Commission for
Communications Regulation

Management and use of the UHF radio frequency band in Ireland
(470 – 790 MHz)

Response to Consultation

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1 Introduction

1.1 The Commission for Communications Regulation ("ComReg") is the statutory body responsible for regulating the provision of electronic communications networks and services in Ireland and for ensuring the efficient management and use of the radio frequency spectrum, pursuant to its relevant functions, objectives, duties and powers which are set out in primary and secondary legislation.

1.2 On 11 February 2014, ComReg commenced a preliminary public consultation on the management and use of the UHF radio frequency band (470 – 790 MHz) (the "UHF band") in Ireland ("Document 14/13") [1]. Amongst other things, ComReg noted in Document 14/13 that:

- the UHF band is an important frequency band with attractive propagation characteristics such that many parties are likely to be interested in any discussions on its future management and use;
- in Ireland, similar to other countries in Europe, the UHF band is currently used for the provision of Digital Terrestrial Television ("DTT") and Programme Making and Special Events ("PMSE") services; and
- at an international level, the management and use of the UHF band is a topic of significant development and discussion:
    - in 2012, a decision was taken by the International Telecommunication Union ("ITU") to change the allocation status of the 694[2] – 790 MHz band (the "700 MHz band") in Region 1 (Europe, Africa and Middle East). This ITU decision gives a co-primary allocation to the Mobile Service (excluding aeronautical mobile) in the 700 MHz band alongside the existing primary allocation for broadcasting services and is due to take effect in 2015; and
    - alongside existing DTT and PMSE services, three new services are being considered for the 700 MHz band, namely the

[1] ComReg Document 14/13, Preliminary Consultation, *"Management and use of the UHF radio frequency band in Ireland (470 – 790 MHz)",* published 11 February 2014.

[2] The lower edge of the band (694 MHz or some other value) is to be confirmed by WRC-15.

International Mobile Telecommunications ("IMT") or Mobile Service, the Public Protection and Disaster Relief ("PPDR") service, and White Space Devices ("WSD") applications.

1.3 To stimulate and facilitate a discussion on the management and use of the UHF band at national level, Document 14/13 set out factual information relating to the UHF band and sought comments from interested parties on the demand by services for spectrum in the UHF band and the spectrum management considerations that might be considered in relation to these services. Five parties responded, as listed below[3], and ComReg thanks these parties for their responses, non-confidential versions of which are published in Document 14/13s[4]:

- 2RN (formerly RTÉNL);
- eircom Group (namely Meteor Mobile Communications Ltd. (MMC) and eircom Ltd. (eircom));
- Raidió Teilifís Éireann ("RTÉ");
- Telefónica; and
- UPC Communications Ireland Limited ("UPC").

1.1 Legal Framework for spectrum in Ireland

1.4 In preparing this document, ComReg has been guided by its statutory functions, objectives and duties relevant to the management of Ireland's radio frequency spectrum. A summary of the legal framework relevant to the management of radio frequency spectrum is set out in Annex 1 of Document 14/13. The overall remit of each of the following State bodies, with regard to radio frequency spectrum, is as follows:

- the Department of Communications Energy and Natural Resources ("DCENR") is responsible for setting policy in relation to spectrum, including broadcasting policy and Ireland's position in relation to decisions taken at any WRC;

[3] Another party, Hutchison 3G Ireland Limited ("Three"), submitted a letter stating that it would submit a response at a later date. As of date of publication no such response has yet been received.

[4] ComReg 14/13s, "Publication of the non-confidential submissions received to ComReg Document 14/13 – Management and use of the UHF radio frequency band in Ireland (470 – 790 MHz)", published 20 August 2014.

- the Broadcasting Authority of Ireland ("BAI") is responsible for the regulation of broadcasting content and licensing commercial DTT; and

- ComReg is responsible for regulating the provision of electronic communications networks and services and for ensuring the efficient management and use of the radio frequency spectrum. Of particular relevance, in the context of this consultation process, is that ComReg has obligations under the Broadcasting Act 2009 ("2009 Act") to provide licences for a minimum number of DTT multiplexes, as may be sought.

1.2 Key matters discussed in this document

1.5 Having considered the responses to Document 14/13 and other relevant material before it (such as the updated international information on the UHF band set out in Annexes 2 and 3), this document ("Response to Consultation 14/13") sets out ComReg's response to consultation Document 14/13 including the next steps which ComReg will take with respect to the UHF radio frequency band.

1.6 As discussed throughout this Response to Consultation 14/13, the management and use of the UHF band and in particular the 700 MHz band is an important matter for ComReg, given the band's attractive propagation characteristics and the current international harmonisation activities.

1.7 In carrying out this consultation process ComReg is not seeking to promote new services over existing services, nor is ComReg seeking to unduly protect existing services against new services. Instead, ComReg is seeking to carry out this process in line with its spectrum management objectives as set down in legislation and outlined above. While there has, in recent years, been a rapid growth in demand for mobile broadband services, there is also an established and continuing strong demand for a high quality, free-to-air national terrestrial television service. Many Irish users want fast internet access on their smartphones and tablets but many also want to watch television, including programmes which reflect local culture and values. An optimal solution, in terms of spectrum management, would allow them to do both.

1.8 ComReg is currently exploring the potential re-planning of the UHF band in such a way that the spectrum requirements for Irish DTT services (as defined under the 2009 Act) could be accommodated in the UHF band below the 700 MHz band. While these considerations are still at an exploratory stage, if such a revised DTT plan can be adopted then this would potentially release the 700 MHz band for re-assignment for other services.

1.9 However, there are many important matters to consider before such a revised plan could be adopted. In line with the next step suggestions made by RTÉ and 2RN in their responses to Document 14/13 and the recently published DCENR's Report on the future use of UHF spectrum for broadcasting in Ireland, [5] ComReg's next steps include progressing matters in relation to conducting a fully reasoned CBA of the likely costs and benefits (economic, social, and cultural) of RTÉ and PMSE users migrating out of the 700MHz band and into the remainder of the UHF band, and the consideration of a compensation mechanism for any such migration. ComReg has taken the suggestions of RTÉ and 2RN into consideration in defining the scope of the envisaged CBA study, details of which are set out in Annex 4, and ComReg is currently in the process of engaging external expert consultants.

1.3 Structure of this document

1.10 This document is structured as follows:

- Chapter 2 sets out a background information related to management and use of the UHF band in Ireland
- Chapter 3 discusses the preliminary consultation issues as outlined in Document 14/13 and any additional matters as raised by the respondents. Following this, ComReg's position on these matters is set out.
- Chapter 4 sets out the next steps in this project.
- Annex 1 provides a glossary of abbreviations used in this document.
- Annex 2 sets out updated information on the international discussions and developments related to the management and use of the UHF band.
- Annex 3 provides updated information on the status of the 700 MHz band and DTT in a sample of European countries; and
- Annex 4 provides an outline of the CBA tasks that ComReg is seeking economic advice on in relation to the 700 MHz band.

[5] http://www.dcenr.gov.ie/NR/rdonlyres/9EF4EF11-AC3E-499C-95CB-2EEF414DAA21/0/ReportoftheUHFSpectrumPolicyReviewGroup.pdf

Chapter 2

2 Background Information

2.1 In Ireland, similar to other EU Member States and non-EU countries in Europe, the UHF band is currently allocated to and used by the Digital Terrestrial Television ("DTT") and Programme Making and Special Events ("PMSE") services. This chapter sets out background information on the UHF band in Ireland, including information on the current allocation and use, international developments, developments in other European countries, and national discussions and preparations.

2.1 The existing DTT use of the UHF band

2.2 Under the Broadcasting Act 2009, RTÉ is responsible for establishing, maintaining and operating a national television broadcasting service which has the character of a public service, is free-to-air, and is available, in so far as is reasonably practicable, to the whole community on the island of Ireland. DTT services in Ireland are provided by RTÉ via its free-to-air *Saorview* service, which is a subscription-free digital television service available to Irish viewers. *Saorview* is operated by RTÉ under two multiplex licences issued by ComReg under the Broadcasting Act 2009.[6]

2.3 Data from RTÉ and 2RN[7] states that the *Saorview* service can be received by over 98% of Irish households and by circa 56% of householders in Northern Ireland. *Saorview* currently carries 8 TV programme channels (two in High Definition) including TV3 and TG4, a number of radio channels and the Aertel (teletext) digital service. According to the Television Audience Measurement (TAM) survey measurements of May 2014[8], approximately 612,000 TV homes (39.1%) had an "Irish DTT" reception method, while 156,000 TV homes (9.8%) classified DTT as the highest form of TV reception available within the home.

2.4 To facilitate *Saorview*, two DTT Public Service Broadcasting (PSB) Multiplex licences have been issued to RTÉ. These licences, which expire in 2019, include assigned spectrum rights of use across the UHF band, including the 700

[6] The TV services carried on *Saorview* are RTÉ One, RTÉ two HD, TV3, TG4, RTÉ News Now, 3e, RTÉ jr, RTÉ One+1 and the digital teletext service RTÉ Aertel. The radio services are RTÉ Radio 1, RTÉ 2fm, RTÉ Lyric FM, RTÉ Raidió Na Gaeltachta, RTÉ Radio 1+1, RTÉ 2XM, RTÉ jr, RTÉ Gold, RTÉ Choice and RTÉ Pulse.

[7] Source: RTÉ and 2RN submissions to ComReg Document 14/13.

[8] http://www.tamireland.ie/tv/universes

MHz band. The 2009 Act places an obligation on ComReg to provide two DTT multiplex licences to RTÉ on request.

2.5 As explained in section 4.1.1 of Document 14/13, the current DTT spectrum management plan provides for the assignment of spectrum for up to nine DTT multiplexes, spread across the UHF band. Spectrum rights of use have been assigned to RTÉ to meet its requirements to date, this being the spectrum assigned under the two existing DTT PSB Multiplex licences. Spectrum rights of use for additional multiplexes under the 2009 Act, have not been issued, as no additional multiplexes licences have been requested by the BAI.

2.2 The existing PMSE use of the UHF band

2.6 In Ireland, similar to other EU Member States and non-EU countries in Europe, spectrum for PMSE is used to cover a wide variety of live and pre-recorded televised events of social and community importance. Licensed PMSE services mainly use the UHF band for wireless microphones and in-ear monitoring systems. As explained in section 4.2 of Document 14/13, spectrum in the UHF band can be assigned to PMSE on a secondary basis, in:

- UHF channel 38 (606 – 614MHz);
- the “interleaved spectrum” between the planned DTT channel; and
- the spectrum planned for DTT channels but currently unused.

2.3 International Developments

2.7 At an international level, significant work is ongoing in relation to the future management and use of the UHF band. This is driven by a number of factors including the changing demand of users in relation to audio visual content and Mobile Services (see section 3.3 for further details on the demand of these services) and the preparations for and discussions regarding the changing spectrum management environment for the UHF band.

2.8 At the 2012 World Radiocommunication Conference (“WRC-12”) a decision was made by the International Telecommunication Union (“ITU”) to change the allocation status of the 694[9] – 790 MHz band (“the 700 MHz band”) in Region 1 (Europe, Africa and Middle East). This decision will take effect after WRC-15 has ended, in late 2015, and it will give a co-primary allocation to the Mobile

[9] The lower edge of the band (694 MHz or some other value) is to be confirmed by WRC-15.

Service (excluding aeronautical mobile) in the 700 MHz band alongside the existing primary allocation for broadcasting services.[10]

2.9 On foot of this decision, and other matters such as the agenda items for WRC-15, a significant body of work across a variety of organisations is ongoing in relation to the UHF band. Annex 2 sets out updated information including an update on:

- Agenda item 1.1[11] of the WRC-15 where it is noted that the 470-694 MHz band is amongst the bands under consideration;
- Agenda item 1.2[12] which is considering the 700 MHz band;
- The technical harmonisation work and preparations are currently underway to make the 700 MHz band available for terrestrial systems capable of providing electronic communications services. In this regard, it is notable that:
  - in response to the EC mandate on the 700 MHz band[13], in June 2014 the European Conference of Postal and Telecommunications Administrations (CEPT), sent its first draft report (draft CEPT report 53[14]) to the European Commission (EC);
  - in June 2014 work commenced within CEPT to develop harmonised technical conditions for the 700 MHz band on the basis of draft CEPT Report 53. In order to take account of the

[10] A change to an allocation at an ITU regional level does not necessarily mean that all countries within that ITU Region must or will adopt that allocation or bring it into use by assigning frequencies to the allocated service. This is a matter for the individual countries to consider and plan in light of its own national circumstances and obligations.

[11] Agenda Item 1.1 is *to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC 12).*

[12] Agenda Item 1.2 is *to examine the results of ITU R studies, in accordance with Resolution 232 (WRC 12), on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures.*

[13] See RSCOM12-37 Rev3 available at https://circabc.europa.eu/ (DG Connect / Radio Spectrum Committee) or CEPT website at http://www.cept.org/Documents/ecc/9585/ECC(13)INFO-002_RSCOM12-37-Mandate-CEPT-700-MHz

[14] http://www.cept.org/files/1051/Tools%20and%20Services/Public%20Consultations/2014/Draft%20CEPT%20Rep53.zip

WRC-15, CEPT agreed that the date of implementation of this decision would be 1 April 2016; and

- the discussions surrounding the long-term future of the UHF band which note that:
    - in June 2014 the ECC published its draft report (ECC Report 224[15]) on a long-term vision for the UHF broadcasting band in Europe. Among other things this provisionally concludes that the long term usage of the band 470-694 MHz is mainly foreseen for downstream audiovisual content distribution.

2.4 Developments in other European countries

2.10 Annex 3 presents updated information on the 700 MHz band and DTT status in a sample of European countries. Annex 3 highlights that:

- Finland and Sweden have stated their firm intention to migrate DTT out of the 700 MHz band by 2017 so that it can be reallocated to the Mobile Service for wireless broadband;
- Germany, Poland and the UK have issued consultations on the 700 MHz band which among other things discuss the potential inclusion of the 700 MHz award in future award process. For example, in the UK's most recent consultation,[16] Ofcom proposes that the 700 MHz band would be available by 2022, or possibly two years earlier. It also expects to award new licences in the 700 MHz band through an auction process, around 2020, though Ofcom will also consider comments in relation to the timing of the award, including as early as 2016; and
- France, the Netherlands, Italy and Switzerland do not appear to have issued public consultations on the future allocation of the 700 MHz band.

2.11 Annex 3 also highlights that demand for DTT services and its future development varies per country:

15 http://www.cept.org/files/1051/Tools%20and%20Services/Public%20Consultations/2014/Draft%20ECC%20Rep224.docx

16 Consultation on future use of the 700 MHz band Cost-benefit analysis of changing its use to mobile services, Ofcom, 28 May 2014.

- In Finland, France, Italy and the UK, DTT is well established and for the foreseeable future spectrum is required for 6 or more national multiplexes.

- For Germany, the Netherlands and Switzerland DTT is less well established (e.g. in Switzerland DTT accounts for 4% of the market) and hence the spectrum requirement for DTT is under consideration.

2.5 National discussion and preparations

2.12 While Document 14/13 and the responses to same have helped stimulate a public discussion on the future management and use of the UHF band in Ireland, ComReg notes that other actions are also underway.

2.13 The Department of Communications, Energy and Natural Resources ("DCENR") established a broadcaster stakeholder group to review the future of the UHF spectrum from a broadcast perspective. The work of this group has been completed and a DCENR report on the future use of UHF spectrum for broadcasting in Ireland (the "DCENR UHF broadcasting Report") has been published.[17]

2.14 The DCENR has also commenced a review of national spectrum policy and a public consultation document was issued on 24 July 2014[18]. The future use of the UHF band is discussed in that consultation document and it is stated that the DCENR UHF broadcasting Report will form a key input to the consultation and the Department's overall spectrum policy.

2.15 ComReg is currently exploring the potential to re-plan the UHF band in such a way that the spectrum requirements for Irish DTT services (as defined under the 2009 Act) could be accommodated in the UHF band below the 700 MHz band. This replanning is being carried out in collaboration with the BAI and 2RN and exploratory discussions are also being held with neighbouring administrations, particularly Ofcom in the UK.

2.16 Given the importance of the UHF band, and given international developments under which the technical conditions that could facilitate a change of use for the 700 MHz band are becoming more concrete, ComReg remains of the view that

[17] http://www.dcenr.gov.ie/NR/rdonlyres/9EF4EF11-AC3E-499C-95CB-2EEF414DAA21/0/ReportoftheUHFSpectrumPolicyReviewGroup.pdf

[18] http://www.dcenr.gov.ie/NR/rdonlyres/8D2F913A-60C5-46C6-97A6-9DB8EEA4AB02/0/SpectrumConsultationDocument.pdf

it is important that Ireland‘s discussions on the UHF band are carried out in a comprehensive and timely fashion. This is necessary in order to ensure the effective management and efficient use of this band for the benefit of consumers and users.

Chapter 3

3 Management of the UHF band - Preliminary Consultation Issues

3.1 This chapter discusses the three preliminary issues set out in chapters 5 and 6 of Document 14/13 and other issues raised by respondents to Document 14/13.

3.1 Summary of Document 14/13

3.2 Chapters 5 and 6 of Document 14/13 set out three issues for which ComReg sought comments:

(a) demand for spectrum in the UHF band and whether services other than DTT and PMSE should be considered;

(b) considerations that should be taken into account in relation to the 700 MHz band; and

(c) considerations that should be taken into account in relation to the remainder of the UHF band, excluding the 700 MHz band (i.e. 470 – 694 MHz).

3.1.1 Demand by services for spectrum in the UHF band

3.3 Document 14/13 presented information on the five potential uses of the UHF band being considered internationally, being the two existing services in the UHF band (DTT and PMSE) and three potential new services (mobile, the Public Protection and Disaster Relief ("PPDR") service, and White Space Devices ("WSD") applications).

3.4 Document 14/13 noted that spectrum in the UHF band could potentially be used by more than one service at one time (it is currently used by DTT and PMSE) and that services could use bands outside of the UHF band (Irish Mobile Services currently use a number of different spectrum bands).

3.1.1.1 Demand by DTT

3.5 In relation to DTT, ComReg noted the following in Document 14/13:

- RTÉ is the current provider of DTT services in Ireland via its *Saorview* platform. To facilitate *Saorview*, two DTT Public Service Broadcasting (PSB) Multiplex licences have been issued to RTÉ. *Saorview* was launched to the public in May 2011.

- The Special Eurobarometer Report 396[19] identified DTT as the most popular way for households to access television services in Europe. In the period February to March 2013, 40% of European households received television via DTT. However, the importance of DTT varies with some countries having a higher usage and more developed DTT service than others.

- Making broadcasting policy, including assessments of future demand for DTT in Ireland, is a matter for the Minister for Communications, Energy and Natural Resources. While the BAI has clarified that it does not intend to request spectrum for commercial DTT at this time, future plans and related spectrum requirements in relation to *Saorview* are unknown.

- ComReg is obliged to comply with all relevant legislation, including the Wireless Telegraphy 1926 and the Broadcasting Act 2009 ("the 2009 Act"). The 2009 Act in particular requires ComReg to provide spectrum for a minimum number of DTT multiplexes. However, the BAI has decided not to proceed with a licensing process for commercial DTT at this time, which means that UHF spectrum set aside for commercial DTT could remain unused.

3.1.1.2 Demand by PMSE

3.6 ComReg noted in Document 14/13 that audio PMSE systems, such as wireless microphones and in-ear monitoring systems, currently use the UHF band and to date ComReg has not experienced any difficulty in assigning UHF band spectrum for PMSE. However, the increasing demand for spectrum in the UHF band could restrict its availability for PMSE in the future. Further, at the EU level, an EC technical harmonisation decision to provide spectrum for audio PMSE is being considered and ComReg will take any such decision, if made, into consideration, when considering the spectrum for PMSE.

[19] http://ec.europa.eu/public_opinion/archives/ebs/ebs_396_en.pdf

3.1.1.3 Demand by Mobile

3.7 In relation to the Mobile Service, ComReg stated in Document 14/13 that it considered that while matters are generally at an early stage in most countries, there is likely to be strong support to make the 700 MHz band available for Mobile Services in Europe. ComReg noted certain key factors, including growing demand for mobile data services, now and in the future, with some studies suggesting annual growth rates of 18% to 70% (OECD[20] and Cisco[21] reports). ComReg also noted current use of the 700 MHz band for Mobile Services markets outside Europe (including the USA and markets in the Asia-Pacific region) and the opportunity this presents for international harmonisation. In addition, ComReg noted the increasing focus at a European level, and within Member States, on making the 700 MHz band available for Mobile Services:

- in France, Germany, Poland and Finland, statements/consultations have already discussed the release of the 700 MHz band for Mobile Services;
- the EU has mandated CEPT to develop technical harmonisations conditions for the 700 MHz band [22]; and
- the RSPG's opinion on the strategic challenges facing Europe in addressing the growing spectrum demand for Wireless Broadband (WBB) which, among other things, identified the 700 MHz band as a potential candidate band for WBB in the medium term.

3.1.1.4 Demand by PPDR

3.8 ComReg noted that two spectrum bands are being considered at a European level for a broadband Public Protection and Disaster Relief ("BB PPDR") system, namely the 400-470 MHz band and the 700 MHz band, with discussions at an early stage.

3.1.1.5 Demand by WSD

3.9 In relation to White Space Devices ("WSD"), ComReg noted that while spectrum in the UHF band is being considered within the CEPT FM53 working group, the

[20] http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm

[21] Cisco VNI Global Mobile Data traffic Forecast Update 2010-2015 (2011).

[22] See RSCOM12-37 Rev3 available at https://circabc.europa.eu/ (DG Connect / Radio Spectrum Committee) or CEPT website at http://www.cept.org/Documents/ecc/9585/ECC(13)INFO-002_RSCOM12-37-Mandate-CEPT-700-MHz

future regulatory framework for WSD and its likely demand for spectrum have not been established.

3.1.2 Considerations associated with the 700 MHz band

3.10 ComReg sought views on the spectrum management considerations that it should take into account regarding the change which will occur in the 700 MHz band in late 2015, when co-primary allocation will be given to the Mobile Service (excluding aeronautical services). Specifically, ComReg sought views on:

- the potential demand for particular uses of spectrum in the 700 MHz band;
- the benefits of facilitating these uses;
- the migration considerations and costs that might be considered in relation to existing users; and
- the timing considerations associated with implementing this ITU-RR allocation change in Ireland.

3.1.3 Considerations associated with the 470 – 694 MHz band

3.11 Noting the discussions at an international level regarding the remainder of the UHF band, excluding the 700 MHz band, which is being considered as a potential candidate band under agenda item 1.1 of WRC-15[23], ComReg sought views on the following:

- the potential demand for particular uses of spectrum in the remainder of the UHF band;
- the economic, social and cultural benefits of facilitating these uses;
- the migration considerations and costs that might be considered in relation to the existing users; and
- any associated timing considerations associated with facilitating new uses.

[23] The studies of the additional spectrum requirements of IMT and other terrestrial mobile broadband services and the potential candidate frequency bands are to be considered under agenda item 1.1 of WRC-15, and appropriate actions taken at WRC-15.

3.2 Key matters raised by Respondents

3.12 This section first considers a number of key matters raised by the four respondents to Document 14/13 (RTÉ, 2RN, Telefónica, and eircom Group), which relate to the position that ComReg may take on to the more specific preliminary consultation matters.

3.2.1 Summary of responses to Document 14/13

3.2.1.1 The importance of the UHF band to Ireland

3.13 The four respondents commented on the importance of the UHF band for existing and new services. Two respondents (RTÉ and 2RN) highlighted the importance of the UHF band for providing the *Saorview* DTT service. The other two respondents (eircom Group and Telefónica) noted the importance of the efficient management of the UHF band against the significant changes in use that are expected over the coming years (i.e. the development and delivery of high quality mobile broadband services particular for rural low population areas).

3.2.1.2 Broadcasting policy guidance from DCENR

3.14 Noting the importance of the UHF band for the provision of *Saorview*, RTÉ and 2RN submitted that the management of the UHF band is not just a matter of economic or national resource management but a matter of social, cultural and political importance. They further submitted that any discussion on the UHF band needs guidance and policy direction from DCENR and that ComReg should wait for this guidance before proceeding further.

3.2.1.3 A detailed Cost Benefit Analysis (CBA)

3.15 Having expressed their view as to the importance of the UHF band for *Saorview* and that management of the UHF band is not just an economic matter but one of social, cultural and political importance, RTÉ and 2RN submitted that a detailed Cost Benefit Analysis (CBA) on any potential spectrum reassignment should be carried out. RTÉ further suggested that the CBA should be carried out in consultation with industry. RTÉ and 2RN submitted that the CBA should consider:

- demand for broadcasting spectrum in Ireland (2RN and RTÉ)
- demand for mobile broadband spectrum in Ireland (2RN and RTÉ)

- *"ways to increase mobile broadband capacity (where necessary) within existing spectrum allocations (including the 2.6GHz band)."* (2RN)
- the migration costs and disruption that would be caused to the DTT viewer, the network operator and the *Saorview* platform by any migration (RTÉ and 2RN)
- "*the social, cultural and economic"* benefits of the DTT Public Service Broadcasting (PSB) that is currently in the UHF band (RTÉ and 2RN)
- *"the ability to continue to grow the DTT platform."* (2RN)
- *"different implementation options including a least disruptive model for broadcast users"* (RTÉ);
- *"protection of broadcasting in adjacent spectrum"* (RTÉ); and
- *"compensation for existing users"* (RTÉ)

3.2.1.4 Consideration of a compensation mechanism for broadcasting migration

3.16 Having expressed the view that a spectrum reassignment would involve disruption and costs for existing viewers and network operators, both RTÉ and 2RN submitted that a compensation mechanism is a key matter which ought to be progressed. RTÉ further referred to the Radio Spectrum Policy Programme (RSPP) Decision[24] which provides for possible compensation and submitted that this needs to be given high priority during early considerations of any potential migration of Irish broadcast services out of the 700 MHz band.

3.2.2 ComReg's position

3.17 ComReg agrees that the UHF band is an important spectrum band for Ireland for a number of reasons, including its attractive propagation characteristics that facilitate the widespread coverage of services, its current usage in the provision of the free-to-air public DTT and PMSE services in Ireland and its potential usage for enhanced existing services or for new services, and the resultant benefits that this could bring to Ireland.

[24] DECISION No 243/2012/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 March 2012 establishing a multiannual radio spectrum policy programme. http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32012D0243

3.18 ComReg notes that RTÉ and 2RN both submitted that ComReg should await broadcasting policy guidance from DCENR before progressing with this project. ComReg, however, remains of the view that discussions on the UHF band should progress without delay, so as to ensure the effective future management and efficient use of the UHF band. ComReg will therefore continue its considerations of the future management and use of the UHF band, while also taking due account of any changes in broadcasting policy as may be made by DCENR. ComReg will ensure, in particular, that due account is taken of both the report of DCENR's UHF Spectrum Policy Review Group and relevant policy guidance which emerges from the DCENR's review of national spectrum policy. In addition, ComReg hopes that the CBA (as discussed below), in addition to informing the future regulatory measure to be taken by ComReg, should also serve as a future input to DCENR's policy-making process.

3.19 ComReg also notes that RTÉ and 2RN suggested that two key matters be progressed, namely the carrying out of a CBA and the consideration of a compensation mechanism for migration. ComReg believes that there is merit in these two matters and these are included in ComReg next steps in this process. ComReg has taken the suggestions of RTÉ and 2RN into consideration in defining the scope of the CBA, details of which are set out in Annex 4. ComReg is currently in the process of engaging external expert consultants to carry out the CBA.

3.20 The CBA may necessitate requesting certain information (such as cost information) from industry in order to ensure that the CBA is sufficiently robust. This was noted by RTÉ in its response where it suggested that the CBA be carried out in consultation with industry. ComReg welcomes the full co-operation of industry in relation to any such information requests and any information provided will be treated in accordance with ComReg's guidelines on the treatment of confidential information[25].

3.21 ComReg notes that RTÉ and 2RN both submitted that the payment of compensation needs to be given high priority in any consideration of the migration of broadcast services from the 700 MHz band, and that Article 6(5) of the RSPP Decision states that: *"Member States may, where appropriate and in conformity with Union law, ensure that the direct cost of migration or reallocation of spectrum usage is adequately compensated in accordance with national law."*ComReg is of the view that any possible payment of compensation

[25] See ComReg Document 05/24 http://www.comreg.ie/_fileupload/publications/ComReg0524.pdf

needs appropriate consideration, having regard to relevant legislative provisions and factors.

3.3 Demand by services for spectrum in UHF band

3.22 Four respondents (RTÉ, 2RN, Telefónica and eircom Group) commented on the demand by services for spectrum in the UHF band.

3.3.1 Summary of responses to Document 14/13

3.3.1.1 Sharing of spectrum by different services

3.23 Two respondents (RTÉ and 2RN) commented on the possibility of spectrum in the UHF band being shared by one or more services. They pointed to the current sharing of the UHF band by DTT and PMSE services, with RTÉ submitting that sharing was possible when carefully planned. RTÉ also expressed the view that sharing between broadcasting and mobile broadband is not possible within the same band without there being complicated, and most likely inefficient, geographical separation.

3.3.1.2 Demand by DTT

3.24 Four respondents commented on demand for spectrum in the UHF band, for DTT.

3.25 Two respondents, RTÉ and 2RN, stated that take-up of DTT in Ireland is growing and as of January 2014 *Saorview* was received in 39% of Irish TV households (620,000). Both respondents expect take-up of DTT to continue to grow and 2RN referenced an Ofcom document and suggested that demand for terrestrial broadcasting is expected to continue up until at least 2030."[26]

3.26 Three respondents (RTÉ, 2RN, and Telefónica) commented upon non-linear methods of consuming broadcast content and the effect this might have on demand for linear TV. Telefónica submitted that the traditional model of a broadcaster transmitting audio-visual content in real-time over a terrestrial wireless network is no longer representative of how content is consumed today. Telefónica further submitted that traditional broadcasters must now compete with non-traditional content providers who, up until recently, did not exist, including Netflix, AerTV, Youtube, Facebook and online players such as RTÉ

[26] 2RN referenced Ofcom - "Securing long term benefits from scarce low frequency spectrum", November 2012.

Player. [27] Having noted the changing broadcast environment, Telefónica expressed its view that "*use of UHF spectrum for broadcasting is of diminishing importance as a means to deliver audio-visual content generally".*

3.27 While RTÉ and 2RN noted that there is non-linear consumption of broadcast content, they both submitted that consumption of linear TV is growing. RTÉ submitted that on-demand TV viewing is not expected to have a significant eroding effect on linear TV consumption before 2020, at the earliest. In support of its submission, RTÉ stated that:

- in 2012, the average European consumed 3 hours and 55 minutes per day of scheduled linear television content, 7 minutes more than in 2011.[28]
- recent research from the UK for 2013 found that 98.5% of total viewing is still carried out via the TV set, with the remaining 1.5% on alternative screens such as laptop and tablets.[29] and
- TAM Ireland reports that in Ireland last year adult viewers watched television for an average of 3 hours and 28 minutes every day, of which 91% was live TV.[30];

3.28 All four respondents commented on the likely spectrum needs of DTT. Two respondents (eircom and Telefónica) submitted that demand for further DTT multiplexes was unlikely to materialise and that section 132 of the 2009 Act should be amended. Telefónica also submitted that spectrum in the VHF band III could be used to meet demand for at least two multiplexes.

3.29 2RN noted that the 2009 Act currently provides for up to six multiplexes but submitted that this needs revision, noting that the 2009 Act was enacted when the entire 470 - 862 MHz band was available for broadcast use. 2RN submitted that it would *"be prudent to expect and plan for at least 3, or possibly 4, high quality national multiplexes in Ireland"*.

[27] Telefónica noted that RTÉ Player's usage grew 35% over the past two years and gaining 330,000 users in the past six months. http://www.rte.ie/blogs/digital/2014/02/13/the-growth-of-video-on-demand/

[28] RTÉ referenced Médiamétrie - Eurodata TV Worldwide - One Television Year in the World - Edition 2013, www.mediametrie.com/eurodatatv/communiques/one-tv-year-in-the-workd-2012-or-the-multiple-tv-experience.php?id=831

[29] RTÉ referenced Thinkbox, February 2014

[30] RTÉ referenced http://www.tamireland.ie/node/381

3.30 RTÉ stated that the 2009 Act was written when there was up to 390MHz of spectrum available to broadcasting (470 – 862MHz) and submitted that a broadcasting band consisting of 470 – 694 MHz would be significantly smaller and could therefore support fewer high quality broadcast services, particularly in the likely event of there being intensive use of the same spectrum in the UK.

3.3.1.3 Demand by Mobile

3.31 Three respondents (RTÉ, 2RN and Telefónica) commented upon the demand by Mobile Services for spectrum in the UHF band.

3.32 Telefónica stated that it has seen explosive growth in the use of data on smartphones in the past year, stating that *"data throughput on O2's network has grown by almost 60% in the second half of 2013, and this is consistent with both reported historical growth and forecast growth from various sources."* Telefónica puts this growth down to a number of factors including the increased penetration of smartphones and higher peak-data rates at the access level, but also changing consumer behaviour whereby the internet is used more often and for more data per session.

3.33 Telefónica submitted that this upward trend is likely to continue for a number of years though it considers it difficult to be precise as to how long it will continue and at what rate. Telefónica cited a number of sources including Ericsson[31], Neilson[32], Red Mobile[33], and Cisco as indicating that data throughput is doubling annually and it submitted that these sources seem consistent with its own recent experience. Telefónica also pointed to the fact that some countries (including the USA and Denmark) have already taken steps to increase spectrum allocation for Mobile Services. Telefónica expressed its view that there is a predictable requirement for more spectrum to be allocated for wireless broadband services in the coming few years. Telefónica further expressed its view that the advantages of lower frequency spectrum for wireless broadband services are likely to be more pronounced in Ireland, given the relatively low population density. Telefónica submitted that ComReg therefore needs to progress the release of additional UHF spectrum for broadband access in the short to medium term.

[31] Telefónica referenced http://www.ericsson.com/news/1561267

[32] Telefónica referenced http://www.nielsen.com/us/en/newswire/2011/average-u-s-smartphone-data-usage-up-89-as-cost-per-mb-goes-down-46.html

[33] Telefónica referenced http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10253.html

3.34 As against the views of Telefónica, both RTÉ and 2RN questioned the scale of predicted growth for mobile data and the level of demand by Mobile Services for spectrum in the UHF band. Among other things, RTÉ and 2RN submitted that:

- current DTT data consumption far exceeds current mobile data consumption and (predicted) future mobile consumption;
- there is not a current shortage of spectrum for mobile broadband services in Ireland, particularly for rural broadband (2RN only);
- an important consideration in determining future spectrum requirements for mobile broadband is the degree to which WiFi offload accounts for those requirements (estimates vary but at present up to 80% of mobile data is carried over WiFi and not over mobile networks[34]); and
- spectrum in other bands (e.g. the 2.6 GHz band) should be made available for Mobile Services before considering the use of UHF spectrum.

3.3.1.4 Demand by PMSE

3.35 Three respondents (RTÉ, 2RN and Telefónica) commented on the demand by PMSE services for spectrum in the UHF band. Two respondents (RTÉ and 2RN) submitted that PMSE is vital for producing broadcast content and that use of PMSE is growing. RTÉ provided data on PMSE usage and submitted that manufacturers and users expect PMSE use to continue to grow by 5% annually in the period up to 2019[35]. RTÉ further stated that it currently uses over 24 MHz of spectrum for PMSE, in non-contiguous blocks throughout the 470 to 790 MHz band, with over 130 devices in its Donnybrook studio campus alone[36]

3.36 In relation to spectrum for PMSE services, all three respondents (RTÉ, 2RN and Telefónica) expressed the view that there is a need to make spectrum available for PMSE.

[34] Both RTÉ and 2RN referenced Communications Chambers, UK - The value of Digital Terrestrial Television in an era of increasing demand for spectrum, Jan 2014.

[35] RTÉ referenced ECC Report 204, Feb 2014

[36] RTÉ stated that *"The production of TV shows such as "The Late Late Show" can require up to 50 RF devices alone, which must co-exist throughout the day long production with production in adjacent studios."*

3.3.1.5 Demand by WSD

3.37 Three respondents (RTÉ, 2RN and Telefónica) submitted that WSD applications are expected to use spectrum in the UHF band in a manner similar to PMSE, and therefore spectrum management decisions in the UHF band are likely to affect WSD applications in a similar manner to PMSE. 2RN stated that it would welcome the implementation of other white space applications in the UHF band provided that sufficient safeguards are in place, including additional resources to identify and mitigate intermittent and difficult to trace sources of interference.

3.3.1.6 Demand by PPDR

3.38 One respondent (Telefónica) submitted that there is no need for the ITU or EU to identify harmonised spectrum exclusively for PPDR within the 700MHz band, on the basis that the PPDR requirement could be met by the future network resources of the MNOs or by the band below 470MHz and other spectrum bands.

3.3.2 ComReg's position

3.3.2.1 General

3.39 While ComReg notes that it may be difficult for certain services (e.g. Mobile and Broadcasting) to share the UHF band and notes the ongoing international considerations on this[37], ComReg is also of the preliminary view that there is increasing convergence between the types of services carried on the same networks – for example, traditional broadcast content is increasingly being carried over mobile broadband networks.

3.3.2.2 Demand by DTT

3.40 In relation to the DTT responses, ComReg notes the following:

- While take-up of DTT services continues to increase, the rate of increase has slowed over the last 15 months. In May 2014, DTT services were received in 39% of Irish households, compared to 36% in January 2013. However, the number of households which use DTT as the primary TV

[37] For example, the work of CEPT TG6 and the EC workstream titled "Challenges and opportunities of broadcast-broadband convergence and its impact on spectrum and network use";

reception method has decreased, from 198,000 in January 2013 to 156,000 (or 9.8%) in March 2014. [38]

- There appears to be general agreement that consumption of non-linear broadcast content will increase in future. ComReg notes the increasing usage of broadcast players, such as the RTÉ Player, and services such as Netflix.

- The respondents submitted varying views as to the effect that the consumption of non-linear broadcast content might have on linear TV. Telefónica expressed the view that increased consumption of non-linear content means that the UHF band will be of diminishing importance as a means of broadcasting audio-visual content. RTÉ expressed the view that linear TV consumption will continue to increase and that non-linear TV should not have a significant eroding effect on linear TV consumption, before 2020 at least.

- The respondents generally agreed that there is little likelihood of six DTT multiplexes being required in Ireland and none of them foresee there being any future demand for a commercial DTT Multiplex service. 2RN submitted that Ireland might only need to "*expect and plan for at least 3, or possibly 4, high quality national multiplexes in Ireland".* The respondents are thus generally of the view that the relevant provisions of the 2009 Act relating to multiplexes require revision;

- One respondent (Telefónica) submitted the view that the VHF band III could be used for at least two DTT multiplexes (spectrum in that band is currently used for DTT in Finland).

3.41 A number of the submissions received are relevant to the DCENR as maker of broadcasting policy for the State. As noted in section 2.5 above, the DCENR has issued a report on the future use of UHF spectrum for broadcasting in Ireland[39] and issued a public consultation on national spectrum policy[40] which includes the future use of the UHF Band.

[38] http://www.tamireland.ie/tv/universes

[39] http://www.dcenr.gov.ie/NR/rdonlyres/9EF4EF11-AC3E-499C-95CB-2EEF414DAA21/0/ReportoftheUHFSpectrumPolicyReviewGroup.pdf

[40] http://www.dcenr.gov.ie/NR/rdonlyres/8D2F913A-60C5-46C6-97A6-9DB8EEA4AB02/0/SpectrumConsultationDocument.pdf

3.42 While noting 2RN's stated view that Ireland need only expect and plan for at least 3, or possibly 4, high quality national multiplexes, ComReg is currently required to manage spectrum in such manner as to ensure that the current provisions of section 132 of the 2009 Act relating to DTT can be met, for so long as those provisions remain in effect. This requires that ComReg must continue to make provision for up to six national multiplexes.

3.3.2.3 Demand by Mobile

3.43 While RTÉ and 2RN questioned the predicted growth rates for Mobile Services, submitting that they might be over-estimated, ComReg notes that there was general consensus among respondents that the level of mobile data will increase in future, though the rate of growth is unclear and there is little indication of what spectrum bands would be most appropriate to meet this demand.

3.44 ComReg notes Telefónica's assertion that it experienced an almost 60% increase in data throughput on its network in the last 6 months of 2013 and its stated belief that this trend is likely to continue for a number of years to come. This increase in mobile data usage in Ireland has also been reported upon in ComReg's most recent Quarterly Report for Q1 2014, where a 48.1% rise in mobile data volumes was experienced in the year to Q1 2014.[41] Furthermore ComReg notes that there are other studies, such as those conducted by Cisco, which forecast further increases [42].

3.45 In relation to the demand by Mobile Services for spectrum in the UHF band, ComReg notes that respondents had differing views. RTÉ and 2RN submitted that spectrum in other bands (e.g. 2.6 GHz band) needs to be made available for Mobile Services, ahead of UHF spectrum. Telefónica submitted that spectrum in the UHF band can play a more important role for provision of Mobile Services in Ireland, given Ireland's low population density and relatively high rural population.

3.46 Given the attractive propagation characteristics of the UHF band and the ongoing harmonisation developments, ComReg also believes that spectrum in the UHF band can play an important role in delivering services in rural areas of Ireland.

[41] See http://www.comreg.ie/_fileupload/publications/ComReg1461.pdf

[42] The Cisco Visual Networking Index ("VNI") Global Mobile Data Traffic Forecast Update reported that global mobile data traffic grew by 81% in 2013 (See http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.html).

3.47 In relation to spectrum in other bands such as the 2.6 GHz bands, ComReg notes that the propagation characteristics of the 700 MHz band are substantially different to that of bands such as the 2.6 GHz band. Compared to the 700 MHz band, the cell coverage of the 2.6 GHz band is likely to be considerably smaller that the cell coverage of the 700 MHz band, thereby suggesting that the 2.6 GHz bands' use is likely to be in the more populated areas where capacity is required.

3.3.2.4 Demand by PMSE

3.48 In relation to the demand by PMSE for spectrum in the UHF band, ComReg notes the comments from the respondents on the importance of PMSE particularly for the production of broadcasting content, its current usage and the expected growth in this usage. ComReg is also of the view that PMSE is an important service whose spectrum requirements need careful consideration, particularly in light of any reassignment of the 700 MHz band. ComReg notes that this is a matter that is facing many countries across Europe and that European harmonisation work in both CEPT and the EC is ongoing. In this regard, ComReg notes:

- ERC Recommendation 25-10[43] and ECC Report 204[44] which note that there are a number of frequency bands available for audio PMSE use as well as spectrum in the UHF band; and
- The recent EC Implementing decision (RSCOM14-04rev4) [45] that is shortly expected to be adopted and published in the EU Official Journal which indicates a preference for making spectrum available in the UHF band.

3.49 ComReg believes that there are many benefits for Ireland in adopting the European standardised approach, and ComReg will give this careful consideration and attention when assessing the spectrum needs of PMSE in Ireland.

3.3.2.5 Demand by WSD

3.50 ComReg notes the respondents' comments on WSD and agrees that the manner in which WSDs are expected to use spectrum is likely to be similar to

[43] http://www.erodocdb.dk/docs/doc98/official/pdf/REC2510e.pdf

[44] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP204.PDF

[45] https://circabc.europa.eu/ - Category DG Connect, Radio Spectrum Committee

that of PMSE, insofar as both services are likely use spectrum that is purposely left vacant (e.g. interleaved spectrum) or unused by other services. However, unlike PMSE, ComReg is of the view that the demand by WSD applications for spectrum has not been established. ComReg will continue to monitor the WSD developments at a European level and will continue to encourage and facilitate where possible the testing and trialling of spectrum for WSD applications.

3.3.2.6 Demand by PPDR

3.51 ComReg notes the views of Telefónica and the preliminary position from CEPT where a set of options which could also be combined by administrations on national level are under investigations/study, including the possible use of guard band and duplex gap of the 700 MHz band and solutions outside the 700 MHz band (e.g.400 MHz). CEPT also noted that the amount of spectrum needed for BB PPDR will depend on individual requirements of CEPT countries. [46]

3.52 ComReg is also aware that there is considerable debate on this issue at an international level and many governments and regulators are considering whether and how additional spectrum capacity can be available for PPDR services. [47] It is ComReg's intention to follow the on-going debate and take appropriate actions in line with any government policy on this matter.

3.4 Considerations associated with the 700 MHz band

3.4.1 Summary of responses to Document 14/13

3.53 Five respondents (RTÉ, 2RN, Telefónica, eircom Group and UPC) commented on the considerations that should be taken into account in relation to the 700 MHz band. Respondents commented on the costs and benefits of releasing the 700 MHz band for other uses, the practical steps in doing so, the timing, co-existence of services within the 700 MHz band, and WRC-15.

3.4.1.1 The potential costs associated with releasing the 700 MHz band for other uses

3.54 Three respondents (Telefónica, 2RN and RTÉ) noted that making the 700 MHz band available for other services would involve migration of the broadcasting service which would incur costs. As explained by 2RN, these migration costs would be due to the fact that the current DTT use of the UHF band is spread

[46] Draft CEPT Report 53

[47] In Ireland narrowband (voice and data) PPDR services are currently provided using Tetra.

across almost the entire 470 to 790 MHz band which means that any changes to this band would create disruption

3.55 2RN and RTÉ submitted that migrating broadcasting from the 700 MHz band would affect viewers, the network operator and the *Saorview* platform and that migration costs and compensation must be considered. 2RN provided some further detail on the potential cost of migrating broadcasting from the 700 MHz band and estimated that this could affect up to 50% of potential viewers requiring many of them to change receiving equipment (in particular banded roof-top antennas) (see Figure 1 below). In addition, 2RN submitted that:

- it would have to alter or replace significant elements of its transmission infrastructure, including transmission equipment, antennas, and distribution equipment, and that it may be necessary to introduce additional transmission sites to repair coverage lost in the migration;
- there would also be a cost associated with an information campaign to help viewers through what would most likely be a phased migration process; and
- costs associated with damage caused to the *Saorview* brand may be more difficult to identify and resolve.

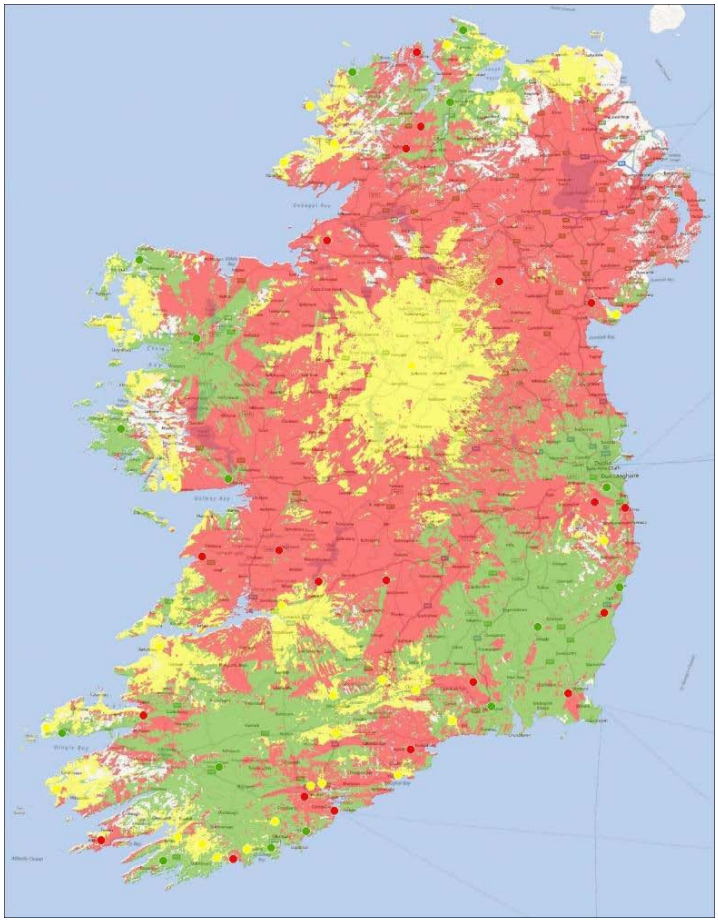

**Figure 1: Areas potentially impacted by 700MHz migration.
Red = definite impact (33% households in Ireland), Yellow = likely impact (18%),
Green = impact unlikely.
(Source: 2RN)**

3.4.1.2 The potential benefits associated with releasing the a 700 MHz band for other uses

3.56 Three respondents (eircom Group, RTÉ and 2RN) commented on the potential benefits of assigning the 700 MHz band to other services. eircom Group pointed to the considerable benefits of harmonisation and expressed its view that harmonizing Ireland's policy with international policy in relation to the 700MHz band would yield major societal benefits, over and above the current use of the band.

3.57 While 2RN and RTÉ acknowledged that there were benefits associated with the 700 MHz band, both were of the view that these benefits would need to be proven through a full cost benefit analysis. In addition, they submitted that the demand for 700 MHz spectrum has not yet been proven.

3.4.1.3 Practical Steps

3.58 Four respondents (RTÉ, 2RN, eircom Group, Telefónica) commented on the practical considerations / steps associated with the 700 MHz band. In summary, they noted that:

- a legislative change may be required (Telefónica);
- a revised DTT spectrum plan to include consideration of migration issues would be needed and this would need to be coordinated internationally (Telefónica, eircom Group, 2RN, RTÉ);
- the existing transmission network will need to be re-tuned (Telefónica, RTÉ, 2RN);
- appropriate information campaigns will need to be undertaken in order to inform DTT viewers of the need to update their receiver settings and potentially change/update their antennas (Telefónica, RTÉ, 2RN); and
- an allocation process/auction would need to be organised and run before the spectrum is ready for re-use. (Telefónica)

3.59 RTÉ and 2RN provided details on the potential costs of the above practical steps, as discussed in section 3.2 above.

3.60 Telefónica also made the following additional comments:

- It recognised that the circumstances surrounding the release of the 800MHz band are different to that associated with the 700 MHz band.[48]
- Given the UK's proposal for 700 MHz spectrum, it believed that ComReg should now re-plan the UHF band to provide for DTT and mobile broadband to ensure that the new plans can be coordinated with Ofcom, while they develop their own plans.

3.4.1.4 Timing

3.61 RTÉ submitted that migration from the 700MHz band should only occur after the incremental benefits of migration are proven and all migration issues and costs have been adequately resolved. In addition, RTÉ submitted that any migration

[48] Telefonica noted that 800 MHz band coincided with analogue switch-off, and *"this shift in delivery method meant networks and consumers were going through a transition already, and the "compression" of the transmission plan could be carried out with relatively little extra effort."*

would have to be coordinated with the UK and that the transition would likely take some time, in order to minimise disruption to viewers in Ireland and UK and to facilitate network infrastructure changes.

3.62 Having noted the benefits to Ireland from international harmonisation, eircom Group suggested that Ireland should time its preparations in respect of the 700 MHz band so as to benefit from a co-ordinated framework for the 700 MHz band across Europe. Having expressed the view that the UHF band is significantly under-utilised by its current exclusive use for DTT, eircom Group submitted that the establishment of a co-ordinated EU framework presents an opportunity for Ireland to easily re-plan the current PSB DTT multiplexes in order to free up the 700MHz band for IMT services.

3.63 Having noted the practical steps associated with the 700 MHz band, Telefónica expressed the view that any process to re-purpose spectrum would take a number of years, from planning to implementation, and it submitted that ComReg is *"right to begin the process now with this consultation document, and aim to have the assignment process completed in 2016."*

3.4.1.5 Support at WRC-15

3.64 One respondent (Telefónica) submitted that Ireland should support the allocation of the 700 MHz band to mobile on a co-primary basis under agenda item 1.2 of WRC-15.

3.4.1.6 Co-existence with other services

3.65 Two respondents (Telefónica and UPC) commented on the potential co-existence issues that might occur between services in a re-farmed 700 MHz band (not being used for broadcasting services) and broadcasting services using UHF spectrum below 700 MHz and the cable TV (CATV) networks.

3.66 Telefónica submitted that this issue would be considered in the standardised bandplans and equipment specifications and additionally noted that the concern that TV reception would be impacted by the reassigned 800 MHz band proved to be unfounded. In relation to co-existence with the cable TV (CATV) networks, Telefónica submitted that it does not expect compatibility issues to arise between wireless broadband and CATV services, provided that CATV networks are adequately screened.

3.67 UPC submitted that due to the potential overlapping use of 700MHz and 800MHz frequency bands by both Mobile and CATV operators, if LTE signals

penetrate cables in its CATV network[49] this can lead to significant disruption and degradation in service quality for its TV and Broadband customers. UPC submitted that ComReg should ensure that appropriate co-existence conditions are included in any future 700MHz licences. In addition, UPC submitted that Ireland should implement a model similar to that in the Netherlands for UHF spectrum co-existence and resolution of harmful LTE interference.

3.4.2 ComReg's position

3.68 ComReg's position on the considerations associated with the 700 MHz band, having regard to all of the responses to Document 14/13, is as follows:

- **Next steps and the consideration of the potential costs and benefits:** The responses capture the key issues which require further analysis and consideration. ComReg broadly agrees with the practical steps outlined by the respondents and Chapter 4 sets out the next step in this process. In particular, ComReg is now in the process of engaging a consultant to conduct a detailed Cost Benefit Analysis (CBA) on the potential reassignment of the 700 MHz band, to include consideration of a compensation mechanism for migration costs.

- **Timing**: Given its attractive propagation characteristics of the 700 MHz band, the ongoing harmonisation developments at an international level and the potential for the 700 MHz band to be used to provide services ComReg remains of the view that it is important to progress matters on this project in a timely fashion.

- **Co-existence with broadcasting below the 700 MHz band:** ComReg considers that it should be possible to resolve this issue by a process of standardisation, as has been done with other spectrum bands.

- **Co-existence with CATV:** ComReg agrees with Telefónica that this should not be an issue provided that CATV networks are adequately protected. ComReg also considers that it is the responsibility of CATV network operators to take all appropriate steps to guarantee the integrity of their networks. ComReg notes, in this regard, that CATV network are "fixed installations" for the purposes of the EMC Directive and therefore the essential requirements of the Directive apply, including that fixed

[49] UPC stated that *"In certain circumstances where the UPC Ireland network is fully compliant with ComReg document 98/66R2 – "Conditions for the operation of a Digital Cable Relay Network under an Authorisation", it will be possible for high strength, near-field LTE interference to cause disruption to Digital TV and DOCSIS broadband services."*

installations must have sufficient immunity to cope with interference from expected sources of interference.

3.5 Considerations associated with the 470-694 MHz band

3.5.1 Summary of responses to Document 14/13

3.69 Four respondents (RTÉ, 2RN, eircom Group and Telefónica) submitted responses in relation to considerations associated with the 470-694 MHz band, i.e. the remainder of the UHF band excluding the 700 MHz band.

3.70 Two respondents (RTÉ and 2RN) expressed the view that DTT will require spectrum in the UHF band until 2030 and that it was too early for ComReg to consider the remainder of the UHF band without first getting clarity from DCENR on the broadcasting policy. In addition:

- 2RN expressed the view that the remainder of the UHF band would be required for the DTT and PMSE services and that Ireland should support the removal of the remainder of the UHF band as a candidate band for IMT as this would create regulatory uncertainty.
- RTÉ called upon ComReg to issue a statement of regulatory certainty regarding the continued use of the 470 to 694 MHz band for broadcasting in order to encourage continued investment in and development of the *Saorview* platform.

3.71 The other two respondents (eircom and Telefónica) had differing views to RTÉ and 2RN.

- Telefónica expressed the view that Ireland should support the allocation of the remainder of the UHF band to mobile on a co-primary basis under WRC-15 agenda item 1.1, as this would not necessarily mean that the entire band would be repurposed in the short term but would allow the future option to do so, if it was decided that that would be most beneficial.
- eircom Group noted the international interest in the UHF band and submitted that ComReg should exercise caution in its making its decision so as not to foreclose the benefits of harmonized use.

3.5.2 ComReg's position

3.72 ComReg notes the differing views of the respondents in relation to the potential allocation of the 470-694 MHz band to the mobile service at WRC-15 and notes

that this matter is the subject of some debate at the international level. [50] Arguments in favour have primarily submitted that this allocation would provide more flexibility to individual countries, while arguments against have generally submitted that there is insufficient demand or need for this allocation at WRC-15 and that it is important that broadcasters have regulatory certainty. Further ComReg notes the recently published UHF broadcasting Report [51] by the DCENR which recommends that the primary allocation of UHF spectrum for broadcast purposes be maintained for the continued provision and development of a national free-to-air DTT network and ancillary services until at least 2025.

3.73 ComReg will continue to monitor discussions and developments in relation to the 470 – 694 MHz band, noting that the CEPT is developing a common position on this issue for the WRC-15.

[50] This issue is being discussed in the CEPT-Conference Preparatory Group (CPG) http://www.cept.org/ecc/groups/ecc/cpg , and in a number of member states, e.g. the UK where Ofcom recently published a consultation on the WRC-15 http://stakeholders.ofcom.org.uk/consultations/wrc15/?utm_source=updates&utm_medium=email&utm_campaign=wrc-15-consultation

[51] Report on Future Use of UHF Spectrum for Broadcasting in Ireland: http://www.dcenr.gov.ie/NR/rdonlyres/9EF4EF11-AC3E-499C-95CB-2EEF414DAA21/0/ReportoftheUHFSpectrumPolicyReviewGroup.pdf

Chapter 4

4 Next Steps

4.1 ComReg is aware that there are many important matters to consider in relation to the management and use of the UHF band, in particular the 700 MHz band, and a number of next steps in relation to these matters are outlined below.

4.2 ComReg will continue its considerations and discussions, at both a national and international level, on the potential radio spectrum re-planning of the UHF band such that the spectrum requirements for Irish DTT services (as defined under the 2009 Act) could be accommodated in the UHF band below the 700 MHz band. While these considerations are still at an exploratory stage, if such a revised DTT plan can be adopted, then this would potentially release the 700 MHz band for re-assignment for other services.

4.3 In line with the suggestions from RTÉ and 2RN, and the recently published DCENR's Report on the future use of UHF spectrum for broadcasting in Ireland, [52] ComReg's next steps include progressing matters in relation to conducting a fully reasoned CBA of the likely costs and benefits (economic, social, and cultural) of RTÉ and PMSE users migrating out of the 700MHz band and into the remainder of the UHF band, and the consideration of a compensation mechanism for any such migration.

4.4 ComReg has taken the suggestions of RTÉ and 2RN into consideration in defining the scope of the CBA, details of which are set out in Annex 4. ComReg is currently in the process of engaging external expert consultants to conduct this CBA study and it is ComReg's intention that this CBA work is carried out over the coming months.

4.5 The CBA may necessitate requesting certain information (such as cost information) from industry in order to ensure that the CBA is sufficiently robust. This was noted by RTÉ in its response where it suggested that the CBA be carried out in consultation with industry. ComReg welcomes the full co-operation of industry in relation to any such information requests and any information provided will be treated in accordance with ComReg's guidelines on the treatment of confidential information[53]

[52] http://www.dcenr.gov.ie/NR/rdonlyres/9EF4EF11-AC3E-499C-95CB-2EEF414DAA21/0/ReportoftheUHFSpectrumPolicyReviewGroup.pdf

[53] See ComReg Document 05/24 http://www.comreg.ie/_fileupload/publications/ComReg0524.pdf

4.6 Following the completion of the CBA it is ComReg's intention to consult on the results of the CBA study. The timing of this consultation will depend upon a number of factors including the completion date of the CBA study itself.

Annex 1: Glossary of abbreviations

A 1.1 A non-exhaustive list of abbreviations and explanations applying to this document is set out in this Annex below.

Abbreviation	Explanation
Allocation	Allocation means the designation in a given frequency band of its use by one or more radiocommunication services under specified conditions as may be set out in the ITU-RR or in a national table of radio frequency allocations
Assignment	Assignment of a radio frequency or radio frequency channel is the authorisation by the competent national authority (e.g., ComReg) for its use by a radio station under specified conditions
ASO	Analogue Switch Off
BAI	Broadcasting Authority of Ireland
CBA	Cost Benefit Analysis
CEPT	European Conference of Postal and Telecommunications Administrations
ComReg	Commission for Communications Regulation
CPG-PTD	Conference Preparatory Group of CEPT, Project Team D
DCENR	Department of Communications Energy and Natural Resources
DTT	Digital Terrestrial Television
DVB-T	Digital Video Broadcasting Terrestrial
DVB-T2	Digital Video Broadcasting Terrestrial, 2nd Generation
EC	European Commission
ECO	European Communications Office
ECC PT	(CEPT) Electronic Communications Committee Project Team
ETSI	European Telecommunications Standards Institute
EU	European Union
FM	Frequency Management Working Group of CEPT
GSM	Global System for Mobile Communications
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
IPTV	Internet Protocol TV
JTG 4-5-6-7	Joint Task Group 4-5-6-7 of the ITU-R
MB	MegaByte
MFCN	Mobile/Fixed Communication Network
MFN	Multi Frequency Network
Minister	Minister for Communications Energy and Natural Resources

Abbreviation	Explanation
MoU	Memorandum of Understanding
PMSE	Programme Making and Special Events
PPDR	Public Protection and Disaster Relief
PSB	Public Service Broadcasting
RR	Radio Regulations
RSC	Radio Spectrum Committee
RSPG	Radio Spectrum Policy Group
RSPP	Radio Spectrum Policy Programme
RTÉ	Raidió Teilifís Éireann
TG4	Teilifís na Gaeilge
TG6	Task Group 6 of the CEPT ECC
UHF	Ultra High Frequency
UK	United Kingdom
USA	United States of America
WBB	Wireless BroadBand
WG	Working Group
WRC	World Radiocommunication Conference
WRC-15	World Radiocommunication Conference of 2015
WSD	White Space Devices

Annex 2: International developments on the UHF band

A 2.1 At the international level significant work is ongoing in relation to the management and use of the UHF band and as noted in section 2.2 of the document this work is driven by a number of sources including:

- The WRC-12 decision to co-allocate the 700 MHz band to Mobile Services (excluding aeronautical mobile) in region 1 of the ITU.
- Agenda item 1.1[54] of the WRC-15 which aims to identify frequency bands for allocation to the Mobile Service and to designate further bands for use by the International Mobile Telecommunications (IMT) service;
- Agenda item 1.2[55] of the WRC-15 which is intended, inter alia, to confirm the lower limit of the frequency allocation to the Mobile service, except aeronautical mobile, in the band 694-790 MHz (the "700 MHz band");.
- The technical harmonisation work and preparations for making the 700 MHz band available for terrestrial systems capable of providing electronic communications services; and
- The long-term future of the UHF band where issues such as the demand for spectrum by services such as DTT, mobile, PMSE, PPDR and White Space Devices (WSD) and the potential for convergence is being considered.

A 2.2 The above issues are being considered by a wide variety of parties and in particular significant work is under development within the European Conference of Postal and Telecommunications Administrations (CEPT). For reference, the following lists a number of the various working groups and projects that is considering matters related to the UHF band:

[54] Agenda Item 1.1 is *to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution 233 (WRC 12).*

[55] Agenda Item 1.2 is to examine the results of ITU R studies, in accordance with Resolution 232 (WRC 12), on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures.

- the Conference Preparatory Group (CPG-PTD) of CEPT which is progressing its work in preparing a preliminary position for WRC-15;
- CEPT Electronic Communications Committee Project Team 1 (ECC PT1) which is considering the technical harmonisation of the 700 MHz band;
- the ITU Radiocommunications ("ITU-R") Joint Task Group JTG 4-5-6-7 which is compiling contributions in relation to studies being undertaken with respect to agenda item 1.1 and 1.2 of WRC-15.
- Task Group-6 (TG6) of the CEPT which is studying the future use of the UHF band, with a particular focus on the 470-694 MHz portion of the band;
- the RSPG which is providing advice to the EC on various high level issues such as the long term future of the UHF band;
- the European Commission's (EC's) high-level advisory group on the future use of UHF spectrum for TV and wireless broadband;
- the EC's workstream titled "Challenges and opportunities of broadcast-broadband convergence and its impact on spectrum and network use";;
- Project Team FM 53 of CEPT/ECC Frequency Management which is considering the use of WSD applications;
- the work of CEPT and the EC in relation to the spectrum requirements of PMSE; and
- CEPT/ECC WG FM49 which is considering the future requirements of PPDR.
- CEPT/ECC WG FM51 which is tasked to review the spectrum requirements for PMSE.

A 2.3 Details on the work of each of these items are generally available on the respective websites. However a summary of the updated information in relation to the 700 MHz band and the 490-694 MHz band is set out below.

A2.1 Update on the 700 MHz band

A2.1.1 700 MHz technical harmonisation for wireless broadband

A 2.4 In relation to the 700 MHz band, at its meeting on 28 April – 2 May 2014, CEPT CPG PTD and ECC PT1 discussed:

- preferred channelling arrangements for the 700 MHz band; and
- the requirements on the level of unwanted emissions from mobile terminals into the spectrum below 694 MHz.

A 2.5 In its considerations of a preferred channelling arrangement for the 700 MHz band, options for band plans were initially centred around two main options:

- a 2 x 30 MHz band plan arrangement, aligned with the lower part of the Asia-Pacific band plan ("3GPP band 28"); or
- a 20 x 40 MHz band plan arrangement, non-aligned, European-only plan.

A 2.6 Discussions considered whether to harmonise technical conditions with the 3GPP band 28 band plan or the alternative Europe-only band plan. Considering the benefits of harmonisation with the Asia-Pacific region, CEPT provisionally agreed to align itself with 3GPP band 28 in terms of the band plan to be adopted.[56] The outcome can be summarised as follows:

- The preferred channelling arrangement for CEPT contains 2x30 MHz block, aligned with 3GPP band 28: (uplink 703-733 MHz and downlink 758-788 MHz);
- CEPT agreed to set a lower out-of-band emission limit as -42dBm/(8 MHz) into the 470 – 694 MHz for 10 MHz LTE bandwidth; and
- CEPT will request 3GPP to modify the band 28 technical conditions to reflect the outcome of CEPT's studies.

A 2.7 Further to the above, CEPT is progressing its work in relation to developing technical conditions for the 700 MHz band in the EU for the provision of electronic communications services, such as wireless broadband..

- In relation to EC mandate on the 700 MHz band[57] in June 2014 CEPT sent the first draft report (draft CEPT report 53[58]) to the EC. In tandem

[56] CEPT has followed up with this outcome by liaising with 3GPP to request it to update the band 28 specification, to now incorporate the out-of-band emissions as agreed within CEPT

[57] See RSCOM12-37 Rev3 available at https://circabc.europa.eu/ (DG Connect / Radio Spectrum Committee) or CEPT website at http://www.cept.org/Documents/ecc/9585/ECC(13)INFO-002_RSCOM12-37-Mandate-CEPT-700-MHz

this draft report was submitted for public consultation on the CEPT website[59]; and

- In June 2014, the ECC agreed to task ECC PT1 to develop an ECC Decision on harmonised technical conditions for Mobile/Fixed Communication Network ("MFCN") in the 700 MHz band on the basis of the draft CEPT Report 53. It was noted that this decision should be limited to harmonised technical conditions, without designating this band for MFCN at this stage. In addition, in order to take into account that the WRC-15 will address this band and that the allocation is only effective after WRC-15, the ECC agreed that the date of implementation will be delayed until 1st April 2016.

A2.1.2 Other potential uses (PMSE, PPDR WSD) of the 700 MHz band

A 2.8 In order to provide flexibility for national administrations depending on their requirements a number of usage options for the guard band and duplex gap of the 700 MHz band are considered by draft CEPT report 53. In combination with MFCN Supplementary Downlink (SDL) these options include PMSE, PPDR and other services (e.g. Machine 2 Machine).

A 2.9 CEPT's consideration of these options is ongoing and CEPT noted that the remaining studies on PPDR and M2M in the guard bands and the duplex gap will be developed by CEPT in the coming months.

A2.2 Update on the 470-694 MHz band

A 2.10 The UHF band from 470 – 694 MHz continues to be considered by the ITU In relation to agenda item 1.1 of the WRC-15. A difficult sharing and compatibility situation could arise in the UHF band related to the coexistence of IMT systems and broadcasting (i.e., DTT)[60]. Further to this, some countries of ITU Region 1 (Europe, Africa and the Middle East) have the band 645 – 694 MHz allocated to the aeronautical radionavigation service on a primary basis[61]. This implies that the coexistence of IMT systems with the

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http://www.cept.org/files/1051/Tools%20and%20Services/Public%20Consultations/2014/Draft%20CEPT%20Rep53.zip

59 http://www.cept.org/ecc/tools-and-services/ecc-consultation#CEPT%20Reports

60 ITU Joint Task Group, JTG 5-6, in a study period prior to WRC-12 have shown the need for separation distances of transmitting broadcasting and IMT stations of around 300 km or higher.

61 ITU Radio Regulation 5.312. In addition the aeronautical radionavigation service allocation is subject to the provisions of ITU Radio Regulation 4.10 which states that *"Member States (of the ITU) recognize that*

aeronautical radionavigation stations is likely to be challenging. Given these sharing scenarios of the UHF band and as part of its preparation work for WRC-15, the CEPT's CPG PTD at its last meeting in May 2014 considers that the UHF band from 470 – 694 MHz be subjected to further consideration taking into account sharing and compatibility studies.

A 2.11 In June 2014, the ECC published its draft report (ECC Report 224[62]) on a long-term vision for the UHF broadcasting band in Europe. This draft report takes a detailed look at trends in the evolution of services (broadcast, mobile and converged services to consumers), as well as the networks and technologies with the potential to deliver them. Focussing on the 470-694 MHz band it sets out a set of possible scenarios for the development of this band in the long term, and among other things it provisionally concludes that:

- a cooperation between radiocommunication services[63] is expected on a long term;
- the long term usage of the band 470-694 MHz is mainly, foreseen for downstream audiovisual content distribution; and
- in order to facilitate different scenarios considered by the CEPT for the usage of the band 470-694 MHz, it could be necessary to introduce more flexibility in the regulatory environment governing the use of this band.

A 2.12 This draft report has been submitted for public consultation and the deadline for responses is 9 September 2014. The ECC expects to complete the report by November 2014, following the public consultation and further review.

A 2.13 Work is also ongoing in a number of other workstreams, including :

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the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies."

62 http://www.cept.org/files/1051/Tools%20and%20Services/Public%20Consultations/2014/Draft%20ECC%20Rep224.docx

63 Draft ECC Report 224 states that "*Content, which could be traditionally seen as typical broadcast content (i.e. audiovisual content like videos, music) is also available in the internet and distributed via cable, optical fibre or wireless broadband access. On the other hand, broadcast services are more and more heading for using reverse channels or additional parallel channels to allow the user more flexibility and access to additional information."*

- The EC workstream titled “Challenges and opportunities of broadcast-broadband convergence and its impact on spectrum and network use”; where a 2nd Workshop on was held on 8 July 2014.[64]

- the EC’s high-level advisory group on the future use of UHF spectrum for TV and wireless broadband[65];

- the RSPG, where a number of working group meetings have taken place in relation to the request for a RSPG opinion on a long-term strategy on the future use of the UHF band (470-790 MHz) in the European Union.[66] In addition, in June 2013, the RSPG published a report on the proposed spectrum coordination approach for broadcasting in the case of a reallocation of the 700 MHz band.[67]

A2.3 Other Developments

A2.3.1 PPDR

A 2.14 As noted in draft CEPT Report 53, a set of options which could also be combined by administrations on national level are under investigation/study, including the possible use of guard band and duplex gap of the 700 MHz band and solutions outside the 700 MHz band (e.g.400 MHz). CEPT also noted that the amount of spectrum needed for BB PPDR will depend on individual requirements of CEPT countries. [68] Work on PPDR is also continuing within CEPT WG FM 49.[69]

A2.3.2 PMSE

A 2.15 In relation to PMSE, there are two recent items of note:

[64] http://www.plumconsulting.co.uk/pdfs/Plum_Jul2014_-_Convergence_second_workshop_0.pdf

[65] http://ec.europa.eu/digital-agenda/en/news/mandate-high-level-group-uhf

[66] http://rspg-spectrum.eu/wp-content/uploads/2014/03/RSPG14-555final_Request-for-Opinion-UHF-band.pdf

[67] https://circabc.europa.eu/d/a/workspace/SpacesStore/614d3daf-76a0-402d-8133-77d2d3dd2518/RSPG13-524%20rev1%20Report_700MHz_reallocation_REV.pdf

[68] Draft CEPT Report 53

[69] http://www.cept.org/ecc/groups/ecc/wg-fm/fm-49

- ECC Report 204[70] approved in February 2014, which notes that there are a number of frequency bands available for audio PMSE including in the UHF band; and

- The recent EC Implementing decision (RSCOM14-04rev4) [71] that is shortly expected to be adopted and published in the EU Official Journal. This indicated a preference for making spectrum available in the UHF band.

A2.3.3 WSD

A 2.16 Work on WSD continues in CEPT Project Team FM 53.[72]

[70] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP204.PDF

[71] https://circabc.europa.eu/ - Category DG Connect, Radio Spectrum Committee

[72] http://www.cept.org/ecc/groups/ecc/wg-fm/fm-53

Annex 3: Overview of 700 MHz band and DTT in a sample of European countries

A 3.1 This annex sets out information on the 700 MHz band and DTT status in a sample of European countries. The countries are Finland, France, Germany, Italy, the Netherlands, Sweden, Switzerland and the United Kingdom.

Finland

A 3.2 Finland currently operates a total of nine national DTT multiplexes (seven in the UHF band and two in VHF Band III) plus four local DTT multiplexes. ASO in Finland was completed in 2007 and the DTT service in Finland uses a mixture of both DVB-T and DVB-T2 across its national multiplexes. It is expected that a further national DTT multiplex in the UHF band will be launched in the short-term (1 to 5 years). In terms of Finland's estimated long-term (beyond 2020) DTT multiplex requirements, a requirement for four national multiplexes in the UHF band and three national multiplexes in VHF Band III is expected. Finland also expects a demand to provide for some regional multiplexes (not quantified).

A 3.3 In September 2012[73], the Finnish Minister of Housing and Communications announced that the Finnish Government is making legislative preparations to allocate the 700 MHz band for wireless broadband in 2017. Any legislative changes would be conditional on the outcome of WRC-15 (i.e., the expected allocation of the 700 MHz band by the ITU to IMT).

France

A 3.4 France currently operates a total of six national and 13 local DTT multiplexes all of which are in the UHF band. ASO in France was completed in 2011 and the DTT service in France uses DVB-T across all of its DTT multiplexes. France expects that it will launch a further two national DTT multiplex in the UHF band in the short-term (1 to 5 years). In the short-term, all of France's DTT services are expected to migrate to HD. This is being facilitated by the roll-out in France of their 7th and 8th national DTT multiplexes (using DVB-

[73] Government policy on the future of electronic media set out in a report, 26 September 2012.

T2). In terms of France's estimated long-term (beyond 2020) DTT multiplex requirements, at present, this has yet to be determined.

A 3.5 While support for freeing up the 700 MHz band within France was announced in 2013[74], discussions are still ongoing in terms of setting a timeframe.

Germany

A 3.6 Germany currently operates a total of six national and 3 local DTT multiplexes all of which are in the UHF band. ASO in Germany was completed in 2008 and the DTT service in Germany uses DVB-T across all of its DTT multiplexes. Germany has no expectation to launch further DTT multiplexes in the short-term (1 to 5 years). In terms of Germany's estimated long-term (beyond 2020) DTT multiplex requirements, at present, this has yet to be determined dependant on the plans of German broadcast organisations and decisions surrounding future broadcasting technologies (e.g., DVB-T2). In its recent coalition agreement, the three parties, CDU, CSU and SPD, forming the new German government, have agreed to continue to earmark frequency spectrum for the continuation of DVB-T2 broadcasts in the country. As a consequence, RTL are reconsidering their earlier announcement to withdraw from the DTT platform in Germany[75].

A 3.7 In respect of the 700 MHz band, no decision has yet been taken by BNetzA. Subsequent to the recent proposed merger within Germany of Telefónica and E-plus (subsidiary of KPN), BNetzA is preparing for a likely auction, due to start at the end of this year, primarily to auction GSM frequencies relating to the remedies imposed by the merger. The potential inclusion of the 700 MHz band in this auction is under consideration and a formal decision on this is expected to be made in Q3 2014, in advance of the auction.

Italy

A 3.8 Italy currently operates a total of 16 national UHF DTT multiplexes, 3 national VHF Band III DTT multiplexes as well as 18 local/regional DTT multiplexes. ASO in Italy was completed in 2012 and the DTT service in Italy uses a mixture of DVB-T and DVB-T2 technologies across all of its national DTT multiplexes. Italy expects to launch a further six national DTT multiplexes in

[74] French 700 MHz auction will be after WRC-15, 22 January 2014, http://www.policytracker.com/headlines/questions-raised-over-whether-france-will-hold-its-700-mhz-auction-before-2015

[75] DVB 19 December 2013

the short-term (1 to 5 years). In terms of Italy's estimated long-term (beyond 2020) DTT multiplex requirements, at present, Italy expect to require up to 40 DTT multiplexes to accommodate both their national and local/regional DTT requirements.

A 3.9 Within Italy, an auction of digital dividend spectrum for broadcasting services commenced in April 2014. In preparation for the auction, the terms of reference took into account the international developments in respect of the 700 MHz, and the 700 MHz band was excluded from the auction[76].

The Netherlands

A 3.10 The Netherlands currently operates a total of five national DTT multiplexes all of which are in the UHF band. ASO in the Netherlands was completed in 2011 and it uses DVB-T across all of its DTT multiplexes. Digitenne (KPN, commercial operator) currently has four national DTT layers and the licence expires in Jan 2017. The PSB operator (NFO) has one national DTT layer, the licence for which also expires in January 2017. The Netherlands are currently in the process of considering the future of DTT. Public broadcasters want to continue to be licensed beyond the 2017 licence expiry. KPN (the commercial DTT operator) announced last year that they did not wish to continue DTT beyond 2017, however KPN published a reversal of this decision in April 2014[77]. The PSB operator (NFO) is particularly keen to continue beyond 2017 using DVB-T2.

A 3.11 No decision has been taken in respect of the 700 MHz band in the Netherlands at this stage.

Poland

A 3.12 A consultation[78] commenced in Poland by the Polish regulator (UKE) in April 2014 concerning whether the 700 MHz band could be exclusively allocated to broadcasting services or to WBB or to both services and or whether the entire UHF band could be used to distribute wireless broadband

[76] AGCOM: http://www.agcom.it/documentazione/documento?p_p_auth=fLw7zRht&p_p_id=101_INSTANCE_kidx9GUnIodu&p_p_lifecycle=0&p_p_col_id=column-1&p_p_col_count=1&_101_INSTANCE_kidx9GUnIodu_struts_action=%2Fasset_publisher%2Fview_content&_101_INSTANCE_kidx9GUnIodu_assetE

[77] KPN looks to continue DTT service Digitenne, www.telecompaper.com - 14 April 2014

[78] UKE Poland, consultation began 24 April 2014 and closed on 24 June 2014.

communications and multimedia content. The consultation closed on the 24 June 2014.

Sweden

A 3.13 The Swedish Broadcasting Authority announced a government decision on the 27 February 2014 that the 700 MHz band will be reallocated to electronic communications from the 1 April 2017. PTS (The Swedish Post and Telecom Authority) now has to prepare a plan for the future spectrum use and a procedure for the migration process for DTT.

A 3.14 The decision sets out that DTT and digital radio will use VHF Band III (174 - 230 MHz) and while DTT may be licensed in the 470 – 694 MHz band until 31 March 2020, DTT must vacate the 700 MHz band by the 31 March 2017. The consequences of this decision are that there will be at least seven multiplexes available for DTT until 1 April 2017. After that time, at least five DTT multiplexes will be available for DTT until 1 April 2020[79].

A 3.15 On the 31 March 2014, the Swedish Broadcasting Authority granted 51 licences with national coverage and six regional licences to broadcast terrestrial television and teletext. Six of the licences are for HD quality broadcasts and the addition of further HD quality programme services during the licensing period is possible.

A 3.16 The duration of the licence period is 1 April 2014 – 31 March 2020. During the licensing period 2014 – 2020, the Swedish Broadcasting Authority is promoting a transition to DVB-T2[80].

Switzerland

A 3.17 Switzerland has one PSB DTT service and no commercial DTT services. The PSB has 7 TV programmes as part of its multiplex. Switzerland extensively utilises cable (>85%) for the distribution of television services at greater than 85% of population. DTT accounts for less than 4% of population with satellite at approximately 10% population. Switzerland intends to use the 700 MHz band for medium and long term for IMT and is looking to maximise the bandwidth usage for IMT, seeking a channel plan compatible with the 3GPP

[79] Swedish Broadcasting Authority, 27 February 2014, Press Release.

[80] Swedish Broadcasting Authority, 31 March 2014, Press Release.

band 28 and a preference for the variant which allows the use of PPDR[81]. DTT licences are due to expire in 2018.

United Kingdom

A 3.18 The United Kingdom currently operates a total of six national DTT multiplexes, one regional DTT multiplex (in Northern Ireland) and a 7th DTT multiplex in certain highly populated areas of the UK using the 600MHz band, all of which are in the UHF band. ASO in the United Kingdom was completed in 2012 and the DTT service in the UK uses a mixture of DVB-T and DVB-T2 across all of its DTT multiplexes. The United Kingdom expect to launch one further DTT multiplex in the short-term (1 to 5 years) in the 600 MHz band using DVB-T2. The United Kingdom (Ofcom) has consulted extensively on a long-term UHF Strategy, including its long-term DTT multiplex requirements. In addition, in May 2014, Ofcom published a consultation on the future of free to view TV[82].

A 3.19 Recently Ofcom has published a consultation on future use of the 700 MHz band, which includes a cost-benefit analysis of changing the use of the band to Mobile Services from DTT[83]. The consultation sets out Ofcom's proposals to make spectrum in the 700 MHz band available for mobile broadband from 2022 or possibly up to two years earlier. An assessment of the associated costs and benefits of such a change is presented as part of the consultation. Ofcom's assessment estimates the value to the UK of making the 700 MHz band available for mobile is between STG£900 million and STG£1.3 billion. Ofcom identified a number of significant benefits, such as:

- improved mobile network speeds;
- helping mobile network operators meet increases in demand for capacity in a more cost effective manner than without access to the 700 MHz spectrum;
- Ofcom expect that meeting demand for capacity in a more cost effective manner will result in lower consumer prices for mobile data services; and

[81] Frequency Spectrum Strategy to Swiss National Frequency Allocation Plan, Edition 2014, Federal Office of Communications Ofcom, January 2014.

[82] http://stakeholders.ofcom.org.uk/consultations/700MHz/ftv/

[83] Consultation on future use of the 700 MHz band Cost-benefit analysis of changing its use to mobile services, Ofcom, 28 May 2014.

A 3.20 Ofcom has estimated that the costs of the transition process for DTT could be between STG£470 million and STG£580 million. Ofcom expects to award licences to the 700 MHz band through an auction process, around 2020, but is open to considering comments in relation to the timing of the award, including as early as 2016. The consultation is open until the 29 August 2014.

Annex 4: Details of the Cost Benefit Analysis (CBA) study

A 4.1 The overall aim of the CBA study is to conduct a fully reasoned cost benefit analysis of the likely costs and benefits (economic, social, and cultural[84]) of RTÉ[85] and PMSE users migrating out of the 700MHz band ("the CBA").

A 4.2 The tasks listed below are non-exhaustive and ComReg may adjust the terms of the CBA study as it considers appropriate. These tasks include:

- To analyse and consider the direct impacts of RTÉ migrating out of the 700 MHz band and into the remainder of the UHF band.
- To analyse and consider any indirect impacts or externalities relating to RTÉ migrating out of the 700 MHz band and into the remainder of the UHF band.
- To provide a reasoned estimate of the total direct costs likely to be incurred by RTÉ in migrating out of the 700 MHz band, including identifying and commenting on any compensation for similar migrations in any other jurisdiction.
- To analyse the impacts (economic, social, and cultural) of RTÉ migrating out of the 700 MHz band on consumers generally.
- To analyse the impacts on PMSE.
- To analyse, describe and estimate the economic benefits of RTÉ migrating out of the 700 MHz band, assuming that the 700MHz band is subsequently re-assigned to the market in line with relevant harmonisation decisions.
- To be informed by opportunity costs where appropriate; and;

[84] Social and cultural benefits include access to education, information, government services, financial services, and public broadcasting services.

[85] *Saorview* is a subscription-free digital television service available to Irish viewers. It is operated by RTÉ under two multiplex licences issued by ComReg it under the Broadcasting Act 2009. The TV services carried on *Saorview* are RTÉ One, RTÉ two HD, TV3, TG4, RTÉ News Now, 3e, RTÉ jr, RTÉ One+1 and the digital teletext service RTÉ Aertel. The radio services provided are RTÉ Radio 1, RTÉ 2fm, RTÉ Lyric FM, RTÉ Raidió Na Gaeltachta, RTÉ Radio 1+1, RTÉ 2XM, RTÉ jr, RTÉ Gold, RTÉ Choice and RTÉ Pulse.

- To present an estimate of the **net economic benefit**, if any, of RTÉ migrating out of the 700MHz band. The estimates shall be based on Net Present Value (“NPV”) which will represent the net sum of the annual benefits, discounted to current prices.