50" split between an upfront reserve payment and annual SUFs should apply in the case of 1800 MHz spectrum, as applying a different ratio for the 1800

[646] See also Document 11/59 for a discussion on DotEcon's current position in relation to structure of reserve prices and SUFs

[647] See ComReg Document 08/35. Also note that DotEcon, in considering a discount factor to be applied in order to set the actual amounts of annual fees given a specific value for licence prices also assessed the potential higher value of 15%.

[648] DotEcon's latest views on indexation of SUFs are set out in Section 14.3 of Document 11/58. Accordingly, and for reasons set out in Section 9.6 of the Annex, ComReg intends to index SUFs based on changes to the Consumer Price Index ("CPI").

[649] A typographical error appeared in Consultation 10/71, as published, hence, for the avoidance of doubt the correct figures are used here, taken from table 9.0 in DotEcon's report, Document 10/105a.

MHz band as against the 800 and 900 MHz bands - all within the same auction - could risk distorting choices between bands on the basis of different payment terms. [650]

A 9.49 Accordingly, the proposed structure for the minimum price for liberalised 1800 MHz spectrum was as follows:[651]

- For a licence from 2013 to 2015 (2.5 years) the reserve price would be €1.72 million with SUFs of €0.75 million per annum for each 2 × 5 MHz lot of liberalised 1800 MHz spectrum; and
- For a licence from 2013 to 2015 (15 years) the reserve price would be €4.36 million with SUFs of €0.75 million per annum for each 2 × 5 MHz lot of liberalised 1800 MHz spectrum.

Views of Respondents

A 9.50 Of the five respondents who expressed a view on the above payment structure, three agreed with it and two did not. The respondents in agreement with the proposal gave the following principal reasons:

- BT agreed that a reserve price higher than that necessary to deter frivolous bidders may be appropriate for the auction format that ComReg had proposed in Consultation 09/99;
- O2 agreed that the overall price should be divided between an annual fee and an upfront reserve, as this gives an on-going incentive to use any allocated spectrum;

A 9.51 The two respondents who opposed the proposal provided the following reasons:

18. Digiweb submitted that [**Confidential text removed].**
19. Vodafone submitted that "Annual SUFs, if any, should be charged only within the first 3-5 years of the licence and set at a level broadly in line, on a per MHz basis, with those currently charged for existing 900 MHz and 2.1 GHz licences." It reasoned that there would be a need to limit the risk of bidders overpaying for spectrum and subsequently being unable to finance the rollout of a network or having to return the spectrum allocation to ComReg part way through the licence term.

A 9.52 In the subsequent consultations (Consultations 10/71 and 10/105) respondents provided additional views, including views on possible alternative approaches to the structure of reserve prices and SUFs, as summarised below:

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[650] However, it is noted that risk would be less important as auction prices rise above the minimum price level.

[651] For the avoidance of doubt ComReg refrained from setting out the values in this format as it was concerned with the relativity of the value of sub-1 GHz spectrum to 1800 MHz in Consultation 10/105 and not the actual level of the 1800 MHz minimum price. For clarity it is presented here in this format so as to aid the comparison with the figures set out in relation to the joint award in Consultation 10/71.

20. There were assertions made to the effect that the minimum prices should be structured to favour new market entry:

- Imagine Group asserted that the structure should be based on a *"graded licence fee"* so as to encourage new market entry, though the respondent did not set out any further details of how its proposal might be implemented or what 'grades' might be imposed
- UPC argued that the price for 2 × 5 MHz blocks of liberalised 800 MHz spectrum was *"too high"* and *to "get new entrants in and incentivise them to innovate and provide coverage*" lower fees (i.e. SUFs) should apply.

21. eircom Group submitted that there would be merit in establishing reserve prices and SUFs price levels at 50% the current proposed value of minimum prices, noting that a balance would need to be struck between discouraging frivolous and/or speculative participation in the auction and facilitating near term investment in infrastructure.

22. O2 communicated that *"ComReg should consider other options, such as fixing a minimum price for the first lots only, to meet its concerns,…"*. This respondent had been in support of ComReg's proposed structure of the minimum prices in its response to Consultation 09/99. This particular contribution was not supported with further detail.

- O2 also asserted that as *"each bidder will have a different cost of capital and a different discount rate"* ComReg's calculation of the Net Present Value for the spectrum usage fees for each operator would need to take into account their particular discount rates.

23. Further, Vodafone noted that DotEcon's review of existing practice across European countries with regard to the setting of SUFs found that *"most countries benchmarked had low, or no, SUFs and most of the licence price was captured in an upfront payment."* In Vodafone's view, ComReg's proposal on the structure of reserve prices and SUFs would not be consistent with the practice in most other European countries. Vodafone also sought further *"justification"* for ComReg's proposed position.

9.4 Deferred Payment Scheme and Interest Costs

A 9.53 This sub-section deals with matters raised in relation to Questions 6 and 7 (from Document 09/99), which dealt with the proposed deferred payment scheme including interest costs in respect of the proposed licence fees and whether other approaches to mitigate any potential for auction disruption arising from the current financial and economic climate should be considered by ComReg.

ComReg's position set out in Consultations 09/99, 10/71 and 10/105

A 9.54 ComReg considered the matter of a deferred payment scheme and interest costs as set out in Section 13.6 of Consultation 09/99. In that section, several reasons as

to why ComReg would consider providing an option for bidders to defer some of the auction payments, especially in the early stages of any new licence were outlined. These included for example, that in the current financial and economic climate, it might be prudent to safeguard against unexpected financing problems which bidders may face. In addition, the high level of capital expenditure that would likely be faced by a bidder in the first several years of its licence (such as due to rolling out infrastructure, marketing expenses etc), if combined with substantial payments during this time, may be too burdensome for potential bidders, such as new entrants to the band or market.

A 9.55 Similarly, DotEcon highlighted in its report Document 09/99c that in the current financial and economic climate, it may be prudent for ComReg to have safeguarded against financing constraints disrupting the auction, that is if capital constraints were to adversely affect or even diminish bidders' participation in the competitive licence award process.

A 9.56 ComReg proposed an option whereby some of the spectrum payments could be deferred to safeguard against such problems while noting that it would need to take reasonable steps to ensure that credible/serious bids would be received and any potential for speculative bidding could be addressed through both the auction design and implementation. ComReg therefore proposed that the remaining amount, of no more than 50% of the excess of bidders winning price over the reserve price, could optionally be deferred until the spectrum becomes available for use and that the payment of the outstanding amount could be spread across three equal payments in the first, second and third years of the licence.

A 9.57 The issue of the deferred payment scheme remained open for views and responses in the follow-up consultations, even though it was not explicitly raised again as a consultation issue.

A 9.58 No other approaches to mitigate any potential for auction disruption arising from the financial and economic climate were given although it can be inferred that respondents' linked their views on this matter to seeking a lower minimum price.

Views of Respondents

A 9.59 Four responses were received on ComReg's deferred payment scheme proposals.

A 9.60 Respondents' opposed to this proposal had the following principal issues with it:

24. it would run the risk of undermining ComReg's statutory objectives as regards the efficient use of spectrum; and
25. it would increase the likelihood of bidders defaulting on their payment conditions.

A 9.61 The reasoning for their positions was that:

26. the scheme could increase the likelihood that a bidder could bid an excessive price in order to win, but then default on their payments, thus

depriving other serious bidders access to the spectrum and this would seem to be inconsistent with ComReg's statutory objectives in relation to the efficient use of spectrum;

27. further, the scheme could facilitate bidders taking risks that additional capital could be forthcoming upon award of the licence, causing them to scale back network investment or delay meeting coverage requirements;

28. ComReg would be effectively acting as a surrogate financier for a bidder who would be unable to support its initial bidding valuation, as to provide an option to defer payment could reduce the level of scrutiny required by bidders on their business plans; and

29. ComReg could apply a pre-qualification stage prior to the auction stage in order to check financial and bidder non-association criteria which could be an alternative safeguard on bidders' financial capabilities, without risking participation by serious bidders.

A 9.62 Respondents in favour of the proposal suggested that the proposal would:

- be prudent to safeguard against potential financial constraints in the manner proposed;
- help strike a balance in the near term between the payment of spectrum fees and the necessary investment that must be made by operators; and
- financially benefit the Irish State, provided the interest rate on deferral would be set slightly above the government debt rate; and asserted that the potential for the proposal to be abused or give rise to detriment would be limited as:

30. ComReg could test the bona fides of potential new entrants (and presumably other participants) wishing to enter the award process so as to be satisfied that the scheme would not be abused, and in particular, rather than 50% of the excess being deferred over three years it could be phased over the full licence duration; and
31. even in the event of a default on the part of a bidder, ComReg could regain the control of the spectrum and potentially, relicense it for an amount greater than the 50% of the original price. In its view, eircom Group contended that default at the end of the first year would mean that ComReg could auction the remaining term of the licence to other parties.

A 9.63 However, all four respondents were opposed to the proposed level of interest of 12%, although there was some support for interest to be applied.

DotEcon's Assessment of Respondents Views to Questions and Current Views

A 9.64 Readers should note that DotEcon has produced an updated report on benchmarking also containing its assessment and position with regard to

respondents' views on the minimum price matter. The report Document 11/59 is issued alongside this Response to Consultation and Draft Decision. ComReg recommends that readers review this report for DotEcon's detailed assessment and response to respondents' views. In particular DotEcon has provided Annexes C and D (11/59) to highlight its assessment of respondents' views. The relevant references to where in its report it assesses and responds to the issues raised are provided in the discussion below.

A 9.65 In addition, it is worth recalling that the full list of auction awards used in the benchmarking dataset is set out in Annex A of the report (11/59), where there are some 290 different awards included.[652]

9.5 Minimum prices and benchmarking methodology and application

A 9.66 The following section summarises the views of DotEcon.

A 9.67 DotEcon does not consider there to be any compelling reasons that would cause it to move away from the benchmark approach. It has addressed all the modelling issues raised by respondents and as a result does not consider there to be compelling reasons that would cause it to overhaul the model and datasets used in the analysis. In its view the benchmarking approach would still be the appropriate approach to calculating a conservative lower bound range of minimum prices in the proposed award.

A 9.68 The main conclusions reached by DotEcon, set out in Section 4 of Document 11/59, are that:

a) It is still reasonable to treat 800 MHz and 900 MHz on a par for setting minimum prices provided these are set conservatively relative to central estimates of likely market value[653];
b) Sub-1 GHz spectrum should have a minimum price for a 2 × 5 MHz block in the range €15 million to €26 million, with the entire range reflecting a likely lower bound estimate of market value for Ireland;
c) 1800 MHz spectrum should have a minimum price at around 45 to 60% of that of sub-1 GHz spectrum (€6.75 million to €15.6 million), again assuming reasonably conservative minimum prices; and
d) Within this range, the primary consideration is trading off the suppression of incentives for strategic behaviour to weaken competition within the auction and the risk of choking off demand from serious bidders.

[652] Award processes from 28 countries worldwide covering 5,969 licences have been used in the benchmarking exercise. Price data has been augmented with information from the Central Intelligence Agency World Factbook on population estimates, purchasing-power parity exchange rates and GDP per capita figures for 2007 to 2011. CIA World Factbook is available online at https://www.cia.gov/library/publications/the-world-factbook/

[653] See also Annex D.4 of Document 11/59 for a discussion on the issues presented.

Benchmarking methodology and relativity analysis

A 9.69 In summary, DotEcon is satisfied that the benchmarking exercise and relativity analysis yield reasonable estimates of a conservative lower bound range of the value of spectrum in Ireland. Accordingly, if ComReg selects a minimum price for the proposed auction anywhere in this range it can reasonably be expected that this will be less than the market value. The principal reasons informing its view are:

- the two forms of benchmarking undertaken yield lower bound conservative prices. The first benchmark was a calculation of means of auction outcomes across different samples of auction data[654] and the second benchmark was a sophisticated regression analysis that used econometric techniques to control for differences in spectrum value that might arise across awards, countries and times;
- the benchmark results yielded a conservative lower bound estimate of the market value of liberalised spectrum which should minimise the risk of setting a minimum price that would choke off demand of serious bidders in the proposed auction; and
- the relativity analysis yielded estimates for the conservative lower bound range of 1800 MHz on a comparable basis.

A 9.70 In response to matters raised in relation to benchmark methodology and relativity analysis, DotEcon's assessment and response is set out in section D.2.1 of Document 11/59.

Modelling issues

A 9.71 In response to matters raised in relation to modelling issues, DotEcon's assessment and response is set out in section D.2.1 of the report Document 11/59. For example, in relation to the principal concerns raised in point (6) above that GNP per capita would be the most appropriate independent variable to use in the regression analysis rather than GDP, DotEcon's stated views are as follows:

" ...we opted to use GDP as an independent variable in our regression analysis rather than GNP as it is a better reflection of the domestic income levels within Ireland."

A 9.72 Further DotEcon highlights in section D.2.1 of Document 11/59 that "...Our updated GDP data (which was 17.3% lower than the 2008 GDP data used in 09/99c) allowed us to some extent take into account of the possible negative effect of the recession on the market value of spectrum" and that between "our analysis in 09/99c … and the current benchmark analysis where 2010 GDP per capita is used, GDP per capita has dropped by nearly 20%".

[654] See a list of the datasets used by DotEcon at Annex A in Document 11/59

Common minimum price

A 9.73 In summary, DotEcon remains of the view that there should be a common minimum price between the 800 MHz and 900 MHz bands and provides further assistance for ComReg in the setting of the level of a common minimum price, which might address concerns over the potential uncertainties in the relative valuation between both bands.

A 9.74 DotEcon's assessment and detailed response in relation to a common minimum price for liberalised rights of use to 800 and 900 MHz spectrum please refer to section D.4.1 of the report Document 11/59.

Structure of reserve prices and SUFs

A 9.75 DotEcon concludes that the issue of the structure of payments should be unchanged[655].

A 9.76 DotEcon's stated views on the matter in section 14.1 in Document 11/58 are as follows:

A 9.77 "…we highlighted the trade-off faced in considering the break-down of auction fees into an upfront fee and subsequent annual licence fees:

- On the one hand, paying significant fees on an ongoing basis during the licence period would ensure that licence holders consider the opportunity cost of their licensing; while
- On the other hand, allowing bidders to be awarded spectrum immediately after the auction based on fees predominantly due in the future risks the possibility of default, where a spectrum winner's inability to pay for its licence only becomes apparent some time after the auction."

A 9.78 Accordingly, it considers that it would be still reasonable to structure the reserve prices and SUFs according to a '50/50' split. DotEcon finds no basis for the assertion that there would be more risk that bidders would overpay for spectrum in the case of 'significant annual fees'. It considers that there would be no incentive for bidders to pay more than their respective valuations for the spectrum, and this incentive should not be affected by the structure of payments.

A 9.79 DotEcon also notes that the level and the structure of fees for licensing spectrum varies from country to country depending on the objectives for setting such fees, whether spectrum is scarce, whether spectrum has been awarded administratively or via a competitive process and factors that are country- and licence-specific.

A 9.80 Therefore, DotEcon considers the relevant issue to be whether the proposed structure of the fees featuring in this award would be consistent with ComReg's objectives.[656]

[655] See Section 14 of Document 11/58 for a discussion on the issues presented.

Deferred payment scheme

A 9.81 DotEcon notes experience in recent spectrum auctions in relation to the issue of offering a deferral payment option has been mixed:

- the multi-band auction in Germany (2010), the 800 MHz auction in Sweden (2011) and the 850 MHz auction in Hong Kong (2011) required full payment of the licence price shortly after the end of the auction; while
- the 900 MHz, 1800 MHz and 2.5 GHz auctions in Denmark (2010), the 2.6 GHz auction in Finland (2010) and the 2.1 GHz auction in Belgium (2011) all permitted payment in instalments.

A 9.82 DotEcon considers that the proposal to implement the deferral option as previously proposed (relating to 50% of the upfront fee required after the auction to be paid over 3 years) is marginal. Further, the sums involved given the specification of the deferral option are small relative to the total financial commitment linked to both the purchase of spectrum rights in the auction, and the proposed timescale of spectrum usage rights in the auction, and the proposed timescale is reasonably short. It considers it unclear whether the small amount of financing flexibility that this option would allow would be justified given the risk of default. Where the proposed deferral option were to be increased in scope (taking in a longer time period and/or increasing the amount of the total payment required from bidders), increased flexibility would be offset by increased risk of default and accordingly, increased risk of inefficiencies stemming from misallocation of spectrum across bidders.

A 9.83 DotEcon also considers there to be no strong case requiring the inclusion of a pre-qualification stage given the award already would include a number of safeguards against non-serious bidders.

ComReg's Assessment and Response

A 9.84 ComReg does not repeat DotEcon's assessment of respondent's views here save to the extent that ComReg wishes to highlight an issue, or where ComReg has some additional response to make, in relation to DotEcon's assessment of such matters.

A 9.85 As part of the key background to this section, ComReg considers DotEcon's assessment to be reasonable, and notes that DotEcon has carefully considered and addressed respondents' views in developing the report 11/58 issued alongside this Response to Consultation and Draft Decision, including the many updates it applied to its benchmarking exercise in previous reports (see also Documents 10/71b and 10/105a). ComReg's current position is developed having regard to all submissions and advices received during this consultative process, including DotEcon's above analysis and assessment of respondents' views.

[656] ComReg's statutory objectives are set out in Annex 1.

Minimum prices and benchmarking methodology and application

Benchmarking methodology and relativity analysis

A 9.86 In ComReg's view a key consideration in assessing the most appropriate benchmarking approach and undertaking the relativity analysis is that they achieve the stated aim of yielding conservative lower bound estimates for liberalised sub-1 GHz spectrum in Ireland.

A 9.87 Respondents' alternative approaches focus on the use of a low but non-trivial minimum price. ComReg has concerns over the potential for strategic behaviour to negatively impact on competition and, accordingly, does not believe that a low but non-trivial pricing approach would be optimal as it would maximise the incentives to collude in any auction where there is limited competition. ComReg sets out below an assessment of the potential issues surrounding tacit collusion and a conservative approach to setting the level of the minimum price.

A 9.88 In relation to the views expressed by respondents summarised in points (3), (4) and (5) enumerated above,[657] on 'efficiency of the auction' 'deterring frivolous bidders' and 'reflecting its experience with the 26 GHz auction', ComReg would contend in the first instance that the benchmark methodology does not attempt to set the market value of the spectrum. The minimum price is the starting point in the auction for the spectrum price, and through the auction potential bidders can reveal the final market value of the spectrum through their bids. Therefore the efficiency of the auction will not be impacted once the minimum price is set a reasonable safe distance below the likely market value of the spectrum, which is the basis of the conservative lower bound utilised.[658]

A 9.89 In relation to the assertions in points (10), (11) and (12) above, on 'why set at market value', 'role of minimum price is not to determine market value', and 'undermine the efficiency of the auction', ComReg emphasises that the minimum price is not set at an estimate of the market price of spectrum but rather at an estimated lower bound of market value. Given the concerns over the potential for collusive behaviour associated with the award of liberalised rights of use to the 900 MHz band, which are especially acute in relation to the first time slice, ComReg is of the view that the minimum price should be set at a level that addresses this. ComReg provides further reasoning in support of a higher minimum price. The key issue is to set the minimum price at a level which is not so high that it would choke off efficient demand from serious bidders and not so low as to encourage or facilitate tacit collusion. In this regard, the minimum price

[657] For ease of cross-reference with respondents' points set out earlier in the relevant Sections, identical numbering is used in this Section setting out ComReg's assessment of those points. The short descriptions after each number are intended only to assist readers refer between points and the main details of respondents views set out in the earlier Sections and in their respective consultation submissions.

[658] As regards reflecting on its experience in the 26 GHz auction, ComReg is always mindful of its own experience when setting new regulatory policy but notes that the context for the 26 GHz auction, including the demand conditions, was very different from that affecting the bands now under consideration.

has been selected from a conservative lower bound range of the market value of spectrum.

A 9.90 In considering respondents' views that ComReg's reserve price should be based on reserve prices in other jurisdictions and not on benchmarking auction outcomes, ComReg considers that such an approach would appear to ignore differing aims of NRA's in setting reserve prices, and as a result could involve importing inaccurate estimates of market value rather than relying on market data obtained from auction results. Such an approach could therefore undermine ComReg's aim to establish a conservative lower bound minimum price which would be not so high as to choke off efficient demand or so low as to attract frivolous players.

A 9.91 In summary, in ComReg's view the benchmarking approach proposed best matches the requirements for this particular award and circumstances. In addition, the results from the relativity analysis for 1800 MHz spectrum based on the benchmarking of 800 MHz and 900 MHz would also be appropriate. Matters informing this view are set out in above, and Section 3.1 in DotEcon's latest benchmarking report Document 11/59. The respondents' principal alternative proposal (that ComReg set a low but non-trivial price) fails to address the potential incentives for collusive behaviour in this auction. While ComReg does draw some comfort from the addition of other bands, its concerns regarding the potential for collusion persist.

Modelling issues

A 9.92 In relation to the principal concerns raised by respondents and summarised in points (1), (2), (6), (7), and (9) above, on the following:

- 'including results from the year 2000';
- 'obtaining a sizeable sample of similar spectrum comparators';
- 'comparing awards between different countries';
- 'accounting for other influential factors (recession & GNP)'; and
- 'transparency of the approach'

A 9.93 ComReg's view is that these have been addressed previously in DotEcon's various benchmarking reports: see Documents 10/71b and 10/105a, also most particularly the latest report Document 11/59. For example, DotEcon expanded the datasets and included higher frequency bands in Document 10/71b. It was also careful to highlight the potential 'over-inflated' average 3G only benchmark and took account of the shrinking of GDP per capita with the recession. DotEcon also modelled the impact of the winners to bidders ratio sensitivities as set out in

section 3.2.2 of Document 11/59.[659] DotEcon undertook two forms of simple benchmarking, noting that the regression analysis sought to explain observed prices in terms of macroeconomic, geographic and other factors. Further, as regards the contention that the approach would not be transparent, ComReg is of the view that as DotEcon lists all the auctions that its analysis is based on (e.g. see Annex A in the latest report 11/59) and as it has set out its justification for the use of the various datasets and set out in considerable detail how it has performed its analysis, this contention is without basis.

A 9.94 In relation to the views expressed and summarised in point (8) above on 'increased weighting to more recent auctions', ComReg notes that placing too much weight on recent auctions could skew the results as regards the value of liberalised sub 1 GHz spectrum as much of the recent award activity has been on higher frequency spectrum bands. ComReg also believes that care needs to be exercised given that the proposed licence duration is relatively long hence, short term factors should not predominate. However, ComReg notes that DotEcon does carefully point out that more recent auctions do have a greater impact on predicted licence prices as compared to older auctions, and this is appropriate in the present context.

A 9.95 In relation to the relativity analysis, and specifically the views expressed and summarised in points (13) and (14) above, that 'few auctions where both categories of spectrum were awarded' and 'worsening economic situation', ComReg notes that a primary aim when setting the price for 1800 MHz is to ensure that the efficiency of the auction process is not compromised. This means that the relative minimum prices between sub-1 GHz and 1800 MHz spectrum should not distort bidders' choice between the different bands. Taking into account the above points, amongst other matters discussed in the revised benchmarking report, and noting that DotEcon recommends that the minimum price for 1800 MHz be set on a reasonably consistent conservative lower bound basis, the exact valuation of sub 1 GHz spectrum and exact valuation of sub-1 GHz relative to 1800 MHz is therefore not crucial. ComReg considers that any uncertainty regarding the precise valuation / parity is reflected in the conservatism in setting the minimum price.

A 9.96 In addition, ComReg considers DotEcon's assessment of respondents' concerns in relation to the modelling issues to be reasonable for the following reasons:

- the recent German auction of licences with rights of use to 800 MHz spectrum gives a good indication of and comparison with the likely value of sub 1 GHz spectrum in Ireland (which is consistent with the international averages for mobile spectrum as reported by DotEcon);

[659] DotEcon concluded at section 3.2.2 in Document 11/59 that *"Therefore, the winner to bidder ratio needs to be set at a value that reflects a plausible view of potential participation by serious bidders. In this regard, simply using the sample average of the winner to bidder ratio has merit (as this reflects actual levels of participation achieved) or possibly more conservatively the case of 0.8 (equivalent to 5 participants for 4 licences). Overall, we consider that there is a good case of lowering the assumed winner to bidder ratio from the previous assumption of 0.86 given the new data".*

- NRA's have differing objectives pertaining to awards for licences, depending on national / other circumstances;
- DotEcon's stated view in Annex D.2.1 of Document 11/59 is *"…the data used in the benchmarking of sub-1GHz spectrum was that of a collection of auctions where a wide range of spectrum bands for mobile and 3G services had been auctioned, which were considered to be less valuable than the liberalised 800MHz and 900MHz spectrum. This meant that this dataset could most usefully be used to produce a conservative market value for 800MHz and 900MHz spectrum. Subsequently, the results from the relativity analysis for 1800MHz spectrum based on the benchmarking of 800MHz and 900MHz spectrum also produced an estimate that is likely to be a lower bound of the market value of 1800MHz spectrum"*. Further it states that in Annex D.4.2 of Document 11/59 that *"…the relative competitive market value of 1800MHz to sub-1GHz spectrum of 45% to 60% derived from our analysis is consistent with that implied by technical studies based on the relative propagation characteristics of sub-1GHz and higher frequency mobile spectrum."* which suggest that the current recommended minimum price range is appropriate; and
- there are no compelling reasons provided as to why it would be appropriate to alter the datasets;

Common minimum price

A 9.97 Having assessed the arguments provided by respondents, summarised in points (15), (16) and (17) above, in relation to whether or not a common minimum price should apply to the 2×5 MHz of blocks of liberalised 800 MHz and 900 MHz spectrum, it appears that important considerations when assessing these arguments are the auction time-slice[660] and the switch-off of analogue terrestrial television services which is scheduled to occur in quarter 4 2012.

A 9.98 In addressing the views expressed by respondents, as summarised in (15), (16) and (17) above, which oppose a common minimum price on the grounds that the spectrum bands would not be substitutable as there would be uncertainties in the relative valuation of 800 MHz and 900 MHz, ComReg notes the following:

- on the one hand, in respect of the first time slice up to 2015, there may be some limitations on substitutability between the 800 MHz and 900 MHz spectrum blocks arising from a difference in equipment availability and the expected continuation of 2 G customers in the 900 MHz band during this period; but,
- on the other hand, a proposed common minimum price would not imply that the 800 MHz spectrum is of identical value to liberalised 900 MHz

[660] Note that DotEcon and ComReg have used different terms when describing issues related to the 'time-slice', as DotEcon have used the term 'temporal or time period'. See Annex 6.3 for a discussion of the 'time-slices' proposals in the award.

spectrum, or suggest that the final auction outcome would necessarily reflect price parity;

- the setting of a common minimum price would instead reflect rather the similarities between the two bands in terms of propagation characteristics and their potential substitutability in the long-run, bearing in mind that proposed licences will not expire until 2030;
- in addition the 900 MHz sub-cap and potential advanced commencement of liberalised licences do not affect setting a common minimum price in effect weigh against each other;
- in relation to the proposal by the respondent RTÉ / RTÉNL that the lower frequency 800 MHz lots should have a higher minimum price, ComReg notes that this is linked to the respondents' principal concerns that broadcasting services adjacent to new services in the 800 MHz band need to be protected. In this regard, ComReg addresses the respondent's concerns in relation to the potential for interference to existing (and future planned broadcasting services) in Annex 10. ComReg intends that the conditions attached to liberalised licences in the 800 MHz band would be homogenous and would therefore not propose to set a different minimum price for certain lots in the 800 MHz band; and
- ComReg does not have evidence before it to suggest that the value of these bands would differ substantially.

A 9.99 Bearing all these factors in mind, DotEcon has emphasised that, while equipment availability timetables might be somewhat different, and initial use of 900 MHz is likely to include servicing legacy 2 G customers, could affect spectrum usage in the short-run, such differences would be much less relevant in the long-run, as with liberalised spectrum and more flexible technologies it *"should primarily be the physical characteristics of the spectrum that would determine its fundamental long-run value"*.

A 9.100 Given the uncertainties over the relative valuation of spectrum in these two bands in the short-run, and the current lack of data about this relativity, ComReg notes DotEcon's recommendation that provided the value would be conservatively set, which would not cause efficient demand to be choked off, a common minimum price should be set. ComReg is of the view that this assessment is reasonable as it acknowledges that, while there may be some uncertainty in the precise relative valuation of 800 MHz and 900 MHz spectrum owing inter alia to the level of development of equipment suitable for each band, this can be addressed through the setting of a conservative minimum price, above which market bidding will be able to express different operator preferences.

Structure of reserve prices and spectrum usage fees

A 9.101 ComReg welcomes the comments and proposals made by respondents concerning the structure of reserve prices and spectrum usage fees.

A 9.102 In relation to the view expressed by one respondent summarised in point (19) above, that 'SUFs (if any) should be charged only within the first 3 – 5 years', ComReg reiterates the reasons behind using SUFs. The first aim of SUFs is to provide an adequate incentive for licensees to use spectrum efficiently and to return unused or under-utilised spectrum, and this is clearly linked to assisting ComReg to achieve its objectives in relation to encouraging the efficient use and ensuring the effective management of spectrum. In this regard, SUFs will also reflect the need to ensure the optimal use of spectrum. Having SUFs payments spread over the lifetime of the licence is important given that these licences would be long lived assets and spectrum should not be put to sub-optimal uses for this period. SUFs help ensure that unused spectrum would be returned to ComReg through the application of an ongoing charge to unused spectrum holdings.

A 9.103 ComReg is also of the view that the '50/50' split between an upfront reserve and SUF is a balanced and proportionate division between:

- imposing the entire fee on an up-front basis, which might both discriminate in favour of well capitalised bidders and discourage efficient investment in infrastructure; and
- imposing the entire fee as SUF, which might encourage speculative bidders with insufficient resources to deploy the required infrastructure.

A 9.104 In relation to the view expressed by one respondent and summarised in point (18) above, that the '[**Confidential Text Removed**'], ComReg notes that no evidence was provided to support this assertion and therefore does not consider it further.

A 9.105 In relation to the potential alternative approaches to the structuring of reserve prices and SUFs, and specifically those proposals of respondents summarised in points (20), (21), (22) and (23) above, on the following:

- 'new market entry';
- '50% of current proposed values';
- 'Fixing the minimum price for the first lots & using bidder specific cost of capital values'; and
- 'Review of European practice'

A 9.106 ComReg's assessment and response is as follows:

- ComReg notes that its proposal does not prevent market entry. The proposed award of liberalised licences for rights of use to 800/900 and 1800 MHz is an open award for serious bidders and ComReg does not consider that new entrants should be deterred by minimum prices based on a conservative lower bound of benchmark results from other auctions. ComReg also notes that respondent's proposals regarding new market entry might result in inefficient entry or participation by frivolous bidders and further their proposals do not address market entry in a proportionate manner.

- ComReg sees no merit in only applying the minimum price to *'a few'* lots. Indeed, such an approach is likely to artificially distort valuations between identical or similar lots leading to a sub-optimal outcome in the auction. This would heighten incentives to collude in relation to lots without a minimum fee. All lots to be made available in the award should be assigned a minimum price in order to avoid giving rise to distortions and uncertainties in the auction lot valuations. ComReg is required to encourage the efficient use of the spectrum and believes that this would be achieved by ensuring that those who value the spectrum most are successful in acquiring the spectrum.
- Similar reasoning would also apply in relation to the proposed use of different discount rates for different operators. The discount rate used is purely illustrative and each firm may put a different value in present terms on the stream of SUF payments. These differences will inform their bidding. In addition, ComReg notes that there is a real risk that such an approach to the setting of spectrum fees could be difficult to administer, contentious with operators, and potentially be in breach both of ComReg's obligations in relation to non-discrimination under the Common Regulatory Framework and its obligations under Article 107 TFEU. In this light, ComReg proposes to apply a single discount rate when calculating the SUFs associated with the licences. That discount rate would be 10.21%, which is the weighted average cost of capital of eircom Group (determined by ComReg in 2008[661]), noting that it would represent a proxy for an industry operator's rate of return on capital.
- Each National Regulatory Authority (NRA) takes into account its own objectives for particular awards. ComReg's primary objective for this particular multi-band award is, amongst others, to promote competition both within the auction and, as a consequence of this, in the related downstream markets. The setting of minimum prices in a manner that would incentivise collusive arrangements in the auction may not set up the related downstream market well in terms of the likely intensity of competition into the future nor would it be likely to ensure efficient use of spectrum in future, as lower SUFs would mean weaker incentives for licensed operators to use spectrum efficiently. ComReg considers it to be key that the spectrum is assigned to those who value it the most; ComReg is of the view that the proposed structure of reserve prices and the setting of spectrum usage fees reflects this and allows sufficient information to be generated in the auction rounds so as to facilitate an efficient outcome.

Deferred payment scheme

A 9.107 ComReg welcomes the comments and proposals made concerning the proposed deferred payment scheme. While at the same time noting that the scheme could help credible bidders to safeguard against potential financial constraints, ComReg

[661] See Document 08/35.

notes the valid concerns raised by those respondents opposed to the proposal. In particular, it was reasoned that the introduction of a deferred payment scheme may assist or even incentivise the participation of non-credible bidders who could leverage the proposed deferred payment scheme as part of a high risk strategy.

A 9.108 ComReg notes that a possible strategy undertaken by a bidder unable to finance the full amount of the up-front licence payment immediately could be to use the acquisition of a licence to attract additional capital. ComReg recognises that its own decision making should not lead to any inefficient use of spectrum, which it notes could arise if a successful bidder could not roll out services for financial reasons.

A 9.109 As the minimum price is a conservative lower bound estimate for the market value of the spectrum, if a successful bidder had to follow a strategy of deferring payments, it would seem to suggest that such a bidder could be too weak to offer competitive services and/or to rollout its network, which could be to the detriment of consumers. Further, where the final market price rises above the minimum price in the auction rounds, the benefit of deferring some of the minimum payment erodes as the market price could be significant in comparison to the minimum price.

A 9.110 There is little guidance arising from recent auctions in relation to whether or not deferral payment schemes benefit award processes. DotEcon's stated views on the matter are set out in section 14.2 of document 11/58 as follows:

> *"While the case for a deferral option has not changed significantly since our first report, we note that the preference to implement the deferral option as previously proposed (relating to 50% of the upfront fee required after the auction to be paid over a period of 3 years) is marginal. While such an option represents a degree of flexibility for bidders, the sums involved given the specification of the deferral option are small relative to the total financial commitment linked to both the purchase of spectrum usage rights in the auction, and the proposed timescale is reasonably short. It is therefore unclear whether the small amount of flexibility that this option would allow would offset the risk of default. Further, where the proposed default option were to be increased in scope (taking in a longer time period and/or increasing the amount of the total payment required from bidders), increased flexibility for bidders would be offset by increased risk of default and, accordingly, increased risk of inefficiencies stemming from misallocation of spectrum across bidders"*.

A 9.111 In relation to the view expressed in point (30) above that 'ComReg should test the *bona fides* of potential new entrants wishing to participate in the award process where all of the excess could then be phased over the full duration of the licence rather than ComReg's proposed 50% of the excess over a three year period, ComReg's view is as follows. It considers this proposal adds a degree of subjectivity to what should be an objective spectrum award process and with that inevitably comes the potential for unnecessary delay. This in itself could give rise to other potential risks to the timely completion of the award and which ComReg considers should be avoided.

A 9.112 In relation to the assertion that not only should a deferred licence payment option not be made available but also there should be a requirement that licence applicants qualify to participate in the competition, by demonstrating their ability to meet reasonable criteria in relation to financial strength and access to capital, ComReg's proposes that to ensure equal treatment between potential new entrants and incumbents, ComReg will implement an objective and transparent stage in the auction process in so far as reviewing deposits and applications, determining bidder eligibility,[662] more details of which will be set out in the Information Memorandum prior to the auction process.

A 9.113 In relation to the view expressed in point (31), that 'ComReg could re-licence spectrum returned arising from a defaulting bidder' ComReg would be concerned that if the results of the auction had to be *unwound* or *re-run* there could be considerable costs and delays on both ComReg (via the development of a revised auction framework) and bidders (who would have invested time studying their potential future business cases). Such a wasting of resources could ultimately threaten the timely launch of the benefits of liberalised rights of use to spectrum for consumers and fail to promote competition. It is more prudent therefore, for ComReg to adopt mitigating strategies in the first instance.

A 9.114 Connected with responses on the deferred payment scheme, it was also proposed that all upfront payments arising from the *'main stage'* of the auction should be received by ComReg before that stage of the auction should be declared complete. This it was reasoned would avoid a bidder participating in and influencing the outcome of the auction but then simply walking away at that point in the auction. ComReg sees some merit in such a proposal, but only to the extent that it would reduce the incentive for a bidder to walk away, as this measure in itself cannot guarantee the prevention of a bidder 'walking away' in this manner. ComReg intends to implement this measure in some form in its award process and will provide details in the Information Memorandum for the award.

A 9.115 In light of the above, ComReg does not propose to offer a deferred payment scheme.[663]

9.6 ComReg's Current Position

A 9.116 ComReg considers that **there should be a minimum price**. This view is informed by the many considerations outlined above but in particular, ComReg considers that a minimum price would be appropriate for the following reasons:

1. To deter frivolous bidders without genuine business cases whose participation my prolong the auction process and waste resources;

[662] See Annex 6g for a discussion on bidder eligibility in the proposed award.

[663] It should be noted that on the issue of interest of deferred payments, all respondents were opposed to the proposed rate of 12%. However, this is now a moot point as ComReg does not propose to offer any form of deferred payment scheme.

2. To disincentivise and guard against uncompetitive auction outcomes, including that arising from anti-competitive collusive behaviour of potential bidders;
3. Encouraging efficient use and ensuring effective management of spectrum; and
4. To ensure the administrative cost of the auction process is recovered.

A 9.117 As regards the methodologies that could be used for setting the minimum price, ComReg believes that **a benchmarking exercise and relativity analysis are appropriate**. The benchmarking exercise and relativity analysis yield a conservative lower bound estimate of the value of spectrum from which ComReg may choose a minimum price with the auction design assisting bidders determine the market value. Having regard to its assessment of the modelling issues raised, and DotEcon's assessment and response to same, ComReg considers that there are no compelling reasons to change its position on the use of a benchmark exercise and relativity analysis that determine conservative lower bound estimates of the market value for liberalised rights of use to 800 MHz, 900 MHz and 1800 MHz spectrum.

A 9.118 ComReg notes one respondent's proposal that it should update the benchmark to account for new data from recent spectrum awards. Interested parties will note that DotEcon, in this regard, has actively updated its datasets.[664] For practical and logistical purposes however, and to ensure some predictability in relation to the level of the minimum price for potential bidders, once the Information Memorandum outlining the award is published it will be necessary to fix on the minimum prices to be used in the award. This would be based on ComReg's assessment of the relevant benchmark report available to it at that time.

A 9.119 ComReg is also of the view **that there should be a common minimum price for sub-1 GHz spectrum**. Following its assessment of respondents' views on this matter, and the expert advice and opinion from DotEcon, ComReg is of the view that a common minimum price would be appropriate for this award. The principal reasons informing this view include:

- Proposing a common minimum price would not imply that the 800 MHz spectrum would be of identical value to liberalised 900 MHz spectrum, or suggest that the final auction outcome would necessarily reflect price parity;
- The setting of a common minimum price would reflect the similarities between the two bands in terms of propagation characteristics and their potential substitutability in the long-run (i.e. until 2030 when licences would expire);
- While equipment availability timetables might be different and this could affect their usage in the short-run, such differences would be much less

[664] See also Sections 2 and 3 of Document 11/59 for a discussion of the latest modifications to the benchmarking exercise.

relevant in the long-run, as with liberalised spectrum and more flexible technologies it should primarily be the physical characteristics of the spectrum that would determine its fundamental long-run value.

A 9.120 ComReg also proposes that the minimum price should be structured into an even division between **an upfront reserve price and annual SUFs** on the basis of the discount rate chosen. The principal reasons for this proposal is that it would help ensure the efficient use of spectrum by incentivising licensees to return under-utilised spectrum holdings by requiring them to pay SUFs at the opportunity cost of preventing the next best alternative use of the spectrum. ComReg also considers that the SUFs should be indexed to inflation[665]. Charging annual SUFs is also a common feature of previous spectrum licences issued by ComReg and there are no compelling reasons why the rights of use for liberalised spectrum should be an exception in this regard.

A 9.121 In relation to the issue of a deferred payment scheme, ComReg's view is that there are real risks that such a scheme could incentivise the participation of non-credible bidders. Such a scheme is not consistent with the specific aims for the award. ComReg proposes therefore to not further consider the implementation of such an approach.

Level of the minimum price

A 9.122 Choosing an appropriate minimum price is a key issue and must balance the risk of tacit collusion or strategic behaviour aimed at weakening competition in the auction without choking off efficient demand. This would be consistent with the specific aims of the award including using the minimum prices to encourage the efficient use of spectrum and setting the minimum prices to ensure the optimal use of spectrum.

A 9.123 Notwithstanding the assessment and analysis of views carried out thus far, which address first the issue of whether there should be a minimum price, and secondly, what methodology would be appropriate in order to inform the setting of the minimum price including whether there should be a common minimum price, respondents also expressed views on ComReg's methodology for selecting the level of the minimum price from the conservative lower bound benchmark ranges produced by DotEcon. There were no consultation questions specifically aimed at obtaining views on this latter issue. However, as such views are interrelated with the overall fees issue and need to be considered, we address them below.

A 9.124 The foregoing Sections highlight that the benchmarking exercise and relativity analysis yield conservative lower bound ranges for the market value of the liberalised rights of use of 800, 900 and 1800 MHz spectrum. ComReg's position

[665] SUFs would be subject to a simple form of indexation reflecting the annual rate of inflation using the CPI published by the Central Statistics Office. Interested parties should also note that indexing the fees in this manner gives an incentive to trade spectrum, which might be useful if permitted in the future. Further as noted by DotEcon, indexing using CPI would be reasonable as operators' revenues are influenced by consumer inflation. See Section 14.3 of Document 11/58 for a discussion on the issues presented.

on the level of the minimum price is informed by weighing this together with DotEcon's stated views, which are as follows:

" ...b) sub-1 GHz spectrum should have a minimum price for a 2 × 5 MHz block in the range €15m to €26m, with the entire range reflecting a likely lower bound estimate of market value for Ireland;

c.) 1800 MHz spectrum should have a minimum price at around 45% to 60% of that of sub-1 GHz spectrum (€6.75 to €15.6m), again assuming reasonably conservative minimum prices; and

d.) within this range, the primary consideration is trading off the suppression of incentives for strategic behaviour to weaken competition within the auction and the risk of choking off demand from serious bidders."

A 9.125 It is important to note here that a minimum price set from within the ranges developed, according to DotEcon in Annex D of Document 11/59, should *"...have a low risk of inefficiently choking off demand"*. Further it considers that the *"...it is unlikely demand would be choked off inefficiently within our recommended range of €15-€26m for a 2 × 5 MHz block of sub 1-GHz spectrum"*. This then addresses part of the primary consideration set out by DotEcon in point d.) above, and in turn should address many of the respondents' concerns on the issue of choking off demand.

A 9.126 As regards the other part of the primary consideration in point d.) above, it should be noted that ComReg has held concerns in relation to the likelihood of tacit collusion occurring, as stated in Consultations 09/99, 10/71 and 10/105. Noting that while the respective proposals to include the 800 MHz and 1800 MHz bands in a joint award with the 900 MHz band might have reduced these initial concerns, upon closer consideration, ComReg remains of the view that a natural outcome could still be tacitly reached, especially in respect of the 900 MHz band given the 900 MHz sub cap proposal in the first time slice. This could facilitate a coordinated approach by bidders in the auction. ComReg's auction mechanism should not only promote competition in the auction but also must reduce the potential for such an outcome.

A 9.127 DotEcon has usefully provided some considerations for choosing a minimum price, in particular, that "the lower half of the range is likely to create a useful moderation of incentives for strategic behaviour whilst running very little risk of discouraging serious bidders with a chance of winning spectrum".[666]

A 9.128 ComReg heretofore has tended towards the upper end of the ranges produced in the benchmarking exercise, which it justified on the basis of concerns in relation to the likelihood of tacit collusion occurring, which many respondents claimed was not consistent with DotEcon's recommendations. It maintains its approach to select the level of the minimum price in line with the recommendations of its

[666] See Section 4.4 in Document 11/59 for a discussion on considerations for choosing a minimum price.

advisors, having taken account of respondents' submissions and all other relevant circumstances. It accordingly proposes a minimum price of €20 million per 2 × 5 MHz of liberalised sub-1 GHz spectrum, which is somewhat below the midpoint of the range produced by the updated benchmarking exercise (a reduction from the previous level of €25 million, arising in light of the revised benchmark range from inclusions of recent awards and changes in input data such as GDP in the exercise as set out in section 2 of Document 11/59).

A 9.129 Further, having considered the updated advice from DotEcon and all submissions from interested parties, ComReg intends to select a minimum price for 1800 MHz at 50% of that of the sub-1 GHz level. The reasons for this include the need to be consistent in setting the minimum prices of both categories of spectrum on a conservative lower bound basis, the desirability of facilitating bidders to switch preferences between these bands over the course of the award and the observed valuation relationship between the bands as documented by DotEcon in Document 11/xx. Since the minimum price is set by reference to a conservative lower bound range, bidding in the auction can determine the actual relative market value.

A 9.130 In summary, ComReg's assessments conducted on these matters (see also the assessment and response to the views addressed at ComReg's selection of the level of the minimum price as set out below), the weighing of the expert advices provided by DotEcon in various benchmarking reports, and careful consideration of respondents' views to date, ComReg proposes that the minimum price for licences with liberalised rights of use to 800 MHz, 900 MHz and 1800 MHz spectrum bands should be as follows:

- For a licence from 2013 to 2015 (2.5 years)[667]:
- the reserve price would be €3.34 million with SUFs of €1.21 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 800 or 900 MHz spectrum;
- the reserve price would be €1.67 million with SUFs of €0.60 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 1800 MHz spectrum; and
- For a licence from 2015 to 2030 (15 years):
- the reserve price would be €8.48 million with SUFs of €1.21 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 800 or 900 MHz spectrum;
- the reserve price would be €4.24 million with SUFs of €0.60 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 1800 MHz spectrum.

A 9.131 For the avoidance of doubt, these figures represent in today's terms the minimum value for delivery in 2013 and 2015, licences for liberalised rights of use of the spectrum bands with durations of 2.5 and 15 years. Accordingly, the auction

[667] Fee calculation based on licence commencing on 01/02/2013 to 31/07/2015.

Information Memorandum will set out the figures so that they represent the minimum value at that point in time.

Other Specific Views in Relation to ComReg's Selection of the Level of the Proposed Minimum Price.

A 9.132 This section of the annex deals specifically with many of the other views in relation to ComReg's selection of the level of the proposed minimum price. The views are grouped into three broad themes, given as follows:

I. clarity in respect of the interplay between the level of the minimum price and the likelihood of tacit collusion occurring;
II. reasons why ComReg should be more conservative in its approach to setting the level of the minimum price; and
III. respondents' specific minimum price proposals.

A 9.133 As regards the submissions grouped under the above themes, ComReg understands that they essentially relate to a single, and common contention between respondents, that ComReg should further lower the level of the proposed minimum prices. As mentioned at the outset in this Annex, it should be noted that the process of setting the level of the proposed minimum price has evolved since the initial level of the minimum price for liberalised 900 MHz rights of use was proposed to be set at **€30 million per 2 × 5 MHz lot**. In particular, for the reasons set out in Consultation 10/71 and 10/105, the proposed minimum price was lowered to **€25 million per 2 × 5 MHz lot** for sub 1-GHz liberalised rights of use (and at a level of 50% of that for 1800 MHz liberalised rights of use)[668]. ComReg notes that the issues and reasoning for the lowering of the proposed minimum price are set out in those Consultations. Bearing this in mind, ComReg now considers each of the above broad themes in turn below.

I. Clarity in respect of the interplay between the level of the minimum price and the likelihood of tacit collusion occurring

A 9.134 In relation to respondents seeking clarity on the interplay between the level of the minimum price and the likelihood of tacit collusion occurring, the following principal observations were made:

1. O2 reasoned that *"[ComReg] gives no evidence of why the collusion objective carriers greater weight than the objective of not choking off demand"* but ComReg still proposes a high minimum price to reduce incentives for collusive behaviour;
2. O2 and H3GI reasoned that ComReg's view in relation to the potential for collusive behaviour is unfounded. For example, at page 72 of the Radio Regulatory Associates and Value Partners' report accompanying the H3GI response to Document 11/11, it was stated that *"Neither ComReg nor DotEcon have successfully proven that the Irish market is prone to collusion, there is no reason to set the reserve price above a low but non-trivial reserve*

[668] The current up to date proposed minimum prices are €20 million per 2 × 5 MHz lot for sub-1 GHz and €10 million per 2 × 5 MHz lot of 1800 MHz.

price…". O2 reasoned that the relative positions of MNOs in terms of market shares and history could not constitute collusive behaviour in the context of the proposed auction despite ComReg's contention on same;

3. O2 also reasoned that the benchmark exercise was not a study designed to determine the price that should be set in order to prevent collusion within the proposed auction therefore, it would be unclear as to how a minimum price of €25 million would offer greater efficacy than €18 million in preventing collusion. It was also argued that there had been no analysis by ComReg to support the allocation by it of the higher figure. Similarly another respondent, Digiweb, indicated that it "didn't understand how the potential tacit agreement will be neutralized by increasing the minimum price by 'just' €8m. And likewise, the respondent H3GI asserted that imposing a "significant minimum price" of €25 million would not be an appropriate mechanism to address the risks identified by ComReg, and that the risk of tacit collusion could remain with a minimum price;
4. Incumbent operators also asserted that the proposed auction format, such as the use of spectrum caps and the move to a second pricing rule, should alleviate ComReg's concerns in relation to collusion / tacit collusion. Reasons provided in this regard included the following:

   - eircom Group asserted that the spectrum cap could be "expected to increase competitive pressure in the auction and reduce the risk of tacit collusion (particularly strategic unilateral demand reduction)". Similarly the respondent Vodafone highlighted that the current proposed auction format, and other proposed rules such as the 2 × 20 MHz sub-1GHz cap would effectively address concerns around potential scope and incentives for tacit collusion or strategic behaviour aimed at manipulating the auction. As a result it considered "there is therefore no clear rationale for ComReg's proposal to also seek to set the level of the minimum price, using a benchmarking process, to deal with these issues."

   - H3GI also noted that the risk of actual collusive behaviour would be sufficiently dealt with by: (i) the threat of expulsion from the award process; and (ii) prosecution under the Competition Act 2002, if bidders concerted practices contrary to section 4 of that Act, such as agreements with other bidders to collude. Similarly, O2 asserted that MNOs would be subject to Irish and EU law including via their regulation by ComReg, and this would act as a deterrent to such behaviour.

   - UPC communicated that "other means than setting the starting price high" could mitigate collusion and deter frivolous bidders in the award. It suggested one alternative mechanism would be "higher down payments" or "creating blocks that a set number of bidders are targeting. For instance, restricting the 4 existing operators to bid on the entire 900 MHz spectrum and a subset of frequencies in the 800 MHz band will focus their bidding" however, it did not provide any further details to explain how this position might be implemented or be aligned with ComReg's objectives.

ComReg's assessment and response

A 9.135 By way of background, in Consultations 09/99, 10/71 and 10/105 ComReg set out some specific aims for setting the minimum price levels of the proposed auction. These were as follows:

- to deter frivolous bidders without genuine business cases whose participation may prolong the auction process and waste resources;
- to ensure the administrative cost of the auction process is recovered;
- to disincentivise and guard against uncompetitive auction outcomes, including that arising from anti-competitive collusive behaviour of potential bidders;
- not setting the minimum price so high that the risk of choking off efficient demand would be significant; and
- ensure the efficient use of spectrum.

A 9.136 In terms of addressing respondents' above-enumerated submissions, and as ComReg takes the view that its stated aims are consistent with its statutory objectives, including, without limitation, those which relate to encouraging the efficient use and ensuring the effective management of spectrum and the promotion of competition, it is accordingly of the view that it would be appropriate when setting the level of the minimum price in this auction to consider the potential for collusion (tacit or explicit). ComReg's proposals have attempted to do justice both to the above aims and DotEcon's conclusions as regards considerations for choosing a minimum price are discussed above.[669]

A 9.137 By way of further key background, interested parties should note that, in the first time slice, there could be incentives for parties to reach a natural outcome as if 800 MHz and 1800 MHz spectrum are not closely substitutable with 900 MHz spectrum, then specific concerns about the ease of tacit collusion in bidding for 900 MHz spectrum could persist. ComReg notes that this is particularly relevant in the short term where substitutability between 800 MHz and 900 MHz spectrum is limited due to the limited availability of equipment to enable new technologies to be deployed in the band, and the continuation of services to GSM customers in the 900 MHz band. However, ComReg also persists in its view of the likelihood for collision to exist in the later time slice, and hence it would be prudent and appropriate to reduce the incentives for collusion in the design of the auction, including with regard to the setting of minimum prices.

[669] In particular, DotEcon's stated conclusions in section 1.4 of Document 11/59 are that

" ...b) sub-1 GHz spectrum should have a minimum price for a 2 × 5 MHz block in the range €15m to €26m, with the entire range reflecting a likely lower bound estimate of market value for Ireland;
c) 1800 MHz spectrum should have a minimum price at around 45% to 60% of that of sub-1 GHz spectrum (€6.75 to €15.6m), again assuming reasonably conservative minimum prices; and
d) within this range, the primary consideration is trading off the suppression of incentives for strategic behaviour to weaken competition within the auction and the risk of choking off demand from serious bidders."

A 9.138 Taking assertion (1) above,[670] on 'why collusion carries greater weight than choking off demand', ComReg is mindful that there needs to be a minimum price to address collusive behaviour and this has been set by ComReg, in light of expert economic advice, on a conservative lower bound basis so as to allow bidding in the auction to determine the actual market price. In this regard, the level of its minimum price does justice to both the aims of minimising scope for collusive behaviour and choking off demand (i.e. the incentives for collusive behaviour are reduced without any likelihood of choking off demand). ComReg maintains the overall view that its selection of the level of the minimum price takes into account all the facts and advices available to it.[671] Bearing in mind that there is no empirical formula to guide how it should yield the level of the minimum price in light of the sometimes competing aims as highlighted in this assertion, ComReg is mindful of three separate points:

- that collusive behaviour, of either a tacit or explicit nature, could impact the outcome of the auction, preventing it from achieving its objective of promoting competition both within the auction and in the related downstream market. This is a particular concern where open rounds are being used to generate information to inform bidders' bidding strategies;
- as part of meeting its statutory objectives, the benchmarking exercise and relativity analysis yield conservative lower bound ranges for the market value of the liberalised rights of use to the 800, 900 and 1800 MHz spectrum so a minimum price set from within the ranges should have a low risk of inefficiently choking off demand. ComReg is mindful of DotEcon's latests benchmarking report where it concludes in section 1.4 of Document 11/59 that *"…within the range the primary consideration is trading off the suppression of incentives for strategic behaviour to weaken competition within the auction and the risk of choking off demand from serious bidders"*; and
- that "the lower half of the range is likely to create a useful moderation of incentives for strategic behaviour whilst running very little risk of discouraging serious bidders with a chance of winning spectrum".

[670] For ease of cross-reference the numbers enumerated in the assessments that follow refer to points made in this Annex. The short descriptions after each number are intended only to assist readers referring between points and the main details of respondents views are set out in the particular sections and their respective submissions.

[671] ComReg has also had regard to European and other international examples and trends. Industry respondents have referred to NRAs who have chosen to set low but non-trivial prices at levels below those now considered appropriate by ComReg and to its advisors DotEcon. This is not the only possible approach and there have been cases where NRAs have sought to set higher minimum prices. A recent example comes from the UK, where in its consultation the upcoming UK 800 MHz and 2.6 GHz auction, published in March 2011, Ofcom stated that it would be deviating from its long-standing approach of setting low but non-trivial minimum prices, and would be considering the setting of reserve prices that better reflect the market value of spectrum so as to manage strategic incentives of potential bidders.

A 9.139 In relation to the views expressed by respondents summarised in point (3) above, on 'benchmark exercise doesn't yield price to be set in terms of preventing collusion', ComReg notes that potential bidders could still have incentives to collude notwithstanding the measures adopted by ComReg in its proposed auction format and spectrum cap. Given the likely high value of liberalised spectrum rights, there could be considerable incentives for collusion. Therefore, the incentives for this behaviour need to be managed. The minimum price criterion is a useful instrument alongside other potential instruments in managing these incentives, and ComReg is accordingly of the view that minimum prices reflecting lower bound estimate of market value should help deter this behaviour as the *payoff* would be much less than if the minimum price were set at a low level. As has been contended by DotEcon and ComReg, the minimum price would be the starting point for the auction. The true market value of the liberalised rights of use to spectrum would be realised by bidders in the auction mechanism.

A 9.140 In relation to the views expressed by respondents and summarised in (2) and (4) above, on 'proof that market is prone to collusion' and 'other ways to alleviate ComReg's concerns, for example relying on competition law remedies', perhaps unsurprisingly, respondents seem to neglect to consider the various difficulties associated with proving that a propensity for tacit or explicit collusive behaviour exists before the fact or proving the occurrence of such behaviour after the fact. Indeed appropriate auction design including with respect to minimum prices will help to limit the incentives for such behaviour, and would appear to be justified in the present case. It would also contribute to legal certainty which ComReg believes would be of paramount concern to those interested parties wishing to enter the market or to invest in liberalised services. ComReg is of the view that actual or potential ex post intervention would fail to meet these concerns and could ultimately lead to a significant delay in liberalisation of sub-1 GHz spectrum[672] to the cost and detriment of the electronic communications sector and ultimately end users. Further, ComReg again notes that it is required to set spectrum fees which reflect the need to ensure the optimal use of spectrum. ComReg therefore rejects the views expressed above.

A 9.141 As noted above, if the results of the auction had to be *unwound* or *re-run* there could be considerable costs and delays on both ComReg (via the development of a revised auction framework) and bidders (who would have invested time studying their potential future business cases). Such a wasting of resources and postponement of the fulfilment of the current process could ultimately threaten the timely launch of the benefits of liberalised rights of use to spectrum for consumers and fail to promote competition. It is more prudent therefore, for ComReg to adopt mitigating strategies in the first instance.

II. Conservative approach

[672] For the avoidance of doubt ComReg's views in this regard should not be taken to imply that it would hesitate to prosecute any breaches of competition law which come to its attention in the course of, or relating to, the auction.

A 9.142 Respondents made assertions that a high minimum price would raise many issues at the industry level, which could result in various potential unintended consequences. The principal reasons given in opposition to what many respondents' perceived as an excessive minimum price, and for which they expressed views on potential unintended consequences are as follows:

5. Demand in the auction could be choked off at the level of the previously proposed price of €25 million given that bidders could be deterred and this would undermine the potential for a successful competition.

   - Further, O2 reasoned that spectrum could be left unassigned following the award process as bidders could be deterred given the proposed level of the minimum price. It was asserted that such an outcome would not best represent the efficient use and management of the spectrum by ComReg. It was asserted that at the end of the award process having unallocated spectrum that could have been sold had ComReg set a more "appropriate" minimum price (understood in the present context by ComReg to mean a lower minimum price), would represent a failure by ComReg to achieve its objectives and exercise its functions in relation to spectrum.
   - eircom Group reasoned that spectrum left unsold would represent a higher economic cost, than would the "misallocation" of spectrum which might occur and/or persist if the minimum price was lower and all spectrum was taken up. It asserted that a key reason both reserve prices and levels of Administrative Incentive Prices (AIP)[673] are generally set conservatively relative to estimated *"opportunity cost"* is to avoid this particular type of unintended economic consequence.

6. Investment would be taken out of the industry at a time when industry would need capital to address the 'explosion of data demand driven by consumer behaviour needs'. Coupled with the current economic conditions, it was contended by eircom Group that investment could be further constrained, as according to an economic study[674] referenced by it additional financial constraints could impact negatively on otherwise efficient investment. Similarly, it was also asserted by Ericsson, that a conservative minimum price would accord with ComReg's duty in respect of these very uncertain *"economic times"* as promoting investment would be important. It was also reasoned by it that a *"sensible first step"* would be to set the minimum price at the level recommended by its advisers DotEcon; and
7. H3GI argued that the level of the proposed minimum price would weaken competition in retail markets for mobile communications and broadband services to the detriment of consumers. In addition, eircom Group argued that a weakened balance sheet may impact negatively on competition, and a 'binding' reserve price would weaken balance sheets of the weakest bidders and/or deter entry.

[673] Aegis and Indepen (April 2007) on "Aeronautical and maritime spectrum pricing paper"

[674] Campello, Graham and Harvey. December 2009, "The Real Effects of Financial Constraints: Evidence from a Financial Crisis". http://papers.nber.org/papers/w15552

ComReg's assessment and response

A 9.143 As with the foregoing assessment of respondents' views in relation to clarity as regards the interplay between the level of the minimum price and the likelihood of tacit collusion occurring, ComReg's specific aims for setting the minimum price levels provide the relevant background to the assessment of the points on a conservative approach.

A 9.144 In relation to the views expressed by respondents in point (5) above, on 'choking off efficient demand' and on 'failing to achieve its objectives', ComReg is of the view that these assertions do not reflect the current facts and circumstances regarding the revised results yielded in the benchmarking exercise (and relativity analysis) as are set out in the DotEcon report issued alongside this Response to Consultation and Draft Decision. Respondents have hypothesised that the proposed level of the minimum prices would choke off demand, in turn resulting in left over spectrum which would have a higher economic consequence than would have the misallocation of spectrum. However, ComReg notes the following:

- the proposed minimum prices have not been calculated to represent the market price of spectrum, rather they represent a conservative lower bound estimate of market prices and therefore are a starting point for spectrum prices in the auction;
- awarding spectrum below the market value would lead to an inefficient allocation of spectrum which would in turn fail to meet ComReg's statutory objectives (see Annex 1);
- ComReg's proposed minimum prices are set at a level that it believes reduces incentives to collude but are not so high as to choke off efficient demand so price information can be generated to inform bidding strategies of potential bidders;
- as set out in the joint report by the Radio Spectrum Policy Group (RSPG) and Body of European Regulators for Electronic Communications (BEREC[675]), AIP is a mechanism which seeks to promote efficient use of spectrum by charging fees based on opportunity costs (i.e. gives incentives for spectrum to be used, and/or returned or traded if not used). In this way spectrum users are incentivised to make optimal use of spectrum as the fee they would pay is based on the value of the next best alternative use (i.e. the opportunity cost of the use that is foregone). In ComReg's view, the combination of the minimum price proposed and the split between upfront payments and ongoing SUFs, will achieve equivalent incentives for efficient use of spectrum based on the principle of opportunity cost; and
- finally, the benchmarking process is objectively justified, transparent, non-discriminatory and proportionate.

[675] RSPG10-351 on "Competition: Transitional Issues in the Mobile Sector in Europe"

A 9.145 In relation to the views expressed by respondents and summarised in points (6) and (7) above, on 'taking out investment' and on 'retail competition', ComReg notes a minimum price is necessary to address concerns of tacit collusion, and that it is set on a conservative lower bound basis aimed at ensuring the optimal use of spectrum. The latter consideration ensures that efficient demand would not be choked off. As regards the issue of investment, ComReg would highlight that there would be significant gains in terms of operational costs by using sub-1 GHz spectrum *vis a vis* higher band spectrum[676].

A 9.146 Further ComReg considers that market mechanisms, such as the proposed auction, are efficient in that they allow potential bidders to reduce their demand for lots when prices rise above their valuation. The auction affords the bidder who values the spectrum the most the opportunity to win that spectrum and in this regard the bidder, rather than ComReg, is responsible for making rational bids in accordance with their bidding strategy, and in this way to optimise their level of investment. When operators have obtained spectrum in an open competitive auction of the proposed type, they should have adequate incentive to make the necessary additional investment in infrastructure and services to derive full commercial benefit from their investment in spectrum, and consumers shall benefit from operators competing to invest and to provide services.

III. Specific minimum price proposals

A 9.147 Sub-1 GHz price proposals

8. Digiweb communicated that a minimum price of "€5m should be far enough to discourage 'frivolous players'"
9. ESBN maintained that spectrum should be structured and priced in a manner to reflect its *"strategic value in terms of the services provided to support energy efficiency, safety and utility network reliability"* and pointed to the pricing for spectrum for the Railway GSM network as an example of the level of price for spectrum. The respondent did not detail whether its proposal related to the minimum price or the spectrum usage fee, however, it argued for a lower minimum price for a new entrant that would provide a utility network.
10. eircom Group communicated that the level of the minimum price would need to be discounted by 50% as *"consideration of international practice suggest that the minimum price should be set at a 50% discount to the chosen auction benchmark, because of uncertainty concerning market values and to encourage participation in the auction so that spectrum is not left fallow"*. However, in its response to Consultation Document 10/105 eircom Group provided a caveat that its views on the fees would be subject to the development of a satisfactory deferral option.

[676] In Document 09/14a Vilicom estimated that the overall deployment costs (CapEx) for UMTS 1800 MHz and UMTS 900 MHz were 88.5% and 65.6% respectively of the total cost of a UMTS 2100 MHz network. See Vilicom Report Document 09/14a -UMTS Network Design & Cost Estimation for National UMTS900, UMTS1800 & UMTS2100 Networks

11. H3GI argued that ComReg should set the minimum price at €4,203,200, which would be equivalent to the reserve prices recently set by the French regulator of the electronic communications and postal sectors ('Arcep') for the auction of the fourth French 3G licence. It reasoned that this would yield approximately €0.10 per MHz per head of population.
12. O2 communicated that the minimum price per 2 × 5 MHz block of liberalised sub-1 GHz spectrum should be €18 million prior to the revision set out in Consultation 10/71 (i.e. when the minimum range had been €18 to €34 million as per Consultation 09/99); and
13. Vodafone communicated through its response to Consultation 09/99 that the minimum price per 2 × 5 MHz block of liberalised 900 MHz spectrum should be €20 million.

1800 MHz price proposals

14. eircom Group communicated that *"ComReg should select a minimum price of no greater than 50% of a conservative estimate of the value of the spectrum (€4m to €8m)"*. The reasons given in support of this position were (i) that there would be larger economic consequences associated with setting a high minimum price, as it would lead to unsold spectrum, would be likely to be much greater than those arising from a low minimum price, and (ii) ComReg should exercise caution and select a value well below the expected value of spectrum given the high level of uncertainty around 1800 MHz spectrum value;
15. Vodafone proposed that if the minimum price of a 2 × 5 MHz block of liberalised 1800 MHz spectrum were to be set relative to the price of sub 1 GHz spectrum (as suggested by DotEcon in its relativity analysis) then it should be no higher than 30% of the price of a 2 × 5 MHz sub-1 GHz spectrum block. To support its proposal for a lower price for a block of liberalised 1800 MHz spectrum, Vodafone reiterated the reasons it already provided in relation to its concern and disagreement with the benchmark exercise and level of the minimum price as discussed in Section 9.1.2.

ComReg's assessment and response

A 9.148 First, these proposals were not reasoned against ComReg's statutory objectives, and are accordingly limited as they are not linked to the objective to promote competition through encouraging the efficient use and ensuring the effective management of radio frequency spectrum or to ensure the optimal use of spectrum (please see Annex 1 where ComReg's objectives are set out).

A 9.149 In particular, taking the specific proposals in points 8, 9, 10, and 11 above, it is noted that they give rise to a level of minimum prices which would be below the range of conservative lower bound estimates yielded by DotEcon. ComReg does not consider that the minimum price should be set at a level below the conservative lower bound estimated by DotEcon, as it would not assist ComReg licensing the optimal use of spectrum.

A 9.150 ComReg does not agree with the contention that the liberalised rights of use to 800/900 and 1800 MHz spectrum should be priced at the price of spectrum made available for GSM Railway (GSM R) spectrum or that some spectrum be priced lower for use by utility companies. ComReg notes that the respondent does not provide any objective justification for its proposal and further that GSM-R is not used to provide relatively unrestricted electronic communications services as in the 800/900 and 1800 MHz bands available but is instead reserved for use on railway systems. ComReg is making the rights of use of spectrum available on a service- and technology-neutral basis and successful bidders, whether they are utility companies or not, can utilise the spectrum to provide broad ranging services.

A 9.151 In relation to the proposal that the minimum price be set at €4,203,200 ComReg notes that the respondent in effect would be advocating that ComReg select a single country from DotEcon's datasets upon which to set the minimum prices. The respondent did however support the benchmark approach and its views here would seem to contradict this original position. Further, the analysis provided in support of this proposal would have been made in the absence of the most recent information on the proposed 4G auction in France, namely that the liberalised spectrum in the award of the 800 MHz band in France would be likely to attract significantly larger minimum prices than the respondent had considered. For example, given that France's population would be approximately 15 times greater than that of Ireland's, ComReg notes the current proposed prices in France would appear to support ComReg's conservative lower bound ranges as estimated by DotEcon **Table 25** more than the respondents' proposal. Further ComReg notes that the French proposals are reserve prices and not minimum prices further conflicting with the respondents' view.

Table 25 Proposed prices for 4G spectrum in France

France	Downlink	Uplink	Reserve price
Block A	791–801 MHz	832–842 MHz	€400 million
Block B	801–806 MHz	842–847 MHz	€300 million
Block C	806–811 MHz	847–852 MHz	€300 million
Block D	811–821 MHz	852–862 MHz	€800 million

A 9.152 Taking the specific price proposals enumerated by points 12 and 13 above, ComReg notes that these proposals were submitted at a time when the upper end of the conservative lower bound ranges was €34 and €30 million respectively (see also Consultations 09/99 and 10/71 for a discussion of the issues presented). Even so, it should be noted that ComReg's current minimum price proposal for a 2 × 5 MHz lot of sub-1 GHz spectrum as selected from the revised benchmark range and with the reasoning set out in this paper, is close to those proposals (i.e. a minimum price of €20 million per lot).

A 9.153 In relation to both of the 1800 MHz price proposals in points 14 and 15 above, ComReg notes that the principal reasons supporting these alternative price proposals relate to respondents' issues with the benchmarking analysis, but, as these have been considered and are addressed in the foregoing Sections ComReg does not consider these proposals further. In addition, in relation to the proposal

to set the relative band value of the bands at 30%, ComReg notes that this figure is outside of the range which DotEcon recommended (45 to 60%) and which it considers is a range that would be consistent with the relevant historic data, including the most recent competitive auctions of liberalised 1800 MHz and sub-1 GHz spectrum.

Annex 10

Other Issues Raised by Respondents

A 10.1 This Annex addresses, in turn, four issues which were raised by respondents in earlier consultations, which are not addressed elsewhere in this document. The four issues are:

- Allocation of 10 MHz of sub-1GHz spectrum for Smart Utility Networks;
- Mandate regulated access of mobile networks for national roaming and/or a Mobile Virtual Network Operator ('MVNO');
- Broader Spectrum Framework Issues namely:
  - Spectrum Trading;
  - Spectrum Sharing/Pooling;
  - Indefinite Licences; and
- Technical Issues relating to co-existence with other services.

10.1 Allocation of 10 MHz of Sub-1GHz Spectrum for Smart Utility Networks

A 10.2 In its response to Consultation 10/71 ESB Networks (ESBN) proposed that ComReg allocate 10MHz sub-1GHz spectrum (800MHz and 900MHz bands) as a *'critical infrastructure asset'* for communications to support the electricity sector, specifically to enable Smart Utility Networks.

A 10.3 ESBN submitted that its proposal would meet "several of the criteria outlined by ComReg in its strategy for the management of Spectrum in Ireland":

- It provides for innovative technologies and services
- It maximises the economic and social returns from the use of radio spectrum;
- Ensures the efficient use of scarce radio spectrum resources; and
- Manage compliance with international requirements and the avoidance of harmful interference."

A 10.4 In section 3 of its response, ESBN set out details of the National Smart Metering Plan and the key objectives of that plan, which in summary are as follows:

- to encourage energy efficiency,
- to facilitate peak load management,
- to support renewable and micro generation,

- to enhance competition and improveconsumer experience
- to improve network services, and
- to review and realise synergies

A 10.5 ESBN submitted that the benefits of a Smart Utility Network utilising 10MHz of sub-1GHz spectrum would include safety, the economic benefit of reliable supply of electricity, and cost efficiencies. ESBN further submitted that its proposal would be in line with other jurisdictions[677].

A 10.6 In response to Question 7 in Consultation 10/71 *(Are there any other approaches to determining appropriate spectrum usage fees for interim licences?)* ESBN submitted that it has an essential requirement for telecommunications and that there is a strong business requirement for ESBN to roll out a last mile telecommunications network. As against that, ESBN stated that as it is a regulated monopoly and it can only earn a regulated rate of return, not a market based return, and therefore its ability to pay for spectrum is likely to be significantly different from that of a commercial operator. ESBN submitted that if spectrum is allocated by public auction there is a strong possibility that utilities will be denied access to spectrum, and that the benefit to the wider community may not be maximised (in that ESBN could not pass on its lower costs to the community through lower electricity charges).

A 10.7 In response to Question 10 (Do you agree with ComReg‟s proposal to hold an auction for the 800 MHz and 900 MHz bands?) ESBN stated: *"ESBN agrees with the proposal to hold an auction as the fairest means of allocating the spectrum and as a means of facilitating competition for the spectrum. However ESBN believes that a minimum of 10 MHz of spectrum should be taken out of the auction process and set aside for Utility requirements to meet their needs and facilitate the services outlined in the submission above."*

A 10.8 Similarly, in response to Question 13 and 14 , ESBN submitted that a portion of spectrum should be set aside for utility use should be priced in a manner to reflect its strategic value in terms of the services provided to support energy efficiency, safety and utility network reliability. ESBN noted ComReg Document 10/84 "Proposed licensing regime for GSM for railway operations Spectrum"[678], and it suggested that its proposal be treated in a similar manner, as the proposed uses of the spectrum would constitute a non-public, non-commercial network for utility use.

[677] ESBN stated that *"This proposal is in line with developments in other jurisdictions such as Canada where dedicated spectrum has already been set aside for utility use, and the USA which is expected to harmonise with the Canadian position and Australia where consultations are ongoing The national regulator ACMA is currently updating its "Five year Spectrum Outlook" and one of the proposed substantive updates to the 2009 – 2013 version is to the information relating to the potential for spectrum to support area-wide and state-wide Smart Grid applications."*

[678] See http://www.comreg.ie/_fileupload/publications/ComReg1084.pdf

ComReg's Position

A 10.9 ESBN submits that ComReg should grant it 10 MHz of sub-1GHz spectrum, for free or for such amount as it can afford (this is not specified) but in any event not based on the market value of the band as would be established by a fully open and competitive auction. ESBN contends that there would be a public benefit in doing so and that it would accord with ComReg's Spectrum Management Strategy.

A 10.10 In considering this proposal, ComReg first sets out its understanding of the current state of play of the smart utility networks trials in Ireland and then discusses ESBN's proposal in light of the wider spectrum issues affecting the 800 MHz and 900 MHz spectrum bands, ComReg's conclusions are set out at the end of this section.

The Smart Utility Network Trials

A 10.11 ComReg is aware that ESBN is currently investigating a number of (wired and wireless) technologies that could be used to deliver a Smart Utility Network in Ireland, including Power Line Carrier (PLC), Radio Frequency ('RF') Mesh, and General Packet Radio Service ('GPRS'). On 16 May 2011, the Commission for Energy Regulation ('CER') published a report prepared by ESBN titled "Electricity Smart Metering Technology Trials Findings Report" (CER11/080b).[679] This report provides details on the range of technologies[680] investigated by the ESBN and the conclusions in Section 13 of the report (CER11/080b) include the following:

- *"Taking into account the timetable above and the issues identified in the trial next generation PLC would appear to offer best prospects for an urban solution. This is focus of activity in Europe.*
- *Existing national and European regulations on spectrum availability means that currently available wireless technologies all have issues leaving GPRS/3G as the leading option for almost 700k rural customers*

[679] This report was published on 16 May 2011. See CER website at: http://www.cer.ie/en/information-centre-reports-and-publications.aspx?article=5dd4bce4-ebd8-475e-b78d-da24e4ff7339

[680] Technologies investigated by ESB Networks include:

- Distribution Line Carrier Trial – this trial was based upon a first generation Power Line Carrier ('PLC') technology and uses the ESB's distribution network;
- 2.4 GHz Radio Frequency ('RF') Mesh Trial – this trial was based upon a RF Mesh technology that operates in the 2.4 GHz licence-exempt Industrial Scientific and Medical ('ISM') band;
- General Packet Radio Service ('GPRS') trial – this trial was based upon the GPRS of the GSM operators;
- PLC Desktop Study – this desktop study investigated the Two-Way Automated Communications Systems ('TWACS'), a PLC technology;
- 868 MHz RF Technology – this study investigated the Wavenis RF solution which uses a short-range radio (868 MHz frequency) and the GPRS network of the GSM operator.

- *Mesh systems, deployed outside of Europe, operating in the sub-1Ghz range and at relatively higher transmit power appear to address many of these issues. We believe that more suitable wireless spectrum should be made available in the sub 1GHz area.*
- *If required to roll out some smart meters on an ad-hoc basis in the near term then we then we should develop an interim solution based on GPRS with a DLMS/COSEM meter".*

A 10.12 It is apparent from the report that ESBN does not envisage having a single national wireless technology solution but instead sees PLC as the leading option to serve the urban population while GPRS/3G is the leading option to serve some 700,000 rural customers (approximately 30% of households in Ireland).

Spectrum Harmonisation

A 10.13 Spectrum management policy is increasingly driven at a European level with the most sought after spectrum bands, including the 800 MHz and 900MHz bands, now subject to EC harmonisation decisions. ComReg must take into account these decisions and their key objective which is to maximise the social and economic benefits of the finite amount of radio frequency spectrum available to provide effective electronic communications network services. Though the 800 MHz and 900 MHz bands will in future be deployed on a technology and service neutrality basis, it is envisaged that both bands will be used throughout Europe for the deployment of public mobile cellular technologies such as GSM, UMTS, LTE and WiMAX.

A 10.14 CEPT and ETSI are currently investigating the possibility of a European harmonised frequency solution for smart utility networks. The frequency ranges being considered are in bands adjacent to the 800 MHz and 900 MHz bands, namely the 863-870MHz, 870-876 MHz and 915-921MHz bands. Therefore if a harmonised spectrum band for smart utility networks is to emerge in Europe it is likely to be one of these spectrum bands.

Compatibility with other systems in the 800 MHz and 900 MHz bands.

A 10.15 For a technology supporting smart metering to be deployed in the 800 MHz or 900 MHz bands, it would have to be capable of complying with the technical parameters of the EC Decisions and be capable of co-existing with other technologies in those bands.

A 10.16 Technologies which are compatible with the EC Decisions on the 800 MHz and 900 MHz bands include mobile technologies such as GSM[681], UMTS, LTE and WiMAX. These technologies can be deployed in these bands.[682] The EC

[681] Note ComReg is not aware of any CEPT Reports studying the deployment of GSM in the 800 MHz band, and it is therefore uncertain whether GSM would be deployed in the 800 MHz band in the future.

[682] CEPT has carried out numerous studies on the 800 MHz and 900 MHz bands, and these studies have considered the deployment of mobile technologies in these bands. See CEPT Reports 29, 30, 31

Decisions allow for other technologies to be deployed on condition that they can demonstrate compatibility with adjacent networks operated by other rights holders. In this regard, a smart utility solution based upon a compatible technology would be permissible within the 800 MHz and 900 MHz bands.[683]

A 10.17 However, ComReg is not aware of any CEPT studies of the compatibility of deploying non-mobile technologies which support smart metering (e.g. RF Mesh) in the 800 MHz and 900 MHz bands. A smart utility solution which utilised non-mobile technologies in the 800 MHz and 900 MHz bands would require compatibility studies similar to those produced by CEPT. As noted above, CEPT is investigating the possibility of designating a specific band for smart utility networks. Therefore, if a harmonised spectrum band for smart utility networks is to emerge it is likely to be in one of the bands under consideration which lie adjacent to the 800 MHz and 900 MHz bands, rather than in the 800 MHz or the 900 MHz band.

Acquiring 10 MHz of sub-1GHz spectrum for smart utility purposes

A 10.18 There is nothing whatsoever to prevent ESBN from entering the proposed auction with a view to acquiring such spectrum in the 800 MHz and/or the 900 MHz band, subject to the general condition that any technology subsequently deployed by a licensee must comply with the technical parameters specified in the EC Decisions on the 800 MHz and 900 MHz bands. These technical parameters limit the types of technologies that may be utilised.

A 10.19 However ESBN's proposed alternative to its participation in the spectrum award process, on the same basis as all other participants, is that it be given 10 MHz of sub-1GHz spectrum, either for free or for such amount as it can afford (this is not specified) but in any event not based on the market value of the band as established by an open, competitive auction.

A 10.20 This proposal is not acceptable to ComReg for a number of reasons:

- First, ComReg has the statutory function and objective, under sections 10 and 12 of the Communications Regulation Act, 2002, to ensure the efficient management and use of the radio frequency spectrum. Spectrum is a finite and valuable State resource, there is only so much of it to go around, and the propagation characteristics of the 800 MHz and 900 MHz bands make them especially important to electronic communications. In such circumstances, ComReg considers that it would be contrary to its statutory function to give a significant amount of valuable spectrum to a specific operator, on favourable terms and in the

and 32 for studies relating to the 800 MHz band. See CEPT Reports 19, 41 and 42 for studies relating to the 900 MHz band.

[683] In this regard, ComReg notes that ESBN has already trialled smart meters using a mobile telephony technology, GPRS. In this trial, the GSM networks of the mobile network operators was used to trial the smart metering product, and subject to commercial negotiations, such a solution would also appear possible in the future, where the networks of the sub-1GHz spectrum licensees could be used to support a smart metering product.

knowledge that the spectrum would be used for a relatively narrow and restricted purpose.

- Second, and most importantly, any such action by ComReg would be *ultra vires* the applicable legislation and therefore unlawful. Regulation 11 of the Authorisation Regulations 2011[684] provides that where ComReg considers that a particular spectrum allocation should be limited then it must give due weight to the need to maximise benefits for users and to facilitate the development of competition and it must consult with all interested parties. But of particular relevance, Regulation 11(2) stipulates that ComReg, having consulted, may decide that the number of licences ought to be limited and where it so decides, ComReg shall grant such 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 Act of 2002 and Regulations 16 and 17 of the Framework Regulations."*

A 10.21 It is clear from the above that, in the absence of any statutory provision to the contrary, ComReg cannot grant spectrum to specific persons or bodies based on subjective reasons. To do so would be unfair to other interested parties and contrary to the clear intent of the legislature.

A 10.22 In addition, ComReg considers that ESBN's proposal could constitute an unlawful State aid under Article 107 of the Treaty on the Functioning of the European Union (TFEU). Article 107(1) states that *"any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the common market."* Articles 107(2) and (3) set out a number of exceptions to the general rule, however ComReg does not propose to consider these in any detail as Regulation 11 of the Authorisation Regulations 2011 already makes the position clear.

Conclusion

A 10.23 ComReg recognises that there are social, economic and environmental benefits that smart metering and smart grids can deliver and ComReg supports[685] the work by the Commission for Energy Regulation (CER) and its stakeholders, including ESBN, to inform a Cost Benefit Analysis for Smart Metering Rollout in Ireland.

A 10.24 However, for the reasons set out above ComReg considers that that an allocation of 10 MHz if sub 1GHz spectrum for utility purposes would not be economically sound or spectrally efficient. Further, a decision to allocate 10MHz of sub-1GHz spectrum to any individual party - on favourable terms and in circumstances where all other parties must compete - could not be considered to be justified, objective, fair or lawful. ComReg therefore believes that it would be wholly

[684] European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. 335/2011)
[685] http://www.cer.ie/GetAttachment.aspx?id=e59a8141-40b7-45b5-9143-14e8afefb374 and http://www.cer.ie/GetAttachment.aspx?id=61d6bd31-3043-416c-89a8-71f6cd6af086

inappropriate and unlawful to set aside 10 MHz of spectrum in the 800 MHz or the 900 MHz band for smart metering purposes.

10.2 Mandate Regulated Access of Mobile Networks for National Roaming and/or a Mobile Virtual Network Operator ('MVNO')

A 10.25 In response to Consultation 09/99 one respondent, BT, urged ComReg to mandate wholesale access to future Mobile Networks for Mobile Virtual Network Operators, as a means of promoting competition in the market.[686]

A 10.26 In response to Consultation 10/71, two respondents, UPC and Imagine, submitted comments on this issue:

Q. 9 asked parties if they agreed that a 2 × 20 MHz cap was the most appropriate for a joint award of 800 MHz and 900 MHz spectrum.

A 10.27 Imagine responded as follows:

- Sub 1GHz spectrum liberalisation holds the potential for substantial consumer benefits through the more efficient use of technology to provide mobile communications services and/or the introduction of new competition into the market. The benefits of this liberalisation can be best achieved by ensuring that sufficient spectrum is awarded to new market entrants and not just existing mobile operators.
- Imagine does not believe that the proposed award structure will result in new market entry and that the proposed structure is skewed in favour of licence award to the incumbent mobile network operators. In our view a 2×15MHz cap should be used with one of these licences reserved for new market entry. The terms and conditions of this licence should be graduated to reflect the increased costs of such entry as well as the long term economic and social benefits. **Imagine is also concerned that the absence of a requirement to provide for MVNO's using the new**

[686] BT stated: "
"In the interests of ensuring that a fair and competitive environment is maintained, we believe that the awarding of licences should not unfairly discriminate against new entrants, particularly by expecting such new entrants to comply with unreasonable rollout/coverage obligations. In order to promote additional competition there are a number of approaches that could be considered including ensuring the possibility to secure spectrum in a range of bands, the possible designation of spectrum for new entrants, and mandated regulated wholesale access requirement for existing network operators to offer wholesale access or national roaming to new entrants.

This latter point can provide a way to extend the network of the licensed MNOs, either to enable them to get started in the case of new entrants, or to provide complementary coverage in rural areas (typically through reciprocal arrangements) in the case of more established operators. In the case of wholesale access for new entrants, the regulator should mandate wholesale access arrangements, at fair and reasonable commercial terms, in order to ensure that a new entrant is not significantly disadvantaged; this will help to ensure that an open and competitive environment is maintained."

liberalised licences could further erode competition in the mobile voice and data market." [ComReg emphasis]

A 10.28 Q.15 addressed the proposal to set a symmetric coverage obligation for 70% of the population and asymmetric roll-out times to meet that obligation, being 3 years for existing mobile network operators and 7 years for new entrants. As part of its response to Q.15, Imagine submitted that[687] *"[national] roaming should also be facilitated through the licensing regime to enable national coverage for any new entrant."*

A 10.29 UPC, in response to Question 9, also stated that while the proposed joint auction of the 800 MHz and 900 MHz bands would create competitive tension amongst incumbent operators, it would exclude new entrants who would be unable to compete with incumbent operators, on the basis that the latter can always outbid new entrants because they do not have to include the same cost components in their business plans. Imagine submitted that *"carving out spectrum for new entrants ... will actually increase the competitive tension and will possibly allow ComReg to generate the highest benefit for a scarce resource and allow for new innovation by fostering competition."* UPC further submitted that the valuable propagation characteristics of the 800 MHz and 900 MHz spectrum bands are such that[688] *"it makes sense for an incumbent to take steps to ensure a new entrant does not obtain the spectrum ... Incumbents are thus incentivised to outbid new entrants ... as a defensive strategy to keep out a viable potentially disruptive new competitors."*

A 10.30 Developing from this submission, UPC responded to Q.15 by stating that as it would take new entrants longer to build their networks they should be given more time than that proposed by ComReg (7 years) *"and suitable regulated roaming agreements should be applied for the period of the build to allow them to readily compete prior to completion."*

ComReg Position

A 10.31 ComReg considered the issue of regulated MVNO access to the mobile networks MVNOs in Section 15.8 of Consultation 09/99. ComReg stated therein that it had consulted extensively on whether to invite commitments to provide MVNO access as part of a future 900 MHz spectrum licence competition, and had noted the lack of a strong consensus favouring such commitments and that no respondent stated that it would volunteer such a commitment. ComReg concluded by stating that it was not minded to include an MVNO commitment as part of the spectrum award process, giving the following reasons for its view:

i) *"In Document 08/57, ComReg identified that the likely welfare effects of increasing the number of independent competitors in the retail mobile market were substantial. This analysis formed the justification for imposing a*

[687] Imagine response to Consultation 10/71 in document 10/103r

[688] UPC response to Consultation 10/71 in document 10/103r

spectrum cap in the 900 MHz band. The spectrum cap is therefore a direct tool with which ComReg can ensure that the initial conditions of the competitive process are optimised when liberalised spectrum is made available (in addition to ensuring efficient use of spectrum by preventing spectrum hoarding, etc.);

ii) The spectrum cap envisaged in the 900 MHz band should ensure that a minimum of four operators will have access to liberalised 900 MHz spectrum;

iii) Successful bidders for the valuable 900 MHz liberalised spectrum will have paid a market price for this spectrum and will therefore have incentives to maximise the return on their investments."

A 10.32 ComReg is of the view that the above rationale still holds for the current proposal to conduct a joint auction of the 800 MHz, 900 MHz and 1800 MHz spectrum bands. ComReg notes the following in particular:

- the current spectrum cap proposal would also ensure a minimum of four operators will have access to sub-1GHz spectrum; and
- the proposed inclusion of the 800 MHz and 1800 MHz bands in the award process will release 2 × 140 MHz of spectrum to the market. This is four times the 2 × 35 MHz spectrum release proposed in Consultation 09/99.

A 10.33 Furthermore, ComReg notes that there are currently two MVNOs and two National Roaming agreements in the Irish market[689].

A 10.34 ComReg must also be mindful of what it is legally empowered to do. Part A of the Schedule to the Authorisation Regulations 2011 sets out the 20 categories of condition that may be attached to the General Authorisation. Of these 20 conditions, no. 15 permits for *"Access obligations other than specific obligations applying to undertakings providing electronic communications networks or services, in conformity with the Access Regulations."* The wording indicates that specific access obligations on particular undertakings (such as MNOs) cannot be imposed under the General Authorisation.

A 10.35 Part B of the Schedule to the Authorisation Regulations 2011 sets out the 9 categories of condition that may be attached to a licence (i.e. spectrum right of use), granted under the Wireless Telegraphy Act, 1926. The list includes, at no.7 – *"Any commitments which the undertaking obtaining the usage right has made in the course of a competitive or comparative selection procedure."* It would thus appear that an access obligation could be imposed under a licence where a party committed to same as part of a competitive selection procedure (in this case the proposed joint auction).

A 10.36 However, the above provision of the Authorisation Regulations 2011 must be read in light of Regulation 8 of the Access Regulations 2011. Regulation 8

[689] The three MVNOs are Postfone, Tesco Mobile. and eircom Mobile also provides services in the market but is not a MVNO.

The two national roaming agreements are between Vodafone and Meteor, Vodafone and H3GI.

provides that ComReg may impose on an operator any of the obligations set out in Regulations 9 to 13 of the Access Regulations, but only where an *"operator is designated as having significant market power on a relevant market as a result of a market analysis carried out in accordance with Regulation 27 of the Framework Regulations."*

A 10.37 Regulation 12(1) of the Access Regulations 2011 provides that ComReg may "impose on an operator obligations to meet reasonable requests for access to, and use of, specific network elements and associated facilities in situations where [ComReg] considers that the denial of such access" would hinder the emergence of sustainable competition, would not be in the interests of end-users, or would otherwise hinder the achievement of the objectives set out in section 12 of the Act of 2002 and Regulation 16 of the Framework Regulations 2011. However, as noted above, this may only be done following a finding of SMP.

A 10.38 It should also be noted that no MVNO access obligations are imposed on MNOs at present. Further, the 2003 Commission Recommendation **on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation included, at number 15, the market for** "Access and call origination on public mobile telephone networks, referred to (separately) in Annex I(2) of the Framework Directive in respect of Directives 97/33/EC and 98/10/EC". However Market No.15 was removed when the Recommendation was updated in 2007. It is therefore most unlikely that any MVNO access obligations will be imposed on MNOs in future.

A 10.39 Given the above, ComReg is of the view that it would be inappropriate to seek regulated access commitments, such as MVNO or national roaming commitments, in the proposed auction.

10.3 Broader Spectrum Framework Issues

A 10.40 In responding to ComReg's consultations, a number of respondents raised issues in relation to the broader framework for spectrum licensing and in particular:

- spectrum trading;
- spectrum pooling & sharing; and
- indefinite licences.

A 10.41 In response to Consultation 09/99:

- Meteor believed that ComReg has failed to address the issues of ***spectrum sharing*** and ***trading*** and that ***finite licenc*****e** duration is not consistent with liberalised use and provides little certainty for industry on return on investment.
- O2 believed that there is insufficient clarity in Ireland on ***spectrum trading*** and it called upon ComReg to clarify the position before it

makes a decision. In addition it noted that the EU Telecoms Reform Package and in particular the Framework Directive (2002\21\EC) as amended (by 2009\140\EC) includes specific provisions permitting spectrum trading, and these must be transposed into Irish law by May 2011;

- O2 also noted there are emerging views that some ***form of collaboration*** between operators may be required in order to increase the capacity and coverage that can be achieved, and O2 called upon ComReg to clarify that there will be no specific restrictions in the licences that would inhibit such ***sharing***.
- Vodafone was of the view that ComReg's assessment of the issue of ***spectrum trading***, as set out in section 6.4 of Consultation 09/99, is deficient as it omits any reference to the recent reforms to the EU Regulatory Framework in respect of spectrum management (in particular the facilitation of spectrum trading) that must be transposed into national legislation in the near term.

A 10.42 In response to Consultation 10/71:

- eircom called upon ComReg to incorporate the broader issues of ***spectrum pooling, trading and sharing*** into the framework for access before any decisions is made on the future licensing of the spectrum bands, and it noted that the introduction of a trading mechanism in the new EU regulatory framework;[690]
- O2 believed that ComReg should take a long term view of the industry and licences that should provide for service and technology neutrality, be ***tradable***, allow for ***spectrum sharing***, and be ***open-ended*** to ensure continued investment;
- O2 also stated that in structuring the proposed auction mechanism, ComReg must facilitate and not inhibit this essential flexibility for the industry. In particular the auction mechanics must not inhibit ***spectrum trading*** or ***spectrum sharing***. They should not restrict flexibility in the approach to acquiring spectrum licences by prohibiting approaches other than single operator bids – for example joint bidding by a consortium of companies.

[690] Eircom group stated that *"Spectrum pooling, trading and sharing should be considered as tools to improve spectral efficiency, peak speeds and better coverage. Trading would enable white spots to be used more efficiently, it could enable new entrants and provides a mechanism by which spectrum at any given point in time can be allocated to its highest value use. Potentially all bands can be shared using combinations of administrative measures (time, geographic and interference management) and technical solutions (filters, smart antenna, smart transmitters (such as SDR and cognitive radio) and transmit power limitations combined with a relaxation of interference constraints all of which will undergo further technical development over the course of the license agreements. Pooling could make infrastructure sharing not just a means to ensure better general coverage at shared cost but ensure better end-services for the consumers."*

- H3GI believed that ComReg should award ***"indefinite licences"*** in respect of 900 MHz and 800 MHz and amend the 3G licences of Vodafone, O2, Meteor and H3GI to provide that they too are indefinite (so that equality of treatment is protected). It noted that the UK government had tabled legislation before parliament which if passed would require Ofcom to convert current 3G licences to licences of an indefinite term terminable on five years notice with no possible termination before the expiry of their current term.
- Ericsson believed it would not be economically feasible for every licensed operator to roll out a separate nationwide 800/900 MHz network. Instead, it believed that ComReg should actively facilitate Radio Access Network (RAN) ***sharing*** between operators but only after an intermediate economically feasible coverage target has been met.

A 10.43 In response to Consultation 10/105:

- Eircom expressed its disappointment that ComReg has not considered the establishment of truly liberalised flexible spectrum rights including rights to ***licence renewal, spectrum trading, spectrum sharing*** and ***spectrum pooling***. It believed that such rights must be established in advance of issuing any new licences to maximise the societal and economic potential of the spectrum. In addition it noted that Article 9B of the Framework Directive as amended requires Member States to ensure that undertakings may transfer or lease spectrum in bands to be specified by the European Commission.

A 10.44 As set out ComReg Document 11/37, Ericsson provided a further response to ComReg in its e-mail of 5 April 2011. In that e-mail, Ericsson was of the view that network sharing should be allowed as a quid pro quo for increased coverage.

ComReg's Position

A 10.45 In outlining ComReg's position on the above broader spectrum framework issues, ComReg firstly notes that while a number of respondents have coupled these issues together, these issues are separate issues in their own right and should be discussed individually.

Spectrum Trading

A 10.46 On 1 July 2011, the EU regulatory framework for telecommunications was transposed into Irish law. Regulation 19 of the Framework Regulations 2011 now provides for the transfer or lease of individual rights to use radio spectrum[691] and states that:

Transfer or lease of individual rights to use radio frequencies

[691] S.I. No. 333 of 2011, EUROPEAN COMMUNITIES (ELECTRONIC COMMUNICATIONS NETWORKS AND SERVICES) (FRAMEWORK) REGULATIONS 2011, http://www.irishstatutebook.ie/2011/en/si/0333.html

(1) Having regard to its objectives under section 12 of the Act of 2002 and Regulation 16, and its functions under these Regulations, the Regulator—

shall ensure that undertakings may transfer or lease to other undertakings, in accordance with conditions attached to the rights of use for radio frequencies and any procedures specified by the Regulator, individual rights to use radio frequencies in the bands for which this is provided for in accordance with implementing measures adopted by the European Commission under Article 9b(3) of the Framework Directive, and

may, in the case of bands which are not identified by the European Commission under Article 9b(3) of the Framework Directive, provide for undertakings to transfer or lease individual rights to use radio frequencies to other undertakings in accordance with any procedures specified by the Regulator.

(2) The Regulator shall ensure that the conditions attached to individual rights to use radio frequencies shall continue to apply after the transfer or lease, unless the Regulator specifies otherwise.

(3) Where an individual right to use radio frequencies was initially obtained by an undertaking free of charge, a determination by the Regulator that paragraph (1) shall or shall not apply will only be made with the consent of the Minister.

(4) An undertaking intending to transfer rights to use radio frequencies shall notify the Regulator of its intention to do so and of the effective transfer of the rights. The notification shall be in accordance with procedures specified by the Regulator. The Regulator shall ensure that such notifications are made public.

(5) Where radio frequency use has been harmonised through the application of the Radio Spectrum Decision or other European Union measures, a transfer of rights to use radio frequencies shall comply with such harmonised use.

A 10.47 While the introduction of Framework Regulations 2011 does not mandate the provision of spectrum trading in the 800 MHz, 900 MHz and 1800 MHz bands, it is likely that spectrum trading will be permitted in these bands in the future. Indeed, the EU Commission has published a draft Radio Spectrum Policy Programme[692] (Noting that these are still proposals and have yet to be agreed by Parliament, council, etc.) in which the proposed harmonized bands for trading are set out in Article 6.5. ComReg expects trading to apply in due course to the three bands covered in this document.

A 10.48 However, before spectrum trading can be introduced to particular spectrum band(s) and licences, there are a number of preparatory steps that need to be taken, including the setting of conditions and procedures. ComReg will set out separately its modality on this matter in due course.

[692] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0471:FIN:EN:PDF

Spectrum Sharing/Pooling

A 10.49 A number of respondents to ComReg's previous consultations have called upon ComReg to allow spectrum sharing and pooling, and O2 has suggested that ComReg should allow the possibility of eligible bidders combining their individually capped allowances to bid as single entity.

A 10.50 In relation to the latter point, this issue is discussed in Annex 6a (Spectrum Caps) and it is ComReg's view that the same spectrum cap should apply to all bidders in the competition, and therefore it would not be possible for bidders to combine their spectrum cap allowances to bid as a single entity.

A 10.51 In relation to the former point, it should be noted that spectrum sharing and pooling can in principle bring benefits such as reduced costs and improved quality of service, but can also give rise to policy concerns, particularly in relation to competition. Having regard to this balance of interests and to the statutory framework, it is not possible for ComReg to give a blanket guarantee that spectrum sharing and pooling agreements will be allowed as the details of any such agreements would have to be in compliance with relevant telecommunications and competition law, and it is only possible to make such an assessment on a case-by-case basis having seen the details of the agreement. [693]

A 10.52 However, in designing this proposed auction, ComReg has been careful not to include restrictions in the licences that would inhibit such sharing after the award process. In that regard, it should be noted that:

- The proposed spectrum cap is for the duration of the competition;
- The proposed minimum coverage level is set to a level that provides scope for meaningful collaboration;
- The proposed licence conditions are set in line Part B of the Authorisation Regulations 2011; and,
- The proposed technical conditions comply with the technical parameters as set in the EC Decisions.

Licence Duration

Attaching a maximum duration condition to a spectrum right of use

A 10.53 Part B of Schedule to the Authorisation Regulations 2011[694] sets out nine categories of conditions that can be attached to a spectrum right of use, and among other items permits ComReg to attach a maximum duration to a spectrum right of use.

[693] For example, in the proposed merger of Orange-UK and T-Mobile-UK, in order to remove possible concern regards the joint venture's spectrum holding, it made a commitment to divest 2×15 MHz of its 1800 MHz spectrum band.
Source: "Of spectrum and radio access networks: the T-Mobile/Orange joint venture in the UK", Jocelyn Guitton, Boryana Hristova & Vera Pozzato, European Commission, Competition policy newsletter 2010-2

[694] http://www.irishstatutebook.ie/2011/en/si/0335.html

A 10.54 The issue of attaching a maximum duration to a spectrum right of use has also been discussed at a European level in relation to the 2009 EC Regulatory framework, and Directive 2009/140/EC (aka the "Better Regulation" Directive)[695] states that:

"Where Member States grant rights of use for a limited period of time, the duration shall be appropriate for the service concerned in view of the objective pursued taking due account of the need to allow for an appropriate period for investment amortisation."

A 10.55 As noted in Annex 6.3 (Temporal Lots), the issue of licence duration for new licences in the 900 MHz band was consulted upon in Consultation 08/57 (Section 7.3.2) and Consultation 09/14 (Section 6.3.1) set out ComReg's proposed view that a licence duration of 15 years would be appropriate for all new licences issued in the 900 MHz band.[696]

A 10.56 Since Consultation 09/14, ComReg has introduced a temporal lot approach and proposed the inclusion of additional bands (namely the 800 MHz and 1800 MHz bands) into the award process and ComReg's current proposal is that the 800 MHz, 900 MHz and 1800 MHz bands be awarded in two temporal lots, namely:

- Time slice 1: 1 February 2013 – 12 July 2015 (i.e. 2.5 years ; and
- Time slice 2: 13 July 2015 - 12 July 2030 (i.e. 15 years).

A 10.57 ComReg believes that its temporal lot approach is in line with the EC Regulatory Framework and it is appropriate to attach a maximum duration (which could be up to 17.5 years where a licensee obtains spectrum in both time slices) condition to any new licences issued in these spectrum bands.

Indefinite Licences

A 10.58 The issue of indefinite licences has been discussed by ComReg in Consultation 11/28, "ComReg's proposed strategy for managing the radio spectrum 2011-2013" where, among other items, ComReg considered that:

- there could be co-ordination issues (e.g. how to manage major allocation and harmonization changes) associated with indefinite licences as an incumbent licensee with an indefinite licence could prevent the spectrum band being used to its full potential or frustrate the process to delay the benefits of the harmonisation changes; and
- the periodic release (and re-assignment) of spectrum to be in line with the expected cycle of technology and investment to be compatible with the aims of the Common Regulatory Framework. This ensures that no

[695] See Article 3 "Amendments to Directive 2002/20/EC (Authorisation Directive)" in http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0037:0069:EN:PDF

[696] Consultation 09/14 stated *"... ComReg considers that a licence duration of 15 years for all new licences issued for 900 MHz spectrum is appropriate as it would strike an appropriate balance between the need to provide operators with the opportunity to earn a reasonable return on their investment and the need for efficient spectrum management (such as the flexibility to re-farm the spectrum to other uses should the need arise)"*

entrenched positions develop that may be allowed to sustain themselves indefinitely, and which would be impervious to normal market pressures.

A 10.59 In addition to those considerations, ComReg notes that the implementation of major allocation and harmonisation changes is often as a result of an EC Decision to harmonise a particular spectrum band, and these Decisions are obligatory on member states. It is important to implement these Decisions in good time and in a manner that allows the benefits to be realised without distorting competition. A term limited licence allows for easier transition and co-ordination, as for example a whole spectrum band could be refarmed towards its new use without the risk that an incumbent licence holder may have incentives to act as a hold out with a view to capturing some of the surplus in the new use. In situations where such decisions are decentralised the market may only move at the speed of the most patient firm.

A 10.60 Furthermore, ComReg notes that indefinite licences are often linked to the trading of spectrum rights. In considering this issue, it is important to distinguish between trades within and between uses. ComReg believes that there are good reasons to be sceptical about the degree to which competing entities in lucrative markets with a harmonised approach to spectrum management will be willing to trade (or even lease) spectrum usage rights to each other and the evidence available so far shows that these trades do not systematically occur even with indefinite duration spectrum licences.[697] While ComReg notes that trading will be less likely to occur as the licence approaches its end, ComReg's proposed approach to spectrum licensing will allow new services to be introduced in a harmonised manner (if necessary) and will allow prospective purchasers (including current licence holders) to compete with each other for the next tranche of usage rights.

A 10.61 As discussed above, Consultation 11/28 sought feedback and empirical evidence on the issue of licence duration and trading. ComReg has received a number of responses to this consultation and ComReg will issue its Response to Consultation in due course providing further views on the issue of indefinite licences. For the purpose of this document and in relation to the 800 MHz, 900 MHz and 1800 MHz award process, ComReg remains of the view that the licence duration for the time-slices proposed are appropriate, and does not envisage making any change to the current approach based on a definitive time-based expiry.

10.4 Co-existence of the 800 MHz band and the 490-790 MHz Broadcasting Band

Summary of Issue Raised

A 10.62 In its response to Consultation 10/71, RTÉ and RTÉNL believed that further studies and consultation with the industry is needed to ensure that services implemented in the 800 MHz band do not impact on broadcasting services in the

[697] This is separate from the active market for corporate control for all asset classes held by companies that hold spectrum usage licences.

adjacent band. It believed that these studies need to be completed before liberalised rights of use to 800 MHz spectrum band could be awarded.

A 10.63 ComReg also notes that UPC held a similar view in its response to Consultation 10/71 where it stated the following: "UPC would therefore call on ComReg to ensure any and all relevant technical research and impact analysis is undertaken in advance of the rollout of the any new services in this particular spectrum band".

A 10.64 In discussing this issue RTÉ / RTÉNL noted that many broadcasting organisations share concerns with regard to the release of the 800 MHz spectrum band. RTÉ / RTÉ NL submitted to ComReg a position statement from DigiTAG[698] (the "Digital Terrestrial TV Action Group") titled *"Necessary measures for limiting the potential interference to DTT services in the band 470 to 790 MHz from mobile/fixed communications networks operating in the 790 – 862 MHz band"*. Additionally RTÉ / RTÉNL referenced the Broadcast Networks Europe ("BNE") consultation submission[699] to the Radio Spectrum Policy Group ("RSPG") consultation on the Radio Spectrum Policy Programme.

A 10.65 In relation to the range of potential mitigation techniques, RTÉ / RTÉNL's principal views (as summarised and noted below) were that it:

- Supported ComReg's proposal to apply the block edge masks ("BEM") as set out in the Annex to EC Decision 2010/267/EU ("Decision 2010/267/EU") and stated that the Case A Block Edge Mask ("BEM") should be applied to all Blocks;[700]
- Noted that *'additional mitigation techniques'* can be applied under Decision 2010/267/EU[701]. RTE stated that it was "concerned that no reference had been made to these additional measures";
- Noted that additional mitigation measures are being considered in other jurisdictions (including the UK and Denmark) and it listed three such mitigation measures:
    - Mitigation at the mobile base-station (e.g. additional filtering, polarisation alignment, power limitations);
    - The supply of filters to broadcast viewers; and
    - The use of on-channel Digital Terrestrial Television ("DTT") repeaters ("OCRs")[702] at the location of the base-station (noting that it

[698] DigiTAG is an organisation representing various broadcasters including public service broadcasters in Europe and Broadcast Networks Europe is an organisation representing terrestrial broadcast network operators in Europe http://www.broadcast-networks.eu/members/

[699] http://rspg.groups.eu.int/_documents/consultations/comments_rspp2010/bne_rspp_en.pdf

[700] RTÉ / RTÉNL added that, *"This is to ensure the protection of the large portion of Ireland where channels in the upper 50s to 60 are currently planned for broadcast use, and potentially the entire country should any future re-planning of broadcasting in the UHF band be undertaken."*

[701] Decision 2010/267/EU states, *"However, it should be understood that the derived BEMs do not always provide the required level of protection of victim services and additional mitigation techniques would need to be applied in a proportionate manner at national level in order to resolve any remaining cases of interference."*

[702] An on-channel repeater (OCR) is a DTT transmitter station operated on the same frequency as the main DTT transmitter in an area and located at the mobile BS to restore the degradation of SINR at

may not be possible to implement this in some cases, particularly where a single frequency network is also implemented);

- Recommended that a separate entity be set-up, independent of 800 MHz licensees, as a point of contact for reports of interference or loss of service, to ensure a prompt resolution for the affected viewers;
- Noted that while this problem has mainly been considered so far with respect to the effect of mobile down-links on broadcast services, it further noted that research from Germany[703] had indicated that interference into broadcast services may also arise as a result of mobile uplinks; and
- Noted that the dependence of many Irish viewers on high-gain aerials and mast-head and distribution amplifiers must also be taken into account, noting that digital switch-over in Ireland will largely not affect TV reception set-up (i.e. no need to change aerials).

A 10.66 The issues raised above are discussed in the following section.

Overview of International Studies and Licence Conditions

A 10.67 At a European level, studies on the co-existence of non-broadcasting services in the 800 MHz band and broadcasting services below 790 MHz have been carried out by the European Conference of Postal and Telecommunications Administrations ("CEPT"). In particular, CEPT has produced two reports, CEPT Report 30[704] and 31[705], which define the technical conditions and frequency channelling arrangements for the 800 MHz band, while also enabling the protection of broadcasting services below 790 MHz.

A 10.68 These CEPT reports were submitted to the European Commission and the technical conditions set out in the Annex to Decision 2010/267/EU are based upon these CEPT Reports.

A 10.69 Decision 2010/267/EU presents these technical conditions in the form of frequency arrangements and BEMs and obliges member states to apply the BEMs *"as an essential component of the technical conditions necessary to ensure coexistence between services at national level."* In addition Decision 2010/267/EU also recognises that *"the derived BEMs do not always provide the required level of protection of victim services and additional mitigation techniques would need to be applied in a proportionate manner at national level in order to resolve any remaining cases of interference".* This issue of additional

impaired DTT receivers. UK studies state that attenuators at the DTT receivers would need to be used in conjunction with OCR's.

[703] Media Broadcast GmbH (TDF Group) "Summary of conducted measurements on DVB-T interfered with by LTE uplink signals" submitted to ITU Working Party 6A, April 2010.

[704] CEPT Report 30: "Report from CEPT to the European Commission in response to the Mandate on The identification of common and minimal (least restrictive) technical conditions for 790 - 862 MHz for the digital dividend in the European Union" http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP030.PDF

[705] CEPT report 31: "Report from CEPT to the European Commission in response to the Mandate "Frequency (channelling) arrangements for the 790-862 MHz band" (Task 2 of the 2nd Mandate to CEPT on the digital dividend) http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP031.PDF

mitigation techniques has been considered and/or studied by a number of European countries as discussed further below.

Loss of Broadcasting Reception and Potential Mitigation Techniques

A 10.70 From international studies, ComReg understands that the loss of broadcasting reception can be categorised as follows:

1. **SINR ("Signal to Interference plus Noise Ratio") degradation:** This can occur when a wanted signal is interfered with by an unwanted (or interfering) signal. If the ratio of the wanted signal power to that of interference power plus noise (i.e. SINR) at the receiver input reduces below a specific threshold in a given channel, then the DTT receiver will fail to operate correctly and broadcast reception is lost or degraded on that channel;
2. **Receiver overloading:** This occurs when the DTT receiver becomes overloaded or desensitised due to the general presence of a high power radio signal. The high power radio signal could be in the same frequency band (i.e. a broadcasting signal) or in adjacent frequency bands (e.g. a mobile signal in the 800 MHz band or other communications services signals in the bands below 470 MHz). Receiver overloading can cause the DTT receiver to stop working altogether; and
3. **Degradation of service from user terminals:** This can occur when user terminals, such as mobile handsets, are operated in close range of DTT receiving equipment. This can result in broadcast reception being lost or degraded.

A 10.71 International studies have been carried out by CEPT and a number of other administrations to consider loss of broadcasting reception, and these studies provide guidance on the various mitigation techniques that could be used to address such issues.

A 10.72 CEPT Report 30 has studied the compatibility of electronic communications network ("ECN") services in the 800 MHz band and with broadcasting services below 790 MHz, and this report defines the least restrictive technical conditions for the 800 MHz band in the form of BEMs. CEPT Report 30 also recognises that the BEMs do not always provide the required level of protection for broadcasting reception and in order to resolve the remaining protection cases additional mitigation techniques would also need to be applied.

A 10.73 Annex 4 to CEPT Report 30 provides a list of potential mitigation techniques which may be used by national administrations to solve or minimise the loss of broadcasting reception on a local/regional/national basis. In brief, the potential mitigation categories are divided into two main categories as follows:

A. Local interference management between ECN Base Stations in the 800 MHz band (also referred to later in this Section as mobile base station ("mobile BS")) and DTT[706]:

[706] See also CEPT Report 21 and 23 for a discussion on the issues presented.

- Co-siting of the mobile BS and DTT transmitters, including DTT repeaters;
- The use of cross polarisation and/or slant polarisation;
- Reducing the power of the mobile BS;
- Adjusting the mobile BS transmitter antenna characteristics (height, pattern, tilt and direction) taking into account local conditions; and
- increasing the power of DTT transmitters; and

B. Hardware modification in DTT receiver or mobile BS [707]:

- Rejection filters in DTT receivers;
- Low-pass filters in DTT receivers; and
- Improved filters in mobile BS transmitters.

A 10.74 The report notes that the above list of possible mitigation techniques is not exhaustive and that additional spectrum engineering techniques may be considered, such as additional frequency offset or restricted BEM.

A 10.75 CEPT Report 30 notes that the mitigation measures to avoid SINR degradation differ from those needed to prevent receiver overloading:

- For SINR degradation, CEPT Report 30 notes that such interference is likely to be caused by mobile base stations operating in the block just above 790 MHz;
- For receiver overloading CEPT Report 30 notes that this is likely to occur when there is a high power signal in close vicinity to the DTT reception, and in the case of portable DTT reception (i.e. the use of an indoor DTT aerial) overloading is likely to be dominated by the user terminal operating in the 8010 MHz band.

800 MHz studies and licence conditions in other European countries

A 10.76 This section sets out information on the 800 MHz studies carried out in other European countries and the licence conditions proposed or set in those countries. In general, international guidance on this matter is varied as:

- National administrations are at different stages in the development of their respective proposals for the award of licences for the 800 MHz band; and
- National circumstances vary per country.

Denmark

A 10.77 Analogue Switch Off occurred in Denmark on 31 October 2009. The Danish regulator ('NITA') is now preparing the 800 MHz auction and has proposed to hold this auction in March 2012. In preparation for this auction, NITA is currently carrying out a technical study which is investigating the potential interference and

[707] See also CEPT Report 21 for a discussion on the issues presented.

receiver overload issues (and the scale of same) to DTT users in the adjacent broadcasting band due to new services in the 800 MHz band. The results of this study have yet to be published.[708]

France

A 10.78 On 31st May 2011, the French regulator ('ARCEP'), adopted decisions on the terms and methods to be used for the 800 MHz and 2.6 GHz frequency band allocations.[709] Among other items, ComReg understands that ARCEP proposes to:

- issue 800MHz licences with technical conditions in accordance with Decision 2010/267/EU using the Case A BEM; and
- include a clause which stipulates that operators who win spectrum in the lower reaches of the 800 MHz band will have to compensate digital terrestrial TV (DTT) viewers for any interference they experience as a result of 800 MHz signals.

A 10.79 On 15 June 2011, ARCEP invited all parties interested in being awarded spectrum in the 800 MHz and 2.6 GHz frequency bands to submit their applications and ARCEP aimed to allocate spectrum in the 800 MHz band in early 2012.

A 10.80 In June 2011, Reuters reported that Bouygues Telecom had submitted a complaint to France's highest court (the Council of State), concerning the obligation that operators who win frequencies in the 800 MHz band would have to compensate DTT viewers who may experience interference caused by 800 MHz signals.[710]

Germany

A 10.81 The German regulator ('BNetzA') held an auction in May 2010 for 800 MHz spectrum, and three operators were successful in acquiring licences in this band. The 800 MHz licences issued include the basic harmonised technical conditions set out in the EC Decision 2010/267/EU.

A 10.82 In addition, in Germany mobile services in the 800 MHz band must not cause any interference to the broadcasting services below 790MHz[711]. Specific mitigation techniques have not been specified, as some mitigation techniques will be more suited to some environments (urban, suburban, rural etc.) than others, and operators are given the freedom to choose the most suitable technique in each instance.

[708] Source: Cullen international (subscription website) http://www.cullen-international.com/

[709] http://www.arcep.fr/index.php?id=8571&L=1&tx_gsactualite_pi1[uid]=1386&tx_gsactualite_pi1[backID]=1&cHash=e1df19862d

[710] http://uk.reuters.com/article/2011/06/24/bouygues-idUKLDE75N1JD20110624

[711] The German "Frequenzbereichszuweisungsplanverordnung" (Ordinance on the Frequency Allocation Table) contains a special footnote on the terms of usage with regard to this compatibility issue ("Nutzungsbestimmung 36" [NB36]).

Sweden

A 10.83 In its open invitation for the 800 MHz auction[712] (published 13 December 2010), the Swedish regulator ('PTS') outlined the licence conditions that it intended to attach to the 800 MHz licences issued in Sweden.

A 10.84 Section 2.3 of the open invitation document discusses the "technical conditions" that the PTS decided to include in the 800 MHz licences. The PTS decided to use the Case A BEM for all blocks in the 800 MHz band, and in addition it decided to include further conditions on the maximum radiated power in 800 MHz band or below 790 MHz in order to achieve appropriate protection to DTT services in the adjacent band below 790 MHz. In particular, it noted that Channel 60 areas (i.e. those geographical areas where the 782-790 MHz frequency is used or is planned for DTT use) are particularly sensitive to radio transmissions in the 800 MHz band and the technical conditions in these areas are stricter than in other areas. PTS proposed a maximum in-block EIRP of 64 to 67 dBm/5 MHz depending on effective antenna height and in Channel 60 areas specific conditions were set for the lower 2 blocks in the 800 MHz band - these specific conditions related to the radiated power and polarisation.

A 10.85 Section 2.4 of the open invitation document discusses the "prohibition against causing interference and measures to remedy interference to television receivers". This condition would apply to all licensees in the 800 MHz band and obliges the 800 MHz licence holder not to cause television interference to terrestrial television reception in the 470–790 MHz frequency band for the permanent resident population. In addition, it obliges the 800 MHz licence holders to:

- establish and maintain cooperation with other 800 MHz licensees in order to take appropriate measures to remedy television interference that may arise; and
- pay for the costs associated with cooperation, investigations and measures to remedy television interference.

A 10.86 In the first quarter of 2011, the PTS held an auction for the 800 MHz band and three applicants were successful in winning rights to 2 × 10 MHz of 800 MHz spectrum[713].

A 10.87 Licences were subsequently issued to these successful applicants and the licence conditions include the *"technical conditions"* and *"prohibition against causing interference and measures to remedy interference to television receivers"* condition discussed above. [714]

[712] http://www.pts.se/upload/Beslut/Radio/2010/10-10534-open-invitation-800-mhz-auction-dec10.pdf
[713] http://www.pts.se/en-gb/News/Press-releases/2011/Press-release/
[714] See Appendix A to the Decision (*"licence conditions etc. for PTS decision to assign licenses (file ref. 10-10534)"*), http://www.pts.se/upload/Beslut/Radio/2011/10-10534-appendix-a-to-decision-800mhz.pdf

Switzerland

A 10.88 Switzerland plans to hold an auction for its 800 MHz spectrum in 2011.[715] The invitation to tender document sets out the details of the auction and outlines the conditions of use associated with each of the frequencies in the auction. For the 800 MHz band this invitation to tender document indicates that Switzerland proposes to:

- adopt the Case A BEM; and
- set a maximum mean in-block EIRP of +56 dBm/5MHz

A 10.89 In addition, in answering questions in relation to 800 MHz conditions of use set out in the invitation to tender document, the Swiss regulator, ('OFCOM'), has clarified that it:

- does not plan on using channel 60 (782-790) for broadcasting purposes; and
- plans to include a general clause with the network specifications to cover interference issues which cannot be foreseen.

A 10.90 Specifically, OFCOM[716] states that, "Potential mitigation depends on the deployment scenario and on the magnitude of impact. For DTT Switzerland has enlarged the lower guard band between Broadcasting and Mobile Services from 1 MHz to 9 MHz (782-791 MHz). Furthermore there are within Switzerland no Broadcasting Services (BS) in the band 782-790 MHz. A part of this band will be used for wireless microphones instead. Therefore, few problems with the protection of DTT services are expected in Switzerland".

A 10.91 As mentioned in the tender, a general clause within the network specifications (Technischer Netzbeschrieb) will cover interference cases which cannot be foreseen. The following clause is contained in the network specifications (Technischer Netzbeschrieb) currently in force for GSM and UMTS. It states as follows, *"If particular base stations/node-b of this license cause interference, then the licensee is obligated to adapt upon the requests of BAKOM to modify the parameters of causing base station/node-b or stop its emissions* "

United Kingdom

A 10.92 The UK regulator ('Ofcom') issued a consultation[717] in March 2011 on the release of 800 MHz and 2.6 GHz spectrum and announced its intention to auction 800 MHz spectrum in 2012.

A 10.93 In June 2011, Ofcom released two further consultations:

[715] Details of the planned auction in Switzerland are available at: http://www.bakom.admin.ch/themen/frequenzen/03569/index.html?lang=en

[716] http://www.bakom.admin.ch/themen/frequenzen/03569/index.html?lang=en&download=NHzLpZeg7t,lnp6I0NTU042l2Z6ln1ad1IZn4Z2qZpnO2Yuq2Z6gpJCDeoN5fGym162epYbg2c_JjKbNoKSn6A--

[717] http://stakeholders.ofcom.org.uk/consultations/combined-award/

- Coexistence of new services in the 800 MHz band with digital terrestrial television[718]; and
- Consultation and information on technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters[719]

A 10.94 In its "consultation and information on technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters", Ofcom proposes that the licence conditions for the 800MHz band should:

- have a maximum in-block emission level of 61dBm/5MHz; and
- be obliged to meet the Case A BEM.

A 10.95 In that consultation, Ofcom also noted that additional technical restrictions may be needed "for achieving the co-existence of new services in the 800 MHz band with adjacent DTT use. A discussion of these is contained in the consultation on coexistence of new services in the 800 MHz band with DTT."

A 10.96 In its consultation on *the "Coexistence of new services in the 800MHz band with DTT"* an initial interference study commissioned by Ofcom identifies that roughly 2.77%[720] of TV households in the UK may suffer interference from the introduction of new services in the 800 MHz band. Ofcom identify that there are a number of mitigation techniques to address such interference issues, including:

- Filtering at the DTT receiver;
- Filtering at the mobile base station;
- Improvements and alterations to DTT equipment;
- Re-orientating DTT terminals;
- Polarisation discrimination (orthogonal to DTT polarisation),
- Reduction in mobile base station power; and
- On channel DTT repeaters ("OCRs").

A 10.97 Ofcom evaluate each of the above mitigation techniques and conclude that:

- "DTT receiver filtering and base station transmit filtering will form a core part of our preferred mitigation options;
- A platform change or adjustments to DTT equipment could fix most of the remaining problems but platform changes could affect the PSB ["Public Service Broadcasting"] and COM ["Commercial"] coverage levels;

[718] http://stakeholders.ofcom.org.uk/consultations/coexistence-with-dtt/
[719] http://stakeholders.ofcom.org.uk/consultations/technical-licence-conditions/
[720] 2.77% was generated by taking the total number of TV households in the UK as being 27,169,147 and the number of households affected as being 751,889. Figures taken from paragraph 1.8 of Ofcom technical report, available at http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/annexes/Technical-Report.pdf

- A limited number of households may experience loss of some or all of their DTT services and it may not be possible to restore them with an alternative platform; and
- Some additional mitigation options may be preferable in some cases, but this will depend on the specifics of where the base station is located and the local geography and we will not know this in advance of the auction of the 800 MHz band. In these cases rather than mandate mitigation techniques at this time, we think it would be more appropriate to use some form of incentive mechanism to ensure new licensees undertake network based mitigation where it is efficient to do so."

A 10.98 In addition, Ofcom proposes to establish a body to manage the delivery of the mitigation measures and proposes that the cost of creating this body and the work it carries out should be predominantly borne by the new licensees of the 800MHz spectrum.

The DTT and 800 MHz Context in Ireland

A 10.99 This section discusses the:

i. Legislative framework and spectrum requirements for DTT in Ireland; and
ii. DTT network and 800 MHz clearance planning in Ireland.

Legislative framework and spectrum requirements for DTT in Ireland

A 10.100 The Broadcasting Act 2009[721] (the "2009 Act") sets out the legislative framework and spectrum requirements for DTT in Ireland. The 2009 Act provides for ComReg to license up to two national digital multiplexes to RTÉ and at least four DTT multiplexes to the Broadcasting Authority of Ireland (BAI).

A 10.101 Licences in respect of the first two digital multiplexes were issued to RTÉ (one was issued in December 2007 and a second in May 2011). These multiplexes make up Ireland's current free digital television service, "SAORVIEW", which operates using channels in the UHF frequency band below 790 MHz.

A 10.102 ComReg does not expect to issue further national multiplex licences prior to Analogue Switch Off ("ASO"), however, the BAI intends to review its position on the licensing of commercial DTT towards the end of 2011 and it may seek expressions of interest in the provision of commercial DTT at that point. A competition could potentially be held during 2012 with a view to commercial DTT being operational in 2013.[722]

[721] http://www.irishstatutebook.ie/2009/en/act/pub/0018/index.html
[722] Statement by BAI in August 2010 - http://www.bai.ie/licensing_digital.html

DTT network and 800 MHz clearance planning in Ireland

A 10.103 ComReg, in conjunction with RTÉNL and BAI, has been planning the necessary spectrum requirements for DTT, and clearing the way for the availability of the 800 MHz band for non-broadcasting services at ASO.

A 10.104 The spectrum requirements for DTT in Ireland have also been discussed with Ofcom. ComReg has provisionally agreed the necessary channel changes for DTT with the UK. ComReg expects the details of this to be concluded before the end of 2011 such that the spectrum requirements for national DTT, in particular any future spectrum requirement for commercial DTT, can be fulfilled using UHF channels 21 to 59 (470 – 782 MHz) only.

A 10.105 It should be noted that the licences in respect of the first two digital multiplexes, which are currently on-air, have been internationally agreed and use UHF channels 21 to 59 only.

ComReg Assessment and Proposals on Measures to Facilitate the Coexistence of Services in the 800 MHz Band and the Broadcasting Service below 790 MHz

A 10.106 This section sets out ComReg's assessment of the measures required to facilitate the co-existence of the 800 MHz band and the broadcasting services below 790 MHz.

The use of the 'Case A' BEMs

A 10.107 ComReg proposed in section 10.3 of Consultation 10/71 to implement the BEMs as set out in the Annex to Decision 2010/267/EU. In response to that consultation RTE submitted that the 'Case A' BEM should be applied to all blocks in the 800 MHz band and stated that *"this is to ensure the protection of the large portion of Ireland where channels in the upper 50s to 60 are currently planned for broadcast use, and potentially the entire country should any future re-planning of broadcasting in the UHF band be undertaken"*

A 10.108 In considering this issue, ComReg notes that:

- Decision 2010/267/EU states that: "Member States shall apply the baseline requirement in case A in circumstances where digital terrestrial broadcasting channels are in use at the time of deployment of terrestrial systems capable of providing electronic communications services";
- As discussed above, ComReg has issued licences in respect of the first two DTT multiplexes and there is provision in legislation for a minimum of six DTT multiplexes to be licensed; and
- Case A BEMs are being proposed and/or set as licence conditions in most (if not all) European countries e.g., the UK, Sweden, Switzerland, France.

A 10.109 In line with Decision 2010/267/EU, ComReg believes that it is appropriate to apply the 'Case A' BEMs as a licence condition in the 800 MHz band. ComReg proposes that this would apply to all licences in the 800 MHz band and for all frequencies below 790MHz at all geographic regions in the State. This is included as a proposed licence condition for the 800 MHz band (see Annex 8 of this document).

A maximum mean in-block EIRP limit for 800 MHz base stations.

A 10.110 Decision 2010/267/EU states that "an in-block EIRP limit for base stations is not obligatory. However, Member States may set limits and, unless otherwise justified, such limits would normally lie within the range 56 dBm/5 MHz to 64 dBm/5 MHz."

A 10.111 Given the co-existence issues that may arise due to the introduction of new services in the 800 MHz band, ComReg believes that it is prudent to set a maximum mean in-block EIRP limit for 800 MHz base stations.

A 10.112 ComReg notes that a number of other administrations have proposed a maximum in-block EIRP:

- Sweden: 64dBm/5MHz in the direction where the effective antenna height is less than 50 m, or 67 dBm/5 MHz EIRP in the direction where the effective antenna height is 50 m or above (noting that channel 60 areas have specific conditions related to radiated power and polarisation)
- Switzerland: 56dBm/5MHz
- The UK: 61dBm/5MHz

A 10.113 ComReg proposes that this should be set at 59 dBm/5 MHz. ComReg notes that the in block EIRP may be reviewed in the future if required.

A 10.114 This is included as a proposed licence condition for the 800 MHz band (see Annex 8 of this document).

Additional mitigation measures

A 10.115 As discussed above ComReg understands that loss of broadcasting reception falls into three general categories:

- SINR degradation;
- Receiver overloading;
- Degradation of service from handheld user terminals:

A 10.116 The following discusses each of the above in relation to Ireland's context.

SINR Degradation

A 10.117 SINR degradation can occur when a wanted signal is interfered with by an unwanted (or interfering) signal. In relation to the reception of a broadcasting service, a DTT receiver can fail to operate correctly and broadcast reception can be lost or degraded on that channel, when the ratio of the wanted signal power to that of interference power plus noise (i.e. SINR) at the receiver input reduces below a specific threshold in a given channel.

A 10.118 In considering SINR degradation issues, it is normally the channels which are closest to the other services that experience SINR degradation issues. As shown in

A 10.119 Figure **13** below, with the proposed FDD band plan for the 800 MHz band (as discussed in Annex 5) the uppermost DTT channel (i.e. channel 60) would have a 1 MHz guardband between it and the lowest block (i.e. block A) in the 800 MHz band. Given this close frequency separation, most international studies have focused on the effects into DTT channel 60.

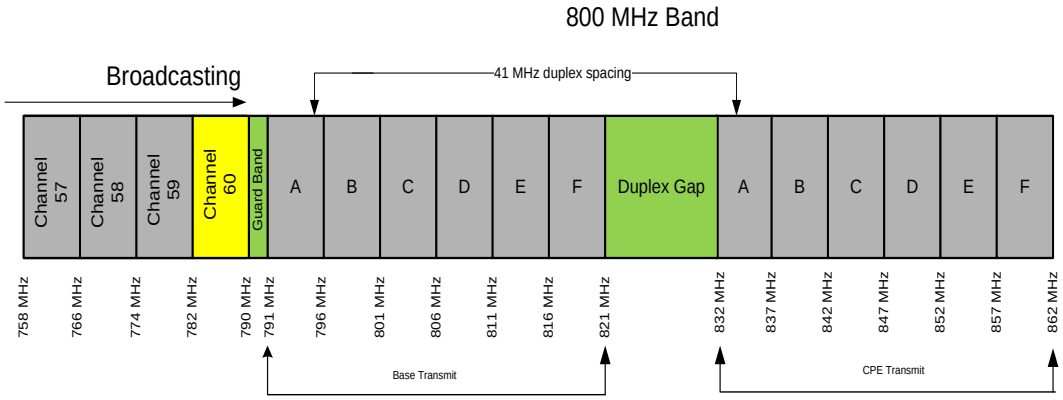

Figure 13. Adjacency between the 800 MHz band and the Broadcasting DTT channels.

International studies

A 10.120 While most international studies have considered the effects on the uppermost DTT channels (i.e. 58, 59, 60) ComReg believes that most (if not all) SINR degradation issues are likely to be experienced in channel 60. In support of this, ComReg notes that:

- Studies carried out in the UK (June 2011)[723] and in Sweden (Feb 2008)[724] have identified that most SINR degradation issues are likely to be in channel 60 areas; and

[723] http://stakeholders.ofcom.org.uk/consultations/coexistence-with-dtt/
[724] http://www.pts.se/upload/Rapporter/Radio/2009/Report-DVB-T-vs-mobile-network-interference-study-2008-02-05.pdf

- In Switzerland, no DTT broadcasting services are planned for Channel 60 and given this, the Swiss Regulator ('OFCOM') maintains that *"few problems with the protection of DTT services are expected in Switzerland"*.

A 10.121 In relation to the other DTT channels such as channel 58 and59, ComReg understands that while SINR degradation may occur in these channels, such instances are likely to be minor (or possibly non-existent) compared to those in channel 60. In this regard, ComReg notes that:

- Studies carried out in the UK (June 2011)[725] identify that channels 52 to 59 may also suffer interference but to a lesser extent than channel 60. Additionally, ComReg notes that the UK study assessed the susceptibility of interference based on the worst-case measured performance of DTT domestic receivers, and therefore the results of this study may overstate the potential issue;
- Studies carried out in Sweden (Feb 2008)[726] have identified some SINR degradation issues could occur in areas where channels 58 and 59 are used, but these are identified as being a minor problem compared to channel 60 areas. ComReg, in reviewing the detail of the studies, notes the protection ratios used for the calculation of interference in this Swedish study would now be considered pessimistic in light of results of ECC report 148 (June 2010)[727] and therefore the results of this study may overstate the potential issue.

A 10.122 Given the above, ComReg believes that most (if not all) SINR degradation issues would likely occur in channel 60 and if there are instances of SINR degradation in other channels these are likely to be minor.

The use of Channel 60 for DTT purposes in Ireland

A 10.123 ComReg has considered the results of the international studies (as discussed above) in its planning of the DTT multiplex channels. Accordingly, ComReg, in conjunction with RTÉNL and the BAI, has planned the DTT spectrum requirements for the first six multiplexes on the basis of using channels 21-59 only (i.e. using frequencies from 470 – 782 MHz only). Furthermore:

- The licences issued to RTÉ in respect of the first two digital multiplex do not use channel 60; and
- Licenses in respect of the four commercial DTT multiplex (as provided for under legislation and currently under consideration by the BAI) have been planned in the 470 – 782 MHz band, and therefore would not use channel 60.

[725] http://stakeholders.ofcom.org.uk/consultations/coexistence-with-dtt/
[726] http://www.pts.se/upload/Rapporter/Radio/2009/Report-DVB-T-vs-mobile-network-interference-study-2008-02-05.pdf
[727] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP148.PDF

A 10.124 In the event that the above six DTT multiplexes are licensed (two to RTÉ and four to the BAI), the Broadcasting Act 2009 provides for ComReg to issue further multiplex licences to the BAI at its request. While any requirement for the use of a 7th or 8th DTT multiplex in Ireland would currently appear remote[728], ComReg, in conjunction with RTÉNL and the BAI, is engaged in negotiations with neighbouring administrations to acquire spectrum rights for a 7th and 8th national multiplex.

A 10.125 ComReg is planning the 7th and 8th multiplexes on the basis that they would mainly or only use channels 21-59. ComReg's negotiation on these multiplexes is ongoing. However, in the event that ComReg receives a request for a 7th or 8th multiplex, it may be necessary to use channel 60 in certain geographic areas.

Assessing the need for additional measures to address SINR degradation

A 10.126 As discussed above, ComReg does not require channel 60 for the provision of six DTT multiplexes. Channel 60 may be required in for the provision of a 7th or 8th multiplex in certain areas.

A 10.127 In practice there would be a 9 MHz separation between the uppermost DTT channel (i.e. channel 59) and the lower 800 MHz block (i.e. Block A). Similar to the OFCOM Switzerland, ComReg believes therefore, that the provision of this 9 MHz frequency separation would result in few (if any) SINR degradation issues being experienced.

A 10.128 However SINR degradation issues may still occur in other DTT channels, such as channel 59 and 58. ComReg believes that the scale of any such SINR degradation issue would be small, and can be addressed via ComReg's statutory obligation to investigate interference in line with the relevant provisions of the Wireless Telegraphy Act 1926.

ComReg's proposal

A 10.129 In light of the foregoing, ComReg does not believe that it is necessary to specify additional mitigation measures to protect the broadcasting service below 790 MHz from SINR degradation issues.

Receiver Overload

A 10.130 Receiver overloading can occur when the DTT receiver becomes overloaded or desensitised, due to the general presence of a high power radio signal. The high power radio signal could be in the same frequency band (i.e. a broadcasting

[728] The issue of such multiplexes to the BAI would only occur if there was sufficient demand for this spectrum and the initial four DTT multiplex licences (the minimum requirement under legislation) had already been issued to the BAI. Currently the BAI intends to review its position on the licensing of commercial DTT towards the end of 2011 and it may seek expressions of interest in the provision of commercial DTT at that point. Consequently no DTT multiplex licences have been issued to the BAI to date.

signal) or in adjacent frequency bands (e.g. a mobile signal in the 800 MHz band or other communications services signals in the bands below 470 MHz).

A 10.131 ComReg believes that receiver overloading issues are primarily a function of the receiver system (i.e. the aerial, DTT receiver and/or cabling) and in coming to this view, ComReg has noted the results of CEPT Report 30 and Ofcom's recent studies.

A 10.132 Annex 4 to CEPT Report 30 provides guidance to national administrations on the relevant mitigation techniques to resolve or minimise interference issues between the 800 MHz band and the broadcasting band. It considers the use of hardware modifications at the DTT receiver and mobile base stations and notes that:

- the use of rejection filters and/or low pass filters in the DTT receiver can minimise overloading issues; and
- the use of improved filtering in the mobile base station would limit the out of band emissions but not the in-band emissions. This would improve adjacent channel compatibility but not blocking or overloading.

A 10.133 Ofcom's studies in the UK suggest that the use of appropriate filtering at the DTT receiver can cure up to 90-95% of the potential SINR degradation and/or receiver overloading issues in the UK. In particular the number of UK TV households susceptible to SINR degradation and/or receiver overloading would reduce from circa 2.7%[729] to circa 0.17%[730] when appropriate filtering at the DTT receiver is used.

A 10.134 Given the above, it is ComReg's view that the most effective and appropriate way of addressing receiver overloading issues is by using appropriate filtering in the DTT receiver system.

A 10.135 Additionally, ComReg believes that it is important that the DTT community in Ireland (i.e. service provider(s), vendors and installers) advises consumers of this potential loss of broadcasting reception issue so that DTT receiver systems installed at consumers' premises would have appropriate filtering fitted where required.

Degradation of Service from User Terminals

A 10.136 Degradation of service from user terminals can occur when terminals, such as mobile handsets, are operated in close range of DTT receiving equipment and can result in the broadcasting reception being lost or degraded.

[729] 2.77% was generated by taking the total number of UK TV households as being 27,169,147 and the number of households affected as being 751,889. Figures taken from Section 1.8 of Ofcom technical report, available here, http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/annexes/Technical-Report.pdf

[33] 0.17% was generated by taking the total number of UK TV households as being 27,169,147 and the number of households affected applying appropriate filtering at the DTT receiver as 47,329. Figures taken from Section 1.8 of Ofcom technical report, available here, http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/annexes/Technical-Report.pdf

A 10.137 Overall, ComReg believes this issue to be minor and notes there seems to be a general understanding that the problem is transient in nature given that the user can resolve this interference by moving the user terminal away from the DTT receiver and/or improving the quality of the DTT installation (e.g. using appropriately shielded TV cabling). ComReg notes that this issue has previously been considered by CEPT and Ofcom UK, as follows.

A 10.138 CEPT Report 31[731] considered the frequency channelling arrangements for the 800 MHz band and recommended that a reverse-direction FDD mode be used. A reverse-direction FDD mode means that the user terminal transmits signals at the higher frequencies in the band and the base station transmits signals at the lower frequencies. The result would be that user terminals would transmit in the 832 – 862 MHz range, ensuring a greater frequency separation between the user terminal and the broadcasting band below 790 MHz. This reverse-direction FDD mode has been adopted by the European Commission in Decision 2010/267/EU and is proposed for the 800 MHz band in Ireland (see Annex 5 of the document).

A 10.139 In the UK, ComReg notes that this issue was last discussed in Ofcom's March 2011 consultation[732]. In that consultation Ofcom was of the view that 800 MHz user terminal interference into domestic television systems (cable or DTT) is manageable and it presented study results dated January 2010[733]. This study assessed the effect of user equipment on TV reception and noted, *inter alia*, that:

- No interference was observed for DTT fixed reception (i.e. reception using a rooftop aerial) from indoor mobile handsets;
- Interference is expected to only affect DTT reception when portable indoor set top aerials are used;
- Interference is mainly seen on poor quality DTT receivers;
- Interference can be seen where a 1 to 2 meter fly lead is of poor quality (i.e. a fly lead is a lead connecting a set top box DTT receiver to the TV set, or other connecting leads); and
- All of the above interference affects disappeared with the introduction of appropriate filtering at the DTT receiver;
- The interference can also simply be mitigated against by the user moving away from the DTT receiver.

[731] www.ero.dk CEPT Report 31 on "Frequency (channelling) arrangements for the 790-862 MHz band"

[732] *"Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues"* http://stakeholders.ofcom.org.uk/binaries/consultations/combined-award/summary/combined-award.pdf

[733] Cobham Technical Services, ERA Technology RF and EMC Group paper titled *"LTE Interference into Domestic Digital Television Systems"* (January 2010) and commissioned by Ofcom UK available at http://stakeholders.ofcom.org.uk/binaries/consultations/800mhz/statement/2010-0026.pdf

A 10.140 In light of the foregoing, ComReg believes that degradation of services from user terminals is manageable and does not require the specification of additional mitigation techniques.

Establishing a separate entity to deal with 'interference complaints'

A 10.141 RTÉ / RTÉNL suggests that a separate entity should be established, independent of the future licensees of the 800 MHz band, as a point of contact for reports of interference or loss of service between future 800 MHz band services and the DTT service.

A 10.142 In considering this matter, it should first be noted that ComReg believes that any loss of service or interference between the future 800 MHz band services and the DTT service are likely to be small in scale and would therefore not appear to warrant the establishment of a separate entity.

A 10.143 As discussed above, ComReg's proposal to avoid using channel 60 for DTT purposes should address most if not all SINR degradation issues and any residual SINR degradation issues can be addressed via ComReg's statutory obligation to investigate interference in line with the relevant provisions of the Wireless Telegraphy Act 1926.

A 10.144 In this regard, it is ComReg's view that:

- any loss of service and/or interference issue should first be reported to the relevant service provider who would then determine the potential cause of this interference and/or loss of service issue.
- If it is determined that the issue is attributable to radio interference between services, then the service provider can report this issue to ComReg who has a statutory function to investigate instances of interference across all radio-communications services.

Annex 11

International Update on Regulatory Actions

A 11.1 This annex sets out specific details of relevant developments relating to the re-farming/liberalisation of the 800 MHz band, 900 MHz and 1800 MHz band activities in other European countries.

11.1 Summary

A 11.2 Common practice amongst NRA's throughout Europe recently is to release all mobile spectrum bands in a combined award process where the availability of spectrum in different bands allows for this.

A 11.3 The Netherlands, Portugal and Switzerland propose to release spectrum in all of the harmonised mobile spectrum bands (800 MHz, 900 MHz, 1800 MHz, 2.1 GHz & 2.6 GHz bands) in upcoming auctions, whereas Italy propose to release all of these spectrum bands with the exclusion of the occupied 900 MHz band. Austria proposes to release 800 MHz, 900 MHz and 1800 MHz spectrum in a joint award, in line with ComReg's proposal. France and the UK propose to release the mobile spectrum it currently has available, 800 MHz and 2.6 GHz spectrum, in the near future. Spain recently completed an auction which released spectrum concurrently in the 800 MHz, 900 MHz and 2.6 GHz bands.

11.2 Detail of European Developments in the 800 MHz, 900 MHz and 1800 MHz bands

Austria

A 11.4 The Austrian NRA (RTR) released a consultation on 25 February 2011 on the use of the 800 MHz band and the liberalisation of the 900 MHz and 1800 MHz bands[734], with closing dates for submission to consultation set at 25 March 2011. In its consultation, RTR propose to auction 800 MHz spectrum in late 2011 or early 2012.

A 11.5 RTR see the benefits in allowing liberalised usage of the 900 MHz band in the near future as it provides mobile broadband coverage at lower cost, better indoor coverage and increase in capacity. However, the existing fragmented 900 MHz assignments between three operators does not lend itself to deployment of new technologies as only two operators have access to the required 5 MHz channels. Another issue for RTR is that all existing 900 MHz licences will expire over the period from 2016 – 2018. In order to overcome these obstacles to earliest liberalisation of 900 MHz spectrum and to satisfy its regulatory objectives, RTR propose to auction liberalised 900 MHz spectrum (with assignment of spectrum

[734] RTR Consultation on 800 MHz, 900 MHz and 1800 MHz bands - http://www.rtr.at/en/komp/Konsult_DD_Refarming/Consultation_dd_refarming_e.pdf

beginning when existing licences expire) and refarm the 900 MHz band after the 800 MHz band has been assigned.

A 11.6 In the event that RTR identify distortion to competition arising from the 800 MHz and 900 MHz assignments, it proposes to impose certain conditions on a licensee(s) to overcome this issue, namely,

- an obligation on sub 1 GHz licensees with refarmed spectrum to provide wholesale services to licensees who have insufficient spectrum sub 1 GHz to provide new technologies, and/or
- TKK would only allow re-farming of spectrum in the 900 MHz band if a licensee(s) were willing to relinquish some of its 900 MHz spectrum, which would subsequently be auctioned.

A 11.7 RTR's position at that time regarding 1800 MHz is that due to the long time remaining on existing 1800 MHz licences, an auction of 1800 MHz spectrum in the near future is not appropriate. RTR consider that re-farming in the 1800 MHz band would not cause distortion of competition, and therefore should it receive a refarming request in the 1800 MHz band, it would be approved without any pro-competitive measures or obligations.

A 11.8 RTR received 18 responses to its consultation[735], and published a summary of these responses in May 2011[736], as well as its next steps in July 2011[737]. RTR proposes to hold a joint auction of 800 MHz, 900 MHz and 1800 MHz spectrum by mid 2012[738] with special coverage conditions and spectrum caps, with details not yet published.

Belgium

A 11.9 An auction for 2.1 GHz spectrum was scheduled for June 2011 in 3 lots (2 × 5 MHz blocks), which existing licensees could not bid on, hence creating a new fourth operator. The winner of 2.1 GHz spectrum in this spectrum release will have spectrum issued immediately after auction with licence termination in 2021. The winner of this 2.1 GHz spectrum will also have the option of buying the 2 × 4.8 MHz of 900 MHz spectrum and 2 × 10 MHz spectrum available from 2015, with this licence expiring in 2021. The fixed cost for taking up the option of 900 MHz and 1800 MHz spectrum is €31,507,311 which would be paid at the end of 2011.BIPT stated that should a new entrant to the mobile market not present itself and win spectrum, there was a possibility that the spectrum may be auctioned to existing operators

[735] http://www.rtr.at/en/komp/Stn_DD_Refarming

[736] http://www.rtr.at/en/komp/Stn_DD_Refarming/Summary_of_comments_and_opinions_dd_refarming.pdf

[737] http://www.rtr.at/en/komp/Erg_DD_Refarming/Ergebnisse_Konsultation_DD_Refarming.pdf

[738] http://www.cullen-international.com/report/6025/t5116#Table_22

A 11.10 BIPT published a call for candidates on 15 March 2011, and operators interested were invited to enter an application. On 10 May, BIPT announced[739] it had received one satisfactory application for the 2.1 GHz spectrum by the closing date of 29 April. The licence will be issued to the applicant, NV/SA Telenet Tecteo BIDCO, at the start of summer 2011.

A 11.11 The coverage requirement for the successful licensee, should it also choose to take the 900 MHz and 1800 MHz spectrum, is: 30 % After 3 Years, 40 % After 4 Years, 50 % After 5 Years and 85% After 6 Years (best effort obligation). By the end of year six after notification of the grant of the rights of use, BIPT may review this 85% target, for various reasons, including public interest.

A 11.12 In April 2010, BIPT adopted a decision[740] on the introduction of UMTS in the 900 MHz band, since then UMTS has been deployed in the 900 MHz band. The 1800 MHz is only allowed for GSM at this time.

A 11.13 On 7 February 2011, the Belgian NRA (BIPT) issued a press release[741] outlining its proposed timeline for the release of spectrum in the 900 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz bands[742]. The three existing MNO's in Belgium (Belgacom, Mobistar and KPN) all have existing spectrum assignments in the 900 MHz, 1800 MHz and 2.1 GHz bands. All 900 MHz licences currently expire in 2015, as a result of BIPT extending both Belgacom and Mobistar's 900 MHz licences by 5 years.

Denmark

A 11.14 Analogue Switch Off has already taken place in Denmark. On 22 June 2009, the national regulator authority (NITA[743]) 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. NITA are still in the early stages of preparing the auction, and have not yet decided how many licences it will auction off, or which conditions will be imposed on the licences. NITA are consulting with interested parties on a motion to postpone the auction from late 2011 to March 2012, with a formal decision expected in the summer of 2011.

A 11.15 In relation to the 900 MHz and 1800 MHz bands, on 23 December 2009, NITA announced its decision on the re-farming of these bands. In 2011, the three incumbent operators released a cumulative 2 × 5 MHz of 900 MHz spectrum and 2 × 10 MHz of 1800 MHz spectrum for re-award.

[739] http://www.auction2011.be/images/stories/documents/3gkandidatuurENfinal.pdf

[740] Information on the BIPT decision available here: http://www.cullen-international.com/report/5347/t4030#Table_22

[741] BIPT press release, http://bipt.be/GetDocument.aspx?forObjectID=3420&lang=en

[742] BIPT Auction rules, http://www.auction2011.be/images/stories/documents/auctionrules3gen.pdf

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

A 11.16 NITA proposed to release this 900 MHz and 1800 MHz spectrum via online auction on 20 October 2010 and 25 October 2010 respectively, with a closing date of registration for auction 29 September. In order to prevent potential distortion of competition, NITA excluded existing 900 MHz and 1800 MHz licensees from participating in the auction. NITA received only one registration for the auction, from Hutchison 3G Denmark, resulting in NITA issuing a licence for the available 900 MHz and 1800 MHz spectrum to Hutchison 3G Denmark on 18 October 2010 at the minimum reserve price[744]. The minimum reserve price was 8million DKK (approximately €1.07m) for the 900 MHz spectrum and 4million DKK (approximately €0.535m) for the 1800 MHz spectrum. NITA considered the two assigned frequency blocks too small to be imposed with coverage and roll out obligations. Since the two licences are both technology neutral, they are not imposed with obligations on call blocking rate and dropped calls.

A 11.17 NITA decide to delay liberalisation of existing 900 MHz and 1800 MHz licences from 1 January 2011 to 1 May 2011 in order to allow the new licensee a reasonable time period to deploy commercial services in the two frequency bands.

France

A 11.18 The French NRA (ARCEP) intend to hold an auction in the near future for 800 MHz and 2.6 GHz spectrum[745], with current expectation for an auction and spectrum assignment to take place by the end of 2011[746]. Analogue Switch Off is scheduled to take place by 30 November 2011. Four lots of 800 MHz spectrum will be offered in the competition, and there were concerns from three of the four existing mobile operators that the other mobile operator could flex its financial strength and acquire two of the four lots, resulting in one operator obtaining no 800 MHz spectrum. These three mobile operators made representations to ARCEP proposing that the regulator imposed a spectrum cap on the 800 MHz band to prevent one operator winning half of the 800 MHz lots in the competition. The French government announced a spectrum cap of 2 × 15 MHz for 800 MHz spectrum for any given operator[747].

A 11.19 On 13 May 2011, ARCEP published its Draft Decision and announced its plans to release a call for applications for spectrum[748] in the 800 MHz and 2.6 GHz band, once its Draft Decision receives government approval, which is expected to take

[744] NITA release of 900 MHz and 1800 MHz spectrum, http://en.itst.dk/spectrum-equipment/Auctions-and-calls-for-tenders/900-1800-mhz-auction

[745] http://uk.reuters.com/article/2011/04/07/idUKLDE7351T420110407?rpc=401&feedType=RSS&feedName=technology-media-telco-SP&rpc=401

[746] http://www.rethink-wireless.com/2011/04/08/french-cellcos-demand-spectrum-limits-orange.htm

[747] http://www.fiercewireless.com/europe/story/france-imposes-caps-lte-spectrum-auction/2011-05-04?utm_medium=nl&utm_source=internal

[748] http://www.arcep.fr/index.php?id=8571&L=1&tx_gsactualite_pi1[uid]=1382&tx_gsactualite_pi1[backID]=1&cHash=5774070235

place shortly. Spectrum for the 2.6 GHz band is expected to be released in 2011, whilst 800 MHz spectrum released in early 2012, with licences in both bands issues for 20 years. Coverage targets have been set for the 800 MHz band which requires each successful licensee to cover 99.6% of the population of mainland France (40% in 5 years and 90% in 10 years). Also, sparsely populated areas will be given an accelerated rollout timetable encouraging operators to engage in network and frequency-sharing arrangements facilitating the achievement of this coverage level. Reserve prices vary for amongst the 800 MHz blocks, two of the 2 × 5 MHz has a reserve price of €300m, whilst one of the 2 × 10 MHz blocks has a reserve of €400m (due to its adjacency to broadcast licensees), whilst the other 2 × 10 MHz block has a reserve of €800m.

Greece

A 11.20 The Greek NRA (EETT) released a public consultation on the liberalisation and assignment of the 900 MHz and 1800 MHz spectrum bands in January 2011[749]. On 26 July 2011, EETT published an Information Memorandum outlining its proposals for spectrum in the 900 MHz and 1800 MHz bands[750] [751].

A 11.21 In this document, EETT sets out its proposal to issue all of the 900 MHz spectrum in this competition, and 20 MHz of 1800 MHz spectrum on a technology and service neutral basis, in line with the EU Directive. Spectrum in the 900 MHz band is packaged in 2 × 2.5 MHz blocks, whereas 1800 MHz spectrum will be released in 2 × 5 MHz blocks. Due to the different availability dates of 900 MHz spectrum, 2 × 25 MHz of spectrum will become available in 2012, with 2 × 5 MHz available in 2016 and a further 2 × 5 MHz available in 2017. All licences will co-terminate in September 2027, and EETT proposes different minimum prices per 2 × 2.5 MHz block of 900 MHz spectrum; €23.3m per 2 × 2.5 MHz block issued in September 2012, €17.1m per 2 × 2.5 MHz block issued in 2016 and €15.5m per 2 × 2.5 MHz block issued in 2017[750]. Each of the available 2 × 5 MHz of 1800 MHz spectrum has a minimum price of €20.5m and will be issued for 15 years immediately after the competition.

A 11.22 The 900 MHz spectrum is reserved for the incumbent 900 MHz operators, who have first right on the spectrum. Should some of the incumbent operators decide not to take any or all of the 900 MHz spectrum reserved for them, the unallocated 900 MHz spectrum, as well as the 1800 MHz spectrum, will become available in an open competition. Should an incumbent not accept the spectrum reserved for it in the 900 MHz band, no future renewal request will be accepted by the EETT. At a minimum, 70% of the auction fees must be paid within 20 days of EETT announcing the winners.

A 11.23 EETT are accepting comments on the Information Memorandum until 9 September 2011, with the list of successful participants announced on 11

[749] http://www.eett.gr/opencms/opencms/admin_EN/Consultations/cons_0006.html

[750] http://www.cullen-international.com/referencedocument/auction_synopsis

[751] http://www.eett.gr/opencms/opencms/admin_EN/News/news_0126.html

November 2011 as well as receiving auction entry forms, with the scheduled completion of the process as well as the announcement of successful bidders due to take place on 25 November 2011.

Hong Kong

A 11.24 The Hong Kong NRA (Ofta) held an auction for spectrum in the 850 MHz and 900 MHz bands. On 15 April 2011, Ofta announced[752] Hutchison Telephone Company Limited as the successful bidder for a 2 × 5 MHz block in the 900 MHz band at a price of HK$1.1bn, and SmarTone Mobile Communications Limited as the successful bidder of a 2 × 5 MHz block in the 850 MHz band costing HK$875 m. There were a total of 6 operators bidding for the two available blocks of spectrum.

A 11.25 Licences were issued on a technology and service neutral basis for a period of 15 years, with an associated coverage requirement of at least 50% within 5 years of licence issue[753].

Hungary

A 11.26 The Hungarian NRA (NMMH) announced that it intends to hold an auction for 2 × 10.8 MHz of spectrum in 2011[754]. NHHM will release 2 × 10.8 MHz of 900 MHz spectrum in three lots, with one 2 × 5 MHz block and 5.8 MHz of additional spectrum split into smaller allocations. The winner of the 2.5 MHz block will have the option of acquiring up to 3 x 5 MHz of 1800 MHz spectrum and 3 x 5 MHz of 2.1 GHz spectrum[755]. There is a cap of 2 × 7.8 MHz spectrum in the competition, with applications due by 20 October 2011 and an auction due to take place between November and December. A winning bidder is permitted to trade spectrum in the future, with licences won in this competition lasting 15 years. NHHM will run a two stage auction for spectrum other than the 2 × 5 MHz block, the first stage to determine amount of spectrum won and the second stage determining the location of the assignment within the given spectrum band. The minimum price for the 2 × 5 MHz block of 900 MHz spectrum is HUF4bn (approximately €14.5m).

Italy

A 11.27 On 24 March 2011, the Italian Regulator (Agcom) published draft regulation for public consultation in relation to an auction for; 800 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz spectrum[756] on a technology neutral basis. The auction is scheduled

[752] http://www.ofta.gov.hk/en/industry/850/success_bidding.pdf

[753] https://www.policytracker.com/headlines/hk-operators-win-new-spectrum-just-in-time-to-beat-data-crunch

[754] http://www.nmhh.hu/dokumentum.php?cid=27724&letolt

[755] http://www.nmhh.hu/dokumentum.php?cid=27726&letolt

[756] http://www.cullen-international.com/report/5511/c67854#_AGCOM_draft_decision

to take place in autumn 2011, with the draft decision stating it will be an SMRA auction. Licences issued in this auction will expire in December 2029.

A 11.28 The amount of spectrum in the auction will be,

- All six 2 × 5 MHz of spectrum in the 800 MHz band,
- Three 2 × 5 MHz of 1800 MHz spectrum,
- One block of 1 x 15 MHz in the 2.1 GHz extension band, and
- Fourteen blocks of 2 × 5 MHz and two blocks of 1 x 25 MHz of 2.6 GHz spectrum.

A 11.29 The Draft Decision stipulates a spectrum cap of

- 2 × 25 MHz between the 800 MHz and 900 MHz spectrum bands
- 2 × 25 MHz of 1800 MHz spectrum
- 55 MHz (between TDD and FDD) of 2.6 GHz spectrum

A 11.30 Agcom has set out specific coverage conditions. For the 800 MHz band:

- For each region, the ministry will identify communes that have a limited broadband coverage, divided into three groups:
  - A: < 1,000 inhabitants;
  - B: 1,000-2,000 inhabitants;
  - C: > 2,000 inhabitants.
- Licensees must start rolling out in small communes (A) before continuing to roll out in larger ones (B and C). The coverage obligation will depend on the amount of spectrum acquired. 50% of the obligation must be fulfilled within three years, and 100% within five years. A commune is considered covered when at least 90% of its population have access to broadband with at least 2 Mbps nominal download speed. The commercial launch (retail or wholesale) of the broadband service must take place within three years. A new entrant is allowed one additional year to reach the same objectives

A 11.31 For the 1800 MHz, 2.1 GHz and 2.6 GHz bands:

- 30% coverage of the population within two years, 50% within four years with coverage to be distributed over all Italian regions. Commercial launch (retail or wholesale) within two years. A new entrant is allowed one additional year to reach the same objectives.
- Existing mobile operators that acquire 800 MHz spectrum must offer national roaming to a new entrant in this band on their 800 and 900 MHz networks for a period of 2 and a half years nationwide, and 6 years limited to areas not covered by the new entrant. Before having the right to national roaming, the new entrant must cover at least 10% of the population with its own network.

A 11.32 The Ministry of Economic Development published the auction rules on 28 June 2011[757]. In July 2011, The Ministry accepted the applications of the four Italian mobile network operators (MNOs) to participate in the auction of 800 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz spectrum[758]. A fifth operator was conditionally accepted, without further detail provided on the reasoning. Initial bids for the auction are due by 29 August 2011 with the auction concluding in September 2011.

Malta

A 11.33 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[759]. The consultation phase was followed by a round of bilateral meetings to clarify respondent's views and on 16 July 2010 the MCA published its analysis of stakeholders' comments together with its final decision[760]. The decision addresses numerous issues, including interim measures to deal with differences in the existing licence expiry dates (2010 and 2011).

A 11.34 The MCA published a call for applications from prospective licensees on 27 October 2010[761], and there were three expressions of interest submitted[762] by the closing date of 14 January 2011, which are now being evaluated by the Maltese authorities.

A 11.35 The licences of incumbent operators were extended to ensure continuity of GSM services until the new licences come into effect[763]. A provision was present in 900 MHz licences which empowered the Authority to add or amend any of the licence terms and conditions, which it enacted in the form of written correspondence with licensee. Currently the existing licences in the 900 MHz and 1800 MHz bands have different termination dates. In order to ensure a smooth migration, the July 2010 Decision stipulated that the existing GSM licences were being extended by a few months pending the completion of the re-assignment process of 900 MHz and 1800 MHz spectrum. These extensions were intended to be issued once off and non-renewable. The licences retained the terms and conditions of the initial licence and granted no additional rights to the existing licence holders.

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[757] http://www.sviluppoeconomico.gov.it/index.php?option=com_content&view=article&idmenu=804&idarea2=0&sectionid=1&viewType=5&andor=AND&andorcat=AND&idarea3=0&partebassaType=4&MvediT=1&id=0&showMenu=1&showCat=1&idarea1=0&idareaCalendario1=0&idarea4=0&idarticolo2=0&idarticolo3=0&showArchiveNewsBotton=1&partebassaType=4

[758] http://www.cullen-international.com/report/5993/c76575#_Five_operators_admitted

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

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

[761] http://www.mca.org.mt/newsroom/openarticle.asp?id=923

[762] http://www.mca.org.mt/newsroom/openarticle.asp?id=944

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

A 11.36 MCA received three applications for spectrum in the 900 MHz and 1800 MHz bands by the closing date of 14 January 2011, and announced in May 2011[764] that it had concluded the process for spectrum assignment. Three interested parties made applications for the spectrum and passed the qualification stage, meaning that demand exceeded supply. In line with its call for applications document, the MCA held meetings with the three interested parties and made proposals for the assignment of spectrum, with this proposal accepted by all three parties, and the available 900 MHz and 1800 MHz spectrum will be issued to these three parties over the coming months.

Netherlands

A 11.37 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[765]. 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.

A 11.38 In relation to the 1800 MHz band, the Ministry rejected arguments for further extension on the grounds of possible consumer disruption[766], 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.

A 11.39 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.

A 11.40 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 was for the 800 MHz band to be allocated for mobile

[764] http://www.mca.org.mt/newsroom/openarticle.asp?id=965

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

[766] Translated from: http://www.rijksoverheid.nl/documenten-en-publicaties/notas/2010/02/02/besluit-gsm-1800-vergunningen.html

services[767]. A strategic note on mobile communications was published in December 2010[768].

A 11.41 In February 2011, the Ministry of Economic Affairs published Draft rules for the proposed auction of spectrum in the 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz bands[769] for later in 2011. Spectrum in the 800 MHz band will be auctioned with €35m reserve per 2 × 5 MHz lot, with 2 × 10 MHz of the 800 MHz band reserved for new entrants (i.e. operators without access to 900 MHz, 1800 MHz or 2100 MHz spectrum). Reserve price for each of the seven available 2 × 5 MHz block in the 900 MHz band is €29m, with a reserve of €4.16m per each of the available 1800 MHz blocks, and a reserve of €0.57m per each of the ten available 1 x 5 MHz of 2.6 GHz spectrum.

A 11.42 Coverage conditions associated with the 800 MHz spectrum is a requirement to cover 308 km2 after two years, 3,080 km^2 after five years. The 900 MHz band needs to be rolled out over 256.7 km^2 within two years and 2567 km^2 after five years. For the 1.8 GHz, coverage has to reach 36.7 km^2 in two years and 367 km^2 in five; for 2.1 GHz, the requirement is 27.5 $km^2$to 275 km^2. The requirement for 2.6 GHz is 20 km^2 and 200 km^2 after two years and five years.

Portugal

A 11.43 On 31 March 2010 the NRA (ANACOM) launched a public consultation on a draft decision[770], which would combine each operator's 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[771].

A 11.44 In relation to the release of spectrum, ANACOM published Draft Auction Regulations on 17 March 2011[772], with a closing date of 2 May 2011 for receipt of comments on the Draft Regulations[773]. The Draft Regulations are in relation to the simultaneous release of spectrum in the 450 MHz, 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz bands. ANACOM propose to release the following spectrum in lots, with each lot being 2 × 5 MHz, and each licence being 15 years in duration:

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[767] 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

[768] http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/rapporten/2011/02/11/quick-scan-spectrum-awards-in-the-netherlands/2010-12-06-min-el-i-quick-scan-spectrum-awards-final-stc.pdf

[769] http://www.telecompaper.com/news/dutch-govt-publishes-draft-rules-for-spectrum-auction

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

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

[772] http://www.anacom.pt/render.jsp?contentId=1077096

[773] http://www.anacom.pt/streaming/Draft_Auction%20Regulation_17mar2011.pdf?contentId=1078193&field=ATTACHED_FILE

- 6 lots of 800 MHz spectrum, with a spectrum cap of 2 × 10 MHz per operator, reserve price of €55m per lot,
- 2 lots of 900 MHz spectrum, with a spectrum cap of 2 × 5 MHz for existing 900 MHz licensees, or 2 × 10 MHz for new entrants, with reserve of €30m per lot,
- 6 lots of 1800 MHz spectrum with no spectrum cap, and a reserve of €3m per lot
- 2 TDD lots (i.e. unpaired) of 2.1 GHz spectrum, with a reserve of €2m per lot
- 14 lots of paired (2 × 5 MHz) 2.6 GHz spectrum with a spectrum cap of 2 × 25 MHz, and 2 TDD lots (unpaired, 25 MHz each) with no spectrum cap, with a reserve of €3m per lot.

A 11.45 The 900 MHz and 1800 MHz licences of the three existing mobile operators expire in 2021 and 2022, whilst the three operators 2.1 GHz licences expire in 2016.

A 11.46 The proposed auction is SMRA. A deposit of €20m is required from each bidder competing for access rights in the 800 MHz, 900 MHz and 1800 MHz spectrum bands. Once the auction is complete and the amount of spectrum won by each operator determined, ANACOM propose to rank winning bidders based on a combination of highest average price paid per spectrum band and number of spectrum bands an operator successfully bid in. The highest rank bidder has first choice of where its assignments are located and so on, with the proviso that all assignments must be contiguous. Successful bidders for spectrum in the auction will be charged spectrum usage fees by ANACOM in line with its overarching ongoing fees structure, and varies based on different characteristics of the network[774].

Singapore

A 11.47 The Singapore Regulator (IDA) issued a Draft Decision on the release of 1800 MHz spectrum on 24 January 2011[775]. The IDA decided to allow both the 900 MHz and 1800 MHz bands be utilised by 2G and 3G technologies, as well as LTE and other technologies which satisfy IDA's licence conditions on mobile networks (e.g. coverage, Quality of Service). The IDA acknowledge the benefits of re-farming the 1800 MHz spectrum band, and cite the rollout of Mobyland's LTE network in Poland as evidence of the developments of usage of technologies in the 1800 MHz band.

[774] Spectrum Usage Fees, http://www.anacom.pt/render.jsp?contentId=978283&languageId=1

[775] http://www.ida.gov.sg/doc/Policies%20and%20Regulation/Policies_and_Regulation_Level2/20100329151251/4G_Interim_Position.pdf

A 11.48 The IDA published a decision on the release of one 2 × 5 MHz 1800 MHz spectrum block[776], which is only available for existing licensees to acquire as this amount of spectrum would not satisfy the spectrum requirements of a new entrant. The licence will be 6 years in duration, which will co-terminate with 900 MHz and 1800 MHz licences. The IDA intends to leave one 2 × 5 MHz block of 1800 MHz spectrum unused to facilitate test and trialling of equipment in the spectrum band.

Spain

A 11.49 In January 2010 the Ministry of Industry[777] published a draft law proposing to liberalise the 900 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.

A 11.50 In June 2010, the Ministry published a consultation on its proposals for re-farming the 800 MHz 900 MHz, 1800 MHz and 2.6 GHz bands[778].

A 11.51 In July the Spanish Competition Authority (CNC) raised some concerns about the Ministry's proposals[779], noting;

- 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 × 20 MHz cap to spectrum below 1 GHz implies that three operators could obtain 92% of the entire spectrum available, leaving only 2 × 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.

A 11.52 In early 2011, the Spanish Government announced that it will assign spectrum in the 800 MHz, 900 MHz, 1800 MHz and 2.6 GH bands in auctions and beauty contests scheduled for Q2 2011[780].

A 11.53 In relation to the 900 MHz band, an auction was held in May 2011 for one block of 2 × 5 MHz, released by existing 900 MHz licensees with assignment of spectrum in 2011 and expiry in 2030. Orange won the rights to the 900 MHz

776 http://www.ida.gov.sg/doc/Policies%20and%20Regulation/Policies_and_Regulation_Level2/20080522114233/ExpMemo1800MHzAuction2011.pdf

777 http://www.mityc.es/telecomunicaciones/es-ES/Paginas/index.aspx

778 http://www.cullen-international.com/report/3796/t3371#Table_27

779 http://www.cncompetencia.es/Inicio/Informes/Informes/tabid/166/Default.aspx

780 http://www.cullen-international.com/report/5469/c67423#_Upcoming_spectrum_award

spectrum[781], with €126m licence fee and and a minimum investment commitment of €433m over the next 3 years to extend services to communities with fewer than 5,000 inhabitants[782]. Telefonica and Vodafone cannot compete for this 2 × 5 MHz block. Any operator holding 2 × 10 MHz of 900 MHz spectrum must offer wholesale 3G services[782]. In the same competition, Yoigo won rights to three 2 × 5 MHz 1800 MHz spectrum blocks with a licence fee of €42m and a commitment to invest a minimum of €300m in providing coverage within three years. These licences expire in 2030.

A 11.54 Two more blocks of 2 × 5 MHz will be auctioned in Q2 2011, but these would not be assigned until 2015[783], following the expiry of a Telefonica licence and the release of a further 1 MHz of spectrum by Vodafone. Telefonica and Vodafone can compete for this spectrum, providing the overarching spectrum cap of 2 × 20 MHz for sub 1 GHz spectrum (800 MHz and 900 MHz) is not breached. The reserve price for this spectrum is €169m per paired 2 × 5 MHz block.

A 11.55 In relation to 800 MHz, the 6 blocks of 2 × 5 MHz in the 800 MHz band will also be auctioned contemporary in Q2 2011, although these blocks will not be assigned until 2015, with licence duration of 15 years. The 800 MHz spectrum has a reserve price of €170m per 2 × 5 MHz block. Successful bidders for 800 MHz spectrum must commit to deliver speeds of at least 30 Mb/s to 90% of people living in communities with less than 5,000 people by 2020[782].

A 11.56 To compensate operators for the release of 900 MHz spectrum, the expiry dates for their remaining assignments in the band will 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 until May 2015 to provide national roaming to operators not licensed in the 900 MHz band, and these operators would have to invest in deployment of services in rural areas[784]. Operators may have to pay for the difference between the value of this extension and the market value of spectrum returned[785].

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781 http://www.fiercewireless.com/europe/story/orange-yoigo-only-bidders-first-round-spains-lte-auction/2011-05-25?utm_medium=nl&utm_source=internal

782 https://www.policytracker.com/headlines/spanish-government-outlines-spectrum-auction-plans

783 http://www.cullen-international.com/report/3796/t3352#Table_26

784 Telefónica Móviles must invest €80m in upgrading its existing 900 MHz GSM network to 3G/4G systems in all cities with less than 1,000 inhabitants or, alternatively, provide new coverage for 500,000 inhabitants in such cities (around 1% of population) by December 31, 2013, Vodafone must invest €160m in upgrading its existing 900 MHz GSM network to 3G/4G systems in all cities with less than 1,000 inhabitants or, alternatively, provide new coverage for 1m inhabitants in such cities by December 31, 2013.

785 http://www.cullen-international.com/report/5520/t4352#Table_22

A 11.57 The Ministry announced in August 2011 that the spectrum award process of 800 MHz, 900 MHz and 2.6 GHz spectrum successfully raised over €1.6bn[786].

A 11.58 The Government proposes that upon request, 1800 MHz licensees may also be permitted to use this spectrum for alternative technologies[787] in return for the release of a block of 2 × 5 MHz or for a once-off fee. The three returned 2 × 5 MHz blocks will be assigned in 2011 on foot of a beauty contest in the Q2 2011 competition, with a minimum investment commitment of €20m per 2 × 5 MHz block. Existing 1800 MHz licensees cannot participate for the 1800 MHz spectrum in the beauty contest.

A 11.59 2.6 GHz spectrum (currently unoccupied in Spain) will also be released in the competition via auction. Five 2 × 10 MHz blocks, four 2 × 5 MHz blocks and five 1 x 10 MHz blocks will be released, with a reserve price of €5m per block for national licences, and fees scaled down pro-rata for regional licences and licence expiry in 2030.

Sweden

A 11.60 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[788], 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.

A 11.61 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[789]. 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[790].

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786 http://www.mityc.es/en-US/GabinetePrensa/NotasPrensa/2011/Paginas/npfinaizacionsubasta010811.aspx

787 http://www.cullen-international.com/report/3796/t3352#Table_26

788 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/

789 Now article 101 of the TFEU

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

A 11.62 A legal challenge against the 2009 PTS decision was rejected and the decision became final on 23 February 2011. The 900 MHz licensees will be permitted to utilise the spectrum on a technology neutral basis from 24 May 2011, with the band currently permitted for GSM use only[791].

A 11.63 The Swedish Post and Telecom Agency (PTS) announced on 13 December 2010[792] that it would release 800 MHz spectrum via an auction in early 2011. PTS stated it would release 2 × 30 MHz of 800 MHz spectrum in blocks of 2 × 5 MHz, with a spectrum cap of 2 × 10 MHz per operator, and licence expire of December 2035. One of the 2 × 5 MHz blocks had specific coverage conditions associated with it[793]. PTS also stated that the onus was on successful bidders to operate and deploy systems which did not cause interference with broadcast transmissions.

A 11.64 Applications for participation in the auction along with bank guarantees were due on 31 January 2011 with an auction scheduled to begin on 28 February 2011. The auction finished on 4 March 2011, and three bidders were successful in winning rights to 2 × 10 MHz of 800 MHz spectrum[794][795]. The auction raised over SEK 2bn (approx €220m). Net4Mobility won the block with coverage obligations, with a final bid of SEK 349m, of which SEK 49m was recovered by PTS in the form of auction fees, and the remaining SEK 300m is committed by Net4Mobility to provide PTS required coverage. From 2013, any of the committed coverage expense not yet invested is liable to CPI, with CPI base of 2010.

A 11.65 Each of the 800 MHz blocks had a SEK 200k fee associated with it. There is an annual fee of SEK 570k (approximately €63k) per 2 × 5 MHz for spectrum usage, and an additional supervision charge of SEK 17.1k (approximately €1.9k) per block. These annual fees are in the existing regulations and are liable to change over the period of the licence.

A 11.66 PTS extended the four existing 1800 MHz licences in February 2011, with three operators reducing their existing 1800 MHz assignment to 2 × 10 MHz in order to receive an extension of 15 years (January 2013 until December 2027) on their licences, while another licensee increased its assignment to 2 × 5 MHz under the same conditions. On 1 June 2011, PTS announced[796] that it is inviting interested parties to register their interest in participating in an auction for the returned 1800 MHz spectrum (from existing licensees) by 2 September 2011, with a planned start date of 11 October for the auction. PTS will release the returned 2 × 35 MHz of 1800 MHz spectrum in this auction, which both incumbents of the band and

[791] http://www.telecompaper.com/news/sweden-opens-up-900mhz-band

[792] http://www.pts.se/en-gb/News/Press-releases/2010/PTSs-invitation-to-auction-of-the-800-MHz-band/

[793] Section 2.9 of http://www.pts.se/upload/Beslut/Radio/2010/10-10534-open-invitation-800-mhz-auction-dec10.pdf

[794] http://www.pts.se/en-gb/News/Press-releases/2011/Press-release/

[795] http://www.pts.se/upload/Beslut/Radio/2011/10-10534-desicion-assignment-800mhz.pdf

[796] http://www.pts.se/en-gb/News/Press-releases/2011/PTS-invites-interested-parties-to-the-spectrum-auction-for-the-1800-MHz-band/

new entrants can participate in. Licences in the 1800 MHz band will start on 1 January 2013 and last for 25 years, and there is no spectrum cap imposed for users of this band. The auction will entail two stages; the auction stage to determine the amount of spectrum a licensee has access to, and an assignment stage to determine where in the band each licensee will be assigned its spectrum. PTS will leave one 2 × 5 MHz block unlicensed and permitted to be used by anyone without the requirement for a licence.

Switzerland

A 11.67 Existing GSM licences were extended in 2009 in order to harmonise their expiry dates[797]. 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 × 5 MHz of spectrum in the 900 MHz band.

A 11.68 The current GSM and UMTS licences will expire in 2013 and 2016 respectively and the regulator is now planning a 2011 "big bang" auction[798] of 550 MHz of spectrum in the 800 MHz, 900 MHz, 1.8 GHz, 2.1 GHz and 2.6 bands.

A 11.69 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 favoured 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.

A 11.70 On 26 November 2010, the NRA announced its intention to hold a combinatorial clock auction (CCA) for all the 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz spectrum on a technology neutral basis in the first half of 2011[799]. Interested parties initially had until 18 March 2011 to submit to the NRA the amount of spectrum it is seeking in each particular band, the appropriate bank guarantee relating to the reserve price of the spectrum desired[800], along with proof it satisfies statutory licensing requirements and the specific obligations of the

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

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

[799] http://www.bakom.admin.ch/dokumentation/medieninformationen/00471/index.html?lang=en&msg-id=36440

[800] http://www.bakom.admin.ch/themen/frequenzen/03569/index.html?lang=en&download=NHzLpZeg7t,lnp6I0NTU042l2Z6ln1ad1IZn4Z2qZpnO2Yuq2Z6gpJCDen99fWym162epYbg2c_JjKbNoKSn6A--

invitation to tender. The NRA later extended the period for submission of interest in auction[801].

A 11.71 The NRA received numerous correspondences from interested parties after it had published its invitation to tender in November 2010. The NRA announced that the auction will take place in Q1 2012, and maintained its position[802] that releasing the available spectrum in the different bands simultaneously in one auction is a better option that releasing the different bands in sequential awards processes, but did revise rules regarding certain issues, e.g. spectrum cap and bank guarantee. Existing licensees now have until the end of 2014 (end of 2015 in Basle and Geneva) to complete all transitions in the 900 MHz and 1800 MHz bands.

A 11.72 Interested parties have until 30 September to submit a candidature dossier to Ofcom, in which it must specify the maximum amount of spectrum they wish to purchase in each bands. Each interested party must then submit a bank guarantee amounting to 50% of the minimum bid for the requested frequencies and show that they can comply with the legal licensing requirements and the specific obligations of the tender. Swiss spectrum management rules state that the auction price for auctioned frequencies must be paid in a single installment immediately after licences are awarded[803]. If a candidate meets the requirements, it will be authorised by ComCom to participate in the auction. Ofcom will publish the amended tender documents on its website at the end of July 2011.

A 11.73 The NRA specified spectrum caps[800], and later revised the caps[804], as follows;

- 2 × 135 MHz of the total available FDD spectrum (duplex frequencies),
- 2 × 25 MHz between 800 MHz and 900 MHz bands,
- 2 × 20 MHz for the 900 MHz band,
- 2 × 35 MHz for the 1800 MHz band,
- 2 × 30 MHz for the 2.1 GHz band, and
- Any bidder of 2 × 15 MHz or more of 900 MHz spectrum cannot bid for more than 2 × 30 MHz of 1800 MHz spectrum

A 11.74 The reserve price for the 800 MHz and 900 MHz 2 × 5 MHz blocks are the same, and set at CHF 21.3m (approximately €16.2m). 1800 MHz 2 × 5 MHz block reserve price is CHF 7.1m (approximately €5.4m) and CHF 8.3m (approximately €6.3m) per 2 × 5 MHz block of 2.1 GHz and 2.6 GHz spectrum.

[801] http://www.bakom.admin.ch/themen/frequenzen/03569/index.html?lang=en#sprungmarke3_8

[802] http://www.bakom.admin.ch/dokumentation/medieninformationen/00471/index.html?lang=en&msg-id=39412

[803] https://www.policytracker.com/headlines/swiss-spectrum-auction-put-back-to-2012

[804] http://www.news.admin.ch/NSBSubscriber/message/attachments/23212.pdf

A 11.75 The delivery date of spectrum won by bidders in the auction varies; some spectrum is currently fallow and will be immediately assigned after the auction, whereas spectrum currently assigned is available for assignment at different dates[805], and all licences will co-terminate on 31 December 2028. Assignment dates for the spectrum is as follows:

- 800 MHz: All the 800 MHz band (six 2 × 5 MHz blocks) will be assigned in January 2013,
- 900 MHz: All the 900 MHz band (seven 2 × 5 MHz blocks) will be assigned in January 2014,
- 1800 MHz:
  - 2 × 10 MHz block of 1800 MHz will be assigned immediately (only 2 × 8.6 MHz is usable until January 2014)
  - Remainder (thirteen 2 × 5 MHz blocks) of 1800 MHz band assigned in January 2014
- 2.1 GHz:
  - Three blocks of FDD (2 × 5 MHz), and two blocks of TDD (1 x 5 MHz and 1 x 15 MHz) will be assigned immediately
  - Nine blocks of FDD (2 × 5 MHz) and three blocks of TDD (1 x 5 MHz) will be assigned in January 2017
- 2.6 GHz: All of the 2.6 GHz band (fourteen FDD 2 × 5 MHz blocks and three 1 x 15 MHz blocks) will be assigned immediately.

A 11.76 Licensees who have the right to use frequencies below 1 GHz (800 MHz and 900 MHz) are obliged to ensure coverage of 50% of the population of Switzerland with mobile radio services via their own infrastructure by 31 December 2018, licensees for 1800 MHz have until the same date to achieve 25% coverage, whereas licensees of 2.1 GHz spectrum have to achieve 25% coverage by 2021.

UK

A 11.77 Licences for spectrum in the 900 MHz and 1800 MHz bands were varied to allow for usage of the spectrum for UMTS as well as GSM[806] (and in time, other technologies deemed compatible by EC), on foot of a government direction (which was made on 20 December 2010) and brought into force on 30 December 2010. This decision also requires to The UK Regulator (Ofcom) to "assess likely future competition in markets for the provision of mobile electronic communication services after the conclusion of the award of 800 MHz and 2.6 GHz bands ".

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805 http://www.bakom.admin.ch/themen/frequenzen/03569/index.html?lang=en&download=NHzLpZeg7t,lnp6I0NTU042l2Z6ln1ad1IZn4Z2qZpnO2Yuq2Z6gpJCDen99fGym162epYbg2c_JjKbNoKSn6A--

806 http://stakeholders.ofcom.org.uk/binaries/consultations/900-1800mhz-wireless-telegraphy/statement/Statement.pdf

A 11.78 Under the Wireless Telegraphy Act Order 2010, Ofcom is required to[807]:

- conduct a competition assessment of the mobile market, taking account of the possible impact of an auction;
- make regulations for an auction of spectrum in the 800 MHz and 2.6 GHz bands as soon as possible after the competition assessment has been performed; and
- revise the licence fees paid by holders of 900 MHz and 1800 MHz spectrum to take account of the sums bid in the auction.

A 11.79 Ofcom released a consultation[808] on 22 March 2011 on the release of 800 MHz and 2.6 GHz spectrum, with a closing date for submissions of 31 May 2011. The auction is expected to take place in the first half of 2012. Ofcom discuss the possibility of implementing spectrum floor and spectrum cap for sub 1 GHz spectrum to ensure a minimum of four credible players in the market. Annual spectrum fees for the 900 MHz and 1800 MHz bands will be revised to reflect full market value, and will incorporate information from the upcoming 800 MHz and 2.6 GHz auction.

A 11.80 Ofcom have suggested a range of reserve prices for the spectrum it intends to release, with 800 MHz reserve price in the range of £30m to £200m per 2 × 5 MHz block, and £10m to £40m per 2 × 10 MHz of 2.6 GHz spectrum. Ofcom propose to release spectrum in a combinatorial clock auction (CCA) with second price rule. Licences would be issued for an indefinite term, but with an initial 20 year period where revocation could occur in certain circumstances.

A 11.81 Ofcom propose to make one 2 × 5 MHz block of 800 MHz spectrum available to achieve high nationwide broadband coverage. A requirement of a successful applicant for this block would, by 2017, be providing an electronic communications network that is capable of providing mobile telecommunications services with a sustained downlink speed of not less than 2Mbps, with a 90% probability of indoor reception and to an area within which at least 95% of the UK population lives.

A 11.82 There is a spectrum cap proposal from Ofcom for spectrum in this competition, which takes into consideration spectrum already licensed to operators. The spectrum cap is:

- 2 × 27.5 MHz for spectrum under 1GHz for all bidders, including existing spectrum holdings of the bidder (the “Sub-1GHz Cap”); and
- 2 × 105 MHz for spectrum in the 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz (paired) and 2.6 GHz (paired and unpaired) bands for all bidders, including existing spectrum holdings of the bidder (the “Overall Cap”).

[807] http://www.cullen-international.com/report/5511/c67862#_Ofcom_consults_on

[808] http://stakeholders.ofcom.org.uk/binaries/consultations/combined-award/summary/combined-award.pdf

A 11.83 If one or more lots are not awarded as part of the award process, Ofcom retain the discretion to award the remaining lots through a separate award process.

A 11.84 On 2 June 2011, Ofcom published a consultation[809] on the technical considerations for the release of the 800 MHZ and 2.6 GHz spectrum, with a closing date of 28 July 2011. This consultation focuses on proposals for dealing with sharing and interference mitigation of the 800 MHz band (primarily with DTT) and the 2.6 GHz (primarily with radar) with other services, and to allow LTE and WiMAX be deployed in the 900 MHz and 1800 MHz bands. Ofcom propose specific Block Edge Masks and maximum transmit power for both the 800 MHz and 2.6 GHz bands, and also make proposals on low power usage for some blocks and licensees coordination for users in the 2.6 GHz band.

[809] http://stakeholders.ofcom.org.uk/binaries/consultations/tlc/summary/condoc.pdf

Annex 12

Draft MoU for the 800 MHz spectrum band

A 12.1 This Annex contains a draft memorandum of understanding (MoU) between the national regulatory authorities of the Republic of Ireland (ComReg) and the United Kingdom (Ofcom) on the use of the 800 MHz spectrum bands in border areas between these two countries.

A 12.2 This MoU is based on ECC Recommendation ECC/REC/(11)04 on frequency planning and frequency co-ordination for terrestrial systems for mobile/fixed communication networks (MFCN) capable of providing electronic communications services in the frequency band 790-862 MHz[810].

A 12.3 For the avoidance of doubt, this draft MoU has yet to be finalised and is therefore subject to alteration.

[810] Recommendation adopted by the Working Group Frequency Management of the ECC on 26 May 2011.

MEMORANDUM OF UNDERSTANDING ON FREQUENCY COORDINATION BETWEEN THE REPUBLIC OF IRELAND AND THE UNITED KINGDOM IN THE FREQUENCY BAND 790 – 862 MHz

1. INTRODUCTION

1.1. This Memorandum of Understanding (MoU) describes the procedures for the coordination of radio services, other than broadcasting, between the Republic of Ireland (RoI) and the United Kingdom (UK) in the frequency band 790 – 862 MHz.

1.2. In order to facilitate the deployment of systems operating in neighbouring countries, it is necessary to establish, by agreement, regulatory and technical procedures for frequency co-ordination. Moreover, this agreement is designed to reduce the administrative procedures in the frequency bands in the countries concerned.

1.3. In the UK, the frequency band 790 – 862 MHz is expected to be awarded on a service and technology neutral basis, in accordance with decisions to be made by Ofcom, following a consultation process.

1.4. In the RoI, it is intended that the 790 – 862 MHz band will become available as part of the Digital Dividend post analogue TV switch off ("ASO") in Ireland. In Ireland and the UK, use of the 790 – 862 MHz band will be in conformance with the European harmonised technical conditions of use as set out in European Commission Decision 2010/267/EU[1].

1.5. The preferred harmonised CEPT channelling arrangement for the 790 – 862 MHz band is as follows:

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					
1MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

1.6. Ofcom is the Administration of the United Kingdom responsible for all relations with the RoI concerning this MoU.

1.7. The Commission for Communications Regulation (ComReg) is the Administration of the RoI responsible for all relations with the UK concerning this MoU.

1.8. Accordingly, the Administrations of the UK and the RoI have agreed the co-ordination procedures in this MoU.

1.9. This MoU applies in the territories of The Republic of Ireland and the United Kingdom.

1.10. The co-ordination procedure is based on the principle of equitable access to the spectrum resource.

[1] Commission Decision of 6 May 2010 (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. http://eur-

1.11. Coordination of FDD services in the 790 – 862 MHz band is based on the protection requirements for non preferential frequency blocks given in annex 1 of ECC Recommendation (11)04[2].

2. COMMITMENT OF THE ADMINISTRATIONS

2.1. The Administrations of the RoI and the UK are committed to ensuring that the radio communication stations operating in the band 790-862 MHz, respect the limits given at paragraph 3, unless the stations are specifically exempt from the coordination procedure in accordance with paragraph 4.

3. CRITERIA FOR COORDINATION

3.1. Suitable coordination arrangements, outlined in paragraphs 3.2 and 3.3, are derived from Annex 1 of ECC Recommendation (11)04.

3.2. Within the frequency band 791-832 MHz, stations of FDD Systems may be operated, established or modified in a country, without co-ordination with the neighbour country, provided that the predicted field strength produced by a cell (all transmitters within the sector) does not exceed the threshold of **55 dBµV/m in a bandwidth of 5 MHz at a height of 3 m above ground level at the coast or border line of the neighbouring country,** and **29 dBµV/m in a bandwidth of 5 MHz at a height of 3m above ground at a distance of 9 km** inside the neighbouring country.

In the case that LTE is deployed on both sides of the border, the field strength levels may be increased to **59 dBµV/m in a bandwidth of 5 MHz,** and **41 dBµV/m in a bandwidth of 5 MHz at 6 km**

3.3. Base stations, for which the predicted field strength exceeds the values given in 3.2, must be co-ordinated in accordance with paragraph 7, except where stations are listed in paragraph 6 or an arrangement exists between operators as described in paragraph 4.

3.4. To establish the predicted field strength produced by a station, the methodology set out at paragraph 5 shall be employed.

3.5. In the case of time division duplex technology the interference power shall be the power, during the active part of the signal, in the stated bandwidth.

4. ARRANGEMENTS BETWEEN OPERATORS

4.1. An Agreement between the administrations of the Republic of Ireland and the United Kingdom, which enables planning arrangements between mobile operators, subject to agreement of the Administrations, was

[2] ECC Recommendation (11)04: Frequency planning and frequency coordination for terrestrial systems for mobile/fixed communication networks (WAN) capable of providing electronic communications services in the frequency band 790-862 MHz.

brought into force on 01 May 2005[3]. The administrations of the Republic of Ireland and the United Kingdom agree to extend the applicability of this Agreement to all operators of systems in the frequency bands 791 - 832 MHz.

4.2. To facilitate reasonable and timely development of their systems, licensees are encouraged to develop arrangements in accordance with the Agreement of 01 May 2005.

4.3. Operators may only negotiate Arrangements concerning the common part of those frequency bands for which they have been licensed by the National Administration. The provisions in the Arrangements shall not result in an impairment of the authorised use of radio frequencies by third parties not involved in the Arrangements.

4.4. In order to facilitate Arrangements between operators, each Administration will provide names and point of contact information for the relevant licensees, subject to the agreement of the licensees.

5. PREDICTION OF PROPAGATION

The field prediction method shall be according to the latest version of Recommendation ITU-R P. 1546[4], With parameters:

- 10% of the time
- 50% of locations
- Height of the receiver antenna 3m

Taking account of:

- Terrain profile (effective height) for the base station in all main directions
- Type of terrain (e.g. land, sea, mixed path)
- Effective radiated field strength
- Antenna tilt and azimuth

Including model components:

- Mixed land/sea paths
- Receiving/mobile antenna height
- Terrain clearance angle

And standard values: DeltaN = 40 (N0m-N1000m)

[3] Agreement between the administrations of the Republic of Ireland and the United Kingdom concerning the approval of planning arrangements between mobile radio communications network operators. [date]

[4] Recommendation ITU-R P.1546, Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 3 000 MHz

6. CO-ORDINATED STATIONS

The stations listed below have been agreed by both Administrations to be coordinated. Any subsequent change in the parameters given in the table shall void any acceptance of co-ordination for the corresponding station or stations.

	Name	Individual Channel bandwidth	Modulation	Centre Frequency	Lat	Long	East	North	Ground H AMSL (m)	H AGL (m)	EIRP dBm	Antenna Manufacturer reference	Pol	3dB B/W Degs	Az Degs E of N	

7. CO-ORDINATION PROCEDURE

7.1. Exchanges of information for co-ordination/notification purposes shall be in the format set out in Annex 2A of the HCM agreement (revised at Vilnius 2005)[5].

7.2. A co-ordination request must be sent by the licensee through the Administration responsible for its authorisation.

7.3. The co-ordination procedure shall follow the one described in the HCM Agreement.

7.4. In the event of interference between authorised users of the band 790-862 MHz in the RoI and the UK, the affected users shall exchange information between themselves with a view to resolving the interference by mutual agreement. A report of the interference and the details of the information exchanged shall be sent to both Administrations who can, if requested, advise on resolution.. The Administrations of the RoI and the UK agree to facilitate the exchange of information between authorised users of the band.

8. REVIEW OF MoU

8.1. The co-ordination threshold and prediction methods defined in this MoU may be reviewed in the light of experience of operation of networks in both countries and future prediction developments.

8.2. This MoU may be updated following the adoption of any international decisions, directives or recommendations relevant to the band 790 - 862 MHz, or the results of awards of licences to use the frequency band 790 - 862 MHz

9. TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

Either Administration may withdraw from this Memorandum of Understanding subject to 6 months' notice.

[5] Agreement between the Administrations of ... on the Coordination of frequencies between 29.7 MHz and 39.5 GHz for fixed service and land mobile service (HCM Agreement) Vilnius, 2005 http://hcm.bundesnetzagentur.de/http/englisch/verwaltung/index_europakarte.htm

Annex 13

Glossary

13.1 European and Governmental Bodies, Regulatory and Standardisation Organisations

ANFR	French Radio Spectrum Regulator
ARCEP	French Telecommunications Regulator
BNetzA	German Regulator
BEREC	Body of European Regulators for Electronic Communications
CEPT	European Conference of Postal and Telecommunications Administrations
CENELEC	European Committee for Electrotechnical Standardisation
CoCom	Communications Committee of the European Commission
ComCom	Swiss Federal Commission for Communications [811]
ComReg	Commission for Communications Regulation
DCENR	Department of Communications, Energy and Natural Resources
EC	European Commission
ECC	Electronic Communications Committee of CEPT
ECJ	European Court of Justice
ETSI	European Telecommunications Standards Institute
EU	European Union
ITU	International Telecommunication Union
NITA	Danish Regulator
NRA	National Regulatory Authority
OFCOM	Swiss Telecommunications and Spectrum Regulator[812]
Ofcom	UK Regulator
PTS	Swedish Regulator
RSC	The Radio Spectrum Committee of the European Commission
RSPG	Radio Spectrum Policy Group advising the European Commission

[811] Independent of the Swiss Federal government and instructs OFCOM

[812] OFCOM can be instructed by either ComCom or the Swiss Federal government under the auspices of the Department of the Environment Transport Energy and Communications and is also known as BAKOM in the German speaking areas of Switzerland

13.2 Primary and Secondary Legislation

SI	Statutory Instrument
2002 Act	The Communications Regulation Act 2002 (No. 20 of 2002), as Amended[813]
2009 Act	Broadcasting Act 2009 (No. 18 of 2009)
Access Regulations	European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No 334 of 2011)
Act of 1926	The Wireless Telegraphy Act 1926 (No. 45 of 1926) as amended from time to time
Authorisation Regulations	European Communities (Electronic Communication Networks and Services) (Authorisation) Regulations 2011 (S.I. No 335 of 2011)
Framework Regulations	European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No 333 of 2011)
EC Decision 2009/766/EC	European Commission Decision on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community
EC Decision 2010/267/EU	European Commission Decision 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
EC Decision 2011/251/EU	European Commission Decision, amending Decision 2009/766/EC, on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications *services in the Community*
The Minister	Minister for Communications, Energy and Natural Resources
The Amending Directive	The Directive (2009/114/EC) amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community.
TFEU	Treaty on the Functioning of the European Union
USO Regulations	European Communities (Electronic Communication Networks and Services) (Universal Service and Users' Rights) Regulations 2011 (S.I. No. 337 of

[813] Includes the Communications Regulation (Amendment) Act 2007 and the Communications Regulation (Premium Rate Services and Electronic Communications Infrastructure) Act 2010.

	2011)
WAPECS Recommendation	Draft Commission Recommendation on the non-technical conditions attached to the rights of use for radio frequencies under the regulatory framework for electronic communications in the context of the Wireless Access Policy for Electronic Communications (WAPECS)

13.3 Technical Terms

2G	Second generation mobile services
2.5G	2G systems incorporating packet switched services
3G	Third Generation Mobile System
4G	Fourth Generation Mobile System
ARPU	Average Revenue Per User
ASO	Analogue Switch-off (the switch-off of analogue TV transmissions have been replaced by DTT)
Beauty Competition or Beauty Contest	A licence award method involving comparative evaluation of applications
BEM	Block Edge Mask
BLER	Block Error Rate
BTS	Base Station
CCA	Combinatorial Clock Auction
CNR	Carrier-to-noise ratio
CPI	Consumer Price Index
DECT	Digital Enhanced Cordless Telecommunications
Digital Dividend	Spectrum expected to be released following the cessation of analogue terrestrial television broadcasting services
DME	Aeronautical Distance Measuring Equipment
DTT	Digital Terrestrial Television
Ec/Io	The ratio of received pilot channel energy to total received Interference
ECN	Electronic Communications Network as defined in the Framework Regulations
ECS	Electronic Communications Service as defined in the Framework Regulations
EDGE	Enhanced Data for Global Evolution (an upgrade to GSM technology often referred to as 2.5G)
EIRP (or eirp)	Equivalent Isotropically Radiated Power
E nodeB	LTE Base Station
FDD	Frequency Division Duplex
FWALA	Fixed Wireless Access Local Area Network
FWPMA	Fixed Wireless Point to Multi-Point Access
GDP	Gross Domestic Product

GHz	Gigahertz (1,000,000,000 Hertz)
GNP	Gross National Product
Guard-band	An unused spectrum bandwidth separating channels to prevent interference
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
H3GI	Hutchison 3G Ireland
Hertz	Unit of Frequency
HSDPA	High Speed Downlink Packet Access
IMT	International Mobile Telecommunications system
kHz	kiloHertz (1,000 Hertz)
LTE	Long Term Evolution of 3G
MCA	Mobile Communication Services on Aircraft
MCV	Mobile Communication Services on Vessels
METSAT	Meteorological Satellite
MMDS	Multipoint Microwave Distribution Service
MHz	Megahertz (1,000,000 Hertz)
MIMO	Multiple In Multiple Out, a diversity antenna system
MNO	Mobile Network Operator
MNP	Mobile Number Portability
MoU	Memorandum of Understanding
MVNO	Mobile Virtual Network Operator (a licensed mobile operator with no spectrum assignment and with or without network infrastructure)
NIR	Non-Ionising radiation
NodeB	UMTS Base Station
OCR	On Channel Repeater
ODTR	Office of the Director of Telecommunications Regulation, established under the Telecommunications Miscellaneous Provisions Act 1996 and predecessor on ComReg.
OFDM	Orthogonal frequency division multiplexing
PMSE	Programme Making and Special Events
Porting	Number Portability is the process by which a consumer can transfer (port) from one service provider to another service provider while maintaining their existing telephone number
PDCCH	Physical Downlink Control Channel
QoS	Quality of Service
RFID	Radio Frequency Identification
RIA	Regulatory Impact Assessment
SBC	Sealed-bid Combinatorial Auction
Service Neutrality	An approach to granting of licences whereby any electronic communications service (ECS) may be provided in a frequency band over any type of electronic communications network
SINR	Signal to Interference plus Noise Ratio

SMP	Significant Market Power
SMRA	Simultaneous Multiple-Round Ascending Auction
SMRA/AS	Simultaneous Multiple-Round Ascending Auction with Augmented Switching
SNR	Signal to Noise Ratio
SRDs	Short Range Devices
SAF	Spectrum Access Fee
SUF	Spectrum Usage Fee
TDD	Time Division Duplex
Technology Neutrality	An approach to granting of licences without specifying the technology to be deployed. However, certain technological requirements may be imposed to ensure compatibility with other services in the same or adjacent frequency bands
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
WACC	Weighted Average Cost of Capital
WAPECS	Wireless Access Policy for Electronic Communications Services
WDMDS	Wide Band Digital Mobile Data Systems
WiMAX	Worldwide Interoperability for Microwave Access
800 MHz Band	The whole band is 790-862 MHz; for the purpose of assigning frequencies in the competition the band is 791 – 821 MHz paired with 832 – 862 MHz
900 MHz Band	880 – 915 MHz paired with 925 – 960 MHz
1800 MHz Band	1710 – 1785 MHz paired with 1805 – 1880 MHz
2100 MHz Bands	1920 – 1980 MHz paired with 2110 – 2170 MHz, 1900 – 1920 MHz