



Commission for
Communications Regulation

Consultation on Proposed Release of the 410-415.5 / 420-425.5 MHz sub- band

Reference: ComReg 17/67

Date: 31/07/2017

An Coimisiún um Rialáil Cumarsáide

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Chapter 1

1 Introduction

- 1 The Commission for Communications Regulation (ComReg) is the statutory body responsible for the regulation of the electronic communications (telecommunications, radiocommunication and broadcasting networks), postal and premium rate sectors in Ireland in accordance with European Union (EU) and Irish law.
- 2 ComReg also manages the radio frequency spectrum (“radio spectrum” or “spectrum”) and the national numbering resource, among other responsibilities. Radio spectrum is a valuable national resource underpinning important economic, social and communications activities.
- 3 In response to its Radio Spectrum Management Strategy 2016 (ComReg 16/49¹), ComReg observed that there were a number of parties interested in the 410-414 / 420-424 MHz sub-band (“*the 400 MHz band*”) and that there are a number of potential uses. ComReg further noted that it would commence a public consultation on the future use of the band.² To this end, ComReg referenced its plans to conduct this consultation in its current Action Plan³.
- 4 The purpose of this consultation document is to consult on the award of spectrum rights of use in the 400 MHz Band on a technology neutral basis. This consultation explores, at a high level, a number of possible uses for the 400 MHz band and how it might be assigned. ComReg welcomes the views of interested parties on all aspects of the proposals set out herein. It is ComReg’s intention to follow up with a response to consultation and a draft decision as appropriate, and/or a further consultation, if that is appropriate.
- 5 This document is laid out as follows:
 - **Chapter 2:** sets out some background and discusses potential uses of the band.
 - **Chapter 3:** sets out ComReg’s view in relation to the Regulatory Impact Assessment.

¹ <https://www.comreg.ie/publication-download/response-to-consultation-15131-on-comregs-radio-spectrum-management-strategy-2016-2018>

² Radio Spectrum Management Strategy 2016 to 2018, para 6.13 and 6.14.

³<https://www.comreg.ie/media/2016/03/Annual-Action-Plan.pdf>

- **Chapter 4:** details key aspects of the proposed award including band plan, channel bandwidth, EIRP limits, licence duration, award mechanisms and fee structures.
- **Chapter 5:** details how to submit comments and the next steps in the process.
- **Annex 1:** details the Legal Basis.
- **Annex 2:** Memorandum of Understanding on Frequency Co-ordination between the Republic of Ireland and The United Kingdom in the Frequency Bands 410 to 414 and 420 to 424 MHz.
- **Annex 3:** Uses in Other Countries.
- **Annex 4:** Consultation Questions.

Chapter 2

2 Background

- 6 In 2005, ComReg assigned spectrum rights of use in respect of the 400 MHz band to Wideband Digital Mobile Data Services (WDMDs) ⁴. Spectrum rights of use in the band were granted in the form of two licences with both successful applicants granted 2 x 2 MHz of spectrum.⁵ These licences expired in December 2015.
- 7 The band is not subject to a European Union (EU) harmonisation decision and in its Radio Spectrum Management Strategy Statement (Document 16/50⁶) ComReg recognised that there are a number of potential uses for this band and envisaged that a consultation on this band would be undertaken during 2017.

2.1 Views of Respondents

- 8 ComReg received six submissions⁷ to the Radio Spectrum Management Strategy (Document 15/131) on the potential benefits of spectrum being made available for new intelligent/smart services and devices; advanced smart metering communications (both smart metering and smart grid) and other professional voice and data platforms (such as TETRA and Digital Mobile Radio (“DMR”)).
- ESB Networks (ESBN) and Smart Connect expressed a specific interest in the 400 MHz Band being made available for smart grid and smart metering uses, noting that no spectrum has yet been identified or harmonised at CEPT or EU level for this purpose.
 - Sigma Wireless and Sensus observed that smart metering is a growing industry.
 - BT noted that spectrum at lower frequencies would better suit the implementation of smart metering.
 - Motorola noted that ComReg should begin a consultation on the transition from the traditional analogue radio communications to more spectrum efficient DMR and TETRA platforms as well as for new non-broadband technologies in service of the expanding Internet of Things (“IoT”) and Machine to Machine (“M2M”) segment.

⁴ The band 872-876 MHz paired with 917-921 MHz was also auctioned.

⁵ <https://www.comreg.ie/csv/downloads/PR211205.pdf>

⁶ <https://www.comreg.ie/publication-download/radio-spectrum-management-strategy-2016-2018>

⁷ BT, ESBN, Motorola, Sigma Wireless, Sensus and Smart Connect.

ComReg's assessment and position

- 9 In its Radio Spectrum Management Strategy 2016 (ComReg 16/50), ComReg considered it appropriate to add a work plan item for this band and that a consultation would commence on foot of same.
- 10 ComReg notes that in addition to the above, and as also outlined in its Radio Spectrum Strategy Statement, there may also be an interest in using this band for Broadband Public Protection and Disaster Relief (BB PPDR) systems.
- 11 Potential uses are discussed in Section 2.2.

2.2 Potential uses of the band

- 12 In the following section, ComReg sets out its preliminary views on the following potential uses for the 400 MHz band:
 - Smart Metering and Smart Grids;
 - Public Protection and Disaster Relief (PPDR); and
 - Other potential uses (DMR / TETRA Enhanced Data Services (TEDS)).

Smart Metering and Smart Grids

- 13 The terms smart meters and smart grids are often used interchangeably but it is important to note that a smart meter is just one element of a smart grid.
- 14 A smart grid is defined as an energy network that can automatically monitor energy flows and adjust to changes in energy supply and demand accordingly.⁸ The Smart Grid integrates the electrical and information technologies in between any point of generation and any point of consumption.⁹ A smart meter on the other hand is simply an electronic system that can measure energy consumption, providing more information than a conventional meter, and can transmit and receive data using a form of electronic communication.¹⁰
- 15 Smart grids and smart meters can be used by electricity and gas transmission and distribution companies, to monitor supply and consumption, to better manage the efficient operation of their business. Smart meters can also be used to introduce dynamic consumer tariffs, and to empower consumers to better manage their energy consumption.
- 16 The relationship between a smart meter and a smart grid is described in ECC report

⁸ <https://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters>

⁹ http://cordis.europa.eu/project/rcn/196834_en.html

¹⁰ EU Directive 2012/27/EU

189¹¹; *“the utility operator needs to adapt the grid constantly. To do that, reliable real-time information on both power consumption and generation is needed. This can be done using meters in distribution points, but also and more precisely by using smart meters.”*

- 17 The demand for smart metering is underpinned by EU Directive 2012/27/EU which stipulates that, in relation to the electricity market, where Member States assess the roll-out of smart meters as positive, at least 80% of consumers should be equipped with intelligent metering systems by 2020.
- 18 As defined by the European Utilities Telecom Council (EUTC)¹², the communication systems needed by utilities, such as smart metering and smart grids, can be characterised as follows:
- low to medium data rates;
 - enhanced resilience;
 - longevity of products and support;
 - extensive geographic coverage (including less populated areas);
 - stringent latency requirements;
 - low jitter and synchronous requirements; and
 - high levels of security.
- 19 ComReg notes that there some are wired solutions available to meet smart metering needs such as Power Line Carrier (PLC). However the geographic and demographic characteristics at large in Ireland are likely to make PLC more costly than a wireless solution.¹³
- 20 Given the above, it is not surprising that smart metering needs can currently be met wirelessly, such as the licence exempt bands below¹⁴:
- 169.4-169.8125 MHz is a harmonised band for the use of non-specific short range devices (SRD), meter reading and assistive listening devices;
 - 868-870 MHz band is listed in ECC Decision (70-03)¹⁵;

¹¹ ECC Report of 2014 on “Future Spectrum Demand for Short Range Devices in the UHF Frequency Bands”.

¹² <http://utc.org/europe/wp-content/uploads/sites/4/2016/04/EUTC-Spectrum-Position-Paper.pdf>

¹³ <http://www.cer.ie/docs/000477/cer09186.pdf>

¹⁴ A full list of SRD bands can be seen in ComReg Document 02/71R10

¹⁵ ECC Decision (70-03) Relating to the use of Short Range Devices (SRD)

- 870-876 and 915-921 MHz bands are listed in ECC Decision (70-03), with 870-875.6 listed in Annex 2: Tracking, Tracing and Data Acquisition; and
 - 2.4 and 5 GHz bands are listed in ECC Decision (70-03).
- 21 All of the above bands have been implemented in ComReg Document 02/71R10 “Permitted Short Range Devices in Ireland”.
- 22 Notwithstanding, licence exempt solutions can place certain power and technical restrictions¹⁶ on the operation of smart meters which may not suit the needs of all potential users.
- 23 There are several reasons why an operator may be interested in acquiring spectrum rights of use for smart grid and smart metering such as;
- The ability to use higher output power;
 - Lower noise floor;
 - Reliability of quality of service;
 - Good in-building penetration;
 - Reduced potential for harmful interference; and
 - Recourse to ComReg to resolve interference issues.
- 24 ComReg notes that there are a number of equipment providers who can provide smart metering services in the 400 MHz band using higher output power and duty cycle than the licence exempt equipment.^{17,18}

Public Protection and Disaster Relief (PPDR)

- 25 Another potential use of the 400 MHz band is for Public Protection and Disaster Relief (PPDR).
- 26 PPDR systems are defined in terms of two different uses:

“Public Protection (PP) ... radiocommunications used by responsible agencies and organisations dealing with maintenance of law and order, protection of life and property, and emergency situations”; and

¹⁶ *bis*

¹⁷ Silver Springs, Sensus

¹⁸ ComReg notes that in the UK Arqiva are providing smart metering services to electricity utilities using spectrum rights of use in the 412-414 / 422-424 MHz band that was granted by Ofcom in 2006. Annex 3 shows applications of the band for 10 other Member States.

*“Disaster Relief (DR) ... radiocommunications used by agencies and organisations dealing with a serious disruption of the functioning of society, posing a significant, widespread threat to human life, health, property or the environment ...”*¹⁹

- 27 In Ireland, a narrowband PPDR network is operated by Tetra Ireland Communications Ltd using Terrestrial Trunked Radio (TETRA) technology in the 380-385 / 390-395 MHz frequency band. This band is harmonised by ECC Decision (08)05 for narrowband PPDR applications.
- 28 However there is also a demand for BroadBand PPDR (“BB PPDR”) applications. BB PPDR applications can operate with bandwidths of 1.4 MHz, 3 MHz and 5 MHz. An example of BB PPDR applications include high resolution video communications for various security and human wellbeing applications, live video feeds, and high resolution imagery.
- 29 ComReg notes that ECC Report 218²⁰ considers a number of spectrum bands for BB PPDR use including the 410 – 430 MHz range. The ECC Decision (16)02²¹ specifically excludes the 410 – 430 MHz band due to ongoing technical studies within Working Group Spectrum Engineering.^{22,23}
- 30 Consequently, and while there may be demand from interested parties to use this spectrum for BB PPDR services, ComRegs preliminary view is that this band may not be suitable as (i) ECC Decision (16)02 identifies a number of bands other than the 410 – 430 MHz range for BB PPDR use and (ii) there are other potential uses identified in this document.

Other potential uses

- 31 In its response to the Spectrum Strategy Statement, Motorola raised the possibility of using the band for professional voice and data communication services and suggested that the 410 – 430 MHz band was suitable for transition from analogue technology to more spectrum efficient DMR and TETRA platforms. Motorola also raised the possibility of introducing TETRA Enhanced Data Services (TEDS).
- 32 TETRA technology is currently being used by TETRA Ireland to provide PPDR services on its network using spectrum assigned to it in the 380-385 and 390-395 MHz band. Furthermore the 385-389.9 and 395-399.9 MHz frequency band is

¹⁹ ECC Decision 16/02

²⁰ ECC Report 218 of 2015 on “Harmonised conditions and spectrum bands for the implementation of future European broadband PPDR systems”

²¹ ECC Decision (16)02 on “Harmonised technical conditions and frequency bands for the implementation of Broadband Public Protection and Disaster Relief (BB PPDR) systems”.

²² <https://www.cept.org/ecc/topics/public-protection-and-disaster-relief-ppdr>

²³ As stated in ECC Decision 16(02), studies are continuing to examine the 410-430 MHz sub-band and where agreed in ECC this could lead to a subsequent revision of ECC Decision 16(02).

allocated for TETRA civil use as per ECC Decision (08)05. ComReg has made 14 assignments in total for TETRA civil use in this band and has not been presented with any case to date for further spectrum use.

- 33 ComReg does not propose to make this spectrum available for use by any particular technology. Rather, ComReg intends to award this spectrum on a technology neutral basis. ComReg proposes to put in place the least restrictive technical conditions for the use of this band thereby enabling the operator to determine what technology they wish to deploy in the band to meet their particular needs, noting that this may be TETRA/TETRA TEDS or alternative.
- 34 Currently, DMR is catered for in both trunked radio services and business radio licencing schemes. Currently there are only 6 active licensees in trunked radio digital with a total of 9.475 MHz of unlicensed spectrum available in this band. Consequently ComReg is of the view that currently there is ample spectrum available for more licensees in digital trunked radio.
- 35 Therefore, ComRegs preliminary view is that it does not see DMR as a potential use for the 400 MHz Band at this time.
- 36 The potential uses identified here are ComRegs preliminary views. ComReg has not made a decision on the future use of this band and all comments regarding the potential uses identified above are welcome. ComReg is open to suggestions from interested parties on uses for the band other than those listed above.

Q. 1 Do you agree with ComReg's analysis of potential uses outlined above? If not, please provide supporting evidence for your view.

Q. 2 Do you have any suggestions for additional potential uses? Please provide reasons and evidence to support a potential use case.

Chapter 3

3 Regulatory Impact Assessment

- 37 ComReg has published Regulatory Impact Assessment (RIA) Guidelines²⁴ (Doc 07/56a), in accordance with a policy direction to ComReg²⁵, which state that ComReg will conduct a RIA in any process that may result in the imposition of a regulatory obligation, or the amendment of an existing obligation to a significant degree, or which may otherwise significantly impact on any relevant market or any stakeholders or consumers. However, the Guidelines also note that in certain instances it may not be appropriate to conduct a RIA and, in particular, that a RIA is only considered mandatory or necessary in advance of a decision that could result in the imposition of an actual regulatory measure or obligation. The Guidelines further state that where ComReg is merely charged with implementing a statutory obligation, it will assess each case individually and will determine whether a RIA is necessary and justified.
- 38 In this Consultation, ComReg is not imposing a regulatory obligation but is setting out its preliminary views on the various technical parameters of the band and on potential uses. Information received as part of this consultation will be used to further inform ComReg's views and may result in the imposition of specific regulatory options. Therefore, a RIA is not included at this stage in the process but may form part of future consultations depending on the nature of measures proposed by ComReg.

²⁴ Guidelines on ComReg's approach to RIA (2007)
www.comreg.ie/media/dlm_uploads/2015/12/ComReg0756a.pdf

²⁵ Ministerial Policy Direction made by Dermot Ahern T.D. Minister for Communications, Marine and Natural Resources on 21 February, 2003

Chapter 4

4 Key Aspects of the Proposed Award of Spectrum

4.1 Introduction

39 In this chapter, ComReg sets out its high level initial proposals, and its policy questions, for channel bandwidth, licence conditions, licence duration, award mechanisms and fee structures in relation to the proposed spectrum award.

40 This band is favourable for many applications due to advantageous propagation characteristics allowing for greater geographic coverage. This band is not subject to any EU Harmonisation Decision for any particular service or technology. ComReg welcomes views from interested parties on all aspects of the proposed licensing framework set out in this Chapter.

4.2 Band Plan

41 During its analysis of the 410-414 / 420-424 MHz band, ComReg noted that there is unused spectrum either side of the 410-414 / 420-424 MHz sub-band. This can be seen in Figure 1 below:

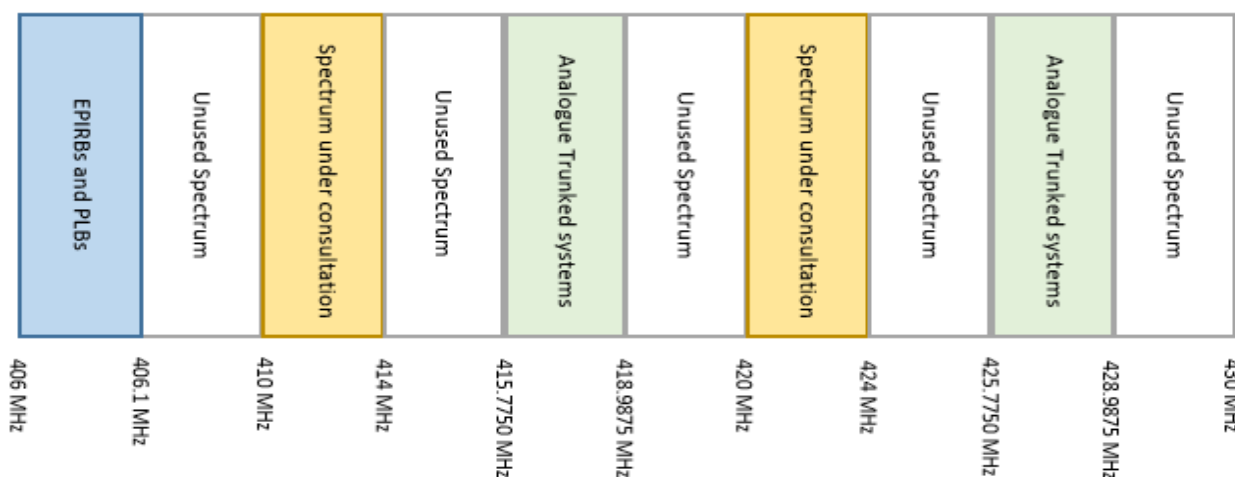


Figure 1. Unused spectrum

42 ComReg proposes to make the amount of available spectrum symmetrical and make available 2 x 5.5000 MHz, from 410-415.5 MHz / 420-425.5 MHz, on a technology neutral basis.

43 This meets with ComReg’s obligation under the Communications Regulation Acts 2002-2011 to ensure the efficient management and use of the radio frequency spectrum in Ireland.

44 When this band was licenced for use of WDMDS, the band was made available in duplex pairs with a separation of 10 MHz between the transmit frequencies of the mobile stations and the transmit frequencies of the base stations. The current configuration of this spectrum band, in line with ECC Decisions (04)04 and (06)06, is for Frequency Division Duplexing (FDD) operation with mobile transmit in the lower part of the band and base transmit in the upper part of the band as illustrated in Figure 2 below. ComReg is proposing to maintain the FDD mode of operation for any award arising out of this consultation process. This will ensure consistency with both the extant ECC Decisions as well as other services deployed in the 400 MHz to 470 MHz band.

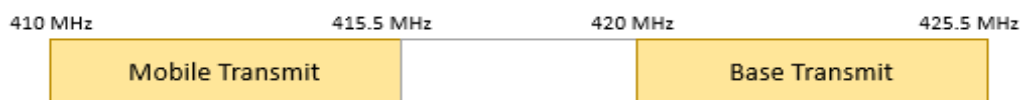


Figure 2. Base and mobile transmits of the spectrum under consultation

45 Figure 3 below shows the current spectrum assignments in the 406 MHz to 430 MHz range.

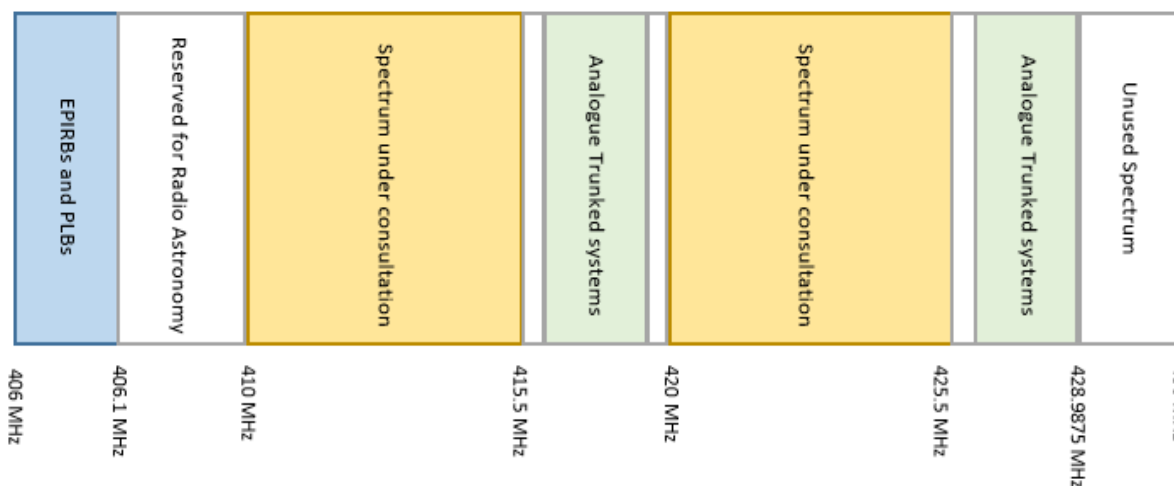


Figure 3. Adjacent users to the spectrum under consultation

46 The nearest spectrum assignments to 410-415.5 / 420-425.5 MHz sub-band are:

- Emergency Position Indicator Radio Beacon (“EPIRB”s) and Personal Locator Beacons (“PLB”s)²⁶; and
- Analogue Trunked Systems.²⁷

²⁶ EPIRBs and PLBs are safety of life radio transmitters which aid the search and rescue emergency services in detection and location of persons in distress.

²⁷ Analogue Trunked Systems are primary users operating at 415.7750 MHz-418.9875 MHz / 425.7750 MHz-428.9875 MHz. Trunked systems create pools of channels which can be accessed by any user rather than assigning specific channels to specific users. There are currently 11 analogue

4.3 Licence

- 47 Currently ComReg does not have any evidence before it to make a firm proposal on the minimum amount of spectrum that is required for an operator wishing to roll out a national network in the 400 MHz band. However, ComReg is mindful that there may be a need to accommodate a number of possible different operators in this band and as such considers that the spectrum should be made available in a number of blocks rather than one block of 2 x 5.500 MHz. Offering spectrum in small blocks allows potential users greater flexibility to aggregate spectrum blocks to fit a demand profile.
- 48 ComReg would note that in its award of this spectrum, the UK regulator, Ofcom, made the 412-414 / 422-424 MHz sub-band available in 4 lots of 2 x 500 kHz on a national basis. Were ComReg to adopt a similar approach to that adopted in the UK, it could allow multiple different operators to deploy different services in the band on a national basis. Given the quantum of spectrum available of 2 x 5.500 MHz, ComReg proposes to award 11 lots of 2 x 500 kHz.
- 49 The spectrum may also be acquired for third party use whereby licensees can allow third parties to use the spectrum without the need for individual licensing by each third party user.
- 50 ComReg welcomes submissions from interested parties on the minimum amount of spectrum required to roll out a national network. Consequently the proposed amount may be revised depending on the evidence received from respondents.

Q. 3 Do you agree with ComReg's proposal for national licences? Please provide reasons and supporting evidence for your answer.

Q. 4 Is 2 x 500 kHz an appropriate lot size?²⁸ Are there larger lot sizes that are equally preferable and suitable to all technologies and potential users? Please provide reasons and supporting evidence for your answer.

Q. 5 What is the requisite amount of spectrum required for each of the potential uses as set out in Chapter 2?²⁹ Is there a risk of the spectrum not being used to deliver the preferred service (or left completely unused) if a licensee is assigned less than the amount they require? Please provide reasons and supporting evidence for your answer.

trunked system licences at these frequencies. These licences are issued under the Wireless Telegraphy (Mobile Radio Systems) Regulations, 2002 (S.I. 435 of 2002).

²⁸ The lot size represents the smallest building block that potential users may use to aggregate spectrum into larger amounts.

²⁹ The requisite amount of spectrum that operators require is likely to vary across services (though they should all be multiples of the lot size). Certain uses may have minimum spectrum requirements that consist of more than one lot.

4.4 Channel Bandwidth

- 51 There are a number of ECC Decisions in force that set out the channelling arrangements that could be implemented. ECC/DEC/(06)06 advises member states to implement up to a 25 kHz channel plan in this band, with ECC/DEC/(04)06 not specifying a channel bandwidth.
- 52 One submission to ComReg's Radio Spectrum Management Strategy 2016 to 2018 (ComReg 16/50) addressed this matter. Sensus, a smart metering technology provider, believed that the available spectrum should be broken into allocations based on 12.5 kHz pairs stating that this will encourage a range of users into the band.
- 53 ECC/DEC/(04)06 and ECC/DEC/(06)06 are 13 and 11 years old respectively and technology has advanced significantly in the interim. These decisions are suitable to certain types of applications, such as PMR. As this spectrum will be awarded on a technology neutral basis, ComReg proposes not to restrict potential licensees to specific bandwidths, but rather to allow potential licensees to use their blocks with whatever bandwidth they wish.
- 54 As well as encouraging a greater diversity of users, this could allow up to 11 licensees to deploy different technologies in this band.

Q. 6 Do you agree with ComReg's proposal on channel bandwidth? Provide reasons and supporting evidence for your answer.

4.5 Guard Bands

- 55 ComReg does not propose to assign guard bands between adjacent operators. Instead, licensees would need to internalise any guard bands that their choice of technology may require. ComReg is of the view that any inter-operators interference could be mitigated by co-ordination between the parties involved. This approach has proven successful in other licensing types, for example, the 26 GHz National Block.

4.6 Maximum Permitted EIRP

- 56 ComReg refers to licence types and cross border coordination standards which are currently in place to inform the EIRP conditions of any future licence that may be awarded in the 400 MHz Band. These are discussed below.

Cross Border Coordination

- 57 There is an existing memorandum of understanding ("MOU") on frequency coordination between the Republic of Ireland and the United Kingdom in the 400

MHz Band, among others³⁰. The MOU sets out the criteria for coordination³¹, the method to predict propagation of base stations to assess the requirement for coordination, and the coordination procedure.

- 58 ComReg is of the opinion that all potential operators would be subject to the coordination thresholds and corresponding procedures set out in the MOU.
- 59 In 2013 ComReg concluded a consultation process for VHF and UHF telemetry processes.³²
- 60 In consultation document 11/94, ComReg proposed to introduce a 25 W maximum transmit power for national telemetry licences. After further consultation (ComReg 13/13) and considering views of respondents, ComReg decided to increase this limit to 50 W EIRP.
- 61 A 50 W EIRP limit allows:
- potential users to easily deploy a national network as fewer sites are required;
 - a more robust system (as cited in document 13/13); and
 - reduces interference concerns with the UK.
- 62 A limit of 50 W EIRP has proven successful as telemetry licensees have been able to successfully roll out a national network under this parameter.
- 63 Considering the above, and pending responses to this consultation, ComReg proposes an EIRP limit of 50 W for this award process.
- 64 ComReg reminds potential licensees that this is the maximum limit and not a guideline on the power level that should be used. In the interest of using the radio spectrum as efficiently as possible all users should use the lowest EIRP that permits stable usage.

³⁰ See Annex 2 for the full MOU document.

³¹ Within the frequency bands 410 to 414 MHz and 420 to 424 MHz, a station may be established without co-ordination, provided that the predicted power spectral density (PSD) produced by the station, at a height of 10m above ground at all locations beyond a line 15km inside the border or coast line of the neighbouring country does not exceed -140 dBW in a bandwidth of 25 kHz.

³² Telemetry systems is area wireless telegraphy systems by which automated measurements are made and other data collected at remote locations and transmitted to receiving station for monitoring or recording purposes, similar to a smart meter network.

4.7 Licence duration

65 As set out in Document 16/50, ComReg will continue to establish the appropriate duration of spectrum rights in accordance with its statutory objectives, powers and duties (including regulation 9(6) of the Authorisation Regulations), and on a case-by case basis having regard to the particular facts and circumstances of the matter at hand.

66 ComReg recalls that:

- the Common Regulatory Framework states that in determining the appropriate duration for rights of use, regard shall be made to the network or service concerned in view of the objective pursued and taking due account of the need to allow for an appropriate period for investment amortisation³³.

67 ComReg considers the following factors when determining an appropriate licence duration:

- the likely technologies that will be deployed using the spectrum;
- an appropriate period for return on investment; and
- the asset life of the network elements of the various technologies to be deployed.

Q. 7 Considering the likely technologies that will be deployed in this spectrum, please provide information on the asset life of the network elements.

4.8 Award Mechanism

68 As outlined in its Spectrum Strategy Statement, ComReg does not favour any specific approach for awarding spectrum rights but prefers to consider each award on its merits.

69 A key objective for ComReg in designing and carrying out a spectrum assignment process is to seek to encourage the efficient use and ensure the effective management of the radio frequency spectrum.

70 In broad terms, there are two main ways in which spectrum can be assigned. These are:

³³ Regulation 9(6) of the Authorisation Regulations.

- a) Market mechanism, whereby, subject to objective and transparent constraints set ex ante by the regulator, the market mechanism, for example an auction, determines the winners of spectrum rights and how much is assigned to same; or
- b) Administrative assignment, whereby the regulator determines who obtains spectrum rights, how much spectrum they obtain and what price is paid.

Administrative assignment

- 71 An administrative assignment can take many forms depending on the specific issues that it is intended to address. It could, for example, involve the administrative grant of spectrum to certain operators (incumbents), the reservation of spectrum for particular groups (new entrants) or the assignment of spectrum on a first come first served basis.
- 72 Administrative awards, however, rely on the regulator making decisions on the efficient use of spectrum where such decisions could be made with significant information asymmetries. This approach raises concerns that regulators may pick the incorrect technologies/operators or that market conditions may change too quickly for regulators to respond by re-planning available spectrum. Even where there is sufficient transparency over the end use there is a risk that the regulator will award the spectrum to less efficient users reducing the social value from the spectrum.
- 73 Where there is a possibility that demand may exceed supply, assigning spectrum on a first-come, first-served basis runs the risk that the spectrum is not assigned to those applicants who can generate greatest value to society from using the spectrum. Similarly, using a beauty contest type of award would involve some challenges for ComReg in assessing the likely value of alternative uses of the spectrum when making a decision on alternative candidate licensees.
- 74 Therefore, awarding spectrum rights of use through an administrative award is usually only appropriate in cases where the nature of demand is such that it is unlikely there will be excess demand.

Market Mechanisms

- 75 ComReg has found it beneficial to use market mechanisms, such as auctions, as an award mechanism for certain bands where the spectrum was scarce and the nature of demand was such that it could exceed supply. Use of a market mechanism removes the burden on ComReg to make complex judgements (based on incomplete information) in relation to assigning the spectrum and setting a suitable level of fees. A market mechanism can better elicit relevant information about the value of the spectrum that is likely not available to ComReg.

- 76 Efficient spectrum assignment generally requires rights of use to be assigned to those users able to make the best economic use of it, and for the users of the assigned spectrum to make use of it in the way that generates the greatest social benefit. Where demand for spectrum is greater than supply, achieving these objectives is typically supported by use of a market mechanism for assignment, such as a well-designed auction.
- 77 Such an approach would allow firms which value the spectrum rights of use the most 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.
- 78 As an aside, ComReg notes that a competitive assignment mechanism³⁴ would sit within a wider framework for awarding spectrum, where:
- An auction would be run in the event that there was competing demand for at least some of the spectrum available; or
 - the spectrum could be directly assigned to interested parties if it were possible to satisfy the demand expressed on all applications with the available spectrum (subject to any necessary conditions being satisfied).
- 79 An auction would only arise where demand exceeds supply. In that regard, the application stage of the award will determine the extent to which demand exceeds supply. Applications will require a binding bid at a minimum price from each bidder. These are then used to assess the extent to which the demand for lots exceeds supply and ultimately the need for an auction. If demand does not exceed supply, there would be no main stage of auction and lots would be assigned at minimum prices. In this way, even where the likelihood of demand exceeding supply does not arise, this award mechanism provides flexibility for the spectrum to be assigned in line with demand at minimum price.
- 80 ComReg has not made any determination on the award mechanism for this band. ComReg expects to determine an appropriate award mechanism having considered responses to this consultation, ComReg's statutory provisions relevant to the management of Ireland's radio frequency spectrum, and any other advice or information.

³⁴ ComReg recognises that there are different auctions formats available and that the most appropriate format for a particular award will be the one which best addresses the specific facts and circumstances that arise.

Q. 8 What are your views on the most appropriate assignment mechanism for rights of use in the 400 MHz band? How does this mechanism encourage the efficient use and ensure the effective management of the radio spectrum? Please provide reasons and supporting evidence for your answer.

4.9 Spectrum Fees

81 ComReg's current approach to setting spectrum fees is set out in Section 7.6 of its Spectrum Strategy Statement and, in particular, that:

- spectrum fees for rights of use are an important tool by which ComReg can ensure the efficient use of such rights; and
- the level of the spectrum fee (and any minimum price) will continue to be determined on a case by case basis in light of the relevant circumstances of the spectrum award (such as the particulars of the rights of use/spectrum band, international benchmarks etc.)

82 ComReg has previously used opportunity cost pricing as an appropriate method of encouraging the efficient use of the radio spectrum. The opportunity cost of the radio spectrum is the value associated with the best alternative use that is denied by granting access to one user rather than to the alternative. If spectrum fees do not consider alternative uses/users in determining the efficient assignment, the assignees have little incentive to consider that the frequencies assigned to them might be more efficiently used by other users.

83 In respect of the level at which a minimum price should be set in an award, a number of factors should inform that decision which are relevant to the proposed award process, including:

- the minimum price should not be set so high as to choke off demand of serious bidders;
- the minimum price should not be set so low that there is participation by frivolous bidders³⁵; and
- the minimum price should not facilitate collusive behaviour (whether tacit or explicit) or otherwise fixing demand.

³⁵ This also creates concerns that a premature award of spectrum may inefficiently displace valuable future uses or lead to excessive take up simply because the price is low.

- 84 The timing and manner in which spectrum fees are to be paid will continue to be determined on a case by case basis, noting that such fees can be apportioned between an upfront Spectrum Access Fee (SAFs) and ongoing Spectrum Usage Fees (SUFs).
- 85 ComReg has not made any determination on the level of fees appropriate for national licences in this band at this juncture. ComReg expects to determine fees for this band once it has made a decision on the various proposals set out in this document.

Q. 9 What are your views on ComReg's current approach to setting fees/minimum prices and the factors that inform the level at which a minimum price is set in an award? Please provide reasons and supporting evidence for your answer.

Chapter 5

5 Submitting Comments and Next Steps

5.1 Submitting Comments

- 86 All input and comments are welcome. However, it would make the task of analysing responses easier if comments were referenced to the relevant section/ paragraph number in each chapter and annex in this document.
- 87 Please also set out your reasoning and all supporting information for any views expressed.
- 88 The consultation period will run until 17:00 on Friday 1st September 2017 during which time ComReg welcomes written comments on any of the issues raised in this paper.
- 89 Responses must be submitted in written form (post or email) to the following recipient, clearly marked – Submissions to ComReg 17/67:

Mr. Patrick Bolton

Commission for Communications Regulation

One Dockland Central

Guild Street

Dublin 1

Ireland

D01 E4X0

Email: marketframeworkconsult@comreg.ie

- 90 We request that electronic submissions be submitted in an unprotected format so that they can be included in the ComReg submissions document for electronic publication.

- 91 ComReg appreciates that respondents may wish to provide confidential information if their comments are to be meaningful. In order to promote openness and transparency, ComReg will publish all respondents' submissions to this consultation as well as all substantive correspondence on matters relating to this document, subject to the provisions of ComReg's guidelines on the treatment of confidential information. In that regard, respondents are requested to provide both a confidential and non-confidential version of their submission to the consultation, providing supporting reasoning as to why they consider material to be confidential. Alternatively, respondents are requested to place confidential material in a separate annex to their response, again providing supporting reasoning in that annex as to why such material is confidential.

5.2 Next Steps

- 92 When it has concluded its review of all submissions received and other relevant material, ComReg's intention would be to publish a response to consultation and a draft decision as appropriate.

Annex: 1 Legal Basis

- 93 The Communications Regulation Acts 2002-2011 (the “2002 Act”), the Common Regulatory Framework (including the Framework and Authorisation Directives as transposed into Irish law by the corresponding Framework and Authorisation Regulations), and the Wireless Telegraphy Acts 1926 to 2009 set out, amongst other things, powers, functions, duties and objectives of ComReg that are relevant to the management of the radio frequency spectrum in Ireland.
- 94 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 serving to ensure that the allocation and assignment of radio frequencies is based on objective, transparent, non-discriminatory and proportionate criteria.
- 95 Regulation 10(1) of the Authorisation Regulations provides that, notwithstanding Section 5 of the Wireless Telegraphy Act, 1926, but subject to any regulations under Section 6 of that Act, ComReg may only attach those conditions listed in Part B of the Schedule to the Authorisation Regulations.
- 96 Regulation 19 of the Authorisation Regulations permits ComReg to impose fees for spectrum rights of use which reflect the need to ensure the optimal use of the radio frequency spectrum. 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.
- 97 Under Section 5(1) of the 1926 Act, ComReg may, subject to that Act, and on payment of the prescribed fees (if any), grant to any person a licence to keep and have possession of apparatus for wireless telegraphy in any specified place in the State. Section 5(2) provides that, such a licence shall 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 may be prescribed in regard to it by regulations made by ComReg under Section 6.

- 98 There is a legal requirement to be authorised to provide an electronic communications network or service in Ireland. Under Regulation 4(1) of the Authorisation Regulations, any undertaking intending to provide an electronic communications network or service shall, before doing so, notify ComReg of its intention to provide such a network or service, following which that undertaking will be deemed to be authorised under Regulation 4(4). The General Authorisation contained in Document 03/81R58 sets out the general conditions of authorisation.

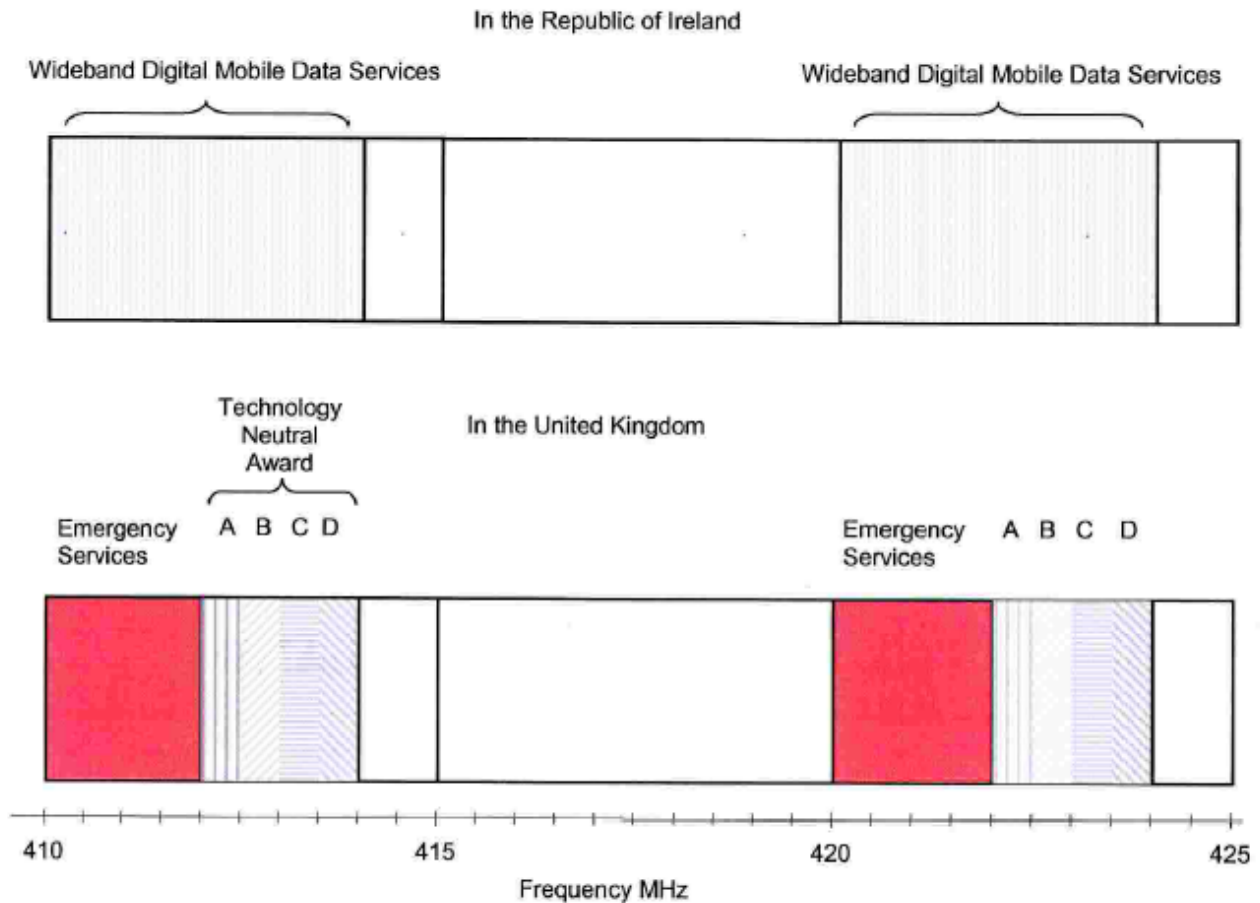
Annex: 2 Memorandum of Understanding on Frequency Co-ordination Between the Republic of Ireland and The United Kingdom in the Frequency Bands 410 to 414 and 420 to 424 MHz.



MEMORANDUM OF UNDERSTANDING
ON
FREQUENCY CO-ORDINATION BETWEEN
THE REPUBLIC OF IRELAND
AND
THE UNITED KINGDOM
IN THE FREQUENCY BANDS
410 TO 414 AND 420 TO 424 MHz

1. INTRODUCTION

- 1.1. This memorandum describes the procedures for the coordination of radio services between the Republic of Ireland (ROI) and the United Kingdom (UK) in the frequency bands 410 to 414 and 420 to 424MHz.
- 1.2. The current use of the frequency band 410 to 414 and 420 to 424MHz in the ROI and the UK is shown in the diagram below.



- 1.3. In the UK the frequency bands 410 to 412 paired with 420 to 422 MHz are designated for Government use and will be used by the Emergency Services. The frequency bands 412 to 414 paired with 422 to 424 MHz are planned to be awarded on a technology neutral basis, in the second half of 2006 according to ¹, 25K.Hz TETRA technology is anticipated.
- 1.4. In the ROI the frequency bands 410 to 414 paired with 420 to 424 MHz are licensed for Wideband Digital Mobile Data services, according to ECC Decision (04)06, EV-DO CDMA technology is anticipated .
- 1.5. Accordingly, the Administrations of the UK and the ROI have agreed the following co-ordination procedures.

¹ Award of available spectrum 412-414MHz paired with 422-424MHz Ofcom Consultation 13 October 2005.

2. PROCEDURE FOR COORDINATION

- 2.1. The co-ordination procedure, shall be based on the principle of equitable access to the spectrum resource
- 2.2. Within the frequency bands 410 to 414 MHz and 420 to 424 MHz, a station may be established without co-ordination, provided that the predicted power spectral density (PSD) produced by the station, at a height of 10m above ground at all locations beyond a line 15km inside the border or coast line of the neighbouring country does not exceed -140 dBW in a bandwidth of 25 kHz.

3. PREDICTION OF PROPAGATION

The field prediction method shall be according to the current version of Recommendation ITU-R P.1546 -2² which shall be applied as follows:

- 10% of the time and 50% of locations for land
- 10% of the time and 50% of locations for cold sea

Taking account of:

- Height of the mobile receiver antenna set at 10 m above ground.
- Average terrain 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
- Terrain clearance angle.

4. EXCHANGE OF INFORMATION

An MoU between the administrations of the ROI and the UK, which enables co-ordination between operators, subject to agreement of the Administrations, was signed on the 22 November 2000.³ This principle shall be extended to operators of systems for the frequency bands identified in this MOU.

At the request of one of the operators, details of existing and future base stations shall be made available by the other operator(s). Where interference is believed to be caused by another operator the respective operators shall exchange information with a view to resolving the difficulty. A copy of the interference details shall also be sent to both administrations.

² Recommendation ITU-R P.1546, Method for point-to-area predictions for terrestrial services in the frequency range 30 MHz to 3 000 MHz

³ Agreement between the administrations of United Kingdom/Ireland concerning the approval of planning arrangements between operators of mobile radio communication networks 22 November 2000

The Administrations of the ROI and the UK agree to facilitate this exchange of information between operators and to intervene should operators not be able to resolve cases of interference by mutual agreement.

Exchange of information for co-ordination purposes shall be in the format given Annex 1 to this agreement.

5. CO-ORDINATION PROCEDURE

The Administration of the ROI and the UK are committed to ensuring that the licensees covered by this Memorandum of Understanding respect the limits for establishment of base stations without co-ordination, given in 2 above. However, there might be an occasional need to establish stations such that the PSD will exceed the limits given in 2 above. In such cases, each administration may seek co-ordination according to the procedure described in Annex 1.

6. REVIEW ARRANGEMENTS

The limits and prediction methods defined in this Memorandum of Understanding may be reviewed in the light of experience of operation of networks in both countries and future prediction developments.

7. TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

Either Administration may withdraw from this Memorandum of Understanding subject to 6 months notice.

8. DATE OF ENTRY INTO FORCE

This Memorandum of Understanding shall enter into force on 1 October 2006.

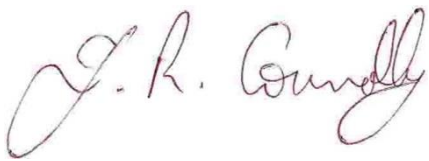
For the UNITED KINGDOM administration.



P BURY

Signed at London on 1 September 2006

For the administration of the REPUBLIC OF IRELAND



J CONNOLLY

Signed at Dublin on 19 September 2006

ANNEX 1

CO-ORDINATION PROCEDURE APPLICABLE TO RELATIONS BETWEEN
THE UNITED KINGDOM AND THE REPUBLIC OF IRELAND

1. - An Administration wishing to bring a station into service must submit a request for co-ordination with the other Administration by way of notice. As a minimum, the following characteristics should be forwarded:

- a) Frequency in MHz
- b) Name of transmitter station
- c) Country of location of transmitter station
- d) Geographical co-ordinates
- e) Effective antenna height
- f) Antenna polarisation
- g) Antenna azimuth
- h) Directivity in antenna systems
- i) Effective radiated power
- j) Channel bandwidth
- k) Expected coverage zone
- l) Date of entry into service
- m) Antenna tilt

The Administration affected shall evaluate the request for co-ordination and shall within 60 days notify the result of the evaluation to the Administration requesting co-ordination.

If in the course of the co-ordination procedure the Administration affected requires additional information, it may request such information.

An Administration not having responded within 60 days following receipt of a coordination request shall be deemed to have given its consent and the station may be put into use with the characteristics given in the request for co-ordination.

Annex: 3 Use in Other Countries

Country	Austria	Belgium	Denmark	Finland	France	Germany	Italy	Netherlands	Sweden	UK
410-415.5 Application	No applications	PMR, TETRA	TRA-ECS*, PMR, PPDR	PMR, Fixed, TETRA	SAP/SAB P to P links, Satellite Systems (military), PMR	PMR, Defence Systems	No Applications	No Applications	Land Mobile, PMR, TETRA	PMR, Space Research, Defence Systems, TRA-ECS*
420-425.5 Application	No Applications	PMR, TETRA	TRA-ECS, PMR, PPDR	PMR, Fixed, TETRA	Land Military systems Telemetry/ Telecommand (military), Radiolocation (military), PMR	PMR, Defence Systems	No Applications	No Applications	Land Mobile, PMR, TETRA	TRA-ECS*, Defence Systems

* TRA-ECS: Terrestrial Radio Applications capable of providing electronic communications services.

Annex: 4 Consultation Questions

Q. 1 Do you agree with ComReg's analysis of potential uses outlined above? If not, please provide supporting evidence for your view.

Q. 2 Do you have any suggestions for additional potential uses? Please provide reasons and evidence to support a potential use case.

Q. 3 Do you agree with ComReg's proposal for national licences? Please provide reasons and supporting evidence for your answer.

Q. 4 Is 2 x 500 kHz an appropriate lot size? Are there larger lot sizes that are equally preferable and suitable to all technologies and potential users? Please provide reasons and supporting evidence for your answer.

Q. 5 What is the requisite amount of spectrum required for each of the potential uses as set out in Chapter 2? Is there a risk of the spectrum not being used to deliver the preferred service (or left completely unused) if a licensee is assigned less than the amount they require? Please provide reasons and supporting evidence for your answer.

Q. 6 Do you agree with ComReg's proposal on channel bandwidth? Provide reasons and supporting evidence for your answer.

Q. 7 Considering the likely technologies that will be deployed in this spectrum, please provide information on the asset life of the network elements.

Q. 8 What are your views on the most appropriate assignment mechanism for rights of use in the 400 MHz band? How does this mechanism encourage the efficient use and ensure the effective management of the radio spectrum? Please provide reasons and supporting evidence for your answer.

Q. 9 What are your views on ComReg's current approach to setting fees/minimum prices and the factors that inform the level at which a minimum price is set in an award? Please provide reasons and supporting evidence for your answer.