An Coimisiún um
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Broadband Public Protection and Disaster Relief (BB-PPDR) Spectrum Options

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Information Notice

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An Coimisiún um Rialáil Cumarsáide
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Content

Section Page

1 Introduction

1 The purpose of this document is to provide consolidated information on the spectrum options for Broadband Public Protection and Disaster Relief ("BB-PPDR") in Ireland, with the aim of informing interested parties, including existing and potential licensees, of the spectrum management considerations and next steps associated with these spectrum options.

2 PPDR radio communications refers to radio applications used for public safety, security and defence used by national authorities or relevant operators in responding to public safety and security including in emergency situations.

1.1 Emergency Services Digital Radio / Narrowband PPDR

3 In 2008, the Commission for Communications Regulation ("ComReg") with the consent of the Minister for Communications, Energy and Natural Resources put in place a licensing framework to allow use of the 380-385 MHz / 390-395 MHz band[1] for emergency services[2].

4 An Emergency Services Digital Radio ("ESDR") licence was subsequently issued to Tetra Ireland Communications Ltd[3] ("Tetra Ireland") for 2 × 4.775 MHz[4] of this spectrum band. This facilitated the building and operation of emergency service networks using the Terrestrial Trunked Radio ("TETRA") technology.

5 Tetra Ireland's network provides 98% overlapping land mass coverage for narrowband PPDR services. It also provides an Air-Ground-Air service for fixed and rotary wing aircraft, and the network is interoperable between a range of different State agencies including police, fire and ambulance but also the Irish Coast Guard and the Irish Prison Service.

[1] This band is harmonised by ECC Decision (08)05 for narrowband PPDR applications.

ECC Decision (08)05 - ECC Decision of 17 June 2016 on the harmonisation of frequency bands for the implementation of digital Public Protection and Disaster Relief (PPDR) narrow band and wide band radio applications in bands within the 380-470 MHz range.

[2] S.I. No. 324 of 2008, WIRELESS TELEGRAPHY (USE OF THE BAND 380-400MHz BY EMERGENCY SERVICES) REGULATIONS, 2008.

[3] In 2006, following a competitive tender process run by the Government, Tetra Ireland Communications Ltd was appointed by the Department of Finance to build and operate an emergency service network.

[4] i.e. 380.2125 - 384.9875 MHz / 390.2125 - 394.9875 MHz.

1.2 Broadband-PPDR

6 Over the last number of years, countries across Europe have started to consider upgrading or replacing their incumbent public safety networks with new broadband PPDR ("BB-PPDR") networks.

7 BB-PPDR is a relatively new concept which integrates a broadband capability into a secure, resilient and high availability network. This broadband capability recognises the increasing data demand requirements for emergency service end users beyond that which legacy (e.g. TETRA) networks can deliver. For example, to provide high resolution data over the network such as images, maps or video.

8 In 2019, ComReg, as part of its proposed multi-band spectrum award (the "Proposed MBSA"), commissioned LS telcom UK Ltd. ("LS telcom") to provide advice on the various network deployment options and spectrum requirements for any future deployment of BB-PPDR in Ireland. The findings of this study are set out in the LS Telcom BB-PPDR Study (ComReg Document 19/59e) and the subsequent update to that report (ComReg Document 19/124e)[5].

9 Among other things, the LS Telcom BB-PPDR Study identified that:

- there is a **wide choice of deployment and spectrum options to consider for BB-PPDR**;
- while spectrum for BB-PPDR would be required for (i) **dedicated**[6] and (ii) **hybrid**[7] network models, this would not be required for a (iii) **commercial**[8] network model

[5] These are available on the ComReg "Proposed Multi-Band Spectrum Award" webpage https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/proposed-multi-band-spectrum-award/.

[6] The dedicated model refers to the deployment of a national dedicated network using spectrum dedicated for BB-PPDR.

[7] The hybrid model is defined as a 'combination of dedicated and commercial networks' and would generally require spectrum dedicated for BB-PPDR (the hybrid model). There are a number of potential hybrid model approaches including:

- Geographical split between dedicated and commercial network infrastructure (Hybrid 1);
- Mobile Virtual Network Operator (MVNO) model where PPDR users share Radio Access Network (RAN) with the public users (Hybrid 2);
- MVNO model combined with a geographical split (Hybrid 3); and
- Extended MVNO model where PPDR has dedicated carriers in the commercial network's radio transmitters/receivers throughout the country (Hybrid 4).

[8] The commercial model provides support for BB-PPDR applications over commercial mobile networks. Unlike a dedicated network, the commercial model would not require dedicated spectrum for BB-PPDR or involve the need to build a new dedicated BB-PPDR network and/or upgrade existing PPDR network infrastructure.

as this would rely on access to mobile operators' existing (or future) spectrum holdings;

- within the concept of "flexible harmonisation" (to enable national flexibility regarding how much spectrum and which specific frequency ranges should be designated for BB-PPDR), **spectrum in the 400 MHz and 700 MHz frequency ranges has been harmonised for BB-PPDR**[9]; and

- should there be a need to provide spectrum for a dedicated/hybrid BB-PPDR network in Ireland, then spectrum in the **410 – 430 MHz band** (the "400 MHz Band"), and in the **700 MHz Duplex Gap** and **700 MHz Guard Bands**[10] are technically viable spectrum options.

1.3 Proposed spectrum bands for BB-PPDR in Ireland

10 Having due regard to the advice of LS telcom, and cognisant that Ireland has yet to make decisions on its BB-PPDR deployment model and may therefore require spectrum for BB-PPDR, ComReg proposed to make spectrum available for BB-PPDR in the 400 MHz Band and in the 700 MHz Duplex Gap and 700 MHz Guard Bands as detailed below.

2 × 3 MHz in the 400 MHz Band

11 ComReg proposed to make 2 × 3 MHz of spectrum available for BB-PPDR in the 414 – 417 MHz / 424 – 427 MHz part of the 400 MHz Band[11]. This is 3GPP Band 88 in the 3GPP E-UTRA specifications[12].

12 When making this proposal, ComReg noted that there were existing licences[13] for analogue trunked radio systems in the 415.7750 – 417 MHz / 425.7750 – 427 MHz

[9] Relevant harmonisation decisions for these bands include:

- CEPT ECC Decision (16)02 sets out the harmonised technical conditions http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC1602.PDF
- COMMISSION IMPLEMENTING DECISION (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694-790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union.

[10] "700 MHz Duplex Gap" is the frequency range 733 – 758 MHz; and

"700 MHz Guard Bands" comprises of the "700 MHz Lower Guard Band": in the frequency range 694 – 703 MHz; and the "700 MHz Upper Guard Band": in the frequency range 788 – 791 MHz.

[11] See ComReg Document 19/69 - Response to Consultation and Decision on the 400 MHz Band Spectrum Award – Published 28 June 2019.

[12] https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=2411

[13] Licences are valid for a 12 month period from the date of issue and must be renewed annually thereafter by the licensee.

part of this band which would need to be migrated to make spectrum available for BB-PPDR[14].

13 The existing and proposed band plans for the 400 MHz Band are set out in Figure 1 below.

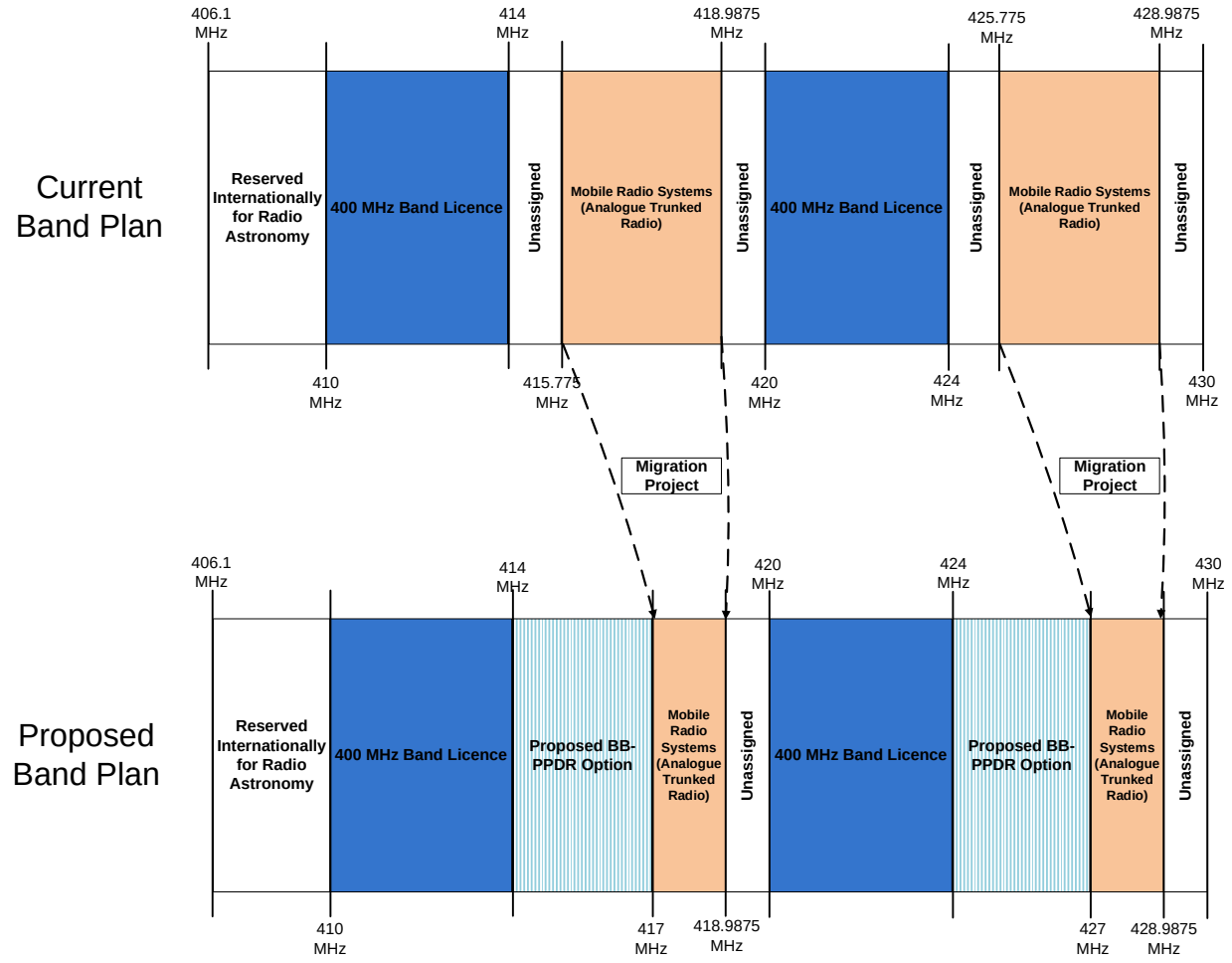

Figure 1: The existing and proposed band plans for the 400 MHz band

[14] See paragraph 2.24 of ComReg Document 19/23 - Response to Consultation and Draft Decision on the Release of the 400 MHz Sub-band – Published 15 March 2019.

2 × 5 MHz plus 2 × 3 MHz 700 MHz Duplex Gap and 700 MHz Guard Bands

14 In the 700 MHz Duplex Gap and 700 MHz Guard Bands, ComReg noted[15] that spectrum in these bands could be made available for BB-PPDR in line with the flexibility afforded under Decision (EU)2016/687 (the "EC 700 MHz Decision")[16].

15 Having considered the advice of LS telcom and other relevant information as part of the Proposed MBSA, ComReg proposed that it could make available:[17]

- 2 × 5 MHz in the frequency range 698 – 703 MHz / 753 – 758 MHz band (i.e. 3GPP Band 68); and
- 2 × 3 MHz in the frequency range 733 – 736 MHz / 788 – 791 MHz (i.e. 3GPP Band 28B).

16 When considering these BB-PPDR spectrum options, ComReg also noted that the EC 700 MHz Decision also provides for alternative uses for some or all of this spectrum. These alternative uses are supplemental downlink ("SDL")[18], wireless audio Programme Making and Special Events ("PMSE") equipment[19] and Machine-to-Machine ("M2M") radio communications[20].

17 The proposed BB-PPDR spectrum options and alternative uses for spectrum in the 700 MHz Duplex Gap and 700 MHz Guard Bands is shown in Figure 2 below.

[15] See for example, paragraph 4.22 of ComReg Document 18/118, "Radio Spectrum Management Strategy Statement 2019 to 2021", published 20 December 2018

[16] COMMISSION IMPLEMENTING DECISION (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694-790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union.

[17] ComReg Document 19/59.

[18] Supplemental Downlink (SDL) represents downlink-only (i.e. unidirectional) base station transmission for the provision of terrestrial wireless broadband electronic communications services.

[19] 'Wireless audio PMSE equipment' means radio equipment used for transmission of analogue or digital audio signals between a limited number of transmitters and receivers, such as radio microphones, in-ear monitor systems or audio links, used mainly for the production of broadcast programmes or private or public social or cultural events.

[20] Machine-to-Machine (M2M) radio communications means radio links for the purpose of relaying information between physical or virtual entities that build a complex ecosystem including the Internet of Things; such radio links may be realised through electronic communications services (e.g. based on cellular technologies) or other services, based on licensed or unlicensed use of spectrum.

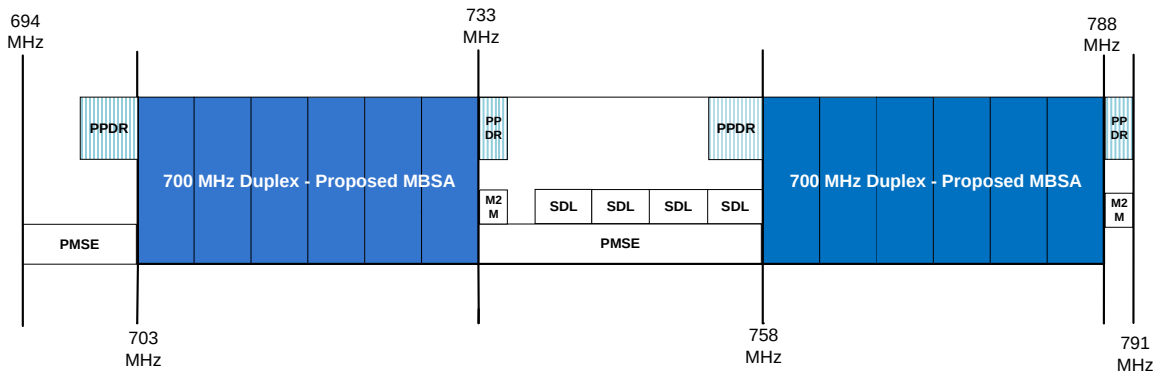

Figure 2: Proposed BB-PPDR spectrum options and alternative uses for spectrum in the 700 MHz Duplex Gap and 700 MHz Guard Bands

1.4 Communications with the Office of the Government's Chief Information Officer

18 From communications with the Office of the Government's Chief Information Officer ("OGCIO"), ComReg understands that each of the three BB-PPDR spectrum options proposed by ComReg is under active consideration and that further investigations, including the possibility of tests in a real-life environment[21], are envisaged before the OGCIO would be in a position to indicate its BB-PPDR spectrum preferences and timing.

19 Noting the above context, a number of spectrum management considerations and next steps are outlined below.

1.5 Spectrum management considerations

400 MHz Band

20 In the 400 MHz Band, ComReg's current spectrum management considerations centre around the potential need to migrate the existing licensees of analogue trunked systems in the 415.7750 – 417 MHz / 425.7750 – 427 MHz part of the band. ComReg licensing data from August 2020 indicates there are 10 such existing licensees using 35 channels of 2 x 12.5 kHz.

[21] Using Test and Trial Ireland (www.testandtrial.ie)

21 As a first step in this migration project, and in line with the flexibility provided by the Mobile Radio System Licence (Trunked Radio) Guidelines & Application Form (ComReg Document 07/57R1), ComReg will endeavour to accommodate new applications in the 417 – 418.9875 MHz / 427 – 428.9875 MHz part of the 400 MHz band, or some other suitable frequency band, and not in 415.7750 – 417 MHz / 425.7750 – 427 MHz range.

22 Existing licences in the 415.7750 – 417 MHz / 425.7750 – 427 MHz range would continue to be renewed as normal in the short-term but that going forward and subject to further clarity being available on the State's BB-PPDR requirements for the 400 MHz band, there may be a need to re-license them to the 417 – 418.9875 MHz / 427 – 428.9875 MHz part of the 400 MHz band, or some other suitable frequency band. ComReg's licensing team will engage with relevant licensees in due course.

23 Further steps in this migration project, including any notification to existing licensees to migrate from the 415.7750 – 417 MHz / 425.7750 – 427 MHz range, will be determined by ComReg in due course, taking account of relevant information including:

- any OGCIO indications to ComReg of whether and, if so, when spectrum in the 400 MHz band would be required for BB-PPDR;
- existing licensees' considerations (e.g. equipment practicalities etc.) regarding migration from the 415.7750 – 417 MHz / 425.7750 – 427 MHz portion of the band; and
- ComReg's spectrum management statutory functions and objectives, including the efficient management and use of radio spectrum.

700 MHz Duplex Gap and 700 MHz Guard Bands

24 For the BB-PPDR spectrum options in the 700 MHz Duplex Gap and 700 MHz Guard Bands, ComReg observes that there are also alternative uses for this spectrum (as shown in Figure 2 above) should the OGCIO indicate to ComReg that one or more of the BB-PPDR spectrum options would not be required.

25 In relation to these potential alternative uses, ComReg observes that some countries have already made proposals to use this spectrum. For example, information from Cullen International[22] indicates that:

[22] www.cullen-international.com/ (a pay subscription website)

- Denmark and Sweden included 1 x 20 MHz for SDL in their respective spectrum awards; and

- Slovenia has proposed to make available 2 x 3 MHz for M2M and Finland has noted that this as a possibility for the future.

1.6 Next steps

26 Cognisant of the OGCIO's active consideration of each of the three BB-PPDR spectrum options, and ComReg's objective to ensure the effective management and efficient use of radio spectrum, ComReg's next steps include:

- endeavouring to accommodate new applications in the 417 – 418.9875 MHz / 427 – 428.9875 MHz part of the 400 MHz Band, or some other suitable frequency band, and not in 415.7750 – 417 MHz / 425.7750 – 427 MHz range;

- renewing existing licences in the 415.7750 – 417 MHz / 425.7750 – 427 MHz range as normal in the short-term but that going forward and subject to further clarity being available on the State's BB-PPDR requirements for the 400 MHz band, there may be a need to re-license them to the 417 – 418.9875 MHz / 427 – 428.9875 MHz part of the 400 MHz band, or some other suitable frequency band. ComReg's licensing team will engage with relevant licensees in due course; and

- continuing to engage with the OGCIO in relation to the State's likely BB-PPDR spectrum requirements in order to inform any spectrum management considerations that ComReg may have in relation to same.

27 ComReg envisages that another BB-PPDR spectrum options update will be provided in due course following further engagement with OGCIO and the existing licensees, and when further information is available.