An Coimisiún um
**Rialáil Cumarsáide**
Commission for
**Communications Regulation**

# Proposed licensing regimes for Private Mobile Radio (PMR) and Low & Medium Power Wireless Broadband Systems (WBB LMP)

Consultation

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**An Coimisiún um Rialáil Cumarsáide**
**Commission for Communications Regulation**
1 Lárcheantar na nDugaí, Sráid na nGildeanna, BÁC 1, Éire, D01 E4X0.
One Dockland Central, Guild Street, Dublin 1, Ireland, D01 E4X0.
Teil | Tel +353 1 804 9600 Suíomh | Web www.comreg.ie

## Additional Information

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## Approval

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# 1 Introduction and Background

1.1 The Commission for Communications Regulation ("ComReg") is the statutory body responsible for the regulation of the electronic communications telecommunications, radio communications and broadcasting networks, postal and premium rate sectors in Ireland and in accordance with European ("EU") and Irish law. ComReg also manages Ireland's radio frequency spectrum ("radio spectrum" or "spectrum") and the national numbering resource.

1.2 Pursuant to the Wireless Telegraphy Act 1926 as amended ("1926 Act") and to section 10(1)(b) of the 2002 Communications Regulation Act[1], as amended ('2002 Act' ), ComReg has the function of managing the radio frequency spectrum and ComReg has the statutory objective under section 12(1)(b) of the 2002 Act of ensuring the efficient use of the radio frequency spectrum in accordance with any Ministerial Policy Directions given under section 13 of the 2002 Act. Furthermore, ComReg has a statutory obligation to promote competition and the interests of end-users and to ensure that spectrum rights of use are granted on foot of objective, transparent, non-discriminatory and proportionate principles and procedures.

1.3 The demand for radio spectrum continues to grow, driven by society's ever-increasing requirements for access to data intensive services. In this context it is ComReg's goal that the management of spectrum facilitates competition, enhances connectivity and promotes efficient investment.

1.4 In that regard, Document 24/99a[2] sets out ComReg's radio spectrum management operating plan for 2025 to 2028 which includes proposals for core programmatic spectrum management activities together with activities in a number of radio spectrum services categories. Two work items identified for the 2025 to 2028 period are:

- a review of the current Private Mobile Radio '(PMR)' licensing regimes and consultation on a new licensing regime;[3] and
- Consultation regarding a proposed licensing regime for local-area Wireless Broadband Low Medium Power '(WBB LMP)' systems, which could be used for, among other things, private mobile (4G, 5G etc.) networks.[4]

1.5 As both work items would provide for the licensing of mainly, but not exclusively, of private networks and that certain PMR licensees could potentially migrate to a WBB

[1] https://www.irishstatutebook.ie/eli/2002/act/20
[2] ComReg Document 24/99a – Radio Spectrum Management Operating Plan 2025-2028 – published 13 December 2024.
[3] See section 4.2.6 of ComReg Document 24/99a.
[4] See section 4.2.2 of ComReg Document 24/99a.

LMP licensing regime, ComReg is now consulting collectively on the work items and seeking the views of parties who may have an interest in one or both matters.

1.6 ComReg notes some demand for the timely implementation of a WBB LMP licensing regime to support certain use cases. In that regard, this preliminary consultation is twofold in that it:

- considers ComReg's existing PMR licensing regimes for narrowband[5] systems, and proposes a new PMR licensing regime; and;
- proposes a new licensing regime for low & medium power wireless broadband[6] systems ('WBB LMP') in the 3.8-4.2 GHz Band.

1.7 Any changes to the current regimes or any new regimes would require new regulations, under the 1926 Act, to replace some or all existing ones. Pursuant to section 37 of the 2002 Act, regulations can only be made under section 6 of the 1926 Act with the consent of the Minister.

1.8 As part of this Consultation process ComReg sought advice and recommendations from its economic advisors, DotEcon Limited ("DotEcon") and technical advisers Plum Consulting Limited ("Plum") and has published alongside this document two interim reports – ComReg Document 25/46a (the 'DotEcon Report') and ComReg Document 25/46b (the 'Plum Report').

1.9 In summary, the "DotEcon Report" sets out:

- the current situation regarding the PMR environment in Ireland;
- a potential future licensing framework for PMR;
- an assessment of use cases for WBB LMP; and
- a potential future licensing framework WBB LMP.

1.10 The DotEcon Report was informed by, amongst other things:

- Interviews, conducted by DotEcon and ComReg, with several PMR and WBB LMP stakeholders including existing users and equipment manufacturers (the "Stakeholder Interviews");
- Analysing PMR and WBB LMP licensing regimes and use cases across Europe; and

[5] Narrowband means a communication channel which operates within a small bandwidth, typically less than 25 kHz. Narrowband systems transmit data, voice, or signals over long distances using minimal bandwidth. Examples of technologies which uses narrowband are telemetry, low-power IoT networks, and legacy telecommunication systems.

[6] Broadband (or wideband) means a communication channel which operates across a wide bandwidth typically in the MHz range. Wireless broadband systems transmit data using communication standards such as LTE and 5G.

- Plum Consulting's analysis of the technical coexistence issues with the 3.8-4.2 GHz Band.

1.11 The Plum Report sets out:

- Potential approach(es) for how the band could be "presented" for WBB LMP network licensing in Ireland taking into account the potential use, services and requirements of interested parties; and
- Coexistence technical analyses between WBB LMP networks and other networks and services.

1.12 The Plum Report was informed by, amongst other things:

- Benchmarking and analysis of approaches adopted or proposed for licensing of WBB LMP networks in other countries; and
- Documents regarding WBB LMP published or currently being developed by the ECC, CEPT and the European Commission.

1.13 This document relevantly summarises the matters discussed in the DotEcon and Plum Reports and readers are referred to both reports for more detail on those matters.

## 1.1 Private Mobile Radio (PMR)

1.14 PMR systems are part of the land mobile service[7] which operates in simplex[8], semi[9] and full[10] duplex modes to provide closed user group communications, and generally, is not used to provide services to consumers.

1.15 The main users of PMR are those which require a reliable means of communication between personnel and in particular groups of personnel over a specific area. Some of the main uses are for public safety and security, public utilities (power, water, transport etc.) and industrial and commercial users such as taxi services, security firms, factories, etc. Therefore, a PMR licence permits the operation of radio communication to support a licensee's activities such as the running of a business.

1.16 ComReg currently issues the following licences/permits[11] for PMR:

[7] A mobile service between base stations and land mobile stations, or between land mobile stations.
[8] Simplex operation is a method in which transmission is made possible alternately in each direction of a communication channel using one or two frequencies.
[9] Semi-duplex operation is a method which is simplex operation at one end of a communication channel and duplex operation at the other.
[10] Full duplex operation is a method in which transmission is possible simultaneously in both directions of a communication channel. Both semi and full duplex operations require two frequencies.
[11] https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/business-radio/

- **Business radio licences** allow for communication between a control point and one or more mobile terminals, or where groups of mobile terminals need to communicate on a "one to all" basis over a single radio channel. Business radio is mainly used to support private communications within the following sectors – commercial, industrial, transportation, etc;
- **Temporary business radio licences or programme making and special events ("PMSE") licences** allow for the temporary use of radio equipment for media programme making at special events such as concerts and sporting events;
- **Trunked radio licences** allow for the use of a two-way radio system that uses a control channel to automatically assign frequency channels from a common pool to groups of user radios for the duration of a call. After each call the channel is returned to the pool where it can be assigned to another user;
- **Community repeater licences** allow for the use of a community repeater system for use by third parties where a base station provides a wide area two-way radio communications on a channel sharing basis;
- **Third party business radio ("TPBR") licences** allow licensees to provide business radio services to third parties nationally for a 5-year period without the need for individual licensing of business radio operations for each specific geographic site or by each third party user; and
- **Paging permits** allow the use of paging systems which provide for the sending of a one-way digital coded signal to a paging receiver.

1.17 Table 1 below lists the VHF[12] and UHF[13] bands that are generally used for PMR in Ireland. Further frequency ranges are available for PMSE licensing on secondary basis, Table 4 in Annex: 2 sets out the list of those frequency ranges.

**Table 1 – List of frequency bands available for PMR licensing in Ireland**

| Band | Frequency (MHz) |
|---|---|
| **VHF Low** | 68 - 87.50 |
| **VHF High** | 163 – 174 |
| **UHF** | 410 – 420 and 450 – 470 |

[12] Very high frequency ("VHF") is the designated term for the range of radio frequencies from 30 to 300 MHz.
[13] Ultra high frequency ("UHF") is the designated term for the range of radio frequencies from 300 to 3000 MHz.

1.18 The current PMR licensing regimes have been in place for many years, some over 75 years and were introduced separately to facilitate specific types of technologies. However, technology has evolved considerably in the time since the introduction of the current PMR regimes, therefore ComReg considers it timely to propose a new licensing framework which would consolidate several of the current licensing regimes thereby providing for a more modern and efficient licensing process going forward.

## 1.2 Wireless Broadband Low Medium Power ('WBB'LMP)

1.19 In 2024 the ECC Decision (24)01[14] on the harmonised technical conditions for the shared use of 3.8-4.2 GHz Band was published. That Decision outlines the technical conditions for shared use of the spectrum in the band. The purpose of the Decision (24)01 is to "*harmonise the use of the frequency band for shared access to low/medium power terrestrial wireless broadband systems local areas network connectivity*".

1.20 In that Decision, Member States are encouraged to authorise the use of the 3.8-4.2 GHz Band in a way which avoids fragmentation across the Union and facilitates a potential future review of spectrum use.

1.21 As part of this consultation and to propose an appropriate licensing regime for WBB LMP, ComReg has considered demand and possible shared use of 3.8-4.2 GHz Band. For example, such use could include the use of WBB LMP systems in hospitals, ports, manufacturing, airports and transport, among other uses.

1.22 WBB LMP systems are driven by technological advances and increasing applications in the manufacturing, healthcare, automotive and energy industries. Offering high-speed, low-latency connectivity, WBB LMP enables real-time data processing and supports key functions in various sectors.

1.23 The 3.8-4.2 GHz Band can enable the deployment of terrestrial WBB LMP systems to provide local-area network connectivity for a variety of services and applications, all on the basis of technology neutrality. The wide range of local use cases for those systems enable deployments across various settings and both indoor and outdoor, would likely benefit from the harmonised use of the 3 800-4 200 MHz frequency band.

1.24 The European Commission Communication '5G for Europe: An Action Plan' ('5G Action Plan')[15] sets out a coordinated Union approach to the deployment of 5G

[14] ECC Decision (24)01
[15] https://digital-strategy.ec.europa.eu/en/library/communication-5g-europe-action-plan-and-accompanying-staff-working-document

services as of 2020. The 5G action plan highlights 5G as a key enabler of the digitalisation of "vertical industries". It also identifies a need for coordinated action at Union level, including the identification and harmonisation of spectrum for 5G, to serve innovative business models and solutions for locally licensed access to spectrum.

1.25 The harmonised technical conditions and the relevant guidance set out in the CEPT Report (88)[16] address the protection and the long-term development of incumbent users sharing the 3.8-4.2 GHz frequency band, in particular receiving satellite earth stations and terrestrial fixed links. It also addresses the protection of terrestrial wireless broadband systems providing electronic communications services below 3 800 MHz and radio altimeters operating in the 4 200 – 4 400 MHz frequency band. There are other CEPT reports[17] that consider and provide guidance on matters related to the harmonization of this band.

## 1.3 Document structure

This consultation invites stakeholders to comment on ComReg's preliminary views as outlined in chapter 2 to 6 below.

1.26 This document is laid out as follows:

- Chapter 2 – outlines the current PMR Licensing Regime;
- Chapter 3 – outlines the PMR Narrowband RIA;
- Chapter 4 – outlines the Proposed new Consolidated Licensing Regime;
- Chapter 5 – provides relevant background information in considering a licensing framework for WBB LMP in the 3.8-4.2 GHz Band and sets out the likely use cases;
- Chapter 6 – sets out ComReg's initial analysis and proposals on a WBB LMP licensing framework in the 3.8-4.2 GHz Band, where firstly ComReg's outlines its views on a number of high-level principles that could inform the establishment of a WBB LMP licensing framework and subsequently sets out its analysis and proposals in relation to the specific aspects of a WBB LMP licensing framework;

[16] CEPT Report to the European Commission in response to the Mandate on shared use of the 3800-4200 MHz: CEPT Report 88

[17] For example some other reports include but is not limited to, 'Receiver selectivity performance of satellite Earth stations in the band 3800-4200 MHz': ECC Report 340 and 'In-band and adjacent bands sharing studies to assess the feasibility of the shared use of the 3.8-4.2 GHz': ECC Report 358

- Chapter 7 – outlines the Next Steps and submitting comments;
- Annex 1 – sets out the Legal Basis for matters proposed in this Consultation;
- Annex 2 – sets out analyses of the PMR fees;
- Annex 3 – sets out the relevant PMR Frequency tables;
- Annex 4 – sets out the background material on usage of the 3.8-4.2 GHz Band in Europe and WBB LMP Use Cases;
- Annex 5 - provides information on licensing frameworks in other European countries relevant to WBB LMP networks; and
- Annex 6 – sets out the background information for each of the sharing and compatibility scenarios regarding WBB-LMP deployment in the 3.8-4.2 GHz Band.

1.27 An Assessment Tool that will assess any changes for existing PMR licensees' fees will be made available on request. Requests should be made by **17:00 on 23 July 2025** to marketframeworkconsult@comreg.ie. This will consist of compiling the organisation's information and verification of the person's identity and their relationship with that organisation. ComReg may seek additional proof of employment or any other relevant documentation before providing the Assessment Tool.

1.28 In accordance with ComReg's Consultation Procedures and with consideration of the summer period, the consultation will run until **17:00 on Friday 22 August 2025**, please see Chapter 7 for further details about submitting comments.

# 2 Current PMR Licensing Regimes

2.1 PMR has various use cases employed across a broad list of sectors i.e. entertainment, healthcare (hospitals), transport (taxi services, ports), construction among others. The use cases listed and considered in this section are high-level categories that differ based on geographic scope, type of equipment, number of pieces of equipment, type of media (alerts/text/voice/video) and other characteristics.

## 2.1 Overview of the Current Licence Types

2.2 There are six types of PMR licence types currently available for the following communication uses[18],:

- Business radio systems that communicate on different modes from a fixed control point or mobile terminal or between mobile terminals;
- Third party business radio (TPBR) licences are designed to allow the licence holder to lease radio equipment and spectrum access to third parties for PMR type applications;
- Mobile radio (also called trunked radio) systems use a pool of channels that can be accessed by multiple users within a closed user group;
- Community repeater systems comprise a base station (typically in a remote position on a high site), trigger stations, and mobile stations that allow equipment providers to offer use of the base station. The systems provide two-way communications services to a number of users on a channel-sharing basis;
- PMSE licences cover the operation of radio equipment at a given location for outside broadcasting and music/sporting/theatrical /etc. events, for a specified time not to exceed six months; and
- Paging systems send one-way coded signals (e.g. a beep or a text message) to a paging receiver owned by a subscriber. Currently, ComReg grants paging permits rather than licences, and there are no fees nor expiry dates associated with a paging permit.

2.3 These licence types were implemented by ComReg at various points in the past to address requirements of the then prevailing technologies, networks and services.

2.4 ComReg also administers a Telemetry licensing regime which provides for

[18] See Annex 1 for a list of the current regulations that govern the PMR licence types.

communications systems which transmit automated measurements from remote locations to receiving stations for monitoring and control purposes.

2.5 ComReg initially considered including the Telemetry licensing regime as part of this consultation process. However, as the previous national telemetry licences were due to expire in 2024, ComReg undertook a separate review specifically for telemetry to ensure both national and regional telemetry licences remained available following their expiry and avoid disruption to users.

2.6 Therefore, the Telemetry licensing regime is not being considered as part of this consultation.

### 2.1.1 Licence fees

2.7 A fee is payable on application for the different licence types (with the exception of Paging Permits). Licence renewal and amendment fees may also be charged where a licence can be renewed or amended. Table 2 below sets out the current fee structure for each licence type.

2.8 Licence amendments are not subject to a fee, however in the case of Business Radio if the equipment number increases then a fee for the additional equipment would apply. Licensed radio equipment may consist of Base Stations, Mobile Stations, and Portable Stations. The appropriate renewal fee must be paid in full prior to the expiry date of the licence each year.

**Table 2 : Fee Structure and Licence Types**

| Licence Type | Licence Fee | Maximum Licence Duration (Years) | Renewable |
|---|---|---|---|
| **Business Radio** | €22 licence processing fee plus €22 per piece of equipment. | 1 | Yes |
| **Third party business radio (TPBR)** | €1,000 per year with total fee payable prior to the issuing of the licence | 5 | No |
| **Mobile Radio (or Trunked)** | €625 for first year, €1,000 each year thereafter | 1 | Yes |
| **Community Repeater** | €12 licence processing fee plus €625 for first year, €1,000 each year thereafter | 1 | Yes |
| **PMSE** | €12 licence processing fee plus €12/piece of equipment | 0.5 | No |
| **Paging** | No fees | Lifetime of system usage | No |

## 2.2 Use cases

2.9 PMR use cases are often distinct but can overlap and shift based on the individual operator needs. Within sectors and even among individual licensees, users might employ a combination of these use cases in their operations. The DotEcon report notes that the main uses of PMR systems fall into the following categories;

- On-site communications (talkback systems) - used in factories, hospitals, construction sites, malls, and security operations;
- Wide-area communication (one-to-one or one-to-many, disseminating messages from a central command centre to many recipients throughout the area) - used in logistics, transportation, search and rescue, private security;
- Event production (e.g video/audio systems, in ear mics) - used for sporting events, concerts, festivals, government/community events; and
- telemetry and control, primarily used by utilities companies to monitor and report back to a command centre frequent readings and critical operating information.

2.10 The DotEcon Report further notes that specific operators falling within each of these use cases may need quite different types and quantities of equipment (e.g. hand portables, repeaters, base stations, a mixture of analogue and digital equipment), depending on the coverage area and, nature of the communication (e.g. one-to-one or one-to-many), but still fall within the same high level use case). PMSE operators may take out temporary broadcasting, point-to-point or satellite Earth station licences, in addition to temporary business radio licences, as set out in the PMSE guidelines.

2.11 See Section 3.2 of the DotEcon Report for a description of the different sectors of society that use PMR.

## 2.3 Demand for PMR licences

2.12 This section considers the demand to date for PMR licenses from June 2020 to June 2024.

2.13 Table 3 shows the number of available channels for each of the frequency bands currently allocated to the PMR licensing regimes. There is an average occupancy rate of approximately 29% across all the bands, demonstrating that there is currently no congestion within the bands. The 450-470 MHz band has the highest occupancy rate of approximately 44%.

2.14 Table 3 also shows the number of licences which have been assigned channels from

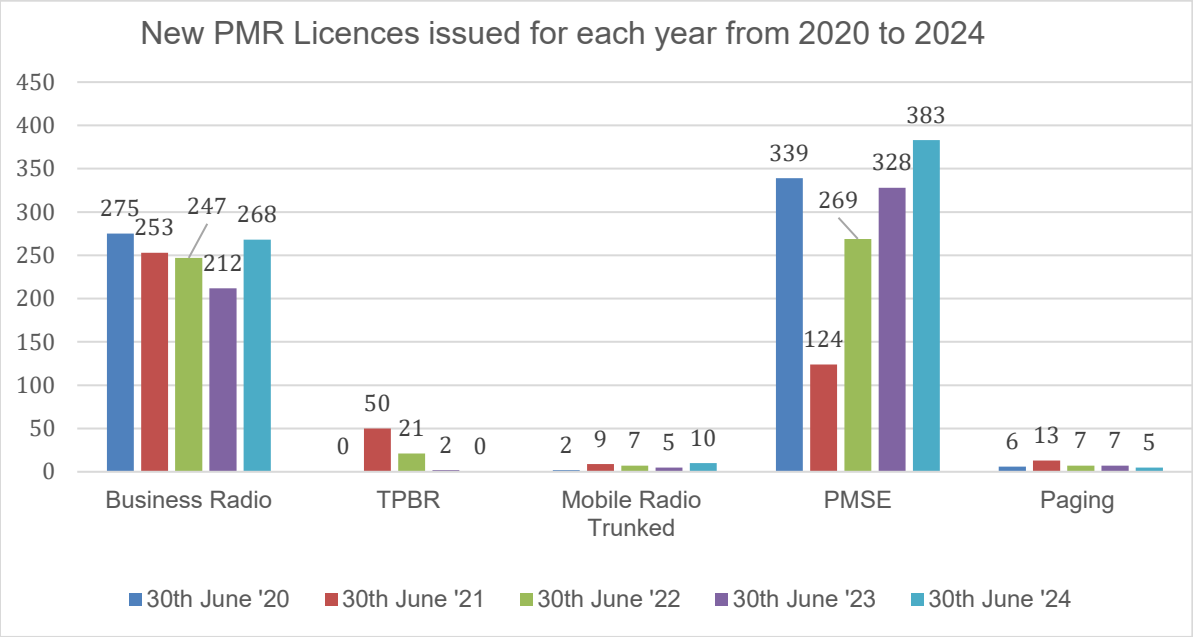
each of the bands, indicating that the 450-470 MHz band is currently the most popular band for PMR systems.

**Table 3: channel occupancy and number of licences issued for each of the frequency bands allocated to PMR**

| Frequency band | Total number of available channels | Number of occupied channels | Total number of licences |
|---|---|---|---|
| **UHF (450-470 MHz)** | 889 | 400 | 1266 |
| **UHF2 (415-429 MHz)** | 159[19] | 99 | 24 |
| **UHF1 (385-399 MHz)** | 200[20] | 20 | 9 |
| **VHF Hi (155.85-174 MHz)[21]** | 552 | 135 | 213 |
| **VHF Lo (68-88 MHz)** | 833 | 47 | 53 |

2.15 Regarding yearly demand for licences, figure 1 below shows the number of new PMR licences and paging permits which were issued within each operating year[22] from 2020-2024.

**Figure 1: New PMR Licences issued for each operating year from 2020 - 2024**




2.16 There was a circa 23% decline in the number of **new Business Radio ("BR")**

[19] The frequency range 415.7750 – 417 MHz / 425.7750 – 427 MHz is currently closed to new Trunked Radio applications. See section 1.5 of ComReg Document 20/98 https://www.comreg.ie/media/2020/10/ComReg-2098.pdf

[20] Channel bandwidths are 25 kHz.

[21] The frequency pairing 155.85-158.525 MHz/160.45-163.025 MHz is allocated for Maritime Services.

[22] The ComReg operating year is 12 months from the 30th of June to the 30th of June the following year.

**licences** issued year on year from June 2020 to June 2023. However, the number of new Business Radio licences increased by approximately 26% during the 2023/2024 operating year. The drop in the number of new BR licences being issued between the 2019/2020 and 2022/2023 operating years is likely the result of reduced business activity during the Covid-19 pandemic, while the increase in demand in the last operating year 2023/2024 may be reflective of the normalisation of business activity and increased economic activity. Notably however, there remains a significant demand for BR systems.

2.17 When ComReg reopened the **TPBR licensing regime** in 2020[23], it increased the number of available 12.5 kHz channels to 73 by making 30 additional channels available. All 73 licences were issued between 2020/2021 and 2021/2023, As all channels were applied for at the time, ComReg observes that strong demand remains for TPBR licences to support various use cases.[24]

2.18 There has been no demand for new **Community Repeater ("CR") licences** during the five-year period, ComReg observes that this is likely due to an increase in TPBR licences replacing the need for community repeater licences and also due to the proliferation of 4G/5G networks. ComReg observes that a significantly large number of CR licences expired or were cancelled between 2005 and 2011, with little to no demand for CR licences from 2011 onwards.

2.19 The demand for **Paging Permits** is low but remains an important use case as paging systems are still utilised within the health care, hospitality and industrial sectors. Some paging system users may also be operating under the BR or TPBR licensing regimes.

2.20 The demand for **PMSE licences** has trended upwards since 2020 when there was a drop in the demand due to restrictions placed on public gatherings and events as a result of the Covid-19 pandemic. ComReg observes that there remains a requirement to facilitate the authorisation of radio equipment for communications at broadcast, sporting, theatrical, and musical events.

2.21 **Trunked Radio licences** are used for networks that are likely to be operated by large national or regional organisations such as the emergency services, utilities and transport operators that need to communicate between large numbers of mobile

[23] ComReg Document 20/76 – Third Party Business Radio Response to Consultation and decision on re-opening the Third-Party Business Radio scheme https://www.comreg.ie/publication/third-party-business-radio-response-to-consultation-and-decision-on-re-opening-the-third-party-business-radio-scheme.

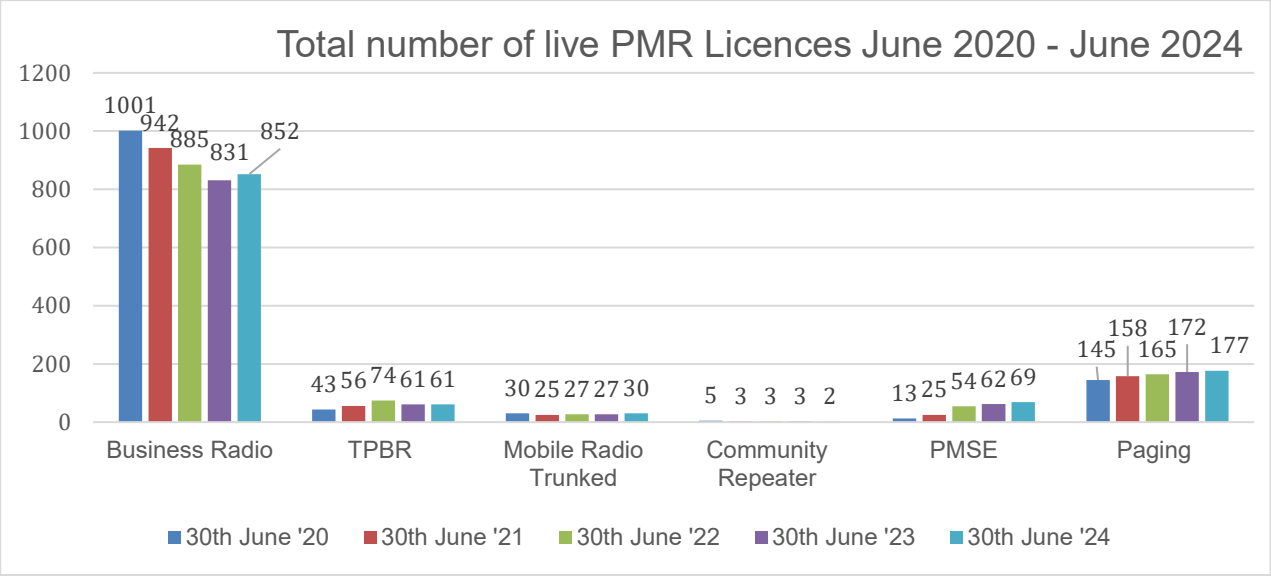
[24] In May 2025 ComReg decided to reopen the TPBR licensing regime for a final time to facilitate the continuation of services currently operating under the regime while ComReg consults on a new PMR licensing framework. If a new PMR licensing framework is implemented, then any of the existing services operating under the TPBR licensing regime could transition to the new regime upon the expiry of the existing TPBR licences.

users. Demand for trunked radio licences has remained largely unchanged year on year. ComReg observes that, similar to paging systems, there may also be an overlap with some business radio applications licensing multiple frequencies and deploying a trunked radio system giving support to the consolidation of the PMR licences.

### Live PMR licences

2.22 Figure 2 below shows the total number of live PMR licences on 30 June 2020 – 2024.

**Figure 2: Total number of live PMR Licences as of 30 June 2020 – 30 June 2024**




**2.23** The number of live **BR licences** on 30 June each year reflects a similar trend as to the number of new licences issued within each of the same years as shown in figure 1 above.

2.24 The number of live **TPBR licences** decreased in 2022 as twelve channels were handed back to ComReg in 2023 due to the licensee implementing a different business solution. Aside from the return of those channels, the number of live TPBR licences has remained steady to 30 June 2024.

2.25 The number of live **Community Repeater licences** continued to decrease with just two live licences as of 30 June 2024.

2.26 The number of live **Trunked Radio licences** has remained consistent over the last five years with only slight change year-on-year.

2.27 **PMSE licences** are only required for short periods (1 day to six months) so the number of live licences in the graph above can only reflect the live licences at 30 June each year. Notwithstanding, the increase of live licences is perhaps illustrative of the post Covid rebound in the broader entertainment industry.

2.28 The number of live **Paging Permits** increased over the 5-year period by approximately 22%, which demonstrates that paging systems still have an important communications role to play.

## 2.4 Frequency Bands

2.29 This section describes the frequency bands which are allocated for land mobile services such as PMR and considers whether any changes are necessary to promote the efficient use of existing and/or new frequency bands.

2.30 The allocated frequencies for all PMR licence types are within the VHF and UHF bands, while higher frequency bands are available within the PMSE licensing regime for equipment such as wireless cameras and microphones. There is no natural division of these frequency ranges into distinct bands for specific types of PMR licence and there is some overlap as to the usage within certain sub-ranges, please see figure 9 to 11 in Annex 3 for further details.

2.31 The main frequency bands available for PMR in Ireland include 68-88 MHz ("VHF Lo"), 155.85-174 MHz ("VHF Hi"), 385-430 MHz ("UHF 1"), and 450-470MHz ("UHF 2"), while digital and analogue Trunked Radio licences are assigned frequencies from within the 385-430 MHz frequency range. Table 4 shows the frequency ranges that are allocated to the different PMR licence types.

**Table 4: Frequency range per licence type**

| Frequency Range | Licence Types |
|---|---|
| **68 – 88 MHz** | Business Radio & PMSE |
| **155.85 – 174 MHz** | Business Radio, TPBR & PMSE |
| **415.775-418.9875 MHz / 425.775 -428.9875 MHz**[25] | Analogue Trunked Radio |
| **385-390 MHz / 395-399.9 MHz** | Digital Trunked Radio |
| **450 - 470 MHz** | Business Radio, TPBR, Community Repeaters, Paging Permits, PMSE & Telemetry |

[25] The frequency range 415.7750 – 417 MHz / 425.7750 – 427 MHz is currently closed to new Trunked Radio applications. See section 1.5 of ComReg Document 20/98 https://www.comreg.ie/media/2020/10/ComReg-2098.pdf

2.32 Additionally, frequency ranges above 470 MHz and within the microwave frequency ranges are available for licensing under the PMSE licence type. Certain types of PMSE radio equipment can be used on a licence-exempt basis provided that the output power does not exceed a certain limit or within a specific frequency range, e.g. 50mW in the case of in-ear microphones or 500 mW for consumer-grade walkie-talkies operating on 446 MHz. Please see ComReg Document 'Permitted Short Range Devices in Ireland Document' 02/71 R17 for further information.

### Harmonisation of frequency bands

2.33 ECC recommendation TR 25-08 recommends[26] planning criteria and coordination of frequencies for land mobile services in the range 29.7-470 MHz (the CEPT Recommendation)[27] and sets out a harmonised channelling arrangement.

2.34 Trunked radio is the only PMR licence type which aligns with the recommended duplex separation, use and location of simplex and duplex bands as set out in Annex 2 of T/R 25-08. The other licence types adopt a reverse (narrowband) configuration meaning base stations operate at the lower end of a frequency band and mobile stations operate at the upper end. This reverse configuration is as a consequence of legacy decisions which pre-date the publication of T/R 25-08.

2.35 This reverse configuration is also used in the UK for PMR licence types due to similar legacy decisions, and consequently the base and mobile station band configuration for land mobile services are the same in Ireland and the UK. To align the base and mobile station band configuration with T/R 25-08 would require a retune of equipment and possible replacement of some legacy equipment which would likely have a significant cost[28] and require a carefully planning transition possibly over a protracted period of time. If the band configuration in the UK was to remain unchanged this may give rise to cross-border inference issues.

2.36 The Business Radio band plans in UHF 2 have evolved over many years resulting in a large number of different duplex channels spacings, see annex 3 below. ComReg is of the view that to fully align the VHF and UHF band plans with T/R 25-08 would require carefully planning and potential incur significant costs across the PMR sector.

2.37 In 2023 Ofcom published a Call for information on Potential spectrum bands to support utilities sector transformation which laid out several options and preformed

[26] https://docdb.cept.org/download/2544
[27] https://docdb.cept.org/download/063e7311-fba7/TR2508.pdf
[28] A study for Ofcom undertaken by PA Consulting in June 2004 estimated the cost of a band reversal for the 450 MHz band would be between £260m and £310m, and in a 2023 consultation on potential spectrum to support the utilities sector, Ofcom noted there could still be significant costs incurred by some or all existing users if they were migrated within or out of the UHF band. Call for Input: Potential spectrum bands to support utilities sector transformation

both technical feasibility and costs and benefits analysis for all. Options ranged from a limited partial replan to a full replan to align the UK's use with other European countries. In March 2025, Ofcom published an update stating that it would not be undertaking any spectrum realignment in this regard.[29]

2.38 Given all of the above, ComReg proposes to not make any changes to the band configuration at this time to align with T/R 25-08 as re-alignment would cause significant disruption to current licensees and impart significant costs. ComReg's current band plan will remain partially aligned with CEPT harmonisation plan and aligned with the UK's band configuration.

2.39 ComReg intends to continue to monitor the usage of the UHF and VHF frequency bands and to engage with Ofcom in our mutual interests and in the event any future requirements necessitate a change to the band configuration to align with T/R 25-08.

### Proposed frequency bands for a future PMR licensing regime

2.40 The DotEcon Report observes that for the most part, there is no evidence of scarcity of PMR spectrum at present and stakeholders have not faced issues in obtaining licences for their desired frequencies. ComReg agrees with this observation considering the demand for PMR frequencies is not exceeding the total number of frequencies available across the VHF and UHF bands. Therefore, ComReg does not propose to make any changes to the 68-88 MHz, 155.85-174 MHz and 450-470MHz bands, and they would continue to be allocated for PMR licensing.

### Rationale for the proposed changes to Trunked Radio

2.41 Unlike frequency bands (68-88 MHz, 155.85-174 MHz and 450-470 MHz) which will remain unchanged, this section considers ComReg's proposal to close the 385-400 MHz and 415-429 MHz frequency ranges to new applications to operate a trunked radio system which instead would be assigned spectrum within the 450-470 MHz frequency range.

2.42 In 2000[30] ComReg's predecessor the Office of the Director of Telecommunications Regulation the ('ODTR'), allocated 385-400 MHz and 415-429 MHz bands to digital and analogue Trunked Radio. Since the original allocation of the 385-400 MHz and 415-429 MHz bands, the use cases and demand for these bands has changed significantly. In particular, ComReg notes that;

[29] https://www.ofcom.org.uk/spectrum/innovative-use-of-spectrum/potential-spectrum-bands-to-support-utilities

[30] The ODTR noted that TETRA equipment was at that time being manufactured for the 410-430 MHz range for civil trunked radio systems. ODTR Document 00/11 – Opening the market for Terrestrial Trunked Radio (TETRA) – published 14 February 2000.

- the ODTR's view regarding the potential harmonisation of the 450-470 MHz band with T/R 25-08 has not materialised and consequently harmonisation is unlikely in the future as it would be costly to licensees in Ireland and the UK;
- the following bands, 415.775-417 MHz / 425.775-427 MHz are currently closed to new applications as a result of spectrum being reserved for future BB-PPDR systems[31] and existing licensees within that range may be migrated in the future;
- demand for Trunked Radio Licences within those bands is low, see Figures 1 and 2 and table 3 above, and any future trunked radio systems could be accommodated with the 450-470 MHz frequency range without creating any congestion;
- other types of communication systems have sought access to spectrum within the UHF band, notably communication networks to support smart grids[32] for utility networks[33] and future BB-PPDR systems. Therefore, ComReg is of the view that it would be prudent to cease assigning frequencies 385-400 MHz and 415-429 MHz bands for new PMR applications to reduce the burden of any potential future migration in the event that demand for those bands were to materialise; and
- Trunked radio equipment is available for use across the entire UHF band (380-470 MHz) and is no longer limited to the 385-430 MHz frequency range, therefore ComReg is of the view that users of trunked radio systems would be agnostic about the specific frequency range allocated for trunked radio systems.

2.43 In that regard, ComReg proposes that the 385-400 MHz and 415-429 MHz frequency ranges would be closed to new applications and that any applications for PMR licences to operate a trunked radio system would be assigned spectrum within the 450-470 MHz range.

2.44 ComReg does not propose, at this time, to migrate any existing Trunked Radio licensees from the 385-400 MHz and the 415-429 MHz frequency ranges. However, ComReg notes that over time some of the current Trunked Radio licences may migrate gradually to other licensing regimes such as a future WBB LMP regime

[31] ComReg Document 20/98 – Broadband Public Protection and Disaster Relief (BB-PPDR) Spectrum Options (October 2020 Update) – published 14 October 2020
[32] A smart grid is defined as an energy network that can automatically monitor energy flows and adjust to changes in energy supply and demand accordingly.
[33] https://www.comreg.ie/industry/radio-spectrum/spectrum-awards/400mhz-band-spectrum/

where larger bandwidths may be available to meet specific sectoral requirements.

### 2.4.1 Demand for specific frequency bands

2.45 As can be seen from table 3 above, the majority of PMR licences are assigned channels from the UHF band where approximately 1,266 12.5 kHz channels are assigned to Business Radio, TPBR, Community Repeaters, Trunked Radio and Paging licences/permits. Within the VHF Hi band approximately 213 12.5 kHz channels are assigned to Business Radio and TPBR licences. Within the VHF Lo band approximately 53 channels are assigned to Business Radio licences. The popularity of the UHF band can be attributed to the propagation characteristics of the band, together with the availability of commercial radio equipment tuned to work within the UHF band.

2.46 The propagation characteristics of the VHF band means it is more suitable for long-distance communication or when operating in open areas, while the UHF band is more suitable for short-range communication and the shorter wavelengths provide a better option to pass barriers such as walls and trees.

2.47 The DotEcon Report observes that during interviews with stakeholders, interest was expressed regarding the potential for the use of additional frequency ranges within 410-450 MHz. However, 415.775- 418.9875 MHz / 425.775-428.9875 MHz is already allocated to the Trunked Radio with 414-417 MHz / 424-427 MHz being reserved for potential future use by Broadband Public Protection and Disaster Relief ("BB-PPDR") systems. In Document 20/98[34], ComReg noted that any future deployment of BB-PPDR within the reserved spectrum would require the migration of existing Trunked Radio licensees from the 415.7750 – 417 MHz / 425.7750 – 427 MHz range.

2.48 Regarding the 430-450MHz frequency range, the lower 10 MHz is allocated to the Radio Amateur service. While the 440-450 MHz has potential for PMR use, ComReg notes that T/R 25-08 designates this range for single frequency use and as such there is no duplex frequency pairing. Therefore, making the 440-450 MHz band available for licensing would have no benefit for use cases which require duplex frequency pairings. In addition, ComReg is of the view that it would be of limited benefit for systems which can use simplex modes on a single frequency as there is currently no scarcity of the currently single unpaired frequencies.

2.49 PMSE licences also have access to higher frequency bands, used for wireless microphones and wireless cameras, including secondary use of the 470-694 MHz range which is used on a primary basis by digital terrestrial television ("DTT") services. In the RSMOP, ComReg stated its intention to input into discussions within

[34] https://www.comreg.ie/media/2020/10/ComReg-2098.pdf

the ITU, CEPT and EC as appropriate in relation to the future use of the 470-694 MHz band. In that regard, ComReg is is currently gathering information regarding the potential future use of the 470-694 MHz band which includes considering scenarios in which PMSE spectrum in the band is maintained, reduced, or the use is migrated from the band entirely.

2.50 The DotEcon Report observes that there is no evidence of scarcity of PMR spectrum at present and stakeholders have not faced issues in obtaining licences for their desired frequencies. The Report recommends that it is prudent therefore for ComReg to monitor PMR usage over time in case scarcity should emerge in future. DotEcon observes that a more likely scenario regarding difficulty in getting access to spectrum is one of local coordination issues creating a risk of interference, but this is not an issue of insufficient spectrum.

2.51 ComReg agrees with DotEcon's assessment regarding the lack of scarcity of spectrum within the current frequency bands allocated for PMR Licensing. The absence of demand is reflected in the section above which shows the demand for PMR licences in Ireland. However, as suggested in the DotEcon report, ComReg intends on closely monitoring demand and availability of spectrum to address any potential scarcity in advance of it materialising.

# 3 Regulatory Impact Assessment – PMR licensing

## 3.1 Introduction

3.1 Private Mobile Radio ("PMR") refers to a variety of licence types issued by ComReg that are used to provide wireless communication services over private networks. Each licence type is issued under its own framework with different technical conditions and fees applicable to each framework and consists of the following licence types:

- Business Radio;
- Community Repeaters;
- Third Party Business Radio;
- Trunked Radio;
- Programme Making and Special Events ("PMSE"); and
- Paging (permit)[35].

3.2 This chapter sets out ComReg's draft Regulatory Impact Assessment ("RIA") on the procedure for setting spectrum fees for Private Mobile Radio licences by outlining the relevant policy issues and assessing the various regulatory options to determine ComReg's preferred option, having regard to the impact on stakeholders, competition, and consumers.

3.3 While assessing the various regulatory options, ComReg will do so in line with relevant legal obligations including Regulation 24 of the European Union (Electronic Communications Code) Regulations 2022[36] (the "ECC Regulations"), which requires that any regulatory option in relation to fees chosen by ComReg is objectively justified, transparent, non-discriminatory and proportionate.

3.4 ComReg has prepared this draft RIA having careful regard to the relevant information available, including the following:

- Interviews carried out by DotEcon and ComReg with multiple stakeholders including existing users and equipment vendors (the "Stakeholder Interviews");

[35] ComReg issues permits for paging under the Wireless Telegraphy Acts, 1926-1988
[36] Regulation 24 of S.I. No. 444 of 2022.

- A survey issued to all PMR licensees; and
- The report by DotEcon that is published alongside this consultation document (Document 25/46a).

### RIA Framework

3.5 In general terms, a RIA is an analysis of the likely effect of proposed new regulation or regulatory change and, indeed, of whether regulation is necessary at all. The RIA should help identify regulatory options and establish whether the proposed regulation is likely to have the desired impact, having considered relevant alternatives and the impacts on stakeholders. The RIA is a structured approach to the development of policy and analyses the impact of regulatory options. In conducting a RIA, the aim is to ensure that all proposed measures are appropriate, effective, proportionate and justified.

3.6 A RIA should be carried out as early as possible in the assessment of regulatory options, where appropriate and feasible. The consideration of the regulatory impact facilitates the discussion of options, and a RIA should therefore be integrated into the overall analysis. This is the approach which ComReg follows in this document and the RIA should be read in conjunction with the overall Consultation.

3.7 In conducting a RIA, ComReg has regard to the RIA Guidelines[37] , while recognising that regulation by way of issuing decisions, for example, imposing obligations or specifying requirements in addition to promulgating secondary legislation, may be different to regulation exclusively by way of enacting primary or secondary legislation.

3.8 To ensure that a RIA is proportionate and does not become overly burdensome, a common-sense approach is taken towards a RIA. As decisions are likely to vary in terms of their impact, if after initial investigation, a decision appears to have relatively low impact ComReg may carry out a lighter RIA in respect of that decision. The draft RIA will be finalised in the final Decision arising from this Consultation, having considered responses to this Consultation and stakeholders' consideration of the draft RIA.

## 3.2 Structure of the RIA

3.9 As set out in ComReg's RIA Guidelines, ComReg's approach to the RIA is based on the following five steps:

- **Step 1:** Describe the policy issue and identify the objectives;

[37] ComReg Document 07/56a, "Guidelines on ComReg's Approach to Regulatory Impact Assessment", published 10 August 2007, available at www.comreg.ie

- **Step 2:** Identify and describe the regulatory options;
- **Step 3:** Determine the likely impacts on stakeholders;
- **Step 4:** Determine the likely impacts on competition; and
- **Step 5:** Assess the likely impacts and choose the best option.

3.10 In the following sections, ComReg identifies the relevant stakeholder groups, specific policy issues to be addressed and relevant objectives (i.e. Step 1 of the RIA process). This is followed by the identification of the policy issues that need to be addressed.

3.11 ComReg then considers these policy issues in accordance with the four remaining steps of ComReg's RIA process.

### Identification of stakeholders and approach to Steps 3 and 4

3.12 The focus of step 3 is to assess the likely impact of the proposed regulatory measures on stakeholders. Hence a necessary precursor is to identify such stakeholders. In this draft RIA, stakeholders fall into two main groups:

- Consumers; and
- Industry stakeholders.

3.13 The industry stakeholders comprise of the licensees and potential licensees of the various PMR licence types. These users span a wide range of sectors and use the various licence types to provide a wide range of use cases. In general, the industry stakeholders are the existing licensees that use the various PMR licence types fall into the following categories:

- Transportation;
- Security;
- Manufacturing;
- Construction;
- Events Broadcasting;
- Utilities; and
- Healthcare/Retail.

3.14 The focus of Step 4 is to assess the impact on competition of the various regulatory options available to ComReg. In that regard, ComReg notes that it has various statutory functions, objectives and duties which are relevant to the issue of competition.

3.15 Of themselves, the RIA Guidelines and the Ministerial Policy Direction on Regulatory

Impact Assessment[38] provide little guidance on how much weight should be given to the positions and views of each stakeholder group (Step 3), or the impact on competition (Step 4). Accordingly, ComReg has been guided by its primary statutory objectives which it is obliged to seek to achieve when exercising its functions. ComReg's statutory objectives in managing the radio frequency spectrum, as further outlined in the Legal Annex, include:

- promote competition[39];
- contribute to the development of the internal market[40];
- promote the interests of users within the Community[41]; and
- ensure the efficient management and use of the radio frequency spectrum in Ireland in accordance with a direction under Section 13 of the 2002 Act.

3.16 In addition, ComReg is guided by regulatory principles and obligations provided for under the European Union (Electronic Communications Code) Regulations 2022, S.I. No. 444 of 2022. Such principles and obligations are outlined further at Annex 1 and include:

- Regulation 24 of S.I. No. 444 of 2022[42] permits ComReg to impose fees for rights of use, which reflect the need to ensure the optimal use of the radio frequency spectrum. ComReg is required to ensure that any such fees are objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose; and
- Regulation 4(5) (d) of S.I. No. 444 of 2022[43] which requires ComReg to promote efficient investment and innovation in new and enhanced infrastructure.

3.17 In this document, ComReg has adopted the following structure in relation to Step 3 and Step 4; the impact on industry stakeholders is considered first, followed by the impact on competition, followed by the impact on consumers. This order does not reflect any assessment of the relative importance of these issues but rather reflects a logical progression. In particular, a measure which safeguards and promotes competition should, in general, impact positively on consumers. In that regard, the assessment of the impact on consumers draws substantially upon the assessment carried out in respect of the impact on competition.

[38] Ministerial Direction dated 21st February 2003
[39] Section 12 (1)(a)(i) of the Communications Regulation Act, 2002
[40] Section 12 (1)(a)(ii) of the Communications Regulation Act, 2002
[41] Section 12(1)(a)(iii) of the Communications Regulation Act, 2002
[42] Regulation 24 of S.I. No. 444 of 2022.
[43] Regulation 4(5)(d) of S.I. No. 444 of 2022

## 3.3 Step 1: Identify the policy issues & the objectives

### Policy Issues

3.18 The spectrum available for users of the existing PMR licensing frameworks is a finite resource with many different services and users, and the radio spectrum management of these resources involves the careful consideration of a broad range of factors (e.g., administrative, regulatory, social, economic, and technical) with a view to ensuring that radio spectrum is optimally and efficiently used. This may also involve balancing a range of competing factors, including appropriately meeting the requirements of all radio services and promoting competition including ensuring that users derive maximum benefit in terms of price, choice, and quality, contributing to the development of the internal market, and promoting the interests of users within the Community.

3.19 Effective management of the radio spectrum requires more than a purely technical consideration; spectrum efficiency, functional and economic considerations must also be considered, including the extent to which the utilisation of spectrum meets a user's specific needs and the social and economic value that can be derived from it. This is particularly relevant in the current case where there are a variety of different frameworks catering for a variety of users providing different services using different technologies.

3.20 With that in mind, ComReg periodically conducts reviews of its licensing frameworks to ensure they remain fit for purpose given developments in use cases and technology. For instance, ComReg has recently completed reviews of its licensing frameworks for Fixed Links[44], Satellite Earth Stations[45] and Telemetry Systems[46]. In each case, ComReg has proposed new licencing frameworks which has provided for an increasing range of uses and technologies ensuring the more efficient use of the radio spectrum.

3.21 Regarding the various PMR frameworks, ComReg observes that the frameworks have been in place for considerable time (over 75 years in some cases) and that they have been developed sequentially to accommodate new technologies as they emerged. The licencing framework(s) for the six licence types (including fees) were established independently from one another over a more than 50-year period with the framework for Business Radio established in 1949 and Third-Party Business Radio in 2005. This means that there has been little if any consideration of how the spectrum rights of use in one licence category impacts the use of another. In that

[44] ComReg Document 23/61
[45] ComReg Document 23/96
[46] ComReg Document 24/25

regard, ComReg notes the views of DotEcon that despite ComReg offering a broad range of licence types across the various frameworks, these licence types are no longer aligned with PMR use cases.[47]

3.22 Furthermore, the fees across all licence types in the period since they were established have not been adjusted for CPI meaning that licensees have benefited from a fee reduction in real terms over each relevant period – which raises the question of whether those fees are still effective enough to ensure the optimal use of the spectrum (e.g. are some licensees selecting some licence types because they are cheaper relative to others rather than more suitable to their requirements). There are different fee regimes for each of the PMR licence categories so it follows that any review of the frameworks should also include consideration of the level of fees to ensure that they are appropriate.

3.23 In that regard, the main policy issues to consider in this draft RIA is, in the context of its statutory objectives, are, how best to establish a licensing framework for the PMR regime by considering (a) whether one or more licence types are still required and (b) an appropriate fee schedule for any such licence type(s)

3.24 The six licensing frameworks are summarised in Table 5.

[47] DotEcon Report, p30, Document 25/46a.

### Table 5: Summary of existing PMR Licences

| | Business Radio | Trunked Radio | Third Party Business Radio | Community Repeater | PMSE | Paging |
|---|---|---|---|---|---|---|
| Established | 1949 | 2002 | 2005 | 1988 | 1949 | 1988 |
| Frequency ranges used | 68 - 88 MHz<br>155.85 – 174 MHz<br>450 – 470 MHz | 415.7750 - 418.9875 MHz Paired with 425.7750 - 428.9875 MHz<br><br>385.0000 - 389.9875 MHz Paired with 395.0000 - 399.9875 MHz | 165.5875 - 166.55 MHz Paired with 170.3875 - 171.35 MHz<br><br>453.8375 - 461.4875 MHz Paired with 460.3375 - 467.9875 MHz | 68 – 88 MHz<br>450 – 470 MHz | **Two way radio**<br>169 MHz, 441 – 448 MHz, 455-456 MHz, 461 MHz, 465 MHz, 469 MHz<br><br>**Wireless microphone/in-ear**<br>470-703 MHz, 733 -753 MHz, 1785-1805 MHz<br><br>**Wireless camera**<br>1980-2010 MHz, 2010-2025MHz, 2025 – 2110 MHz, 2170 – 2200 MHz, 2200-2300 MHz, 6.425 – 7.125 GHz, 7.125 – 7.425 GHz, 10.3 – 10.5 GHz | 68 - 88 MHz<br>155.85 – 174 MHz<br>450 – 470 MHz |
| Duration | 1 year (renewable) | 1 year (renewable) | 5 years | 1 year (renewable) | Max 6 months | Lifetime of system usage |
| Service Area | On site, local area, wide area | On site, local area, wide area | National | National | On site | On site |

| | | | | | | |
|---|---|---|---|---|---|---|
| Channel Size | 12.5 kHz | 12.5 kHz | 12.5 kHz | 12.5 kHz | 12.5 kHz/200 kHz/10 MHz/ 20 MHz[48] | 12.5 kHz |
| Fees | €22 + €22 | €625 per 12.5kHz channel per base station (Year 1)<br><br>€1000 (Subsequent) | €5000 per 12.5kHz channel | €12 processing fee + €625 year 1<br><br>€1,000 renewal | €12 fixed charge + €12 per piece of equipment | None |
| Exclusive/shared access | Shared | Shared | Exclusive | Shared | Shared | Shared |
| Number of live licences (June 2024) | 852 | 30 | 61 | 2 | 69 | 177 (permits) |

[48] The maximum channel bandwidth for 2-way radio is 12.5 kHz; Wireless microphone/in-ear monitors is 200 kHz; and Wireless cameras is 20 MHz. See ComReg-08_08R7.pdf

### Objectives

3.25 ComReg aims to design and carry out its review of the PMR licensing framework in accordance with its broader statutory objectives (as outlined in Annex 1) including the promotion of competition in the electronic communications sector.

3.26 In addition, the focus of this RIA is to assess the potential impacts of the proposed measure(s) (see regulatory options below) on stakeholders, competition, and consumers. ComReg can then identify and implement the most appropriate and effective means by which to set a new licencing framework including an approach to spectrum fees for PMR services, while achieving its relevant statutory objectives under section 12 of the 2002 Act of promoting competition by, among other things:

- Encouraging efficient use and ensuring effective management of radio frequencies;
- Promoting regulatory predictability by ensuring a consistent regulatory approach;
- Safeguarding competition to the benefit of consumers and promoting, where appropriate, infrastructure-based competition
- Contributing to the development of the internal market; and
- Promoting the interest of EU citizens.

3.27 ComReg notes that, in achieving its objectives, it seeks to choose regulatory measures which maximise the benefits for consumers in terms of price, choice and quality. Having identified the policy issues and objectives, ComReg now identifies the regulatory options to be assessed over the remainder of this draft RIA.

## 3.4 Step 2: Identify and describe the regulatory options

3.28 The existing PMR licensing frameworks have been in place for significant periods of time and have supported a wide variety of use cases. For this reason, ComReg will evaluate the existing licensing regimes as an option, given their utility to date, and to fully understand the impact of any change to an alternative option(s). Therefore, ComReg notes **that Option 1 is to maintain the status quo** and maintain the current frameworks and fee structures under the existing PMR licensing frameworks.

3.29 Furthermore, because those fees have not ever been updated for CPI an alternative option would be to update the existing fees for CPI. Therefore, Option 1 (b) is existing fees updated to account CPI in the period since those fees were first established.

### Identifying other policy options

3.30 In relation to determining other potential options, it is necessary to ensure that such options could facilitate current and future use cases for Private Mobile Radio while also supporting ComReg in its objective to effectively manage the radio spectrum allocated to Private Mobile Radio.

3.31 As outlined above, the two main policy issues are (a) whether one or more licence types are still required and (b) what is an appropriate approach to setting fees for any such licence type(s). ComReg considers these in turn below to determine other regulatory options because options which require more licences than necessary and/or have an inappropriate approach to setting fees would not be valid regulatory options.

***A. Are one or more PMR licence types still required?***

3.32 As discussed previously, the existing frameworks were developed in separate processes over a substantial period of 50 years or more. While these frameworks have facilitated users in delivering a variety of use cases, ComReg notes that the frameworks may no longer be best aligned with the use cases that exist for PMR today and that there may be room for consolidating licences into one or more frameworks.

3.33 Following engagement with stakeholders, DotEcon notes that the stakeholders typically require PMR licences to provide the following use cases:

- **On-site communication**: such as talkback systems used at factories, retail, hospitals and construction sites;
- **Wide-area communication:** such uses include transportation, logistics companies, emergency services and search and rescue operations.
- **Events and broadcasting:** used in wireless devices for the production of events and for broadcasting
- **Telemetry and control:** generally used by utilities companies to monitor and report back to a command centre frequent readings and critical operating information.
- **Paging** which allow the use of paging systems to provide for the sending of a one-way digital coded signal to a paging receiver.

3.34 Third Party Business Radio users also tend to cater for the same use cases with licensees often interested in that licence type because it offers an exclusive use to channels. Recent data gathered by ComReg shows that these licences are typically used to deliver on-site usage across different parts of the country. This points to a likely need for a more regional licence with the possibility for exclusive use of that licence where required. Future requirements for a national licence

should be supported by a rollout plan.

3.35 Each of these use cases have varying requirements in terms of bandwidth, types and quantities of equipment (e.g. hand portables, repeaters, base stations) and geographic scope etc. Within all these use cases there is significant overlap between the spectrum, equipment, channel size and technical conditions across each of the different licence types and there is no apparent reason why these requirements cannot be satisfied across a single licence type.

3.36 This is supported by the fact that the ECC documents[49] currently applicable to PMR are technology neutral and common ETSI standards cover multiple types of equipment. Alignment with best practice throughout Europe would not require different types of PMR systems/equipment to be covered by a separate licence type. In that regard, DotEcon notes there does not appear to be any prevailing need for licence types to be tied to specific types of PMR technology to deliver the above use cases. Furthermore, stakeholders were generally in favour of a consolidated licence type being introduced as it would simplify matters for users. This points to a need for a consolidation of licences to better ensure the efficient management and use of the radio spectrum.

3.37 While potential licensees will likely have different requirements in terms of geographic scope, bandwidth and duration etc there is no reason why these requirements cannot be satisfied under a single licencing framework. The notable difference is PMSE which is only available for a maximum duration of six months and makes use of frequencies above the UHF and VHF bands used by licensees through the other frameworks. Furthermore, the duration can be anything from a few days to six months meaning a uniform duration (e.g. one year, five years etc) as would be appropriate for other uses is unlikely to be suitable for PMSE.

3.38 A consolidated PMR licence would enable licensees to apply for a licence that is best aligned with their PMR needs and would lend a high degree of flexibility for a framework to be able to suitably adapt to any use cases for PMR that may emerge in the future. The potential benefits of such an approach ins relation spectrum efficiency are discussed in Paragraph 3.98 to 3.112 below. As such, ComReg considers that the basis for any alternative options should be through a PMR licence that would consolidate the existing licensing frameworks for Business Radio, Third Party Business Radio, Trunked Radio, Community Repeaters and Paging.

3.39 However, for the reasons outlined above, ComReg is of the view that it would be

[49] For example, ECC Decision (19)02 and ERC Recommendation 25-08– On land mobile systems in the VHF and UHF bands; ECC Decision (15)05 – On PMR 466 applications and EC Decision 243/2012/EU – Establishing a multiannual radio spectrum policy programme.

appropriate to retain a separate licence type for PMSE for the following reasons:

(i) PMSE users require access to additional frequency ranges for specific radio equipment, e.g. wireless cameras, that the users of the other PMR frequencies do not; and

(ii) The events for which PMSE licensees provide communication services generally take place over very short periods of time i.e. days for concerts and months for TV/film productions. This is reflective of the different usage requirements of PMSE licensees.

3.40 Therefore, ComReg is of the preliminary view that a consolidated PMR licence (which would now include paging) and a separate PMSE licence are required, and any regulatory options assessed in this draft RIA should facilitate same.

***What is an appropriate approach to setting fees?***

3.41 Fees can play an important role in ensuring that licensees use the spectrum resource efficiently and supports ComReg in its function of ensuring the effective management of the spectrum resource. Regulation 24 of S.I. No. 444 of 2022 permits ComReg to impose fees for rights of use that reflect the need to ensure the optimal use of the radio frequency spectrum. In addition, ComReg is also required to:

- ensure that any such fees are objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose; and
- consider the objectives of ComReg as set out in Section 12 of the 2002 Act and the general objectives of the Directive and S.I. No. 444 of 2022. [50]

3.42 There are various methods of determining spectrum fees and some approaches (or a combination of approaches) are likely to be more suitable than others. ComReg does not favour any one process for determining an appropriate approach to fees. As a matter of principle, it decides the most appropriate process in each individual case. Each approach will typically have its advantages and disadvantages, and one process may, on balance, be found to be the most suitable in light of the circumstances, including the characteristics of the spectrum to be assigned, the types of rights of use to be assigned and the anticipated demand for the spectrum.

3.43 As previously mentioned, ComReg has recently conducted reviews of other

[50] Among other things, these include the promotion of competition in the provision of electronic communications networks and associated facilities, including efficient infrastructure-based competition, and in the provision of electronic communications services and associated services.

licensing frameworks and carried assessments of fee regimes for each. For each of those reviews, ComReg considered the relevant circumstances in each case to determine the most appropriate approach to setting fees.

- In the Fixed Links licensing review, ComReg determined that it was appropriate to adopt an approach that sets fees that are reflective of opportunity cost which should encourage licensees to utilise the spectrum more efficiently, including incentivising the return of unused or underused spectrum. [51]

- In the Satellite Earth Station licensing review, ComReg found that the circumstances were materially different[52] to fixed links such that an approach based on the recovery of ComReg's administrative costs for licensing SES was the most appropriate approach.[53]

- In its review of the Telemetry licensing regime, ComReg determined that the existing framework for telemetry was effective and that the existing fee regime should remain in place, with the only change being a CPI adjustment which is in line with ComReg's best practice for determining licence fees for spectrum.[54]

3.44 ComReg endeavours to ensure a consistent regulatory approach across each of these relatively recent licensing reviews.

3.45 In the context of PMR, ComReg notes that the current regimes have different fee structures, and a policy option based around a consolidated PMR licence would mean that one approach to setting fees would be applicable to all users of PMR. In relation to PMSE, ComReg agrees with DotEcon that it would also be appropriate to closely align the fee regime for PMSE with the regime proposed under a consolidated licence approach. This would be similar to the approach taken with the existing fee schedule for PMSE which is based on the existing fee schedule for business radio licences.

3.46 At a high-level, there are broadly two approaches to setting spectrum fees:

- **Opportunity cost based**: The opportunity cost of the radio spectrum is the value associated with the best alternative use that is denied by granting access to one user rather than to the alternative.

[51] ComReg Document 23/61
[52] The comparatively lower demand for SES, in addition to the low interference and scarcity risks resulted in ComReg determining that administrative cost approach was appropriate.
[53] ComReg Document 23/96
[54] ComReg Document 24/25

- **Administrative cost recovery**: a minimum requirement for fees is that ComReg recovers its administrative costs associated with managing spectrum licences.

3.47 Clearly, there is a sequencing in determining the appropriate fees approach. If it is the case that the spectrum can be used freely, or relatively freely, across alternative potential users over a sufficiently long period, then an approach based on the recovery of administrative costs is likely to be appropriate. In this circumstance, no further consideration of alternative approaches would be required because there would be no opportunity cost that needs to be reflected in fees because other users are not precluded. An administrative cost approach often serves as a floor for fees because even where no scarcity issues are evident, there may also be a need to provide licensees with the correct incentives to use the spectrum efficiently than would be the case with simply administrative cost recovery.

3.48 Therefore, it follows that, prior to setting out the regulatory options available to it, ComReg must first assess the extent to which issues of scarcity could arise in the licensing of PMR rights of use.

### Assessment of spectrum scarcity for PMR

3.49 ComReg notes that to date there have been no issues of spectrum scarcity preventing operators from obtaining licences for their desired frequencies. This is primarily due to the usage characteristics of PMR.

- First, on-site and wide-area PMR users (e.g. business radio, trunked radio) are geographically confined, and operators should not cause interference with other geographically defined licences when in compliance with the technical conditions of their licence.

- Second, most PMR licences operate as shared use and employ coordination techniques, such as tone control, to use the same frequencies in overlapping areas without causing interference to other PMR users.

3.50 While a high proportion of PMR licences are concentrated in the Dublin area, there is considerable scope for reuse of frequencies without denying access to other users. DotEcon notes that where interference has been observed between PMR users, it is primarily due to operators failing to meet the technical conditions specified in their licences rather than an issues around excess demand[55].

3.51 ComReg agrees with DotEcon's finding that there are no general trends in PMR

[55] DotEcon Report p.28, Document 25/46a

demand that suggest spectrum scarcity will emerge. ComReg notes DotEcon's view that some emerging technologies such as push to talk over cellular (PoC) using mobile networks to provide similar services could reduce demand. However, there has been no indications at this time from PMR operators that they might migrate to this technology.

3.52 ComReg is of the view that demand for PMR licences will continue to provide communications across various sectors of society. ComReg does not envisage, at this point in time, significant changes to demand in the near future. However, some types of narrowband systems may be replaced by wideband systems over time in certain sectors such as transport, industry, and manufacturing to meet greater data bandwidth requirements. This could result in a migration from one type of licensing regime to another such as PMR to WBB LMP.

3.53 In relation to the Third-Party Business Radio licensing regime, ComReg notes that the supply of available channels was exhausted at the end of the last application round. While some of those licences have since been cancelled, ComReg agrees with DotEcon that the demand for national licences demonstrates there is potential for scarcity to arise if many users were to demand access to national licences.[56] ComReg agrees with DotEcon that the potential for scarcity among users of PMR spectrum is likely to be low and an opportunity cost-based approach, would not likely be appropriate in this circumstance.

3.54 While a consolidation of licence types would help support this outcome by providing licensees with a higher degree of flexibility than under the existing frameworks, ComReg notes the views of DotEcon that any fee regime attached to this framework should create the correct incentives for users to select a licence that best fits their specific requirements and minimise the potential for artificial scarcity to arise.[57] In such cases, fees should incentivise potential users to assess its actual need for spectrum and select the most appropriate spectrum band from a range of alternatives. Therefore, ComReg's approach is to recover the administrative costs of licensing PMR but also provide the correct incentives for licensees to apply for a licence only for what they require to serve their use case(s).

3.55 In the section that follows, ComReg considers the factors that should be used to best ensure efficient use by encouraging users to only apply for rights of use that meet their requirements but not beyond.

### Factors that could be used to determine fees under a consolidated

[56] DotEcon Report p.23, Document 25/46a.
[57] DotEcon Report p.40, Document 25/46a.

### licence approach

3.56 Under the existing PMR framework, fees are determined based on a variety of factors specific to each licensing framework. However, under an approach that is based on a consolidated PMR licence type, there would to be one approach to setting fees that would apply to all licensees. Therefore, before ComReg can assess any policy options, it must first carry out an assessment of what factors would be appropriate to determine how fees may be charged for PMR under a consolidated licence approach.

3.57 ComReg considers that a pragmatic approach would be to first assess the extent to which any elements of the existing fee structures associated with each of the current frameworks could be appropriate for determining fees as part of a consolidated licence approach. This assessment is set out below.

### Equipment

3.58 Equipment is a feature of determining fees in three of the existing frameworks.

- The Business Radio framework where licence fees are based on the number of pieces of equipment used by the licensee.
- Trunked Radio, where the number of base stations included in the licence is used to determine licence fees; and
- The PMSE framework, where licence fees are based on the number of pieces equipment charged at half of the rate charged under the Business Radio framework.

3.59 An effective fee mechanism should encourage the most efficient use of the radio spectrum and facilitate the various use cases considered necessary under a consolidated PMR licence. However, a fee regime which includes an equipment charge could risk disincentivising licensees to use the limited spectrum resource to its maximum potential if it becomes inefficiently costly to use the optimal amount equipment on the network. (i.e. an equipment-based approach).

3.60 Charging per piece of equipment reduces the incentives to use spectrum more efficiently because it increases costs proportionally with each additional piece of equipment, potentially discouraging certain users (e.g. third-party business radio) from deploying the optimal amount of equipment needed for the efficient use of the spectrum because the total cost could become excessive and disproportionate.

3.61 In particular, Third-Party Business Radio users would be significantly disadvantaged by using a per-equipment based approach because as noted by DotEcon it would place an administrative burden on third-party operators and would be difficult to set at a level that meaningfully differentiated between different amounts of equipment without the risk of undermining some third-party

provider business cases.[58] This effectively precludes charging per piece of equipment under a consolidated PMR licensing approach.

3.62 Conversely, the removal of per piece of equipment-based charging would not impact the efficient use for users that were formally charged on that basis because other factors such as geographic scope can adequately ensure the efficient use because any geographic area that an operator needs to cover needs to be served by a minimum set of equipment. As noted by DotEcon, we see no strong need to maintain the per equipment charges that apply to other licence types, noting, for example, that the effect of per base station charges to trunked radio operators might already be achieved by charging based on coverage area.

3.63 Therefore, ComReg is of the preliminary view that, in assessing a policy option under a consolidated PMR licence approach, it would not be appropriate to consider an equipment charge in the determination of fees as part of that assessment.

### Geographic scope

3.64 Under the current regime, the geographic scope of the existing PMR framework includes on-site (<1 km), Local area (<12.5 km), Wide area (<25 km) and national licences. Third Party Business Radio licensees are the only licensees that can be assigned a national licence under the existing frameworks. The other licensing frameworks can only operate within a subnational area (i.e. on-site, local area, wide area) as specified in the licence conditions.

3.65 To best provide for the efficient use, it is essential that the geographic scope of a licence aligns with the usage/coverage area required by a licensee. Not accounting for the geographic scope of a user's requirements could have the undesired effect of:

(a) licensees inefficiently applying for larger areas that they do not need, thereby impeding access to other potential users and increasing the potential for scarcity in the future; and

(b) pricing off licensees that only require rights of use across a defined area (e.g. on site) but would need to pay the price of a national or wider area licence.

3.66 Therefore, ComReg is of the view that, in assessing a policy option under a consolidated PMR licence approach, it would be appropriate to consider a geographic scope/coverage in the determining fees as part of that assessment.

[58] DotEcon Report, p.41, Document 25/46a.

### Channels

3.67 The spectrum available for PMR is finite and, notwithstanding the risk of scarcity being low, not including the number of channels or total bandwidth in the determination of fees would not be conducive to creating the appropriate incentive for users to only use the spectrum or bandwidth that they need. Absent such a consideration, licensees would likely apply for more spectrum than necessary increasing the risk of future scarcity.

3.68 Therefore, ComReg is of the preliminary view that, in assessing a policy option under a consolidated PMR licence approach, it would be appropriate to consider a charge per channel size in the determination of fees as part of that assessment.

### Exclusive use of the spectrum

3.69 Third Party Business Radio is the only framework where licensees have the option of exclusive access to the channels licensed to them. This is also in part because they are licensed spectrum on a national basis meaning that it would not be possible for other users to get access to the same frequencies. The other frameworks involve users sharing access to the different frequency bands available for PMR and this has meant that frequencies can be re-used by multiple users.

3.70 ComReg notes from the stakeholder engagement that there is demand for the exclusivity offered by the Third-Party Business Radio framework. ComReg has recently published a consultation to reopen that regime for applicants. While the need for exclusive rights of use is currently linked to the national licences under the Third-Party Business Radio regime, a consolidated approach would also facilitate use cases that value exclusivity over a smaller geographic footprint.

3.71 Therefore, ComReg is of the view that, in assessing a policy option under a consolidated PMR licence approach, it would be appropriate to consider an exclusivity charge in the determination of fees as part of that assessment.

## 3.4.1 Conclusion

3.72 Given the above, ComReg is of the preliminary view that a valid regulatory option would be a consolidated PMR licence (including paging) with fees primarily based on administrative cost but also encourages more efficient use determined by reference to the geographic scope, channels and exclusivity that a potential licensee would require.

3.73 Therefore, ComReg considers that the three regulatory options available to it are:

- **Option 1 –** Maintain the existing licensing frameworks and make available all PMR frequencies on the same basis as detailed in each of the existing fee schedules.

- **Option 1(b) –** The same as Option 1 except fees would be updated to account for the change to the Consumer Price Index (CPI) in the intervening periods since the last updates to fees were made.
- **Option 2 –** Make available all rights of use through a consolidated PMR licence (including paging). This option would involve consolidating five of the existing frameworks into one single PMR licensing framework with fees based on administrative cost set by reference to Channels, Geographic scope and exclusive use. Fees would be annually updated for CPI.

3.74 Option 2 is set out in more detail in Annex 2 including the proposed variables that would be attached to each of factors used to determine fees under a consolidated licensing approach.

3.75 Under Option 2, ComReg would closely align the fee regime for PMSE with that of the consolidated PMR licence.

## 3.5 Step 3: Impact on Stakeholders

3.76 This section provides information on the impacts on industry stakeholders (as outlined in Section 1.4) arising from the regulatory options above.

3.77 ComReg notes that there are two broad categories of impacts relevant in this section:

- First, the impacts arising from how rights of use are assigned in each of the regulatory options (i.e., "Assignment Impacts"); and
- Second, the impact of the regulatory option on spectrum fees paid by Existing Licensees or would be paid by future licensees (i.e., "Financial Impacts")

### Assignment impacts

3.78 Assignment Impacts refers to impact on licensees arising from how ComReg assigns spectrum rights of use. The choice of preferred option can impact an operator's ability to obtain the rights of use necessary to satisfy efficient demand and deliver one or more of its use cases. Generally, these impacts can arise where licensees are unable to obtain rights of use necessary to deliver their use cases, and/or where there is uncertainty about future fees and the extent to which they may change. For example, there are assignment impacts arising from the fact that the requirements that users have does are not fully aligned with the existing PMR frameworks.

3.79 As discussed, each PMR framework currently has different approaches to the assignment of spectrum (including fees) and there are some features that are only applicable to certain frameworks. Under Option 1 or Option 1 (b), there is a risk that a licensee could apply for a licence that does not fully align with their

specific requirements. For instance, if a user requires exclusive access to spectrum on a non-national basis (stakeholder engagement indicated support for such a provision), there is no existing framework that supports such a use case. Similarly, if a user requires nationwide access to spectrum but does not require exclusive use, a Third-Party Business Radio licence is the only licence type that could facilitate such a use case under Option 1 or Option 1(b)

3.80 However, the use of the third-party business radio framework for such use cases is inefficient because the geographic scope is too large for non-national use cases and exclusivity may not be required by all potential licensees. Therefore, under Option 1 or Option 1 (b) some licensees would be assigned spectrum rights of use beyond the geographic scope of their requirements or be granted exclusivity when it is not required by the user. Further, a Third-party Business Radio licensee may not require the licence to provide services to third parties, but rather it is required to meet their own communications requirements.

3.81 Misalignment between current use cases and licensing frameworks was raised during the stakeholder engagement and it mainly arises due to legacy effects associated with the annual renewal of licences (e.g. many licensees have applied for licences under certain frameworks because they are simply renewing the same licence every year as a matter of practice). The stakeholder engagement supports the view that some licensees hold licences not because of an assessment of what their exact needs are and how they have changed over time but because it is easier to simply renew an existing licence. For example, some trunked radio users could potentially use the business radio framework except it currently does not accommodate trunked use cases which has a different fee schedule.

3.82 Under Option 2, operators would be able to determine what their exact PMR requirements are and then apply for a licence that is more precisely aligned with their use case through a single consolidated framework (e.g. the licence would be provided based on the licensees' exact requirements across, bandwidth, geographic scope, exclusivity, third party use etc). This would remove the gaps between the existing frameworks and would better support existing use cases already provided for under the existing frameworks, while also facilitating new use cases that cannot be facilitated under the current regimes.

3.83 Therefore, ComReg is of the preliminary view that based on assignment impacts stakeholders would likely prefer Option 2 over Option 1 and Option 1 (b).

### Financial Impacts

3.84 Under Option 1 there would be no change in the financial impacts faced by stakeholders as the fees across the various licence types would remain the same.

3.85 The remainder of this section assesses the financial impacts of Option 1 compared to Option 1 (b) and Option 2.

***Option 1 v Option 1 (b)***

3.86 The existing PMR licences are not annually updated for CPI. Therefore, the financial impacts that would arise under Option 1 (b) would amount to the % increase/decrease in the CPI in the intervening periods since the frameworks have been last reviewed. As noted previously, the various PMR frameworks were introduced at different times and have been in place for considerable durations. In the case of Business Radio, PMSE and Community Repeaters, the governing regulations predate the adoption of the Euro in Ireland and the fee regimes for each of these frameworks were converted from the Irish Punt to reflect the equivalent value in Euro from January 2002.[59, 60]

3.87 See Table 1 for the percentage change across each licence type. In summary, the total fees paid by Existing Licensees would increase by approximately 52% or €320,000 per annum under Option 1 (b). The change in the CPI under Option 1 (b), using the latest available data at the time of publication[61,] would result in licence fee increases of the following:

- 55.2% for Business Radio, Community Repeater and PMSE;
- 50.2% for Trunked Radio; and
- 37.3% for Third Party Business Radio.

**Table 6: Changes to the CPI for each licensing framework**

| | Commencement | CPI Change%[62] |
|---|---|---|
| Business Radio | January 2002 | 55.2% |
| Trunked Radio | August 2002 | 50.2% |
| Community Repeaters | January 2002 | 55.2% |
| Third Party Business Radio[63] | October 2005 | 37.3% |

[59] Euro Changeover (Amounts) Act, 2001
[60] See the Euro Changeover Act of 2001.
[61] CPI data available to May 2025
[62] CPI Inflation Calculator interactive comparison app | CSO Ireland
[63] ComReg will reopen the TPBR licensing regime on 1st September 2025 and all new licences issued will expire on 29 September 2030. Any adjustment for CPI under this option would only take effect after the expiry of licences.

| | | |
|---|---|---|
| Paging | n/a | n/a |
| PMSE | January 2002 | 55.2% |

***Option 1 v Option 2***

3.88 To assess the financial impact of Option 2 on Existing Licensees, ComReg has conducted a comparative analysis of the fees paid by those licensees compared to Option 1. The assessment that follows is necessarily static and is conducted to highlight possible impacts, noting that final fees paid by Existing Licensees would depend on choices made by those licensees in determining how to dimension their PMR networks in the future.

3.89 Total fees for Existing Licensees under Option 2 would increase by approximately €60,000 per annum annually compared to Option 1a. This modest increase in overall fees is not universal because some licensees would experience a decrease in fees while others would experience an increase. However, this increase would be approximately €260,000 lower compared to Option 1b which updates existing fees for inflation as set out in the table above.

3.90 Under Option 2, any financial impacts (whether an increase or decrease) would be dependent on the number of channels used, the geographic scope and whether the spectrum is used exclusively or not. It is not possible to outline each of these impacts individually, given the prevailing confidentiality concerns. Notwithstanding, it is informative to note the % increases and decreases across each of the existing licence types given that stakeholders typically fall under these categories. In summary:

- The median on-site Business Radio user would experience an increase on average of around €61 per licence.
- Trunked Radio Licensees would experience a decrease on average of around €5,600 per licence.
- Third Party Business users would experience an increase on average of around €2,900 per annum.
- Community Repeater users would experience a decrease of approximately €700 per annum.
- Paging would now fall under a consolidated PMR licence and the average fee for a licence would be €263 per annum (this would depend on the number of channels used, the geographic scope and whether the channel(s) are exclusive or shared use).

3.91 Business Radio and Trunked Radio users (who are currently charged on a per equipment basis under Option 1) are likely to prefer Option 2 because their licence fee would not increase with each piece of equipment used on the network. This is particularly likely to be the case for operators who have a large quantity of equipment operating on an on-site basis network using shared spectrum. The removal of equipment-based charging means that licensees that previously used a large amount of equipment would face the largest fee reductions.

3.92 Licensees with smaller amounts of equipment under the current Business Radio framework (i.e. less than 8) would likely see a rise in fees compared to Option 1. However, any increase would be small (i.e. in the order of tens or hundreds of euros) and such operators may offset any increase against the flexibility that Option 2 would bring as operators would not need to make any licence amendments or pay additional fees should they require additional equipment at any stage over the duration of their licence.

3.93 Third-Party licensees that require national, exclusive licences are likely to prefer Option 1 over Option 2 because such licences would experience a €2,900 increase in fees per annum under Option 2. This increase primarily arises from the need for fees to reflect the exclusive and geographic nature of the spectrum rights of use under Option 2. To date such licences have been made available for a relatively modest €1,000 per annum and have not been updated in over 20 years. However, as noted earlier, some of these licensees may not require national exclusive licences. Under Option 2 such licensees would now be able to tailor their licence to suit their requirements such that the fees paid may be less that what is currently under the case under Option 1 or Option 1 (b).

3.94 In May 2025 ComReg decided to reopen the TPBR licensing regime for a final time to facilitate the continuation of services currently operating under the regime while ComReg consults on a new PMR licensing framework. As such, any financial impacts for Third Party Business users would not occur until the proposed expiry of those licences. (i.e. those licensees most impacted would potentially have five years notice if assigned a new licence under that framework).[64]

3.95 Having considered the assignment and financial impacts associated with both Options, ComReg is of the preliminary view that, on balance, stakeholders are likely to prefer Option 2.

[64] ComReg Document 25/29

## 3.6 Step 4: Impact on Competition and consumers

### Impact on competition

3.96 There are different elements to competition that are relevant in determining the impact of any of the preferred options. There is a natural overlap between the aims of the fee methodology and an assessment of ComReg's compliance with some of its statutory obligations, particularly that of promoting competition, in accordance with Section 12 of the 2002 Act. These include:

- Encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources[65] ("Efficiency and Spectrum Management"); and
- Promoting efficient investment and innovation in new and enhanced infrastructures[66] ("Efficient Investment"); and

3.97 ComReg provides its assessment of each below.

### Efficiency and effective management of radio spectrum

3.98 ComReg's spectrum management role requires that operators with spectrum assignments are incentivised to efficiently use those spectrum assignments. Given the requirements of users across bandwidth, geographic scope and exclusivity, there are three main areas governing the efficient use of spectrum under this aspect of competition.

I. the geographic scope of a licence should not extend beyond the area necessary to meet its intended use of the spectrum.

II. the approach to fees should incentivise spectrum sharing to avoid potential scarcity. (i.e. if operators have rights of use beyond their needs or inefficiently use exclusive licences when the frequencies could be shared)

III. Fees should not be sufficiently different across similar use cases (i.e. users that require similar bandwidth and coverage should have broadly similar fees).

IV. Licensees should be incentivised to only apply for bandwidth that is sufficient to satisfy their requirements.

3.99 In relation to I and II, under Option 1 and Option 1 (b), licensees are unable to match their requirements to the geographic scope and/or their exclusivity requirements across certain licence types. For example, Third Party Business

[65] Section 12(2)(a) of the 2002 Act
[66] Section 12(2)(a) of the 2002 Act

Licences are national exclusive licences with no scope for any further specificity across either the geographic scope or the extent of sharing (i.e. exclusive or not). For example, a licensee can only obtain an exclusive licence across a national area and there is no flexibility under Option 1 to provide a non-national exclusive licence or a national shared licence.

3.100 This means if a licensee requires exclusivity to provide for its use case, it can only obtain a national licence when a licence across a smaller geographic would have better suited their requirements and been a more efficient use of the radio spectrum. In such cases, licensees either must obtain a licence beyond its geographic or sharing requirements or decide not to apply for a licence at all. Neither outcome best ensures the efficient use of the spectrum because a licence is either assigned inefficiently beyond the licensees' requirements or not at all denying a valid use of the spectrum because the licencing framework was not sufficiently flexible.

3.101 Under Option 2, consolidating licences enhances spectrum efficiency by enabling licensees to apply for a single licence that best aligns with their operational needs. This reduces the inefficiencies of using multiple different licences across different spectrum assignments, allowing operators to optimise network performance and minimise potential interference with other users. A consolidated licence ensures more effective use of a finite resource by streamlining assignments to better match demand, improving network capacity and supporting innovative services while maximising the overall utility of available frequencies.

3.102 Alternatively, under Option 2, all licensees would be able to apply for a licence that best represents the geographic area required to cover its use (i.e. national, local, wide area etc) and whether access to the spectrum is exclusive or shared with other PMR users. This clearly represents a more efficient use of the radio spectrum because Option 2 provides more flexibility to cater for a potential licensee's requirements across bandwidth, geographic scope and the need for exclusivity (or not).

3.103 In relation to III, under Option 1 and Option 1(b), there would be no consistent approach to determining fees which means that licensees are charged different fees for accessing spectrum through the different frameworks, despite technical conditions being largely similar. The approach to setting fees is different across each of the frameworks because they were designed independently and licensees may select a licensing framework (e.g. business radio) based on the fees charged, rather than on whether the licencing framework best suits its requirements in terms of the use of the spectrum.

3.104 For example, it is likely that some licensees would prefer trunked radio but may instead use the business radio framework purely because the fees for trunked radio are significantly higher owing to the €625 per channel per base station

charge (compared to €22 per piece of equipment plus a fixed charge of €22 for the duration of the licence for business radio). Such scenarios would not support efficient use, particularly given that trunked radio aims to be an efficient way of sharing a pool of channels between users and its use could potentially be discouraged under Option 1. As previously discussed, such scenarios arises because the frameworks under Option 1 were developed independently of one another over a more than 50-year period.

3.105 Alternatively, under Option 2 fees are primarily determined based on administrative cost recovery given a licensee's requirement across, bandwidth geographic scope and sharing requirements. The fees associated with any use type increase in line with those usage requirements regardless of the underlying technology used by the Licensee. In this way, potential licensees do not need to consider fees in determining how (or what technology) is used to support their requirements. Such an approach also better supports ComReg's position that the licensing of radio spectrum in Ireland is technology and service neutral. In that regard, ComReg agrees with the views of DotEcon that the structure of fees and the assumptions used to distribute costs must reflect that the types of consolidated licence that would be taken up and that fees approach under Option 2 would better encourage users to best determine their requirements and only apply for licences specific to their requirements.

3.106 In relation to IV, the use of bandwidth as a factor simply means that the more bandwidth that is used the higher the associated spectrum fee.

3.107 Under Option 1, fees rise in line with increases in bandwidth for Trunked radio only (i.e. the fee for a 25 kHz is twice that of a 12.5 kHz channel) – for all other licence types of Licences higher bandwidths are either unavailable or users are assigned several 12.5 kHz channels. Alternatively, under Option 2, the formula approach applies to the fee per 2 x 12.5 kHz channel. Other channel widths and unpaired channels are also permitted (unlike Option 1) and will be charged the same price per kHz, meaning an unpaired 12.5 kHz channel pays half this fee, as does a paired 6.25 kHz channel, while a paired 25 kHz channel pays double. If a licence covers multiple channels, this formula applies to each channel and the channels fees are added together to give the licence fee.

3.108 Given the above, ComReg is of the preliminary view that Option 2 best promotes the efficient use of the radio spectrum.

### Efficient investment

3.109 Creating the conditions for promoting efficient investment and innovation in new and enhanced infrastructure involves ComReg exercising its regulatory functions in an appropriate and predictable fashion, thus providing regulatory certainty. Any option should provide certainty that the regulatory framework, which often underpins investment decisions, will not change unnecessarily and require

operators to make subsequent and additional investments and/or changes to their network.

3.110 Promoting competition and encouraging efficient investment, in ComReg's view, means allowing for a cost-effective deployment of PMR services and preventing inefficient duplication of investment caused by predictable changes to the regulatory regime. With that in mind, it is important that any option considers the likely long run development of the market to avoid future changes to the regulatory framework that could have been foreseen or give rise to additional cost.

3.111 Under Option 1, investment in the PMR network to date has largely been effective and efficient given the benefits to consumers and competition. However, it is unlikely that this option can persist in the long run because each of the PMR frameworks are linked to use cases which were developed over 20 years ago and DotEcon's assessment of use cases shows that these use cases are no longer aligned with the existing framework. Over time, it is likely that potential licensees will find it increasingly difficult to roll out their preferred network due to the misalignment between the existing frameworks and their requirements. As previously discussed, Option 1 limits the extent to which potential licensees can be assigned rights of use that match their requirements across bandwidths, geographic scope and exclusivity.

3.112 Alternatively, under Option 2 fees are primarily determined based on administrative cost recovery given a licensee's requirement across, bandwidth geographic scope and its sharing requirements. In this way, licensees can match their requirements with the type of spectrum assignment that they require, thereby promoting efficient investment choices. As noted by DotEcon, certain types of licence are not currently available under Option 1 but will be under the consolidated licence such as national shared use licences, or regional licences that are exclusive or support third party provision (under Option 2). Additionally, under Option 2, fees are based on administrative cost recovery, thereby not inefficiently choking off demand for smaller users.

3.113 Therefore, ComReg is of the preliminary view that Option 2 would better encourage efficient investment and innovation by allowing operators to deploy services best aligned with their needs.

### Conclusion on impact on competition

3.114 Based on the assessment above, ComReg is of the view that Option 2 best promotes competition.

### Impact on consumers

3.115 ComReg considers that as consumers are not direct users of PMR systems, it

would be appropriate to consider the impacts on consumers in the context of ensuring that spectrum rights are efficiently used to facilitate the effective deployment of PMR use cases used by industry stakeholders, which in turn provide goods and services that consumers are likely to value. In that sense, ComReg considers that the primary consumers impacts to be considered are how the policy options impact inputs to downstream services which are valued my consumers.

3.116 Further, it can be generally assumed that what is good for competition, and what promotes investment in infrastructure, is, good for consumers. This is because increased competition between operators brings benefits to their customers in terms of price, choice and quality of services. In that regard, options that are good for competition are likely to be good for consumers. For example, consumers are likely to prefer those options which maintain or improve services and while at the same time not deterring entry or efficient investment. With that in mind, ComReg reminds the reader that Option 2 is preferred in terms of the likely impact on competition.

3.117 It is useful to briefly set out why the efficient assignment of PMR rights of use across a range of bands and services which are not directly used for downstream services is an important issue for consumers, as it will affect the choice, price, and quality of the electronic communications service that ultimately are made available to consumers.

3.118 The efficient assignment and use of PMR rights of use is important for consumers because these systems serve as inputs into essential services that consumers rely on. PMR enables reliable, secure and cost-efficient means of communications public safety, public and private transport (e.g. bus and taxi), logistics and critical infrastructure (e.g. utilities and construction). The efficient assignment of these rights of use minimises interference thereby helping to ensure that these industries can operate effectively, delivering timely and dependable services that consumer scan rely on and that enhance consumer safety, convenience and economic productivity. Inefficient assignment could lead to communications failures, delays, or increased costs ultimately impacting the quality and affordability of consumer facing services.

3.119 As discussed previously, the existing frameworks under Option 1 have been developed for old and possibly outmoded use cases. While consumers value the services that these frameworks have helped to deliver, the flexibility provided by Option 2 would better facilitate existing and future use cases by best allowing operators to deploy services best aligned with their communications needs. Additionally, as Option 2 is primarily based on the recovery of ComReg's administrative costs, the distribution of costs should not inefficiently choke off demand from smaller users.

3.120 With that in mind, ComReg is of the view that consumers are likely to prefer

Option 2.

### 3.6.1 ComReg's preferred option

3.121 This RIA considers a number of regulatory measures available to ComReg within the context of the analytical framework set out in ComReg's RIA Guidelines (i.e., impact on industry stakeholders, impact on competition and impact on consumers).

3.122 In light of the above, ComReg is of the preliminary view that Option 2, as outlined at paragraph , is preferred in terms of the impact on stakeholders, competition and consumers mainly because it is the Option that best provides for the provision of all use cases referred to in this consultation and appropriately weights the burden of administrative costs on those users most likely to benefit from the deployment of those costs.

# 4 Proposed New Narrowband Licensing Regime

## 4.1 Overview of the Proposed PMR Licencing approach

4.1 The preferred option in the draft RIA above introduces a consolidated PMR licence (including paging) to replace the range of licence types currently available under the existing business radio framework. PMSE would have its own licencing framework separate from the consolidated PMR licence. The purpose of this Chapter is to summarise both approaches for relevant stakeholders in order to allow for practical implementation of the proposed licencing approach.

4.2 The remainder of this chapter is structured as follows:

- Section 4.1.1 summarises the proposed consolidated PMR licence framework ("PMR Licences");
- Section 4.1.2 summarises the proposed PMSE licencing framework ("PMSE Licences");
- Section 4.1.3 provides details on the transition between the old PMR Framework and the new PMR licensing frameworks; and
- Section 4.1.4 provides details on ComReg's approach to monitoring to ensure the efficient use of the radio spectrum.

4.3 Each section is discussed in turn below.

### 4.1.1 PMR Licences

4.4 PMR licences would be assigned annually on a first come first served basis with renewal rights, permitting the holder to operate any PMR equipment, with no limit on the number of pieces of equipment, subject to technical restrictions derived from the relevant standards and regulations (e.g. CEPT or ETSI standards).

4.5 A PMR Licence would have the following parameters, which potential licensees would need to determine in line with their requirements.

***Geographic scope/coverage***

4.6 Three geographically differentiated licence types would be made available from which a potential licensee would select their preferred requirement:

- on-site, subject to tighter power limits and antenna height restrictions, as is the case for existing on-site business radio licences;

- wide area, for which the licence applicant would provide the locations of its base station(s) and the size of the coverage area it requires, subject to a general obligation not to claim unnecessarily large coverage areas, and with a requirement to justify the size of the coverage area requested on application; and
- national licences covering the geographic area of the state.

4.7 The choice of geographic scope impacts a licensee's fees through the $\beta c$ portion of the fee formula in Annex 2.

***Frequencies***

4.8 The following frequencies would be made available which would be equivalent as those currently offered for each of the current business radio licensing frameworks which are:

- 68 – 88 MHz
- 155.85 – 174 MHz
- 415.775-418.9875 MHz / 425.775 -428.9875 MHz
- 385-390 MHz / 395-399.9 MHz
- 450 - 470 MHz

4.9 Existing trunked radio licensees can continue using the UHF channels below 400 MHz, even though these will not be available to new applications under the proposed new licensing framework.

4.10 ComReg retains discretion over which specific frequencies to assign to applicants, but, if they have a preference operators should express that as part of their application. ComReg will endeavour to accommodate the operator's preference for specific channels in the VHF or UHF frequency bands, but only if it does not conflict with other users or spectrum management objectives

4.11 The choice of frequency band does not impact a licensee's PMR fees.

***Channels***

4.12 Channel options available to potential licensees would be 6.25 kHz, 12.5 kHz and 25 kHz (currently available under trunked radio and community repeater schemes). Unpaired operation is also permitted and would need to be specified by licensees.

4.13 Operators may request a number of channels and can provide a preference on whether these must be contiguous

4.14 Fees are charged on a per channel basis with an unpaired 12.5 kHz channel half

the fee of a 2 x 12.5 kHz channel, while a paired 25 kHz channel is double etc.

***Exclusive or shared use***

4.15 Operators would be able to request an exclusive or shared use licence for the geographic scope of their licence requirements. In these cases, the applicant would be required to provide ComReg with a justification as to why exclusive use is required.

4.16 Shared use means that multiple operators with overlapping coverage areas could be assigned the same channel and should make use of spectrum management techniques like tone control and channel access codes to share the channel without harmful interference. Applicants could also specify the main operating hours to enable other users operate on the same channel at a different time, for example, a channel could be used during the daytime for crane control, while a security service uses the same channel during the night time.

4.17 The choice of shared or exclusive licence impacts a licensee's fees through the $\gamma^E$ portion of the fee formula in Annex 2. (the proportionate premium paid for exclusive-use licences).

**Third Party or own use**

4.18 Licensees would be required to specify whether they intend to make use of the licence themselves or provide services to third parties (in the same way that serving third parties is currently possible using TPBR licences).

4.19 The choice of Third Party or own use would not impact a licensee's PMR fees.

***Fees***

4.20 Fees are formula based as set out in Annex 2.

4.21 ComReg will make available an Assessment Tool on request for existing licensees to the extent to which fees could change because of ComReg' proposed option.

4.22 For avoidance of doubt, Paging would now fall under a consolidated PMR licence with associated fees determined based on factors above and as set out in Annex 2.

### 4.1.2 PMSE

4.23 As noted previously, the preferred option in the draft RIA is that PMSE licences would be separate from the consolidated PMR licence.

4.24 The process of issuing PMSE licences under the proposed new licensing framework would be largely the same as the existing PMSE licensing process

except for the approach to fees which is discussed in Annex 2 and summarised below.

4.25 A PMSE Licence would have the parameters set out below, which potential licensees would need to determine in line with their requirements, noting that ComReg issues all PMSE licences on a non-interference, non-protected basis.

***Frequencies***

4.26 No changes to the frequency bands available to PMSE are proposed, but operators should be aware of the separate ComReg review and subsequent consultation process on the sub 700 MHz band.[67]

4.27 The frequency ranges which would be made available would be the same as those currently offered and set out in Table 7 below. See also PMSE Guidelines[68].

| | Frequency Ranges |
|---|---|
| **Two-way radio** | 169 MHz, 441 – 448 MHz, 455 - 456 MHz, 461 MHz, 465 MHz, 469 MHz |
| **Wireless microphone/in-ear** | 174-230 MHz, 470 - 703 MHz, 733 -753 MHz, 1785 - 1805 MHz |
| **Wireless camera** | 1980 - 2010 MHz, 2010-2025 MHz, 2025 – 2110 MHz, 2170 – 2200 MHz, 2200 - 2300 MHz, 6.425 – 7.125 GHz, 7.125 – 7.425 GHz, 10.3 – 10.5 GHz |

**Table 7: PMSE frequency ranges**

*4.28* The choice of frequency band does not impact a licensee's fees.

***Duration***

*4.29* The duration for a PMSE licence is specified by the licensee to last for the

[67] ComReg is currently gathering information into future use of the sub-700 MHz band, covering scenarios in which PMSE spectrum in the band is maintained, reduced, or the service is migrated from the band entirely.
[68] https://www.comreg.ie/media/2023/03/ComReg-08_08R7.pdf

duration of the event and for a period not exceeding a maximum period of six months.

***Channels***

4.30 Channel options for PMSE would be 6.25 kHz, 12.5 kHz, 25 kHz, 50 kHz, 200 kHz, 10 MHz and 20 MHz depending on the use case and frequency band chosen by the licensee. The channel sizes are general bandwidths and ComReg will consider other bandwidths for PMSE on a case-by-case basis.

4.31 The choice of channel bandwidth impacts a licensee's fee because the typical bandwidth for **each band** is identified before applying the per channel fee to a licence using that typical bandwidth. The constant per kHz charge would then apply to licences in the same band (i.e. fees would increase in proportion to the typical bandwidth for that band)

4.32 The typical bandwidth for each of the PMSE Bands is as follows;

**Table 8 : Bandwidth for each of the PMSE Bands**

| | Frequency Ranges | Typical bandwidth used |
|---|---|---|
| **Two-way radio** | 169 MHz, 441 – 448 MHz, 455 - 456 MHz, 461 MHz, 465 MHz, 469 MHz | 12.5 kHz |
| **Wireless microphone/in-ear** | 174-230 MHz, 470 - 703 MHz, 733 -753 MHz, 1785 - 1805 MHz | 200 kHz |
| **Wireless camera** | 1980 - 2010 MHz, 2010-2025 MHz, 2025 – 2110 MHz, 2170 – 2200 MHz, 2200 - 2300 MHz, 6.425 – 7.125 GHz, 7.125 – 7.425 GHz, 10.3 – 10.5 GHz | 10 MHz |

***Fees***

4.33 PMSE fees would be half the level of a comparable shared use, on-site licence. This is similar to the existing fee schedule for temporary business radio licences, with the discount reflecting the fact that the licences are only temporary and do not receive protection from harmful interference.

4.34 Fees are formula based as set out in Annex 2. In summary, the PMSE fee for the typical bandwidth in a band is €129.50 which increases or decreases in proportion to bandwidth required above or below the typical bandwidth (i.e. the fee would decrease to €64.75 for bandwidths half the typical bandwidth and €259 for bandwidths double the typical bandwidth. These fees are independent of the number of pieces of equipment used by a Licensee.

**Table 9: Summary of proposed licencing approach for PMR and PMSE**

| | PMR Licence | PMSE |
|---|---|---|
| Available Frequencies | 68 - 88 MHz<br>155.85 – 174 MHz<br>450 – 470 MHz<br>415.7750 - 418.9875 MHz Paired with 425.7750 - 428.9875 MHz<br><br>385.0000 - 389.9875 MHz Paired with 395.0000 - 399.9875 MHz | **Two way radio**<br>169 MHz, 441 – 448 MHz, 455-456 MHz,<br>461 MHz, 465 MHz, 469 MHz<br><br>**Wireless microphone/in-ear**<br>470-703 MHz, 733 -753 MHz, 1785-1805 MHz<br><br>**Wireless camera**<br>1980-2010 MHz, 2010-2025MHz, 2025 – 2110 MHz, 2170 – 2200 MHz, 2200-2300 MHz, 6.425 – 7.125 GHz, 7.125 – 7.425 GHz, 10.3 – 10.5 GHz |
| Scheme Duration | Minimum 20 years | Minimum 20 years |
| Duration | 1 year (renewable) | Up to six months, non renewable |
| Service Area | On Site, Local area, wide area, National | On site, Local area. |
| Channel Size | 6.25 kHz/12.5 kHz/25 kHz | 6.25 kHz/12.5 kHz/200 |

| | | |
|---|---|---|
| | | kHz/10 MHz/ 20 MHz[69]. |
| Fees | Formula Based<br><br>See Annex 2 or request Excel Spreadsheet | Formula Based<br><br>See Annex 2 or request Excel Spreadsheet |
| Exclusive/shared access | Both | N/A |
| Third-Parry Licences | Yes | N/A |

### 4.1.3 Transition of existing licensees to the consolidated regime

4.35 ComReg agrees with the view as outlined in the DotEcon report that existing holders of PMR licences would transition automatically to the consolidated PMR licence at licence renewal. Existing trunked radio licensees would be allowed to continue using the UHF channels below 400 MHz, even though these will not be open to new applications for consolidated PMR licences.

4.36 Existing trunked radio licences would formally transition to a consolidated PMR licence, but as a legacy trunked radio operator, they would maintain access to the channel that they are currently using. New licences under which an operator intended to deploy a trunked radio system would not have access to the legacy trunked radio channels. This avoids unnecessary disruption to spectrum users while minimising transition issues that might arise in future, for example if spectrum in the 410-430 MHz range is assigned to BB-PPDR. Some operators might naturally transition out of the legacy channels as they upgrade technology.

### 4.1.4 Monitoring to ensure efficient use of Spectrum

4.37 ComReg will take appropriate steps to avoid any competition issues where, for example, if a small number of licensees were to take out national exclusive use licences (or wide-area licences in some cases) for most of the available channels, this could create artificial scarcity of spectrum. At the application stage, some checks will be carried out to ensure that the licence is being used for the purposes specified e.g. that a channel is required constantly, if the application is for exclusive use.

4.38 Once the licence is issued, ComReg can carry out further checks based on any rollout conditions applied, in particular checking that national licences are in use

[69] The channel sizes are general bandwidths and ComReg will consider other bandwidths for PMSE on a case by case basis.

throughout the country and failure to actively use the licence within a year might lead to its coverage area being adjusted on licence renewal.

4.39 In November 2024 ComReg published in accordance with the Access to Information on the Environment Regulations 2007[70], a Decision document, the 'Publication of Radio Spectrum Licence Information'[71]. That document outlines ComReg's decision to publish radio spectrum information, on Siteviewer[72] for fixed radio link licences and satellite earth station licences. ComReg also states its intention to publish other licence types, on Siteviewer, in due course.

4.40 Such information helps to ensure the efficient management of the radio spectrum, for example inter-operator interference analysis, and aligns with government policy and international developments. Ease of access and availability of high-quality information is also important for the existing users of spectrum and its associated facilities. In that regard, ComReg intends to publish PMR licence information to assist applicants and licensees with the application process and any potential inter-operator interference.

[70]The European Communities (Access to Information on the Environment) Regulations 2007 to 2014 (S.I. No. 133 of 2007, S.I. No. 662 of 2011, S.I. 615 of 2014 and S.I. 309 of 2018).
[71] ComReg Document 24/90 - Publication of Radio Spectrum Licence Information – published 14 November 2024.
[72] ComReg's interactive map of Ireland that currently provides information for a broad range of stakeholders, such as electronic communication network and service ("ECN/S") providers, infrastructure developers such as wind farm developers, and members of the public, who wish to know base station locations and the services provided from those locations. https://siteviewer.comreg.ie/#explore this is different to the Mobile Coverage Map.

# 5 The 3.8-4.2 GHz band – background and use cases

## 5.1 Introduction

5.1 In ComReg's Radio Spectrum Management Operating Plan for the period 2025-2028 (Document 24/99), ComReg committed to the following:

> "(*vii) Consult in 2025 and put in place, as appropriate in the first half of the 2025-2028 period, a licensing regime for local-area Wireless Broadband ("WBB") systems, which could be used for, among other things, private mobile (4G, 5G etc.) networks. This would be subject to demand and progress continuing at European (CEPT/EU) level to harmonise the 3.8-4.2 GHz band for local area WBB systems (low to mid-power). This might also encompass spectrum in the lower part of the 26 GHz Band (24.250 –24.745 GHz (495 MHz) – Block C*)".

5.2 ComReg is now consulting on putting in place a licensing framework for Wireless Broadband Low and Medium Power (WBB LMP) licensing in the 3.8 – 4.2 GHz Band. Given the lack of demand for spectrum in the 26 GHz band for 5G purposes as noted in ComReg's most recent consultation on its radio spectrum management operating plan (ComReg Document 24/99), the lower part of the 26 GHz Band is not considered in this consultation.

5.3 This chapter sets out the relevant background information related to the 3.8-4.2 GHz Band and the following chapter sets out ComReg's preliminary proposals for WBB LMP licensing framework for the 3.8 - 4.2 GHz band.

5.4 In setting out these proposals, ComReg has been informed by its independent consultants:

- DotEcon Limited – related to general licensing matters, with its initial report being published as Document 25/46a,
- Plum Consulting - related to technical matters including sharing and compatibility considerations published as Document 25/46b.

## 5.2 Background

This section provides relevant background information in relation to:

- the existing allocations and uses of the 3.8-4.2 GHz Band and the adjacent bands in Ireland;
- recent harmonisation measures for the 3.8-4.2 GHz band in Europe; and

- the further work within CEPT to develop recommendations on coexistence of WBB LMP with other services; and

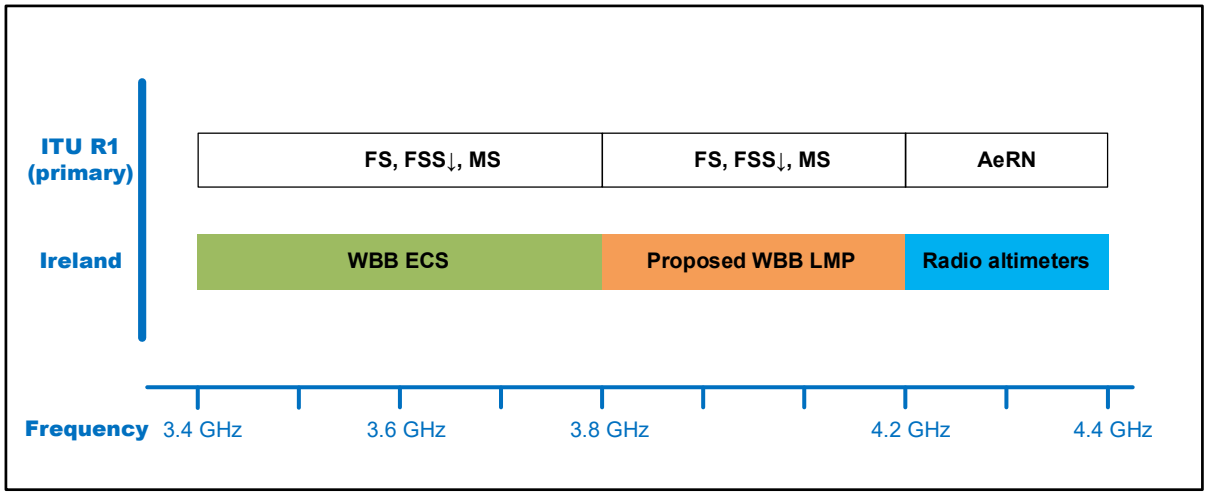
### 5.2.1 Existing allocations and use of 3.8-4.2 GHz Band and adjacent bands in Ireland

#### Existing allocations in the 3.4 – 4.4 GHz band in Ireland

5.5 Figure 3 below provides an overview of the existing allocations in the 3.4-4.4 GHz bands, in particular:

- the 3.4-3.8 GHz Band has International Telecommunications Union (ITU) primary allocations to the fixed service (FS), fixed satellite service (space to earth) and the mobile service (MS), where in Ireland the band has been assigned for WBB ECS;
- the 4.2-4.4 GHz Band has an ITU primary allocation to the Aeronautical Radionavigation Service (AeRN); and
- the 3.8-4.2 GHz Band has ITU primary allocations to the fixed service and fixed satellite service (space to earth) and a secondary allocation to the mobile service.

**Figure 3: Existing allocations in the 3.4 – 4.4 GHz in Ireland.**




#### Existing use of the 3.8 – 4.2 GHz Band

5.6 In Ireland, while the 3.8-4.2 GHz Band is currently allocated to the fixed-satellite (space to Earth) services and fixed services, there are currently no licensees in the 3.8 to 4.2 GHz Band in Ireland that warrant protection[73]. Further, there have been no such applications for Fixed Satellite Services ("FSS") licences in the last

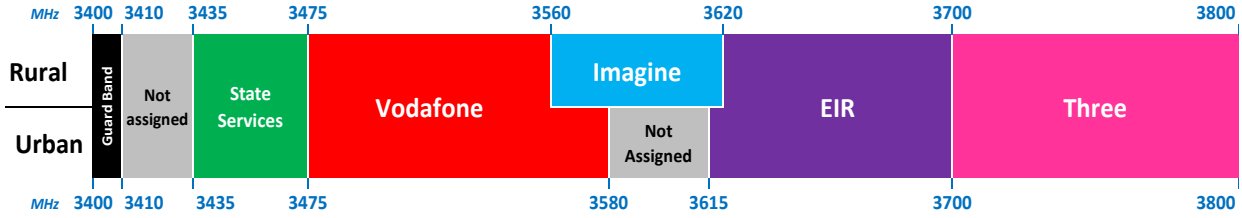
[73] The main licences in the band currently are issued for test and trial purposes.

decade.

### Existing use of 3.4-3.8 GHz Band for WBB-ECS

5.7 The three mobile network operators (MNOs - Eir, Three and Vodafone) and one fixed wireless access provider (Imagine) currently hold licences for spectrum rights in the 3.4-3.8 GHz (the "3.6 GHz") band, as shown in **Figure 4** below. Spectrum rights in the 3.6 GHz band were awarded[74] in 2017 for the provision of WBB electronic communications services (ECS) across the Republic of Ireland consisting of four rural[75] and five urban[76] regions in Ireland. This band is used to provide public 5G NR services by the MNOs and home broadband services by Imagine. The relevant 3.6 GHz Band Liberalised Use Licences held by these operators expire in 2032.

**Figure 4: Existing Use of the 3.4 – 3.8 GHz band in Ireland**




### Existing use of the 4.2-4.4 GHz for Radio Altimeters[77]

5.8 The ITU has allocated the frequency band 4.2-4.4 GHz on a primary basis worldwide to the Aeronautical Radionavigation service. Use of the frequency band by that service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground.

5.9 Radio Altimeters are used on all types of aircraft – including passenger service, cargo airplanes and helicopters – and work by transmitting a signal toward the ground below the aircraft, receiving the reflected signal, and measuring time delay to determine the height above ground. Radio altimeters provide precise height measurements critical for various safety functions in aviation, including automated landing, Ground Proximity Warning Systems (GPWS), Terrain Awareness Warning Systems (TAWS) and collision avoidance.

## 5.2.2 WBB LMP Harmonisation measures for the 3.8-4.2 GHz Band

[74] See further ComReg's 3.6 GHz Band Spectrum Award webpage
[75] Borders, Midlands & West; East; South East and South West.
[76] Cork City & Suburbs, Dublin City & Suburbs, Galway City & Suburbs, Limerick City & Suburbs and Waterford City & Suburbs.
[77] Sources: Section 2.6 of CEPT Report 88 and Chapter 4 of ECC Report 362.

## in Europe

### EC Mandate to CEPT

5.10 In 2021, the European Commission mandated[78] CEPT to develop technical conditions regarding the shared use of the 3.8-4.2 GHz Band for terrestrial wireless broadband low/medium power (WBB LMP) systems providing local-area network connectivity for a variety of services and applications.

5.11 In that mandate, the EC noted that such local-area network connectivity (with base stations operating at low/medium power) could provide services for vertical[79] uses and possibly other terrestrial wireless use cases[80], subject to an authorisation decision at Member State level.

### CEPT harmonisation and ECC Decision 24(01)

5.12 In response to the mandate, CEPT completed various technical studies[81] and in November 2024 CEPT submitted CEPT Report 088[82] to the EC and **adopted ECC Decision 24(01)**[83] at the same time.

5.13 **ECC Decision 24(01) sets out the harmonised technical conditions** for the shared use of the 3.8-4.2 GHz Band by WBB LMP systems providing local-area network connectivity. Among other things, ECC Decision 24(01) decides that:

- "the purpose of this ECC Decision is to harmonise the use of the frequency band 3.8-4.2 GHz for shared access by low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network connectivity" (Decides 1) (emphasis added);

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[78] See https://ec.europa.eu/newsroom/dae/redirection/document/82230

[79] Local vertical applications refer to specific use cases and applications of WBB technology (5G) that are tailored to meet the unique needs and requirements of particular industries, businesses, or sectors within a localized or specific geographical area.

[80] As noted in the footnote 13 of the mandate, *"Wireless local-area connectivity could serve both private (e.g. enterprise) and public (e.g. community-type) networks"*

[81] See in particular ECC Report 358 and ECC Report 362.

- ECC Report 358, *"In-band and adjacent bands sharing studies to assess the feasibility of the shared use of the 3.8-4.2 GHz frequency band by terrestrial wireless broadband low/medium power (WBB LMP) systems providing local-area network connectivity",* published 28 June 2024; and
- ECC Report 362, *"Compatibility between MFCN operating in 3400-3800 MHz and wireless broadband systems in low/medium power operating in the frequency band 3800-4200 MHz with Radio Altimeters operating in 4200-4400 MHz",* published 8 November 2024

[82] CEPT Report 088, *"Report from CEPT to the European Commission in response to the Mandate on shared use of 3800-4200 MHz by terrestrial wireless broadband systems providing local-area network connectivity (WBB LMP)"*

[83] ECC Decision (24)01, *"Harmonised technical conditions for the shared use of the 3.8-4.2 GHz frequency band by low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network"*

- "for the purpose of this ECC Decision, WBB LMP networks are used in a defined limited geographical area (no nationwide network)" (Decides 2) (emphasis added);
- "for the purpose of this ECC Decision, a base station is a fixed radio device providing the gateway between the back-end network, for example the gateway to the internet or the user's fixed infrastructure, and the WBB LMP radio network devices;" (Decides 3)
- "CEPT administration shall:"" designate the frequency band 3.8-4.2 GHz, or parts of this band, on a non-exclusive basis for the use of low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network connectivity" (Decides 4) (emphasis added); and
- "for the purpose of this ECC Decision, the technical and operational parameters for WBB LMP specified in Annex 1 apply" (Decides 5) (emphasis added).

*5.14* Annex 1 of ECC Decision 24(01) sets out the least restrictive technical conditions for the shared access of the 3.8-4.2 GHz band, noting that "*the harmonised technical conditions defined in this annex have been developed assuming that the location of WBB LMP networks or base stations is known, and that the protection of MFCN below 3.8 GHz, is ensured at national level with appropriate coordination"* (emphasis added).

### Ongoing EC harmonisation progress and draft EC Decision

5.15 The EC Radio Spectrum Committee (RSC) is developing a **draft EC Implementing Decision** for the harmonisation of the 3.8-4.2 GHz band for the shared use by terrestrial wireless systems capable of providing local area connectivity in the Union of the 3.8-4.2 GHz band, the latest publicly available draft is as of 2 July 2025 (RSCOM24-43rev4)[84].

5.16 Recitals (1) to (4) of this draft decision set out information on the rationale for this draft decision:

(1) "*The 3 800-4 200 MHz frequency band can enable the deployment of terrestrial wireless broadband systems to* ***provide local-area network connectivity for a variety of services and applications****, on the basis of technology neutrality. The wide range of local use cases across different industrial and non-industrial environments, both indoors and outdoors, will benefit from harmonised technical conditions*." (emphasis

[84] RSCOM24-43rev4, *"Draft elements of a Commission Implementing Decision on the harmonisation of the 3 800-4 200 MHz frequency band for the shared use by terrestrial wireless broadband systems capable of providing local-area network connectivity in the Union"*, Radio Spectrum Committee, Working Document, 2 July 2025.

added)

(2) *"The Commission Communication '5G for Europe: An Action Plan' ('5G action plan')[85] sets out a coordinated Union approach to the deployment of 5G services as of 2020. The 5G action plan highlights 5G as a key enabler of the digitalisation of "vertical industries". It also identifies a need for coordinated action at Union level, including the identification and harmonisation of spectrum for 5G,* ***to serve innovative business models and solutions for locally licensed access to spectrum****."* (emphasis added)

(3) *"In its 'Opinion on 5G implementation challenges (RSPG 3rd opinion on 5G)[86]', the Radio Spectrum Policy Group (RSPG) concludes that connectivity for vertical industries ('verticals') could be provided by mobile operator's solutions, third-party providers and directly by verticals themselves in EU-harmonised bands for electronic communications services or in dedicated spectrum for verticals. The RSPG recommends* ***that Member States also consider other spectrum solutions including dedicated or shared spectrum for the business/sectoral needs that may not be adequately met by mobile operators****."* (emphasis added)

(4) *"In its 'Opinion on additional spectrum needs and guidance on the fast rollout of future wireless broadband networks'[87], the RSPG further recognises that there is a specific demand for mid-band spectrum and* ***recommends that Member States investigate the possible use of the 3 800 - 4 200 MHz frequency band for local (e.g. vertical) applications (i.e. low/medium power), while protecting satellite and other existing applications and services****."* (emphasis added).

5.17 In relation to the potential obligations on Members States arising from this draft decision, Articles 1 and 3 of the draft decision state the following:

- *"Article 1: This Decision establishes the harmonised technical conditions for the availability and efficient shared use of the 3 800 – 4 200 MHz frequency band,* ***for terrestrial wireless broadband systems with low and medium power capable of providing local-area network connectivity*** *in the Union ('WBB LMP systems').* (emphasis added)

- "Article 3: By 30 September 2026, Member States **shall designate and make available on a non-exclusive basis the 3 800 – 4 200 MHz**

[85] COM(2016) 588 final of 14 September 2016, "*5G for Europe: An Action Plan*".
[86] Document RSPG19-007 final of 30 January 2019, Strategic spectrum roadmap towards 5G for Europe: RSPG opinion on 5G implementation challenges (RSPG 3rd opinion on 5G)
[87] Document RSPG21-024 final of 16 June 2021, RSPG opinion on additional spectrum needs and guidance on the fast rollout of future wireless broadband networks.

**frequency band for WBB LMP systems** in compliance with the harmonised technical conditions set out in the Annex." (emphasis added)

5.18 In relation to timelines for the potential adoption of an EC decision on this band, ComReg observes that:

1. The draft decision is under active consideration by Member States and the EC. Following the RSC#90 meeting in July 2025, a new version of the draft Decision (RSCOM24-43rev5) was circulated, with Member States invited to submit editorial comments by 4 July 2025[88].
2. **End-2025 remains the envisaged date** for the adoption of any such EC Implementation decision, as noted in the latest draft of the EU Roadmap for the 3.4 - 4.4 GHz band in relation to Radio Altimeters[89] which also foresees that an update to the Implementation Decision may occur in the period 2026-2029 should it be necessary (e.g. to address the next generation of radio altimeters).

### 5.2.3 Further work within CEPT to develop recommendations on coexistence of WBB LMP with other services

5.19 CEPT Report 088 and ECC Decision 24(01) do not set out a complete suite of technical conditions for all coexistence scenarios. The FM60 project team[90] under WG FM[91] within CEPT is carrying out further work[92] to develop recommendations on technical toolkits to assist CEPT administrations with managing the coexistence scenarios not addressed in CEPT Report 088 and ECC Decision 24(01). FM60 is developing three separate recommendations on:

1. coexistence between WBB LMP and FSS receiving earth stations and Fixed Service (FS) links;
2. coexistence between WBB LMP in the 3.8-4.2 GHz Band and radio altimeters in the 4.2-4.4 GHz Band; and
3. coexistence between WBB LMP networks within the 3.8-4.2 GHz Band and coexistence between WBB LMP and Mobile Fixed Communications Networks (MFCN) below 3.8 GHz.

5.20 The draft recommendations focus on the management of coexistence by CEPT administrations at national level and aim to provide guidance to administration

[88] Chairperson's Summary Report, 90th Radio Spectrum Committee Meeting 2 July 2025
[89] "EU Roadmap for Ensuring Safe Coexistence Between Mobile Networks and Aircraft Radio Altimeters Within the Frequency Range 3.4-4.4 GHz in the Union", Version 2, April 2025.
[90] WG FM - FM 60 Webpage
[91] Working Group Frequency Management (WG FM)
[92] Under ECC Work Item FM60_02

on how best to manage coexistence, including the use of any additional technical conditions not currently set out in ECC Decision 24(01).

5.21 All three recommendations were originally scheduled for publication by 31 October 2025. However, and while FM60 aims to complete its work on time for the recommendation considering coexistence between WBB LMP and FSS and FS links, it obtained the approval of WG FM[93] at its June meeting for additional time – running into Q1 2026 – to complete its work on the other two recommendations.

## 5.3 Use cases for private 5G networks in 3.8-4.2 GHz band

5.22 This section sets out information on the demand for and use cases for private 5G networks, as well other potential local-area WBB uses, such as FWA and neutral hosts.

### 5.3.1 BEREC Report on Private 5G networks

5.23 On 13 March 2025, the Body of European Regulators for Electronic Communications (BEREC) issued a report (BoR (25)33) on the Evolution of Private 5G Networks and interrelation with public networks in Europe. This report aims to deliver fresh perspectives for the national regulatory Authorities (NRAs) and other relevant stakeholders and make it simpler to understand the different definitions and classifications of such networks, and the related regulatory approaches in different countries.

5.24 Following the survey of different NRAs, BEREC noted a number of use cases that had been provided by different NRA's which include:

(i) logistics and warehousing - where it was particularly noted that airports and railways logistics increasingly rely on private networks;

(ii) manufacturing - where the automotive and chemical industries were highlighted;

(iii) educational institutions;

(iv) energy and public authorities (including defence);

(v) mining/ extraction of raw materials;

(vi) agriculture;

[93] At the WG FM #110 meeting in early June 2025.

(vii) forestry;

(viii) retail settings, and;

(ix) healthcare.

5.25 Some of BEREC's observations include that:

- The frequency range 3400-4200 MHz is the most common band for private 5G networks in Europe; and
- The private 5G networks market appears to be a nascent market now but is gathering momentum.

### 5.3.2 ComReg's Radio Spectrum Management Operating Plan 2025-2028

5.26 ComReg consulted on its radio spectrum management operating plan for the period 2025-2028 in its Document 24/65.[94] Responses received to the consultation submitted that there are notable benefits associated with private networks and that private 5G networks:

- are rapidly becoming a prerequisite to support a wide range of sectors, in particular for manufacturing, transport/logistics, and entertainment and events (i.e. outside broadcasting) as summarised in Annex 4, and;
- would benefit Ireland by supporting Foreign Direct Investment (FDI), supporting the significant cluster of Irish companies supplying the private cellular industry globally and allowing Ireland to keep pace with leading countries with a private 5G licensing framework.

5.27 ComReg's response to consultation (Document 24/99) noted the strong support from respondents to put in place a WBB LMP licensing framework, with the 3.8-4.2 GHz band being identified as the key band to consider. Reasons supporting this were set out in ComReg's consultation (Document 24/65) and included the harmonisation of the 3.8-4.2 GHz band for this purpose and growing and for and licensing of spectrum in the 3.8-4.2 GHz band across Europe.

### 5.3.3 Stakeholder interviews for this consultation

5.28 To inform this consultation, ComReg and DotEcon conducted ten stakeholder

[94] See Radio Spectrum Management Operating Plan 2025 – 2028 | Commission for Communications Regulation

interviews with potential end-users or licensees across a variety of sectors and with vendors supplying solutions to the end users of private networks

5.29 DotEcon, in Chapter 3 of its report, Document 25/46a, sets out its analysis of the use cases informed by the stakeholder interviews and other analysis, including information on a number of defining characteristics, including bandwidth needed, site characteristics, TDD profiles and integration with public networks.

5.30 DotEcon notes that the use cases can be grouped into

(i) **Private 5G Networks:** this is likely to be the main use across many sectors including industrial applications, applications in energy / natural resources and mining, campus settings, events and programme making and transport applications where uses could include one or more of the following

- Voice and messaging comms, including push to talk;
- CCTV;
- Emergency alarm systems;
- Sensing and monitoring;
- Tracking;
- Internet of Things;
- Pattern recognition;
- Automated guided vehicles within controlled areas;
- Remote control operation of equipment;
- Augmented Reality (AR)/Virtual Reality (VR);
- Artificial Intelligence;
- Content production; and
- Backup networks.; and

(ii) **Public 5G Networks:** covering applications provided to the public such as FWA and neutral host networks.

5.31 In relation to Public 5G networks, DotEcon notes that while FWA is a possible use case, it would not expect FWA to be a common use case in this band, largely because of the extensive availability of fibre in Ireland, including in rural areas

under the NBP,[95] and because FWA operators have access to other licence-exempt and licensed spectrum.

5.32 Regarding neutral hosts, DotEcon observes that access to spectrum in the 3.8-4.2 GHz Band could be useful to provide capacity, allow truly neutral access including to service providers without appropriate spectrum, or to simplify network set up.

[95] https://nbi.ie/where-can-i-buy/

# 6 Proposed WBB LMP licensing framework in the 3.8-4.2 GHz Band

## 6.1 Introduction

6.1 This chapter sets out ComReg's initial analysis and proposals on a WBB LMP licensing framework in the 3.8-4.2 GHz Band, and:

- firstly sets out ComReg's views on a number of high-level principles that could inform the establishment of a WBB LMP licensing framework; and
- secondly sets out ComReg's analysis and proposal in relation to the more detailed aspects of a WBB LMP licensing framework.

6.2 The above has been informed by:

- the harmonisation decisions already taken for this band, further ongoing harmonisation work, and the long list of potential use cases for this licensing framework, as outlined earlier and detailed below;
- the guidance of ComReg's technical advisors, Plum, on the in-band and adjacent-band technical co-existence analysis, and the potential approaches for licensing WBB LMP networks in Ireland as detailed in Document 25/46b; and
- the guidance of ComReg's economic advisors, DotEcon, on a number of key aspects of a WBB licensing framework, including geographic scope of licences, duration, rollout, application requirements, information available to licensee and fees, as set out in Document 25/46a;

## 6.2 General principles to inform a WBB LMP framework

### 6.2.1 A pragmatic approach

6.3 From the stakeholder meetings and the benchmarking work of both Plum and DotEcon, it is evident that a large number of unknowns continue to prevail with regard to the establishment of a WBB LMP licensing framework. ComReg, as such, is of the view that it would be prudent to apply a pragmatic approach.

6.4 In this regard, ComReg observes that:

- there are a diverse and large number of potential use cases and licensees, where the network set-up and requirements are likely to be

tailored to each individual licensee and as such unfamiliar to ComReg until the licensing framework is in operation.

- the market for private 5G networks is relatively new and the extent of demand for spectrum remains somewhat uncertain. While initial demand for WBB LMP licences might well be limited, it is possible that this demand could accelerate as industrial, manufacturing and other use cases make ready for 5G connectivity.

- mostly, the licensing frameworks for WBB LMP services across Europe are relatively new. Further countries are generally updating their frameworks as new information becomes available; and

- information on WBB LMP co-existence measures with both in-band and adjacent band services is under study within CEPT, and additional licensing recommendations and considerations are expected to be released over time.

### 6.2.2 Ensuring the efficient use of spectrum

6.5 Ensuring the effective management and efficient use of radio spectrum in Ireland is one of ComReg's statutory functions and objectives.

6.6 Given the work of DotEcon and Plum, ComReg appreciates that there remains some ambiguity as to how best to license a WBB LMP network and the commensurate demand for such licences.

6.7 Plum notes that co-existence between two WBB LMP networks in the same frequency band can depend on many factors (power, synchronisation etc.) and that the re-use range of spectrum could vary from a hundred metres for low power synchronised deployments up to as much as 22 km for medium power unsynchronised deployments. This is detailed in Tables 2.1 and 2.2 of Plum's report, reproduced below:

| Unsynchronised | | MP | LP | Indoor |
|---|---|---|---|---|
| Interferer (BS) | MP | 22 km | 9 km | 1.5 km |
| | LP | 6 km | 3 km | 0.5 km |
| | Indoor | 1.5 km | 0.5 km | <0.3 km |

Table 2.1: Indicative re-use distances (BS-BS, unsynchronised operation)

| Synchronised | | MP | LP | Indoor |
|---|---|---|---|---|
| Interferer (BS) | MP | 4 km | 4 km | <0.2 km |
| | LP | 0.4 km | 0.4 km | <0.2 km |
| | Indoor | <0.2 km | <0.2 km | <0.1 km |

Table 2.2: Indicative re-use distances (BS-UE, synchronised operation)

6.8 Noting the potential for existing licences to impact the availability of the band for other users, the effective management and efficient use of spectrum remains especially important for ComReg, and it will be understood that in making the WBB LMP proposal, ComReg must adopt a prudent approach.

### 6.2.3 Promoting innovation and competition is preserved

6.9 In pursuit of its policy objectives, ComReg, among other things, is obliged to promote efficient investment and innovation in new and enhanced infrastructures while ensuring that competition in the market is preserved[96].

6.10 Notwithstanding the relative newness of the private 5G market and its potential to provide significant contributions across a large number of sectors, including manufacturing, logistics and transport amongst others, the promotion of innovation and protecting competition are also key ComReg objectives to consider in establishing a WBB LMP framework.

### 6.2.4 Technology and service neutrality

6.11 Technology and service neutrality is a key principle enshrined in the European and Irish regulatory framework for electronic communications. This principle is reflected in the European harmonisation decisions for the 3.8 – 4.2 GHz band, noting that the draft EC decision:

- would oblige Member States to designate and make available the 3.8 to 4.2 GHz band for *"WBB LMP systems in compliance with the harmonised technical conditions set out in the Annex"* to the draft Decision (see Recital 1, Article 1 and 3). In practical terms, this means that the band is harmonised for WBB systems on a technology neutral basis (e.g. for 4G, 5G, DECT NR etc.), provided the technology complies with the technical conditions set out in the Annex; and

[96] Regulation 4(5)(d) of S.I 444 of 2022.

- promotes service neutrality, noting that the band can be used for a variety of services and applications across different industrial and non-industrial environments (see Recital 1).

6.12 Given the above, ComReg will adopt technology and service neutrality in establishing a WBB LMP framework.

### 6.2.5 Low to Medium Power – Local Area network connectivity

6.13 Both ECC Decision (24)01 and the draft EC decision harmonise the 3.8 – 4.2 GHz band for local area network connectivity with low to medium power. In addition, both harmonisation decisions make clear that this band is not to be used for nationwide networks.

6.14 The draft EC decision:

- would harmonise the 3.8 - 4.2 GHz Band for *"terrestrial wireless broadband systems with low and medium power capable of providing local-area network connectivity in the Union ('WBB LMP systems')" (See Article 1); and*

- would oblige Member States to designate and make available the 3.8 - 4.2 GHz Band for WBB LMP systems *"in compliance with the harmonised technical conditions set out in the Annex"* (see Article 3), where:

    - Table 1 in the Annex sets out maximum in-block EIRP limits per cell for low power and medium power base stations; and
    - Note 2 to Table 1 in the Annex states that *"The network coverage shall remain local (i.e. no nationwide networks)."*

6.15 Noting the above, ComReg's WBB LMP framework will be available for WBB LMP systems capable of providing local-area connectivity only.

### 6.2.6 Shared Use of the 3.8 – 4.2 GHz band

6.16 Both ECC Decision (24)01 and the draft EC decision harmonise the 3.8 – 4.2 GHz band for *"shared use"* (see Article 1 of draft EC decision).

6.17 In practice, this means that the band will be shared between many different licensees as determined by the Member State.

### 6.2.7 Make the full 3.8 – 4.2 GHz band available

6.18 Article 3 of the draft Decision would oblige Member States to designate and make available on a non-exclusive basis the 3.8 – 4.2 GHz Band for WBB LMP systems.

6.19 Noting the above, ComReg's WBB LMP framework proposal is based on the release of the entire 3.8 – 4.2 GHz Band.

## 6.3 Details of Proposed WBB LMP Licensing framework

6.20 The remainder of this chapter sets out ComReg's analysis and proposals on the detailed aspects of a WBB LMP licensing framework, where each of the following topics are discussed in turn:

- Transmission Power in the band;
- Licensing and network planning approach;
- Bandwidth;
- Synchronisation;
- Licence duration;
- Rollout and usage obligations;
- Fees;
- Application process;
- Other issues; and
- Sharing and compatibility considerations.

## 6.4 Transmission Power in the band

### 6.4.1 Background

6.21 As noted above, the 3.8-4.2 GHz Band is harmonised at CEPT level with ECC Decision (24)01 and the European Commission is developing a draft implementing decision for the band.

6.22 Within these decisions, power levels for both base and terminal stations are set out as detailed below, noting that the draft EC implementing decision (RSCOM24-43rev4) uses the very same levels as that in ECC Decision 24(01).

6.23 Decides 4 of ECC Decision 24(01) states CEPT administrations shall:

> *"– designate the frequency band 3.8-4.2 GHz, or parts of this band, on a non-exclusive basis for the use of low/medium power terrestrial wireless broadband systems (WBB LMP) providing local-area network connectivity; and the power levels of transmissions are set out in the Annex to the Decision."* (emphasis added)

6.24 Table 1 of Annex 1 of the ECC Decision (24)01 sets out the power levels for Base Stations as shown below:

**Table 1: Maximum in-block e.i.r.p. per cell for base stations operating in 3800-4200 MHz**

| Category | e.i.r.p. per cell (Note1 and Note 2) |
|---|---|
| Low power base station | ≤ 24 dBm/channel for BW ≤ 20 MHz<br>≤ 18 dBm/5 MHz for BW > 20 MHz |
| Medium power base station | ≤ 44 dBm/channel for BW ≤ 20 MHz<br>≤ 38 dBm/5MHz for BW > 20 MHz |
| Note 1: In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.<br>Note 2: Higher e.i.r.p. levels may be authorised by national administrations in exceptional and duly justified cases, provided that protection of FSS receiving earth stations and FS links (where appropriate nationally) in the band as well as MFCN below 3.8 GHz and radio altimeters above 4.2 GHz is ensured, taking into account their future development, including in the neighbouring countries. Coverage shall remain local, i.e. no nationwide networks. | |

6.25 In line with ECC Decision (24)01, a national administration may authorise higher EIRP levels for exceptional and duly justified cases, provided incumbent services remain protected.

6.26 With respect to terminal stations, Annex 1 of ECC Decision (24)01 provides terminal in block requirements as set out in the table below:

**Table 10: WBB LMP User terminal in-block power requirements**

| | Requirements |
|---|---|
| **Maximum user terminal station power** | 28 dBm TRP[97]. (including a 2 dB tolerance) |
| **Fixed Terminals** | An in-block EIRP[98]. limit may be defined at national level, provided that protection of in-band and adjacent band incumbent services and cross-border obligations are fulfilled. |
| **Transmission power control** | Mandatory and shall be activated |

### 6.4.2 Preliminary assessment and view

6.27 The harmonisation decisions for the 3.8-4.2 GHz Band set out harmonised low and medium power levels, as defined in Annex 1 to the ECC Decision 24(01) for providing local area connectivity, i.e. no nationwide networks, albeit that higher

[97] TRP - Total Radiated Power
[98] EIRP - Equivalent Isotropic Radiated Power

EIRP levels may be authorised in exceptional and duly justified cases.

6.28 With these low and medium power levels ComReg has no discretion in terms of the powers that can be licensed, as any licensing needs to be consistent with the relevant harmonisation decisions. Further ComReg observes that even with medium power licences, the indicative reuse distances as modelled by Plum between medium power unsynchronised deployments are very significant at up to 22km, and therefore careful consideration is needed by ComReg for medium power levels.

6.29 In light of the above, ComReg is of the preliminary view that it would permit both low and medium power deployments in the 3.8-4.2 GHz Band in accordance with the levels set out in relevant harmonisation decision, noting that the deployment of medium power base stations would need careful consideration prior to any licensing due to its potential to limit the reuse of frequencies by other licensees.

6.30 In relation to the use of powers higher than the low and medium power levels, ComReg believes that there is merit in retaining the discretion provided by the harmonisation decision to consider and license same in exceptional and duly justified cases.

6.31 In relation to in-block power for terminals ComReg proposes to license these in accordance with the levels set out in Annex 1 of ECC Decision (24)01.

## 6.5 Licensing and network planning approach for WBB LMP

### 6.5.1 Background – ongoing work of FM60

6.32 The CEPT Working Group FM60 ("FM60") is currently developing recommendations for the licensing and planning approaches that may be adopted by administrations in establishing WBB LMP licensing frameworks. The latest draft recommendation[99] under development identifies two generic licensing approaches that a national regulator can use with the aim of ensuring interference-free coexistence:

1. Case-by-case planning, where the national regulator ensures interference-free coexistence based on the technical parameters given in the licence conditions (output power, antenna configuration etc).

[99] Latest available FM60 working draft ECC Recommendation on WBB LMP Planning and Co-existence with MFCN below 3.8 GHz, 1 July 2025, LINK.

2. The setting of licence conditions at the border of the licence area to ensure interference-free coexistence, including requirements on maximum field strength levels, for example.

6.33 While the second approach could enable simpler more generic planning, the draft FM60 recommendation focuses on the first approach, with specific protection criteria for case-by-case planning.

### 6.5.2 Summary of Plum's recommendations on the licensing and network planning approach for WBB LMP networks

#### General licensing approach

6.34 In its report Plum considered the two generic approaches as provided by FM60.

6.35 In relation to the first approach, i.e. a case-by-case assessment of each application where the regulator undertakes the necessary assessment and planning to ensure co-existence between WBB LMP networks, Plum observes that:

- this could be appropriate for medium power deployments of a single base station and has been used by Ofcom (UK) and Nkom (Norway) for MP deployments; and
- a variant of this approach for low power deployments would be to allow a licensee to deploy low power base stations within a small defined area (e.g. a circle with 50m radius). Plum observes that both Ofcom (UK) and Nkom (Norway) also use this approach.

6.36 In relation to the second approach, that of the requirement to define a service area and to determine field strength values at the boundary of that area, Plum observes that:

- such a licensed service area could be appropriate for larger WBB LMP deployments or campus network deployments where multiple base stations are deployed within the service area;
- the licensee would need a technical expert that is capable of designing the system to meet maximum field strength requirements at the border of the area or at some distance from the border, and its subsequent monitoring and reporting;
- it may be disproportionately complex for the majority of applications, certainly in the low-power case;
- to define an appropriate field strength value would also require assumptions to be made about the technical characteristics of the (unknown) services to be protected; and,

- the definition of appropriate field strength values requires assumptions to be made regarding the technical characteristics' representative of all other services and may lead to inefficient planning.

6.37 While making the above observations, Plum noted that it would be worthwhile seeking stakeholder views on this issue.

6.38 In light of the above, Plum recommends establishing a licensing framework in keeping with the first approach identified in FM60. In this regard, Plum advises the adoption of an approach similar to that used in Norway (see Figure 5 below):

- providing a **low power licence** which would allow flexible base station deployment within a circle of 50m radius. The maximum permitted antenna height outdoors would be 10 metres above ground level, with the aim to remain within the clutter, while indoors there would be no height restriction. User terminals can operate inside the 50m radius and can also operate outside. If an applicant needs to deploy base stations over a larger area, it could apply for multiple 50m licence areas, contiguous or otherwise; and,

- providing a **medium power licence** on the basis of the detailed base station deployment characteristics (antenna pattern and pointing, antenna height, radiated power, etc.). Plum notes that the example interference contours shown in Appendix D of its report illustrate limited scope for co-channel frequency reuse of medium power sites in urban areas. Plum observes that as it is likely that the majority of urban use cases can be addressed by low power base stations, with antennas below the average clutter height (e.g. 10m), it recommends that medium power licences should not be made generally available in city areas. Plum notes however that this should not be a strict rule, as compelling use cases may require wider coverage and some exceptions should be possible following consultation between prospective licensees and ComReg.

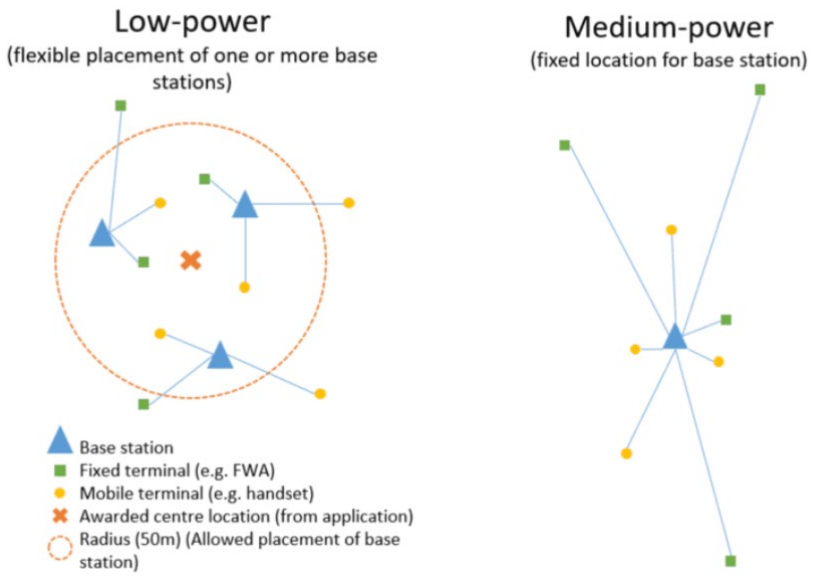


**Figure 5: Private Network deployment options for a Low and Medium power licence in the 3.8-4.2 GHz Band (source Nkom)**

## Network planning approach

6.39 Plum suggests the following network planning approach for low power and medium power licences:

6.40 For Low Power (LP) licences:

1. Initial licence(s) are issued and ComReg makes available the relevant details of these licences on its website.

2. For subsequent applicants, Plum states that it would be prudent that new applicants consider the existing licences issued in the band and submit their applications to ComReg following coordination with existing licensees (as required). Co-channel deployment would likely be permitted if beyond a fixed distance (e.g. using Table 2.1 of the Plum report presented in Section 6.4.2 above) this would be 0.5 km for LP to indoor, 3 km for LP to LP and 6 km for LP to MP).

3. If within the above distance, and if no non-overlapping assignments are available for the bandwidth requested, ComReg may conduct an assessment using modelling that takes into account terrain and clutter (e.g. Recommendation ITU-R P.1812) to determine whether the signal is below an appropriate threshold (See Table 3.1 of Plum Report), and whether the application could be licensed. The assessment would be made between the nominal locations of base stations and, in the general case, would assume a victim receive antenna at base station height (i.e. 10m for the LP case). Where synchronisation was known to exist, the calculation would be made to the nominal UE height (e.g. 1.5m).

4. If the level is predicted to be above the threshold, ComReg would be unable to issue a licence unless prior agreement had been reached between the applicant and existing licensees to resolve the co-existence issue.

6.41 For Medium Power (MP), licences would be granted on the basis of carrying out a detailed assessment of:

- base station deployment characteristics (e.g. antenna pattern and pointing, antenna height, radiated power, etc…) for medium power deployments (proposed and existing), and
- generic characteristics for low-power licences.

6.42 Plum notes that these calculations could apply the limits currently under discussion in FM60 (see Table 3.1 of Plum Report), or other limits deemed representative (e.g. those used by Plum and detailed in Appendix I of its report).

### 6.5.3 ComReg's preliminary assessment and view

6.43 While FM60 is continuing its work to develop recommendations for the licensing and planning of WBB LMP networks in the 3.8-4.2 GHz Band, due in 2026, ComReg sets out below its preliminary assessment in relation to the licensing and network planning approaches below, noting that this may be updated as new information becomes available.

6.44 In relation to the licensing approaches for the band, both FM60 and the advice from Plum at this juncture suggests the first approach is the preferred approach namely:

1. Case-by-case planning, where the national regulator ensures interference-free coexistence based on the technical parameters given in the licence conditions (output power, antenna configuration etc).

6.45 FM60 has focussed its work on providing its recommendations on this option and is in the process of developing the recommended power levels to allow for coexistence, see Section 3.5 of the Plum Report and the latest draft of the relevant ECC recommendation from FM60[100]

6.46 In relation to the second approach (i.e. establishing licence areas based on conditions including requirements on maximum field strength levels, for example at the border of the licence area) and while ComReg notes that this could be beneficial for a more sophisticated licensee with detailed network planning

[100] Latest available FM60 working draft ECC Recommendation on WBB LMP planning and co-existence with MFCN below 3.8 GHz, 1 July 2025, LINK

capabilities or for campus-type networks with multiple base station deployments, ComReg also notes the potential concerns raised by Plum:

- it may be disproportionately complex for the majority of applications, certainly in the low-power case;
- to define an appropriate field strength value would also require assumptions to be made about the technical characteristics of the (unknown) services to be protected; and
- the definition of appropriate field strength values requires assumptions to be made regarding the technical characteristics representative of all other services and may lead to inefficient planning.

6.47 Noting the above, ComReg is of the preliminary view that the second approach may not be practicable at this juncture. ComReg is of the preliminary view that the case by case approach to licensing, as recommended by Plum, is the appropriate approach to adopt at this point. ComReg will of course continue to monitor the work of FM60 and will consider any new information that becomes available.

6.48 In relation to the case by case licensing approach, ComReg is of the view that as services are being deployed it will be important to understand the intended service area of the applicant as this will inform the most appropriate licensing option (e.g. either LP or MP) and thereby assist in ensuring the most efficient use of spectrum.

6.49 Therefore, in summary, ComReg is of the view that the following approach would be appropriate for WBB LMP licensing in the 3.8-4.2 GHz Band:

- low power licences would be issued to allow base stations to be licensed within a 50m radius of a centre point. Antenna heights of base stations outdoors could be no greater than 10m, with no restriction indoors. Applicants that require low power use across a wider area than 50m circles could apply for multiple licences to make up a larger area;
- licences for medium power base stations would be issued on a case-by-case basis and for the exact technical details of the base stations; and
- medium power base stations would not be licensed in the cities[101] unless there are exceptional circumstances

[101] Dublin, Cork, Limerick, Galway and Waterford.

## 6.6 Bandwidth

### 6.6.1 Summary of DotEcon's views

6.50 DotEcon observes that the stakeholder engagement exercise highlighted a diverse range of bandwidth requirements, some with a minimal user bandwidth of circa 5 MHz and others submitting that they would require up to around 100 MHz.

6.51 DotEcon notes that several of the more traditional/basic communications applications (i.e. voice and messaging services) could be accommodated using limited bandwidth, while some applications especially those involving video transmission would likely require higher bandwidths (e.g. CCTV systems, visual pattern recognition, augmented/virtual reality applications, remote control of machinery if video feedback is required, safety cameras and programme making)

6.52 DotEcon observes that a small number of stakeholders identified needs with very high reliability requirements that could require two parallel networks being deployed to provide for redundancy and thus large bandwidths.

6.53 DotEcon also notes that there may be use cases where a licensee operates and manages the spectrum on a particular site with multiple users accessing the network with different bandwidth requirements. This could require access to larger bandwidths depending on the relevant use cases.

### 6.6.2 Summary of Plum's views

6.54 Following its benchmarking exercise, Plum notes that the channel bandwidths from other countries vary between 10 MHz and a maximum of 80 MHz (Norway and Sweden) or 100 MHz (UK, Poland, Germany). Plum notes that bandwidths from other countries are generally based on multiples of 10 or 20 MHz.

6.55 Plum observes that while the ECC Decision (24)01 specifies a 5 MHz raster[102] for the band, to allow a 5 MHz channel bandwidth could result in excessive fragmentation with consequent constraints on assignment.

6.56 Plum notes that it will clearly be important to ensure that users do not demand more bandwidth than is required for a particular application and provide the following options to ensure this:

[102] In wireless communication, a channel raster defines the specific frequencies, or "steps", at which channels (frequency ranges used for communication) are defined within a band. It essentially acts as a grid or reference for allocating and identifying channels, ensuring proper spacing and avoiding interference.

- Require applicants to provide detailed rationale and plans for requested bandwidth, based on service, coverage area, capacity requirement, number of users/connected equipment, etc; and

- Impose requirements on licensees to periodically report *actual* usage. Plum also notes that ComReg should have the discretion to change the licensed channel size if actual spectrum use falls below the licensed bandwidth or to withdraw the licence entirely in the event of no use.

6.57 Plum also observes that there may be justified cases where higher bandwidths are required, for example where an WBB LMP network uses a synchronisation profile that it would not ideally choose for licensing purposes (e.g. to align with WBB-ECS in the 3.6 GHz Band, another WBB LMP system or both).

6.58 Plum additionally notes that it is anticipated that video applications and deployments at ports and airports would likely require higher bandwidths.

### 6.6.3 Preliminary assessment and view

6.59 ComReg has considered the observations made by both DotEcon and Plum and ComReg is in general agreement with both.

6.60 While ComReg's WBB LMP licensing framework aims to provide licensees access to sufficient spectrum to meet their needs, given the potential for existing licences to impact the availability of spectrum for new users, it is important that no one applicant should be able to apply for bandwidth on a speculative basis, (e.g. seeking to obtain access to spectrum rights of use that it does not need in the immediate term). Without appropriate controls, ComReg notes that in any localised area the 400 MHz of spectrum of the 3.8-4.2 GHz Band could end up being fully licensed in a short timeframe potentially foreclosing any future licences being issued in that area.

6.61 This matter becomes more stark, when one considers the indicative re-use distances provided by Plum at Tables 2.1 and 2.2 of its report. Depending on the case the re-use distances for a local area could limit co channel spectrum use from a few hundred metres in the best case (low power and synchronised) to as much as 22km in the worst case (medium power unsynchronised).

6.62 ComReg therefore proposes that two controls should be put in place:

1. applicants would need to provide detailed rationale and plans for the requested bandwidth to provide the services it needs. The information to be submitted would likely need to include a description of the type of service being provided, the coverage area, the capacity requirement of the services, the number of users/ connected equipment etc; and

2. licensees would have to periodically report actual usage to ComReg. Should licensees not be utilising, in whole or in part, the licensed bandwidth, ComReg would retain the right to amend or withdraw the licence as appropriate.

## 6.7 Synchronisation

### 6.7.1 Background

#### Harmonisation decisions - ECC Decision (24)01 and draft EC Decision

6.63 ECC Decision (24)01 sets out that the 3.8-4.2 GHz Band is harmonised with a Time Division Duplex (TDD) frequency arrangement.

6.64 The Annex to the latest draft of the EC Decision for the 3.8-4.2 GHz Band also establishes that the duplex mode of operation shall be TDD. The draft EC Decision usefully defines the different synchronisation modes as follows:

- Synchronised operation means operation of two or more different TDD networks, where simultaneous uplink (UL) and downlink (DL) transmissions do not occur, that is at any given moment in time either all networks transmit in downlink or all networks transmit in uplink. This requires the alignment of all DL and UL transmissions for all TDD networks involved as well as synchronising the beginning of the frame across all networks (i.e. have a common phase clock reference).

- Unsynchronised operation means operation of two or more different TDD networks, where at any given moment in time at least one network transmits in DL while at least one network transmits in UL. This might happen if the TDD networks either do not align all DL and UL transmissions or do not synchronise at the beginning of the frame (i.e. no common phase clock reference).

- Semi-synchronised operation means operation of two or more different TDD networks, where part of the frame is consistent with synchronised operation, while the remaining portion of the frame is consistent with unsynchronised operation. This requires the adoption of a frame structure for all TDD networks involved, including slots where the UL/DL direction is not specified, as well as synchronising the beginning of the frame across all networks.

#### Adjacent users

6.65 As set out in Chapter 5, WBB ECS is licensed in the 3.6 GHz Band to the three MNO's (Eir, Three and Vodafone) and to a fixed wireless access provider (Imagine). The 3.6 GHz Band also has a TDD duplex mode of operation. In the licences issued to the 3.6 GHz band licensees under S.I. 532 of 2016 it is a

condition of the licence that all licensees must operate in accordance with the Inter Licensee Synchronisation Procedure, which in summary, identifies a default frame structure for UL and DL transmissions to occur. Should licensees operate in accordance with the default frame structure and synchronise their networks, they can utilise what is called a "Permissive Block Edge Mask", if not they must operate using a "Restrictive Block Edge Mask".

6.66 As all licensees in the 3.6 GHz Band provide similar services with respect to the traffic profile (wireless broadband to either mobile devices or fixed devices), all licensees in the 3.6 GHz Band operate using the default frame structure as set out in Section 3 of Part 4 of Schedule 1 to the S.I. 532 of 2016, which in summary is:

- transmissions from a licensee's base station shall have a frame structure as shown in Figure 6 below, which is TD-LTE frame configuration 2 (Downlink: Uplink 3:1) with special subframe 6 or equivalent frame structures aligned with this configuration;
- timeslots shall have a duration of 1 millisecond; and
- licensees shall ensure that frames start at a common reference time (+/- 1.5 µs) so that all the frames are aligned and transmissions synchronised.

| DL/UL ratio | Timeslot or Subframe number | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 3:1 | D | S | U | D | D | D | S | U | D | D |

**Figure 6: Default frame structure for use in the 3.6 GHz Band**

6.67 By the licensees deploying the consistent frame structures, this significantly enhances the usage of the spectrum and aims to eliminate base station to base station interference between networks.

### 6.7.2 Summary of Plum's views

6.68 Plum notes that for many users, the default frame structure of the 3.6 GHz Band licences, TD-LTE frame configuration 2 (Downlink: Uplink, 3:1), is likely to be acceptable and may be configured in the equipment used in WBB LMP networks by default.

6.69 Plum notes that it has given some consideration to the idea that the band might be segmented to ease coexistence between users with different, specific, frame structures or indeed power levels. However, Plum notes that there is a significant risk in such an approach, given the uncertainty regarding the balance between different use-cases and the overall demand for licences, such segmentation

could enshrine an inefficient pattern of use.

6.70 Further, Plum notes that while ECC Report 358 and ECC Decision (24)01 only state that synchronisation (of WBB LMP networks with WBB ECS below 3.8 GHz) may be necessary, the current working text in FM60 would mandate the use of synchronisation in the lower 20 MHz in all cases and require synchronisation for medium power stations up to 3860 MHz. This is illustrated in Figure 3.2 of the Plum Report as shown below:

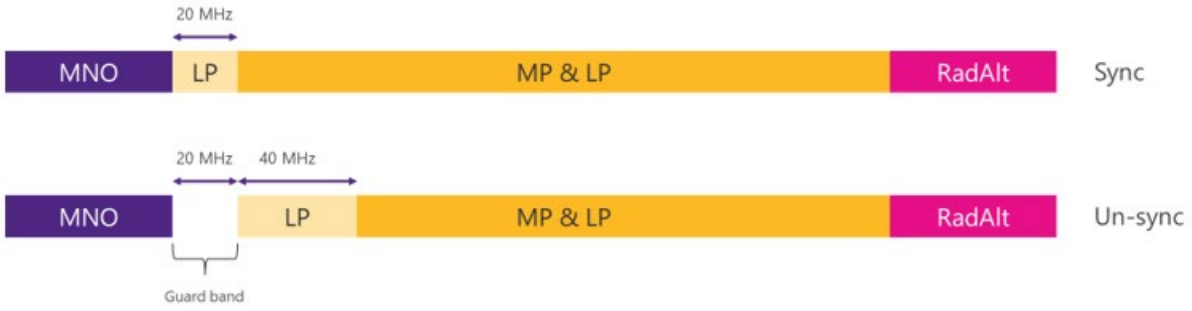


**Figure 7: Illustration of the two scenarios of coexistence with WBB ECS below 3.8 GHz where networks are either synchronised or unsynchronised (extracted from Figure 3.2 of the Plum Report)**

6.71 Plum recommends that rather than mandate synchronisation, a preferable approach in the circumstances would be to assign WBB LMP systems that intend to adopt the default frame structure (i.e. configuration 2 (Downlink: Uplink, 3:1)) at the lower end of the band, with other systems assigned from the top down. This in Plum's view would lead to a 'soft' band segmentation that would likely be reflective of demand.

### 6.7.3 ComReg's assessment and preliminary view

***Use cases***

6.72 The stakeholder interviews, along with the submissions to ComReg's consultation on its draft Radio Spectrum Management Operating Plan (see Document 24/99) demonstrate a variety of potential use cases, complete with varying traffic profiles. Some could be more uplink heavy (e.g. outside broadcasts), while others may be more compatible with the default frame structure in the 3.6 GHz Band (i.e. configuration 2 (Downlink: Uplink, 3:1)). Therefore, it seems appropriate to permit licensees to propose frame structures that are most suitable for each use case, noting that ComReg may suggest amendments to these proposals as necessary for reasons of efficient planning or licensing purposes.

***Coexistence with WBB ECS below 3.8 GHz***

6.73 To facilitate coexistence with WBB ECS below 3.8 GHz, ComReg notes that:

- the current draft recommendation from FM60 identifies that synchronisation is necessary in the lower 20 MHz (3800-3820 MHz) and for medium power use in the lower 60 MHz (3800-3860 MHz); and

- Plum notes that in many cases WBB LMP usage may well use the default frame structure of the WBB ECS licensees in the 3.6 GHz band.

6.74 To facilitate efficient spectrum use, should a licensee propose a frame structure compatible with the default frame structure, ComReg would assign the rights of use in the lower part of the band with other frame structures located at the top part of the band.

6.75 As the potential for the re-use of frequencies is significantly enhanced when synchronisation between networks is in place (see Tables 2.1 and 2.2 of the Plum Report), ComReg would aim to grant licences in a way that reflects the frame structures being requested/used and in line with the current FM60 draft recommendations. ComReg may, for spectrum management reasons, seek to amend applications or existing licences and so it would be necessary for all equipment to be tuneable across the entire 3.8-4.2 GHz Band.

## 6.8 Licence duration

### 6.8.1 Background

***Stakeholder Engagement***

6.76 Prior to setting out its preliminary assessment below, ComReg first summarises the stakeholder engagement aspects of licence duration conducted by DotEcon.

6.77 A frequent issue put forward during the stakeholder engagement was that reasonable certainty over long-term access to spectrum was necessary for investment certainty reasons. Stakeholders expressed a concern that short-term licences might hinder private 5G development in Ireland.

6.78 DotEcon notes that stakeholders observed that the implementation of one-year licences with annual renewal may not necessarily provide the certainty sought by investors, as potential licensees might be concerned by the regulator's reluctance to grant longer term licences, even if, in practice, ComReg would be very unlikely to revoke annually renewed licences.

***Views of DotEcon***

6.79 DotEcon notes that reasonable certainty over long-term spectrum access is needed to encourage investment for projects needing private 5G. Stakeholders consistently expressed a concern that short-term licences could hinder private 5G development.

6.80 However, DotEcon also notes that locking in spectrum assignments for a significant period of time for speculative or relatively undeveloped (with future demand unclear) use cases could impede ComReg in ensuring the efficient use of the radio spectrum.

6.81 Accordingly, DotEcon notes that there needs to be a balance between providing appropriate long-term stability while protecting against inefficient assignment of spectrum if licensees apply for more than they need or without a clear use for the spectrum, thereby foiling access for other potential users.

6.82 Therefore, DotEcon recommends the following approach to provide regulatory predictability to licensees.

I. A WBB LMP licensing framework which provides regulatory predictability noting that some licensees may require long periods of time to make a return on investment;

II. Appropriate notice of any major changes to the licensing framework being provided in sufficient time and consulted upon where appropriate.

III. The provision of annual licences, with renewal licences subject to payment of spectrum fees and compliance with licence conditions, thereby granting a high degree of certainty of renewal; and

IV. A rollout requirement and spectrum fees being required for all licences.

6.83 DotEcon notes that a licensing framework under these terms should help to give stakeholders confidence that the spectrum would be available over a long period under broadly consistent terms.

### 6.8.2 Preliminary assessment

6.84 ComReg has made a preliminary assessment of an appropriate licence duration for WBB LMP Networks in an open, transparent, and non-discriminatory manner by having regard to its functions, objectives and duties, including in particular: by promoting regulatory predictability, competition and the effective and efficient use of radio spectrum, and by taking due account of the need to allow for an appropriate period for investment amortisation.

***Importance of investment certainty and regulatory predictability***

6.85 ComReg is conscious of the need to provide regulatory predictability in relation to the availability of spectrum rights of use to enable investment considerations. Regulatory predictability is important in facilitating a stable and transparent environment where businesses can confidently consider long term investments. As DotEcon notes, the use of private 5G is linked not just to investment in private network infrastructure, but also potentially in industrial infrastructure that may require connectivity over its economic life. Therefore, industrial users are likely to seek such regulatory predictability as sustained access to a private 5G network

may be essential to make the case for adopting applications such as advanced manufacturing.

6.86 Industries leveraging private 5G networks such as manufacturing, healthcare logistics, energy and smart cities/campus are characterised by their drive for innovation through high speed, high reliability, low latency and secure connectivity, often critical to their operation. Such sectors might deploy private 5G to enable cutting edge applications like real time industrial automation, diagnostics and mission critical processes to ensure enhanced operational efficiency, improved connectivity and robust security. Such deployments often require substantial upfront investment[103] and, as it is by and large a new technology use case, may likely feature longer development timelines.

6.87 In particular, there needs to be reasonable confidence that the required access to the spectrum can be maintained to underpin investment and to accommodate a reasonable return on investment. It follows that any uncertainty concerning spectrum availability could negatively impact investment decisions.

***Spectrum hoarding and inefficient use***

6.88 Regulatory certainty over long term access can be met in various ways, with long-term spectrum licences being just one approach given that it can provide a reasonable level of assurance for any investments in equipment and network infrastructure.

6.89 However, individual licences for a long-fixed period can also cement market structure, limit potential market entry and reduce the viability of use cases, ultimately to the detriment of competition and consumers. This could be particularly acute in this case where there is a shared use band and private 5G used in innovation-driven markets characterised by constant technological advancement where the nature of potential users and uses can be expected to rapidly evolve.

6.90 Furthermore, the asynchronous nature of demand for spectrum in these instances means there can be no single or accepted reference point for when users require rights of use. This could mean if left unchecked that spectrum use is frustrated or delayed until long term licences expire. Timely access to spectrum rights in such circumstances is key as it can support a diverse range of businesses across diverse industries, each with unique operational needs and lifecycles. Delays in spectrum availability can hinder innovation, thwart operational efficiency and engender distortions to competition. Prompt and flexible spectrum assignment is therefore key.

[103] See REVIEW OF THE 5G ECOSYSTEM, ADOPTION, AND INDUSTRIAL

6.91 Inefficient use, including spectrum hoarding (e.g. in dense urban or industrial areas) must be avoided given that it could, if left unchecked, deny access to those that would use it efficiently. DotEcon observes therefore that applying a degree of caution to a licensing framework at this stage would appear warranted as locking in spectrum assignments for a significant period of time through long term licences could leave limited scope for others and impede ComReg in making needed adjustments as demand evolves.

6.92 Spectrum hoarding and/or inefficient use can stifle innovation making regulatory action and prompt reassignment essential to ensure optimal use of an important, finite resource. Delays in addressing hoarding can lead to spectrum scarcity in all or some areas fuelling higher industry costs[104] and ultimately thwarting technological advancement.

6.93 Spectrum hoarding may be more likely to occur within a Private 5G licensing framework given that they are typically site specific, often in denser urban or industrial areas where demand for connectivity is likely to be high and the cost of holding a licence is not a sufficient deterrent in itself. Such circumstances might encourage hoarding so as to secure future connectivity or competitive advantage over rivals in a variety of industrial and economic markets. Spectrum hoarding is not simply a theoretical consideration in these circumstances but a reasonable possibility.

***Proposed approach***

6.94 ComReg has some concerns that long term spectrum assignment to individual licensees could undermine efficiency, competition and innovation. However, ComReg wishes to provide regulatory predictability over a sufficient period by which licensees could invest with some certainty of a return in their investment. Potential licensees should be able to reasonably predict whether the spectrum rights of use that are required would be available over a sufficient period to justify any necessary investments. Such regulatory predictability creates a stable and transparent environment where businesses can confidentially plan long term investments. Therefore, ComReg sets out its proposal as follows.

- **First**, Spectrum rights of use for WBB LMP networks would be made available through a WBB LMP licensing framework made via statutory instrument and in accordance with the European harmonisation decisions for the band. The adoption of a statutory instrument in accordance with European harmonisation decisions provides regulatory certainty that promotes the long-term planning and coordination of spectrum to avoid harmful interference. Changes of uses to harmonised bands are infrequent

[104] Because more efficient users may have to use more costly and less effective alternatives.

events that generally only occur when the harmonised band is being inefficiently used[105].

- **Second**, potential Licensees would apply for a WBB LMP licence on a first come first served basis subject to satisfying the application requirements. Licensees would then be required to apply annually thereafter for the licence to be re-issued which would be provided by ComReg subject to compliance with licence conditions (e.g. rollout obligations) and payment of fees. By consistently meeting the licence conditions and paying annual spectrum fees, licensees themselves are actively controlling the duration and continuity of their usage rights, helping to safeguard that licences remain in place for the required duration.

- **Third**, any ComReg decision to bring the WBB LMP Licensing Framework to a conclusion would be consulted upon and licensees would be provided sufficient notice of same. It is ComReg's current expectation that licences would be given at least five years notice, noting that ComReg's consultations on its Radio Spectrum Management Operating Plan occur every 3-4 years and could be used to provide notice of any potential change of use being contemplated within the European harmonisation bodies.

### 6.8.3 Preliminary view

6.95 ComReg is of the preliminary view that the proposed approach achieves an appropriate balance between the need to provide regulatory predictability with ensuring that ComReg has the means to act in the event of spectrum hoarding or inefficient use. In the event that ComReg was to determine that spectrum hoarding or inefficient use was occurring, it would be able to take appropriate steps, for example it could simply not renew the annual licence and ultimately reassign the rights of use.

## 6.9 Rollout and usage obligations

### 6.9.1 Background

6.96 Schedule 1 to the EECC Regulations (S.I 444 of 2022) provides that obligations to ensure the effective and efficient use of spectrum may be attached to spectrum rights of use. Such obligations can include the use of rollout or usage obligations,

[105] For example, recently parts of the 1900 – 1920 MHz band we harmonised for a different use as this band was not being used to provide services under the previous harmonisation (namely for 3G services and harmonised in the late 1990s/early 2000s). In repurposing this band, many consultations were undertaken within the European harmonisation bodies (e.g. CEPT, RSPG, etc.) and its change of use was well signalled.

or both.

6.97 The Plum benchmarking study reveals that four of the six countries with an established regulatory framework for private mobile networks in the 3.6 GHz or the 3.8 - 4.2 GHz Band (UK, Norway, Germany and Sweden) have a usage obligation that requires licensed spectrum to be put into use within 6 or 12 months of the licence award. For example:

- in the UK *"a licensee must commence regular transmissions within six months after the date on which their licence was issued."*[106] and
- in Norway, *"All allocated transmission points must be implemented in accordance with the licence within 12 months of the licence coming into force."*[107]

6.98 To aid efficient use, DotEcon notes that ComReg might consider the use of base station rollout and user terminal usage obligations.

6.99 DotEcon notes that any such rollout condition should allow sufficient time for project development, and with this in mind, its initial view is that:

- by default, usage of the spectrum should be required within 6 months of first receiving the licence; and
- there could be merit in considering additional rollout obligations for licence applications with more impact on potential neighbouring users.

6.100 DotEcon also observes that some exceptional private network deployments might have significantly longer roll out periods (e.g. a large overall development project, such as a new transport system), and ComReg, at its discretion, could consider whether longer rollout periods might be justified in those cases, subject to sufficient evidence and justification.

### 6.9.2 ComReg's assessment

6.101 Rollout and usage obligations are important regulatory tools for ensuring that spectrum licensed is efficiently used. In the present case these tools would appear particularly important, particularly when the spectrum use of one party could prevent the licensing of the same spectrum over a large area, noting that the indicative re-use distance for medium power unsynchronised operation is of the order of circa 22 km.

6.102 ComReg has employed rollout obligations previously, for example the MBSA2

[106] Ofcom's Shared Access Licence Guidance Document, paragraph 2.34
[107] Nkom's "Regulation of local networks in 3.8-4.2 GHz", Section 5.

licences and 3.6 GHz Band licences. In both cases, the rollout obligation is essential in ensuring the efficient use of radio spectrum. The combination of the rollout obligation, the maintenance of a base station log and annual reporting ensures spectrum efficiency remains to the fore. ComReg envisages a similar approach would apply to the WBB LMP framework.

6.103 ComReg notes that a usage obligation is also likely to be important in the WBB LMP framework, as there might be situations where a base station is brought into operation but is not used. Again, Plum's benchmarking work highlights that a usage obligation has been deployed in other countries (e.g. the UK and Norway). ComReg observes that such an obligation could ensure for example that one of more user terminals would need to be in active use and traffic would need to be transmitted on all the licensed spectrum. To demonstrate that all the licensed spectrum is being efficiently used, ComReg notes that applications for large amounts of bandwidth or applications which have a large impact on the availability of spectrum (i.e. medium power applications) would likely need to deploy multiple user terminals.

6.104 Regarding the relevant timelines for any base station and usage obligations, the benchmarking analysis from Plum indicates that a 6 – 12 month time period has been used elsewhere. Noting that ComReg proposes that WBB LMP licences be of one year duration, and that applicants should be encouraged to submit licence applications close to planned deployment dates, ComReg is of the view that a 6 month time period would be appropriate for a WBB LMP framework.

6.105 ComReg understands that some prospective licensees may have multi-year projects with deployments longer than 6 months and may request longer deployment timelines. While there is merit in ComReg retaining discretion to address such circumstances, ComReg believes that this should be exceptional and that the applicant would need to provide sufficient evidence, including deployment plans demonstrating intent and ability to use the spectrum within a reasonable timeframe and why an exception might be warranted.

6.106 Overall, ComReg would encourage any prospective licensees with multi-year projects to discuss matters with ComReg prior to application.

### 6.9.3 ComReg assessment and preliminary view

6.107 ComReg is of the preliminary view that rollout and usage obligations should be attached to all WBB LMP licences.

6.108 The standard rollout and usage obligation would include:

- A Base Station Rollout obligation: For each licence issued (low power or medium power) the licensee should be required to install, work and use one base station within 6 months of licence commencement.

- A Usage obligation: For each licence issued (low power or medium power) the licensee should be required to put all of the spectrum licensed into use within 6 months and actively use one or more user terminals within this time period. To demonstrate that all the licensed spectrum is being efficiently used applications for large amounts of bandwidth or applications which have a large impact on the availability of spectrum (i.e. medium power applications) would likely need to deploy multiple user terminals.

- A Base Station Log obligation: For each base station licensed, the licensee should be required to maintain a daily base station traffic log that is of sufficient detail to demonstrate to ComReg's satisfaction the usage of this base station (e.g. traffic, frequency used, time of transmissions) on the WBB LMP network and the interactions with terminal stations on the network.

- A reporting on compliance obligation: at the appropriate time (e.g. at 6 months from licence commencement) licensees would be required to report to ComReg on the above obligations.

6.109 ComReg notes that some applicants/licensees may have multi-year projects with deployments longer than 6 months. While pre-application discussions with ComReg on an appropriate licensing approach might resolve the 6 month timing issues (e.g. submitting applications in a phased manner), ComReg observes that there could also be exceptional cases. This would likely require sufficient evidence, including deployment plans, to be provided to ComReg over intent/ability to use the spectrum (within a reasonable timeframe) and why an exception might be warranted.

6.110 ComReg notes that some applicants may also submit rollout plans for multiple base stations and user terminals in support of their applications (e.g. for large bandwidths etc.). ComReg retains the right to attach any such commitments as a licence condition.

## 6.10 Fees

### 6.10.1 Background

6.111 Regulation 24 of S.I. No. 444 of 2022 permits ComReg to impose fees for rights of use that reflect the need to ensure the optimal use of the radio frequency spectrum. In addition, ComReg is required to ensure that any such fees are objectively justified, transparent, non-discriminatory, and proportionate in relation to their intended purpose, and consider the objectives of ComReg as set out in Section 12 of the 2002 Act and the general objectives of the Directive and S.I. No. 444 of 2022.

***Views of DotEcon***

6.112 DotEcon observes that the optimal use of the radio spectrum in the case of WBB LMP can be best achieved through consideration of the following factors.

A. Administrative cost recovery: Fees collected from the licensing scheme should cover ComReg's associated costs.

B. Incentives for efficient use: The framework should encourage the efficient assignment and use of 3.8-4.2 GHz spectrum and ensure prospective seek only sufficient spectrum to operate.

C. Avoiding barriers to take-up: The fee structure should not discourage take-up.

D. Transparency and consistency: Clarity and certainty of fees is essential in attracting investment in emerging technologies that require long-term investments.

E. Practicality: The fee structure must be feasible for ComReg to implement and maintain.

### 6.10.2 Preliminary assessment

6.113 ComReg agrees with DotEcon on the factors that would best ensure the optimal use of the radio spectrum for WBB LMP use.

6.114 In relation to A, setting licence fees that recover at least ComReg's administrative costs, including one-off costs of issuing licences, ongoing monitoring of compliance with licence conditions and ongoing monitoring and resolution of any interference problems. ComReg has used this approach previously, for example in its licensing frameworks for Fixed Links[108] and Satellite Earth Stations.

6.115 In relation to B ComReg's spectrum management role requires that operators with spectrum assignments are incentivised to efficiently use same. Any fees framework should therefore ensure that licensees are incentivised to use assigned rights of use as efficiently as possible (i.e., the least amount of spectrum necessary to deliver a service at certain levels within a certain geographic area) and not rely on additional rights of use when a service could be delivered using less.

6.116 Fees should incentivise prospective licensees to assess actual need for spectrum and also provide incentives for such parties to carefully evaluate any

[108] ComReg Document 23/61

perceived need for additional bandwidth, power and/or bandwidth in certain geographic areas. If the cost of holding additional spectrum rights of use is either too low or even non-existent, the incentives to use those rights of use efficiently are reduced, which can even result in spectrum hoarding. Promoting efficient spectrum use ensures that the best use is made of a scarce resource and minimises the risk that access to spectrum becomes restricted.

6.117 In relation to C, spectrum fees should not be set at a level that would choke off demand. Prices that are set too high could lead to spectrum being unused, or underutilised (e.g., with an operator choosing not to deploy equipment at the expense of improved operational processes, productivity or service quality etc.)

6.118 In relation to D, fees should be transparent, predictable and easy to understand providing licensees with confidence to plan investments. Such certainty is important to incentivise long term investments in network infrastructure. A clear and consistent approach to fees enables strategic planning and promotes sustained development in these sectors.

6.119 In relation to E, any approach to fees must be straightforward given ComReg's responsibilities to collect spectrum fees from licensees.

### 6.10.3 Preliminary View

6.120 ComReg's preliminary view is that spectrum fees for WBB LMP should reflect the need to ensure the optimal use of the spectrum by considering each of the factors referred to by DotEcon as outlined above.

## 6.11 Application process

6.121 ComReg envisages that the application would have three distinct stages:

- Pre-application queries and engagement;
- Application for a new licence; and
- Application for a renewal licence.

### 6.11.1 Pre-application queries and engagement

6.122 ComReg would encourage prospective licensees to discuss their proposed application(s) with ComReg in advance of submission in order to tailor their application to their specific circumstances, and to consider any public information available on existing licensees.

6.123 This could be particularly useful as it would allow applicants to understand:

- any potential constraints (e.g. frequency, bandwidth, synchronisation) that might be impacting their proposed location, noting that the ability to licence a new application would depend on not impacting existing licensees beyond permitted interference limits;

- how best to phase their applications in order to meet the standard rollout and usage obligation timelines.

### 6.11.2 Application process – initial licence

6.124 ComReg proposes that all applicants would need to:

(a) justify their application request (e.g. frequency, bandwidth, power, etc.) in order to ensure the efficient use of spectrum; and

(b) submit sufficient information on their proposed deployment (e.g. service area, frame structure, etc.) to allow ComReg to assess the application and check whether the application is fit for purpose.

6.125 ComReg envisages that it would assess every application, and when satisfied, for example that the appropriate frequency and bandwidth is being applied for, it would carry out technical checks consisting primarily of two-steps, being:

1. Firstly a high-level check on the re-use distance to existing licences which overlap in frequency; and
2. Where necessary, a detailed technical assessment of the proposed deployment against permitted interference levels to existing licensees.

6.126 Subsequently, ComReg may either

(a) approve the application;

(b) request the applicant to make changes to its licence application (e.g. frequency applied for etc.) so it could be approved; or

(c) reject the application, noting that the applicant could submit a new application with modifications, for example based on further coordination of its application with existing licensees.

### 6.11.3 Application process - renewal licence

6.127 The application process for licence renewal would follow the same process as the application for a new licence with the following considerations:

- the compliance of the applicant/licensee with its licence conditions, including its rollout and usage obligations, would be considered by ComReg in evaluating a renewal application; and

- the technical assessment of a renewal application (absent any modifications to its set-up) should be less onerous than the original application.

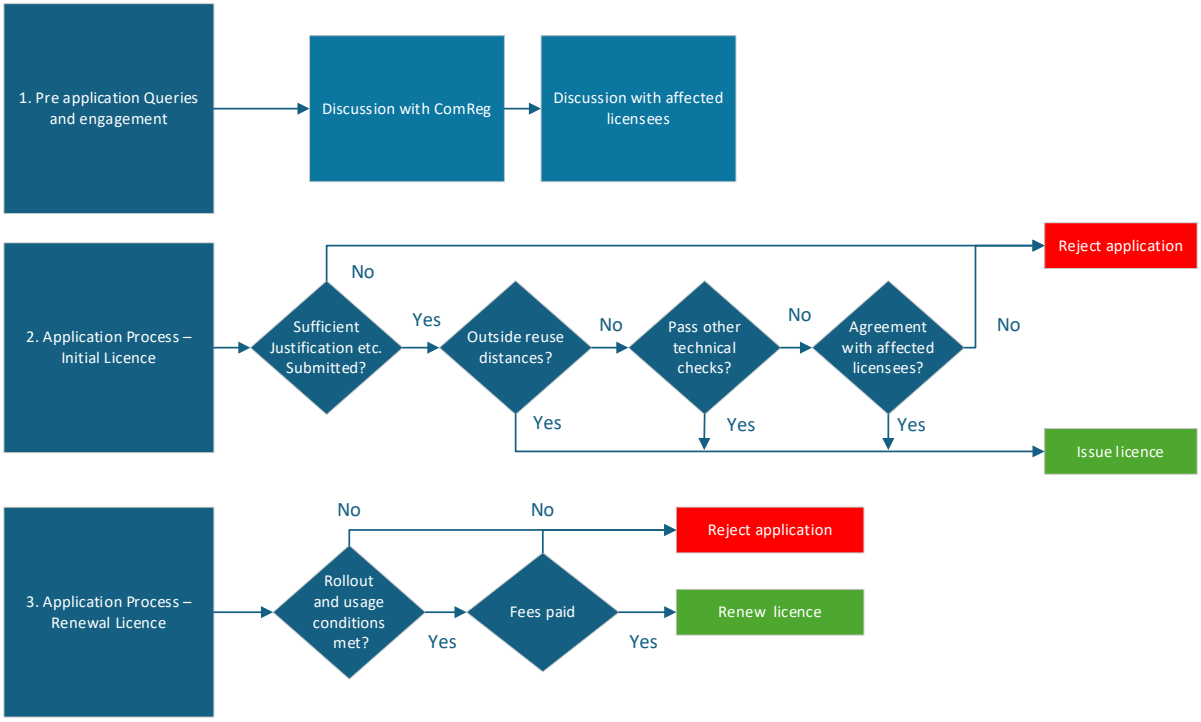


**Figure 8: Overview of indicative application process**

## 6.12 Other issues

6.128 This section sets out information and ComReg's proposals on a number of other matters including:

- Publication of information on existing licences;
- Applicant co-ordination with existing licensees;
- Equipment to operate across the full band;
- ComReg discretion to amend licences;
- Apparatus licensing (both BS and UE); and
- Numbering.

### 6.12.1 Publication of licence information

6.129 As the details of existing WBB LMP licences (i.e. location, frequency, bandwidth, power, etc.) would influence ComReg's ability to issue new WBB LMP licences to applicants, ComReg is of the view that it is necessary to publish relevant details of existing licences, so that prospective licensees can understand

spectrum availability prior to application.

6.130 ComReg's general policy is that information concerning radio spectrum licences is published on ComReg's website[109] as among other things, this:

- facilitates compliance with the relevant requirements under the Access to Information on the Environment Regulations 2007; and
- helps ensure the efficient management of the radio spectrum, for example in allowing inter-licensee communications that facilitate new applications or inform interference issues between licensees.

6.131 ComReg proposes that relevant information on WBB LMP licences would be published on ComReg's website, for example on its Siteviewer tool, noting that there would be some development and associated cost to ComReg arising from same.

### 6.12.2 Applicant coordination with existing licensees

6.132 Prior to the submission of an application, or following the rejection of an application by ComReg, ComReg notes that an applicant may wish to co-ordinate its application with existing licensees with an aim of agreeing an application request and/or agreeing suggested amendments to existing licences that might facilitate its application.

6.133 In such circumstances, both prospective and existing licensees would need to agree the necessary amendments to the existing licences, and these proposed amendments would in turn be advised to ComReg for its review and approval prior to any new licensing taking place.

### 6.12.3 Equipment to operate across the full band

6.134 Noting that equipment in the 3.8 - 4.2 GHz Band is likely to be capable of operating across the full band, ComReg is of the view that this should be reflected in any licensing approach and thus any WBB LMP licensee would only be able to use equipment with such capability. Among other things, this full-band capability would help ComReg ensure the efficient use of spectrum.

6.135 ComReg notes that full-band capability is an obligation in Norway (see below), albeit noting that Nkom allows some exceptions in the interim period.

[109] See ComReg Document 24/90 - Publication of Radio Spectrum Licence Information – published 14 November 2024

*"The equipment used during the regulation must support the entire 3800-4200 MHz frequency band, to facilitate effective frequency assignment of local networks. Until equipment that supports the entire frequency band is generally available, Nkom will be able to permit the use of equipment with restrictions to the frequency range supported. The equipment's tuning range must be stated in the application."*[110]

### 6.12.4 Licensing of apparatus (base station and terminal stations)

6.136 Any WBB LMP licence issued would cover all apparatus using the spectrum rights in the WBB LMP licence, including base station equipment and user equipment or terminals.

6.137 In the application process, and each subsequent renewal process, the applicant/licensee would be required to provide relevant details of this apparatus and maintain and submit to ComReg.

### 6.12.5 ComReg discretion to amend licences

6.138 In line with Article 14 of the EECC Regulations, ComReg retains discretion to amend WBB LMP licences in objectively justified cases and in a proportionate manner.

6.139 Noting that ComReg's ability to license new applications is dependent on the set-up of existing licensees (e.g. frequency, bandwidth, power, synchronisation profile etc.), ComReg notes that it may be necessary to make amendments to existing licences to ensure the effective management and efficient use of spectrum.

### 6.12.6 Mobile network code

6.140 From an overview of other countries licensing frameworks, ComReg understands that some licensees may require the use of a mobile network code (MNC) for their private mobile network.

6.141 ECC Recommendation (17) 02[111] sets out a number of options for private networks regarding the use of MNCs. These include:

[110] Nkom "Regulation of local networks in 3.8-4.2 GHz", Regulation 6 available at https://nkom.no/aktuelt/nkom-has-opened-3-8-4-2-ghz-for-local-area-5g-networks

[111] ECC/REC/(17)02 of 31 May 2017 on harmonised European Management and Assignment Principles for E.212 Mobile Network Codes (MNCs)

- the use of mobile country code (MCC) 999 for standalone non-public networks (SNPNs)[112]; Coordination requirements on this approach may be needed in order to manage potential network attachment issues[113];
- the allocation of one or more MNCs from the geographic MCC for shared use without direct assignment for SNPNs; and
- the assignment of a single MNC for simultaneous use by multiple networks for shared usage.

6.142 ComReg plans to review its numbering conditions in the coming year and the options set out above for private network MNCs, and perhaps others, could be considered in that consultation. Should applicants have a requirement for a MNC in advance of this consultation, applicants are encouraged to contact ComReg's numbering team.[114]

## 6.13 Sharing and Compatibility

6.143 The full background material on sharing and compatibility is outlined in Annex 6. A high level summary is set out below of the relevant issues and key methods of ensuring compatibility between WBB LMP and existing services in the 3.8-4.2 GHz Band and in adjacent bands as well as between WBB LMP networks in-band. ComReg's consideration of these issues has been informed by a number of factors, including:

- ECC Decision (24)01;
- the draft EC Implementing Decision[115];
- the most recent working version for a draft ECC Recommendation on WBB LMP planning and co-existence with MFCN below 3.8 GHz[116] being developed by FM60;
- the most recent working version for a draft ECC Recommendation on

[112] Which includes also SNPNs with shared RAN (see ECC Report 337)

[113] Network attachment issues occur when a mobile device can attach to different networks that use the same combination of MCC and MNC

[114] See https://www.comreg.ie/industry/licensing/numbering/

[115] RSCOM24-43rev4, *"Draft elements of a Commission Implementing Decision on the harmonisation of the 3 800-4 200 MHz frequency band for the shared use by terrestrial wireless broadband systems capable of providing local-area network connectivity in the Union"*, Radio Spectrum Committee, Working Document, 2 July 2025

[116] Latest available FM60 working draft ECC Recommendation on WBB LMP Planning and Co-existence with MFCN below 3.8 GHz, 1 July 2025, LINK

co-existence between WBB LMP and Radio Altimeters[117] being developed by FM60;

- the most recent working version for a draft ECC Recommendation on coexistence of WBB LMP with FS and FSS[118] being developed by FM60;
- the Plum Report; and
- the existing licence frameworks already established in other European countries for WBB LMP type networks in the 3.8-4.2 GHz Band.

6.144 ComReg's preliminary views in relation to the relevant coexistence scenarios are also set out below.

### 6.13.1 WBB ECS below 3.8 GHz and WBB LMP

#### Summary and key methods of ensuring compatibility

6.145 There are a number of methods for ensuring coexistence between WBB LMP and WBB ECS below 3.8 GHz[119]. The two key approaches to ensuring protection of WBB ECS below 3.8 GHz from WBB LMP would be to:

- assign licensees that can synchronise with WBB ECS below 3.8 GHz in the lower end of the 3.8-4.2 GHz Band, therefore eliminating the base station to base station interference scenarios; and
- implement a guard band (3800-3820 MHz) and restricted use (low power only in 3820-3860 MHz) at the lower end of the 3.8-4.2 GHz Band for unsynchronised use, as under consideration by FM60 in the relevant draft ECC Recommendation;

6.146 These key methods of either synchronising networks or providing a guard band are set out above in Section 6.7 on synchronisation. ComReg's proposal, in Section 6.7, is that ComReg would licence WBB LMP networks that can synchronise with the default frame structure at the lower end of the band in order to facilitate coexistence. Where other frame structures are requested, they will be licensed towards the other end of the band.

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[117] Latest available FM60 working draft ECC Recommendation on Co-existence between WBB LMP and Radio Altimeters, 1 July 2025, LINK

[118] Draft ECC Recommendation (25)03, *"Guidelines for the protection of FS and FSS and their future deployment when introducing low and medium power terrestrial wireless broadband systems (WBB LMP) in the 3800-4200 MHz band also considering cross border situations"*, published for public consultation by ECC on 12 June 2025 at LINK. Consultation deadline 8 August 2025.

[119] See Annex 6

### ComReg's preliminary view

6.147 ComReg will continue to monitor the further work and outputs of FM60 on this matter. ComReg's preliminary view, at this juncture, is to only assign licences that can **synchronise** with WBB ECS below 3.8 GHz in the lower end of the 3.8-4.2 GHz Band and to assign licensees that cannot synchronise from the top end of the band where synchronisation with radio altimeters above 4.2 GHz would not be an issue. This is in line with Plum's suggested light touch approach where spectrum efficiency would not be compromised by use of a guard band and a restricted band.

## 6.13.2 Radio altimeters above 4.2 GHz and WBB LMP

### Summary and key methods of ensuring protection

6.148 There are several methods for ensuring coexistence between WBB LMP and Radio Altimeters above 4.2 GHz. These include:

**(1) Maximum unwanted emission levels above 4.2 GHz for WBB LMP base stations**

ECC Decision (24)01 and the draft EC Implementing Decision define maximum unwanted emission levels above 4.2 GHz for WBB LMP base stations as a general protection for radio altimeters operating above in the 4.2-4.4 GHz band[120]. ComReg does not envisage any changes to this approach in the final version of the EC Implementing Decision, as these levels were developed by CEPT for the European Commission as part of harmonised technical conditions for the shared use of the 3.8-4.2 GHz Band in response to the relevant Mandate to CEPT from the European Commission.

**(2) Coordination zones for AAS WBB LMP base stations in 4.1-4.2 GHz close to runways**

ECC Decision (24)01 and the Draft EC Implementing Decision indicate that coordination may be needed at national level to protect radio altimeters from the potential risk from spurious emissions from AAS medium power WBB LMP base stations in 4.1-4.2 GHz deployed in close proximity to those airports which support precision approach procedures. Both documents suggest that such coordination could include coordination zones where no AAS medium power base station could be deployed closer than 1200 m from the runway threshold and 40 m laterally from the edge of the runway, unless they can comply with the spurious emission limit between 4200 and 4240 MHz.

6.149 FM60 is considering two approaches to implementing coordination zones around

[120] See ECC Decision (24)01; Annex-1, section A1.4 WBB LMP BASE STATION UNWANTED EMISSIONS ABOVE 4200 MHZ

runways for the relevant draft ECC Recommendation. The first approach is as suggested in the ECC Decision (24)01 and the Draft EC Implementing Decision, as outlined above. The second approach has been suggested by EASA[121] and entails, among other things, taking into account possible lateral deviation of the aircraft from the centre of the runway as it approaches to land. This is a more conservative approach and results in a wider coordination zone than in the first approach due to the addition of the lateral deviation and in a trapezoidal rather than a rectangular shape.

6.150 Plum observes that coordination zones around runways could mitigate the interference risk to Radio Altimeters and notes the two approaches to defining coordination zones under consideration by FM60, which have yet to be agreed. In Plum's view, any coordination zones would likely be minor and unlikely to impose a significant constraint on WBB LMP deployment.

#### ComReg's preliminary view

6.151 In ComReg's view, the existing approaches to coordination between WBB LMP networks and Radio Altimeters other European countries are not relevant to ComReg's current considerations, as they were adopted before CEPT had concluded its studies and begun to develop its recommendations. Further the approaches in those countries will likely, in any case, come to align with harmonised measures in Europe over time.

6.152 ComReg notes that the draft EC Implementing Decision contains maximum unwanted emission levels for WBB LMP base stations above 4.2 GHz to protect radio altimeters. ComReg intends to adopt these levels and include them as a licence condition for WBB LMP networks to ensure coexistence.

6.153 In addition, CEPT, the European Commission and Plum have all identified coordination zones around runways where precision approach procedures are supported as another key approach to the protection of Radio Altimeters from potential spurious emissions from medium power AAS WBB LMP base stations in 4100-4200 MHz. ComReg's preliminary view is that this approach is appropriate and does not propose at this stage a particular methodology for defining runway coordination zones. ComReg will continue to monitor the ongoing work of FM60 on this matter.

### 6.13.3 Fixed Satellite Service in the 3.8-4.2 GHz

#### Summary and key methods of ensuring protection

6.154 The ECC Decision (24)01 and the draft EC Implementing Decision do not provide any harmonised technical conditions to protect FSS in the 3.8-4.2 GHz Band.

[121] The European Union Aviation Safety Agency.

ECC Decision (24)01 indicates that it is not possible to define generic technical conditions to protect fixed satellite service (FSS) in the band and that case-by-case assessment would therefore be required, while the draft EC Implementing Decision would require Member States to appropriately protect FSS for space-to-earth communications in the band.

6.155 The relevant draft ECC Recommendation being developed by FM60 is aimed at providing guidelines for CEPT administrations on the protection of FS and FSS systems and their future deployment when introducing WBB LMP in the 3.8-4.2 GHz Band. In relation to FSS the draft ECC Recommendation includes:

- a methodology to determine a coordination contour around an FSS Earth Station, within which coordination with FSS systems is needed before activating a WBB LMP transmitter; and
- a methodology to ensure the protection of FSS earth stations inside the coordination contour.

6.156 Determining the coordination contour entails calculating the area around a FSS Earth Station within which a WBB LMP base station could cause interference, if it does not meet the relevant protection criteria. The calculations include an appropriate terrain elevation model. Base stations can be deployed anywhere outside the coordination contour without any concerns of interference, and no coordination is required. To simplify the calculation burden for administrations, the draft ECC Recommendation suggests a generic 40 km radius coordination contour around FSS earth stations but notes that this may not exclude all possible cases of interference. If it is proposed to locate a WBB LMP base station within the coordination contour, more detailed interference calculations would be made between the proposed base station and the existing FSS Earth Station, taking into account building heights and clutter information in addition to terrain.

6.157 Belgium, Norway and the UK assess licence applications to deploy base stations under their licensing frameworks for WBB LMP type networks on a case-by-case basis in relation to existing FSS Earth Stations in 3.8-4.2 GHz. Norway also defines protection areas around FSS Earth Stations, albeit its assessment methods were defined prior to FM60 commencing its deliberations.

6.158 Plum notes that protection of FSS receivers is a very case specific activity and that coordination zones could be in the order of 40 km in radius, as per the generic coordination contour suggested by FM60. However, Plum suggests that ComReg could discontinue protecting FSS receivers in the 3.8-4.2 GHz Band, given that:

- no FSS systems have been licensed in the band over the last decade in Ireland and there are none currently;

- demand for FSS receivers tends to be in the Ku-band at 10.7-12.7 GHz; and
- coordination areas between FSS and WBB LMP could be large.

6.159 Additionally, Plum considers that satisfactory reception of satellite services might be possible in most cases but could require careful positioning of the FSS receive antenna behind buildings, or the use of a larger aperture antenna to reject interference.

### ComReg's preliminary view to close the band for licensed FSS in the 3.8-4.2 GHz Band

6.160 As Plum observes, there are currently no incumbent Satellite Earth Station licensees in the 3.8 to 4.2 GHz Band in Ireland and ComReg has received no applications in the last decade to license Satellite Earth Station licences in the 3.8 to 4.2 GHz Band.

6.161 In ComReg's view, coexistence between WBB LMP networks and Satellite Earth Stations in the band could prove challenging given large potential separation distances between WBB LMP base stations and Satellite Earth Stations and potentially large coordination areas around Satellite Earth Stations. In that connection, ComReg notes that:

- CEPT Report 88 indicates that relatively large separation distances could be required to protect Satellite Earth Stations from WBB LMP networks e.g. up to 4.7 km for WBB low power and up to 18 km for WBB medium power[122];
- FM60 suggests a generic 40 km radius coordination contour around FSS earth stations, but notes that this may not exclude all possible cases of interference; and,
- The Plum Report observes that potential coordination areas could be very wide in the Irish context, e.g. city wide in the case of WBB medium power in Dublin, or a significant portion of the city in the case of WBB low power in Dublin[123], all depending on the location of the WBB LMP base station and the antenna height of the Satellite Earth Station.

6.162 Considering the potential benefits for the Irish economy of private networks, in particular private 5G Networks, and that there are no incumbent Satellite Earth Station licensees in the 3.8 to 4.2 GHz Band in Ireland nor there been any

[122] Based on generic studies with clutter.
[123] Depending on the location of the WBB LMP base station and the antenna height of the Satellite Earth Station.

applications in the last decade, ComReg proposes to close the 3.8 – 4.2 GHz Band to further applications for Satellite Earth Station Licences as of 30 September 2025.

6.163 In the event that any Satellite Earth Stations applications are received, ComReg can accommodate in other bands noting that, in any event, FSS operations tend to occur in bands other than 3.8 to 4.2 GHz.

### 6.13.4 In-band (WBB LMP)

#### Summary and key methods of ensuring protection

6.164 The various methods for ensuring coexistence between WBB LMP networks include:

**1) Synchronised operation**

ECC Decision (24)01 and the Draft EC Implementing Decision do not require synchronisation between WBB LMP networks. In other European countries that have already implemented WBB LMP type licensing frameworks, synchronisation between WBB LMP networks is only required in some cases: in high demand areas (Norway), where there is a risk of interference (Poland) or where interference cannot be resolved among licensees (UK). The relevant draft ECC Recommendation indicates that administrations may also consider synchronisation as a way to enable more efficient planning of WBB LMP networks using 3GPP based technology. Plum notes that where spectrum is assigned with TDD duplexing, synchronisation between licensees minimises the potential for co- and adjacent-channel interference and maximises spectrum efficiency

**2) Maximum levels for interference to victim networks**

FM60 is developing maximum interference levels as recommended planning criteria between WBB LMP networks for the relevant draft ECC Recommendation.

For **unsynchronised operation** between WBB LMP networks, the draft ECC Recommendation currently sets out maximum interference levels at the receiver of victim networks for the following cases:

- co-channel (BS to BS interference)[124];

[124] Max interference levels of -100 dBm/5MHz or -103 dBm/5MHz respectively at the connector of the victim base station, depending on whether it is low or medium power.

- co-channel (BS to UE interference)[125]; and
- adjacent channel (BS to BS interference)[126].

The draft ECC Recommendation does not address adjacent channel co-existence base station to UE interference, which it considers typically not an issue.

For **synchronised operation** between WBB LMP networks, the draft ECC Recommendation sets out a maximum interference level for co-channel base station to UE interference[127]. FM60 considers that, under synchronised operation, adjacent channel co-existence is generally not an issue for 3GPP based technology and that base station-to-base station interference does not need to be considered for co-channel.

According to Plum, FM60's approach to setting interference limits seems appropriate and appears to consider all interference scenarios, noting that FM60 may refine it further over the course of its work.

**3) Field strength thresholds at edge of WBB LMP network boundary**

The relevant draft ECC Recommendation from FM60 includes an option for managing co-channel interference between unsynchronised WBB LMP networks, based on specifying a field strength threshold at the edge of a local area network boundary. The current draft text only recommends this as a fallback measure for interference cases where no agreement is reached between the relevant WBB LMP network operators. Plum notes that this approach may be disproportionately complex for the majority of applications, certainly in the low-power case and could lead to inefficient planning.

**4) Adjacent channel emission masks**

Of the European countries that have already established long-term licensing frameworks for WBB LMP type networks, Belgium, Poland and the UK require licensees to comply with adjacent channel emission masks, while Norway does not. The work of FM60 has yet to address adjacent channel emission masks and there is no indication that it will do so, given the structure of the draft ECC Recommendation which includes no placeholders for such masks.

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[125] Max interference level of -98 dBm/5MHz at 1.5 m above ground within the victim network's coverage area.
[126] Depending on whether the adjacent channel frequency separation is <20 MHz or ≥ 20 MHz respectively, the max adjacent channel interference level at victim the BS antenna connector will be -57 dBm/5 MHz or -48 dBm/5 MHz for low power victim networks, -60 dBm/5 MHz or -51 dBm/5 MHz for medium power victim networks (depending on whether the adjacent channel frequency separation is <20 MHz or ≥ 20 MHz respectively).
[127] -98 dBm/5MHz anywhere within the victim WBB LMP network's coverage area, at 1.5 m above ground.

Instead, as outlined above, FM60 focuses on addressing adjacent channel coexistence through specifying maximum interference levels experienced by victim networks as appropriate. Further, Plum indicates its agreement with FM60's approach.

6.165 A further key method for ensuring coexistence between WBB LMP networks is the licensing and network planning approach by the regulator for WBB LMP networks, which can include, among other things, case-by-case planning and defining geographic areas for licences. Relevant background material and ComReg's preliminary views in relation to a licensing and network planning approach for WBB LMP are set out above in Section 6.5 above.

### ComReg's preliminary view

6.166 ComReg's preliminary view is that the FM60 proposed approach to co channel and adjacent channel coexistence of specifying maximum levels for interference to victim networks, where relevant, is appropriate, noting that this approach is also favoured by Plum. As such, in relation to adjacent channel interference ComReg does not consider it necessary to specify adjacent channel emission masks. ComReg will continue to monitor the work of FM60 on these matters.

# 7 Next Steps and submitting comments

## 7.1 Submitting comments

7.1 ComReg invites submissions from interested parties in regards to the proposals in this Consultation. Respondents should provide reasoning and supporting information for any views expressed and reference the relevant section / paragraph number from this consultation.

7.2 In accordance with ComReg's Consultation Procedures[128] , the consultation period will run until **17:00 on Friday 22 August 2025**.

7.3 Responses must be submitted in written form, by email only, to marketframeworkconsult@comreg.ie and clearly marked – Submissions to ComReg Consultation 25/46.

7.4 Electronic submissions should be submitted in an unprotected format so that they may be readily included in the ComReg submissions document for electronic publication.

7.5 ComReg appreciates that respondents may wish to provide confidential information if their comments are to be meaningful. In order to promote openness and transparency, ComReg will publish all respondents' submissions to this notice, as well as all substantive correspondence on matters relating to this document, subject to the provisions of ComReg's guidelines on the treatment of confidential information (Document 05/24).

7.6 In this regard, respondents should submit views in accordance with the instructions set out below. When submitting a response to this notification that contains confidential information, respondents must choose one of the following options:

7.7 Submit both a non-confidential version and a confidential version of the response. The confidential version must have all confidential information clearly marked and highlighted in accordance with the instruction set out below. The separate non-confidential version must have actually redacted all items that were marked and highlighted in the confidential version.

OR

7.8 Submit only a confidential version and ComReg will perform the required

[128] https://www.comreg.ie/media/2024/01/ComReg2402.pdf

redaction to create a non-confidential version for publication. With this option, respondents must ensure that confidential information has been marked and highlighted in accordance with the instructions set out below. Where confidential information has not been marked as per our instructions below, then ComReg will not create the non-confidential redacted version and the respondent will have to provide the redacted non-confidential version in accordance with option A above.

7.9 For ComReg to perform the redactions under Option B above, respondents must mark and highlight all confidential information in their submission as follows:

(a) Confidential information contained within a paragraph must be highlighted with a chosen particular colour;

(b) Square brackets must be included around the confidential text (one at the start and one at the end of the relevant highlighted confidential information); and

(c) A Scissors symbol (Symbol code: Wingdings 2:38) must be included after the first square bracket.

7.10 For example, "Redtelecom has a market share of [✂25%]."

## 7.2 Next Steps

7.11 Following receipt and consideration of submissions in response to this consultation, and other relevant material, ComReg intends to publish a response to consultation and draft decision document along with draft regulations, non-confidential submissions and the application process / guidelines for accepting applications for licences.

7.12 As noted in section 1.3 above and in Chapter 4, an Assessment Tool will be made available for existing PMR licensees on request. Requests should be made by **17:00 on 23 July 2025**. This will consist of compiling the organisation's information and verification of the person's identity and their relationship with that organisation. ComReg may seek additional proof of employment or any other relevant documentation before providing the Assessment Tool.

7.13 Requests must be submitted in written form (email) to the following recipient, clearly marked – "Assessment Tool for ComReg 25/46":

Email: **marketframeworkconsult@comreg.ie**

7.14 ComReg would advise interested parties to request the Assessment Tool as soon as possible to ensure that all submissions are received within the consultation timeframe mentioned above.

# Annex: 1 Legal Basis

A 1.1 ComReg's relevant functions pursuant to Section 10 of the Communications Regulation Act 2002, as amended, include the management of the radio frequency spectrum. ComReg's primary objectives in carrying out its statutory functions

A 1.2 In the context of electronic communications are to:

- ensure the efficient management and use of the radio frequency spectrum in Ireland in accordance with a direction under section 13 of the 2002 Act;
- promote competition[129];
- contribute to the development of the internal market[130]; and
- promote the interests of users within the Community[131].

A 1.3 Regulation 27 of the Code Regulations governs the management of radio spectrum. Regulation 27(1) requires that ComReg, subject to any directions issued by the Minister pursuant to Section 13 of the 2002 Act and having regard to its objectives under Section 12 of the 2002 Act, Regulation 4 of the Code Regulations, and Article 4 of the Directive, ensure:

(a) the effective management of radio frequencies for ECN and ECS;

(b) that the allocation of, the issuing of general authorisations in respect of, and the granting of individual rights of use for radio spectrum for ECN and ECS are based on objective, transparent, pro-competitive, non-discriminatory and proportionate criteria; and

(c) ensure that harmonisation of the use of radio frequency spectrum by ECN and ECS across the EU is promoted, consistent with the need to ensure its effective and efficient use and in pursuit of benefits for the consumer such as competition, economies of scale and interoperability of networks and services, having regard to all decisions and measures adopted by the European Commission in accordance with Decision No.676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in EU (namely the Radio Spectrum Decision).

[129] Section 12 (1)(a)(i) of the 2002 Act.
[130] Section 12 (1)(a)(ii) of the 2002 Act.
[131] Section 12(1)(a)(iii) of the 2002 Act.

A 1.4 Regulation 27(3) provides that, without prejudice to Regulation 27(4), ComReg must ensure that all types of technology used for the provisions of ECN or ECS may be used in the radio spectrum declared available for ECSs in the Radio Frequency Plan published under Section 35 of the 2002 Act in accordance with EU law.

A 1.5 Regulation 27(4)[132] provides that, notwithstanding Regulation 27(3), ComReg may, through licence conditions or otherwise, provide for proportionate and non-discriminatory restrictions to the types of radio network or wireless access technology used for electronic communications services where this is necessary to –

- avoid harmful interference,
- protect public health against electromagnetic fields,
- ensure technical quality of service,
- ensure maximisation of radio frequency sharing;
- safeguard the efficient use of spectrum, or
- ensure the fulfilment of a general interest objective as defined by or on behalf of the Government or a Minister of the Government in accordance with Regulation 27(7)[133].

A 1.6 Regulation 28(1) of the Code Regulations provides that ComReg shall facilitate the use of radio spectrum, including shared use, under a general authorisation under Regulation 6 of the Code Regulations, and limit the granting of individual rights of use for radio spectrum where such rights are necessary to maximise efficient use in light of demand and taking into account the criteria set out in Regulation 28(2).

A 1.7 Regulation 28(2) of the Code Regulations provides that ComReg may decide to grant individual rights of use for radio frequencies by way of a licence taking account of:

a) the specific characteristics of the radio spectrum concerned;

b) the need to protect against harmful interference;

c) the development of reliable conditions for radio spectrum sharing, where appropriate;

d) the need to ensure technical quality of communications or service;

[132] Regulation 27(4) of the Code Regulations.
[133] Regulation 27(7) of the Code Regulations.

e) objectives of general interest as laid down by or on behalf of the Government or a Minister of the Government in conformity with EU law; and

f) the need to safeguard the efficient use of spectrum.

A 1.8 Regulation 28(3) provides that when considering whether to issue general authorisations or to grant individual rights of use for the harmonised radio spectrum, taking into account technical implementing measures adopted in accordance with Article 4 of the Radio Spectrum Decision, ComReg shall seek to minimise problems of harmful interference, including in cases of shared use of radio spectrum on the basis of a combination of general authorisation and individual rights of use.

A 1.9 Regulation 29(1) of the Code Regulations provides that ComReg shall attach conditions to individual rights of use for radio spectrum in accordance with Regulation 9(1) in such a way as to ensure optimal and the most effective and efficient use of radio spectrum. Regulation 29(7) provides that Regulation 29 is without prejudice to the Act of 1926.

A 1.10 Regulation 20(1) of the Code Regulations provides that: “When granting a right of use for radio spectrum in relation to which — (a) the harmonised usage of the radio spectrum involved in accordance with any international agreements or European Union rules, (b) any relevant access conditions and procedures under any international agreements or European Union rules, or (c) any selection procedure in accordance with international agreements or European Union rules, apply, the Regulator shall grant the right of use for such radio spectrum in accordance therewith and shall not impose any further conditions, additional criteria or procedures which would restrict, alter or delay the grant of the right of use concerned provided that all conditions which may be specified by the Regulator to be complied with by the holder of the right of use in the State have been satisfied.”

A 1.11 Regulation 34(1) provides that: “The Regulator shall promote effective competition and avoid distortions of competition in the internal market when deciding to grant, amend or renew rights of use for radio spectrum for electronic communications networks and services in accordance with these Regulations.”

# Annex: 2 PMR Fee's Annex

## High-level summary of Fees

A 2.1 In the draft RIA, ComReg set out its preliminary view that Option 2 was its preferred approach to setting fees for PMR. This option would set fees to at least recover ComReg's administrative costs of managing the framework for PMR licensing and encourage the more efficient use of the radio spectrum through the distribution of costs based on the following parameters:

- The number of channels used;
- The coverage area of the licence; and
- Whether the spectrum is licensed for exclusive or shared use.

A 2.2 This chapter provides a formal description of the formula used to calculate fees under Option 2. Further, it outlines the values for each parameter under that option and provides a preliminary assessment for each value.

## Description of formula

A 2.3 To implement this administrative cost fee schedule, ComReg proposes to use the following formula:

$$\boldsymbol{F(c,E) = \alpha[1 + \beta c]\,\gamma^{E}}$$

A 2.4 Table 11 below provides a description of each of each of the variables, how each variable is mathematically represented and the proposed value for each variable. Following this table, ComReg provides its rationale for the proposed value for each variable in the formula.

**Table 11 The values for the proposed model parameters under Option 2**

| Variable | Description and proposed values |
|---|---|
| The base fee for a 12.5 kHz channel: α | This is the value required for ComReg to recover its administrative costs of managing the PMR licensing framework.<br><br>ComReg proposes setting **α=263** |
| The coverage area of a licence: c | This is a variable that is associated with the coverage area of a licence.<br><br>If the coverage area of a licence is national: **c=1** |

| | |
|---|---|
| | If the coverage area of a licence is <u>on site</u>: **c=0**<br><br>If the coverage area of the licence is wide area, c is the geographic scope of the licence in proportion to the area covered by a national licence. (i.e. c will be greater than zero, but less than 1) |
| The premium value for a national licence: β | This determines how much a national licence costs relative to an on-site licence:<br><br>ComReg proposes setting **β=4** |
| The premium for exclusive-use licences: y | y is the proportionate premium for exclusive use licences relative to licences that share channels.<br><br>ComReg proposes setting **y=3** |
| Whether a licence is exclusive or not: E | This is a binary variable that is associated with the exclusivity of a licence.<br><br>If the licence requires exclusive use of spectrum: **E=1**<br><br>If the licence does not require exclusive user of spectrum: **E=0** |

### Parameter values

A 2.5 The consolidated licensing approach proposed under Option 2 would see a significant change in the structure for PMR licensing. This approach would facilitate new licence type possibilities (for example, national share-use licences and exclusive-use on-site licences) and provide more flexibility for licensees to apply for licences better suited with their specific communications requirements than under the existing, technology-linked frameworks.

A 2.6 As such, the demand for licences under the proposed licensing structure is highly uncertain and ComReg cannot reasonably predict what users will need to meet their communications requirements. However, DotEcon advises that the structure of fees and the assumptions used to distribute costs should reflect that the types of consolidated licences that may be taken up under the proposed framework are highly uncertain and there is a potential risk of scarcity if many of these licences are national or exclusive. Additionally, the distribution of costs should not inefficiently choke off demand from smaller users.

A 2.7 Therefore, fees should create meaningful incentives for efficient use of spectrum for PMR and should at least recover ComReg's administrative costs while also being predictable and practical to implement for ComReg.

A 2.8 In light of the above, ComReg discusses the parameters for each component in the fees formula in order below:

- The base fee (**α**);
- The premium value for a national licence (**β**);
- The premium for an exclusive-use licence (**y**).

### The base fee (α)

A 2.9 The base fee, $\alpha$ is set at the level required to cover ComReg's administrative costs, (under the assumption that the number of licences remains constant). The total administrative costs incurred by ComReg is divided by the total number of channels currently licensed to give the value of $\alpha$, which is the minimum fee any PMR licensee would need to pay for a 6.25 kHz on-site shared use licence). Additional fees would be incurred for licences with wider coverage, greater bandwidth and/or exclusive use (as discussed below).

A 2.10 DotEcon advise that based on current use this could lead to some over-recovery of costs because the scope of existing licences go beyond a 6.25 KHz on site shared use licence, and it is not possible to set a base fee for a consolidated licence when existing use is spread across five use types. In that regard, ComReg agrees that it appropriate for ComReg to protect itself against the risk of significant under-recovery subject to not inefficiently choking off efficient demand. This is a proportionate approach for three main reasons.

(i) any potential over-recovery would be spread across over 500 licensees compared to an under recovery which would have to be borne entirely by ComReg.

(ii) Any additional costs arising from an over recovery of the base fee would be very modest amounting to tens of euro for each licensee.

(iii) the level of (and differences within) the fees must be sufficient to create meaningful incentives for efficient use of the spectrum.

A 2.11 Given the above, the base fee (**α**) should be set at 263.

### The premium value for a national licence (β);

A 2.12 To create the appropriate incentive to avoid operators claiming larger coverage areas than required, DotEcon suggests that the premium for a national licence be based on the difference in fees between national and on-site licences (noting that such geographic scopes are already available under existing PMR licences and the stakeholder engagement suggested that they remained appropriate for the likely use cases). Third Party Business Radio licences (which are national licences) and Business Radio licences (which provide for on-site licences) are the closest equivalent licence types under the existing frameworks for PMR. To calculate the premium, DotEcon calculates the ratio of an annual TPBR licence[134] to a typical Business Radio licence[135] which gives a premium value for a national licence (β) of 4.

A 2.13 ComReg notes that this value would be towards the lower end of where ComReg could set the parameter value to incentivise users only taking national licences when required. For instance, DotEcon notes that a similar calculation based on the difference between national telemetry licence fees (not subject to this consultation) would result in a premium value of approximately 60. However, ComReg notes that such a high parameter could risk pricing off those who have genuine requirement for a national licence and agrees with DotEcon and proposes to set the value at 4.

### The premium value for an exclusive-use licence

A 2.14 Similar to the premium value for a national licence, DotEcon advises that the exclusive-use parameter should be set at a level to incentivise operators to only take out exclusive-use licences when they have a genuine need and value for them. DotEcon notes that the number of users that would share a channel is not fixed and may depend on the usage patterns of licensees. As such, DotEcon recommends that ComReg offers guidance that there will typically be no more than 4 operators sharing a channel in a given area and advises that the premium value for an exclusive-use licence is set at 3[136]. In DotEcon's view, this would reflect that the number of users sharing a channel would likely be below the maximum.

[134] The total fee for a Third-Party Business Radio licence is €5000 for a duration of 5 years. DotEcon assumes an annual value of €1000. DotEcon report p.44, Document 25/46a.
[135] This is calculated by taking the median number of pieces of equipment for on-site business radio licences. DotEcon Report p. 44, Document 25/46a.
[136] DotEcon Report p. 45, Document 25/46a.

A 2.15 ComReg notes that under the existing frameworks, only TBPR licensees have exclusive use of their licensed frequencies and that all other PMR licensees are licensed on a shared basis. However, with the consolidated licence approach proposed under Option 2, all users would be able to apply for exclusive use. ComReg agrees with DotEcon that setting the exclusive-use parameter should be set at a level to incentives efficient use and not give rise to artificial scarcity. As such, ComReg agrees with DotEcon's recommendation and proposes to set the value at 3.

### Fees for PMSE

A 2.16 As detailed in Chapter 3 (RIA chapter), ComReg is of the preliminary view that the fee structure for PMSE licences should be aligned with the fee structure for the consolidated PMR licence proposed under Option 2. This approach would remove the equipment charge currently attached to PMSE licences and would helpfully make fees more predictable for PMSE users while also being practical for ComReg to implement as the approach to fees would be in alignment with other PMR users.

A 2.17 ComReg agrees with DotEcon's recommendation that PMSE fees would be set at half the comparable PMR licence under the formula set out above.[137] This is similar to the existing fee schedule and is also reflective of PMSE licences only being issued for a maximum of six months. DotEcon notes that under this proposal, PMSE channels in different frequency bands would be charged the same fee, irrespective of frequency or bandwidth.

### Indexation of fees

A 2.18 DotEcon recommends that fees should be indexed on an annual basis according to the Consumer Price Index ("CPI").

A 2.19 ComReg agrees that fees should be indexed for inflation (using CPI), and this is consistent with ComReg's long established approach of applying a CPI adjustment annual licence fee. The CPI is the measure of inflation in Ireland and is, therefore, an appropriate and accessible benchmark for measuring changes to the value of money.[138]

[137] DotEcon Report p. 46, Document 25/46a.
[138] What is the CPI - CSO - Central Statistics Office

# Annex: 3 PMR Frequency Band Plans

A 3.1 The section sets out the relevant band plans for PMR licensing.

A 3.2 Figure 9 below sets out the VHF Lo band plan for the 68-88 MHz frequency range which consists of both paired duplex and single frequency sub-ranges.

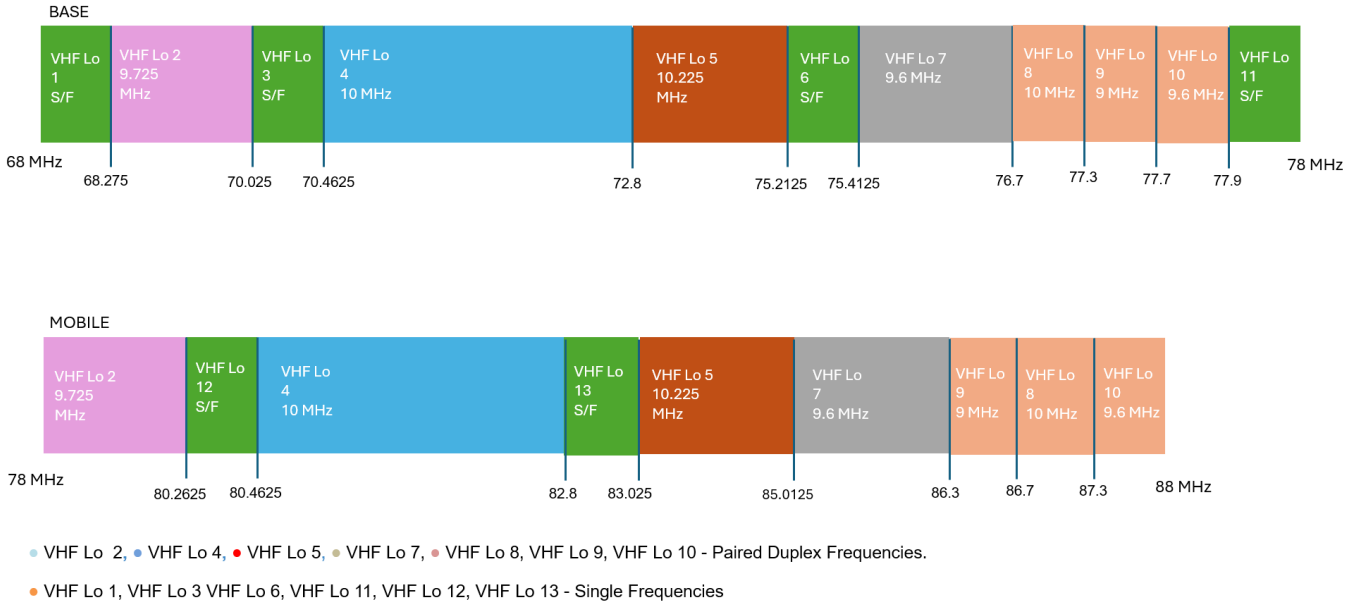
A 3.3 The following sub-ranges are designated for **single frequency** use:

- VHF Lo 1 – 68-68.275 MHz;
- VHF Lo 3 – 70.025-70.4625 MHz;
- VHF Lo 6 – 75.2125-75.4125 MHz;
- VHF Lo 11 – 77.9-78 MHz;
- VHF Lo 12 – 80.2625-80.4625 MHz; and
- VHF Lo 13 – 82.8-83.025 MHz.

A 3.4 The following sub-ranges are designated for **duplex frequency** use:

- VHF Lo 2 – 68.275-70.025 MHz paired with 78-80.2625 MHz (channel separation of 9.725 MHz);
- VHF Lo 4 – 70.4625-72.8 MHz paired with 80.4625-82.8 MHz (channel separation of 10 MHz);
- VHF Lo 5 – 72.8-75.2125 MHz paired with 83.025-85.0125 MHz (channel separation of 10.225 MHz);
- VHF Lo 7 – 75.4125-76.7 MHz paired with 85.0125-86.3 MHz (channel separation of 9.6 GHz);
- VHF Lo 8 – 76.7-77.3 MHz paired with 86.7-87.3 MHz (channel separation of 10 MHz);
- VHF Lo 9 – 77.3-77.7 MHz paired with 86.3-86.7 MHz (channel separation of 9 MHz); and
- VHF Lo 10 – 77.7-77.9 MHz paired with 87.3-88 MHz (channel separation 9.6 MHz).

**Figure 9: VHF Lo Band Plan for the frequency range 68-88 MHz**




A 3.5 Figure 10 below sets out the VHF Hi band plan for the 155.85-174 MHz frequency range which consists of both paired duplex and single frequency sub-ranges.

A 3.6 The following sub-ranges are designated for **single frequency** use:

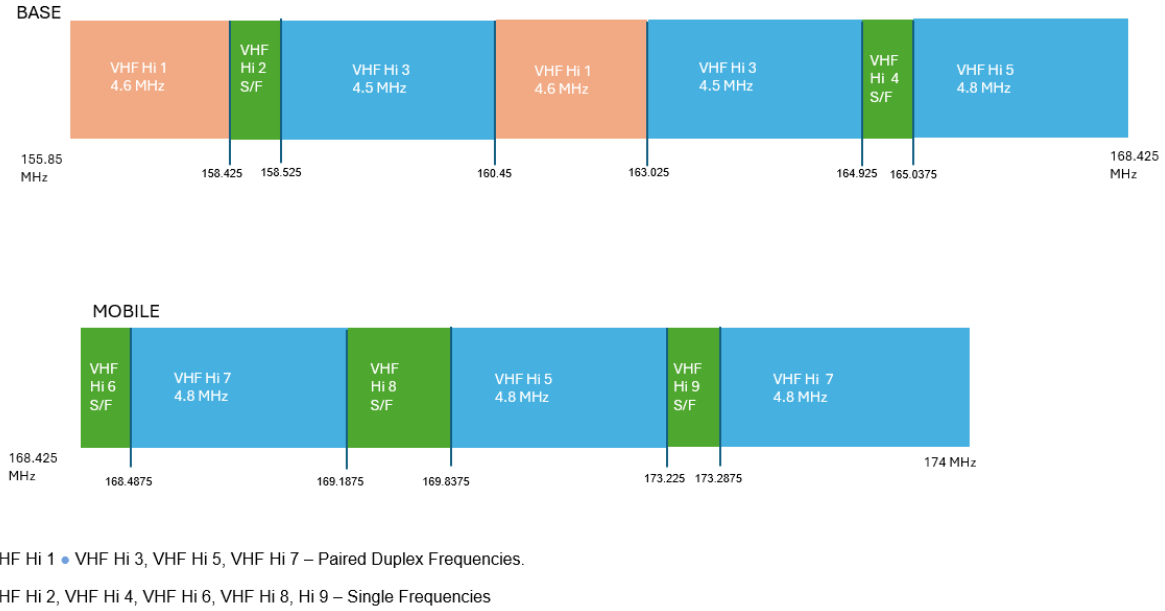
- VHF Hi 2 – 158.425-158.525 MHz;
- VHF Hi 4 – 164.925-165.0375 MHz;
- VHF Hi 6 – 168.425-168.4875 MHz;
- VHF Hi 8 – 169.1875-169.4 MHz; and
- VHF Hi 9 – 173.225-173.2875 MHz.

A 3.7 The following sub-ranges are designated for **duplex frequency** use:

- VHF Hi 1 – 155.85-158.425 MHz paired with 160.45-160.025 MHz (channel separation of 4.6 MHz);
- VHF Hi 3 – 158.525-160.45 MHz paired with 163.025-164.925 MHz (channel separation of 4.5 MHz);
- VHF Hi 5 – 165.0375-168.425 MHz paired with 169.8375-173.225 MHz (channel separation 4.8 MHz); and
- VHF Hi 7 – 168.4875-169.1875 MHz paired with 173.2875-174 MHz (channel separation of 4.8 MHz).

A 3.8 The VHF Hi 1 and 2 sub-ranges are allocated exclusively to Maritime services.[139]

**Figure 10: VHF Hi Band Plan for the frequency range 155.85-174 MHz**




A 3.9 Figure 11 below sets out the UHF band plan for the 450-470 MHz frequency range which consists of both paired duplex and single frequency sub-ranges.

A 3.10 The following sub-ranges are designated for **single frequency** use:

- UHF 2 – 452.5-453 MHz;
- UHF 5 – 455.85-456 MHz;
- UHF 7 – 458.5-459.5 MHz;
- UHF 9 - 466.5-467.0 MHz; and
- UHF 10 – 469.85-470 MHz.

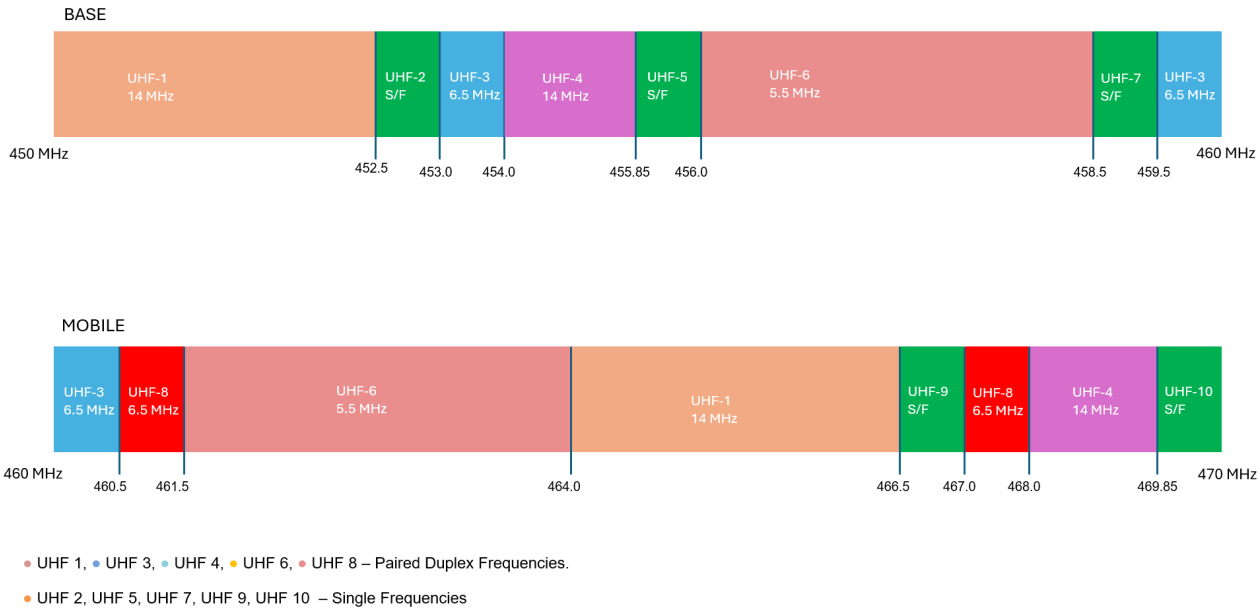
A 3.11 The following sub-ranges are designated for **duplex frequency** use:

- UHF 1 – 450-452.5 MHz paired with 464.0-466.5 MHz (channel separation of 14 MHz);
- UHF 3 – 453.0-454.0 MHz paired with 459.5-460 MHz (channel separation of 6.5 MHz);

[139] See Appendix 18 of the ITU's Radio regulations the table of transmitting frequencies in the VHF maritime mobile band

- UHF 4 – 454.0-455.85 MHz paired with 468.0-468.0 MHz (channel separation of 14 MHz);
- UHF 6 – 456.0-458.5 MHz paired with 461.5-464.0 MHz (channel separation of 5.5 MHz);

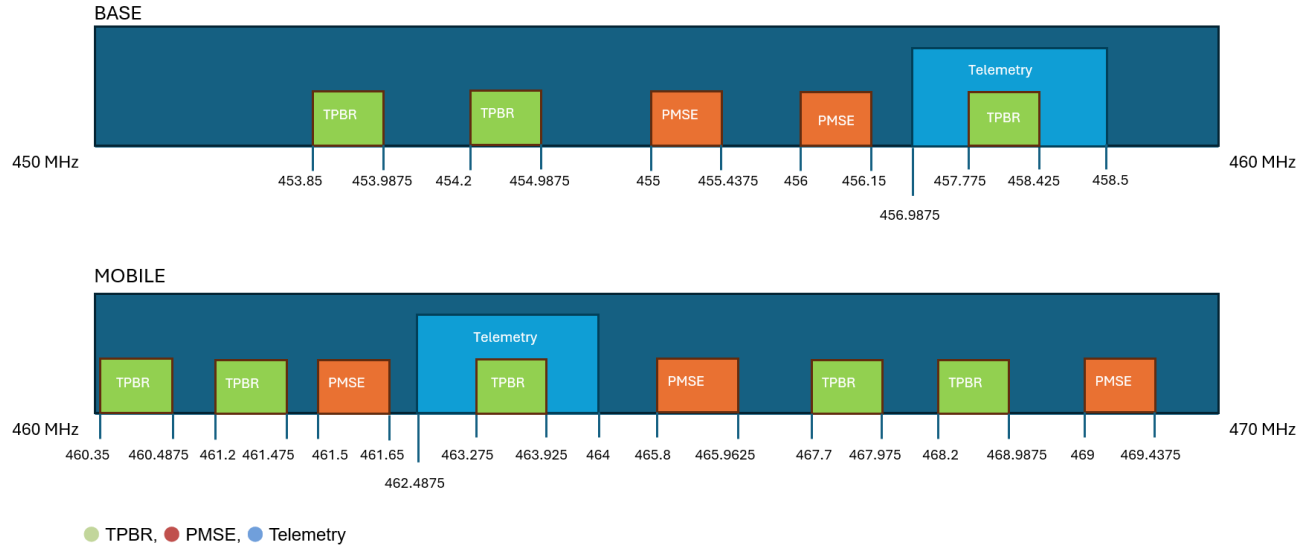
**Figure 11: UHF Band Plan for the frequency range 450-470 MHz**



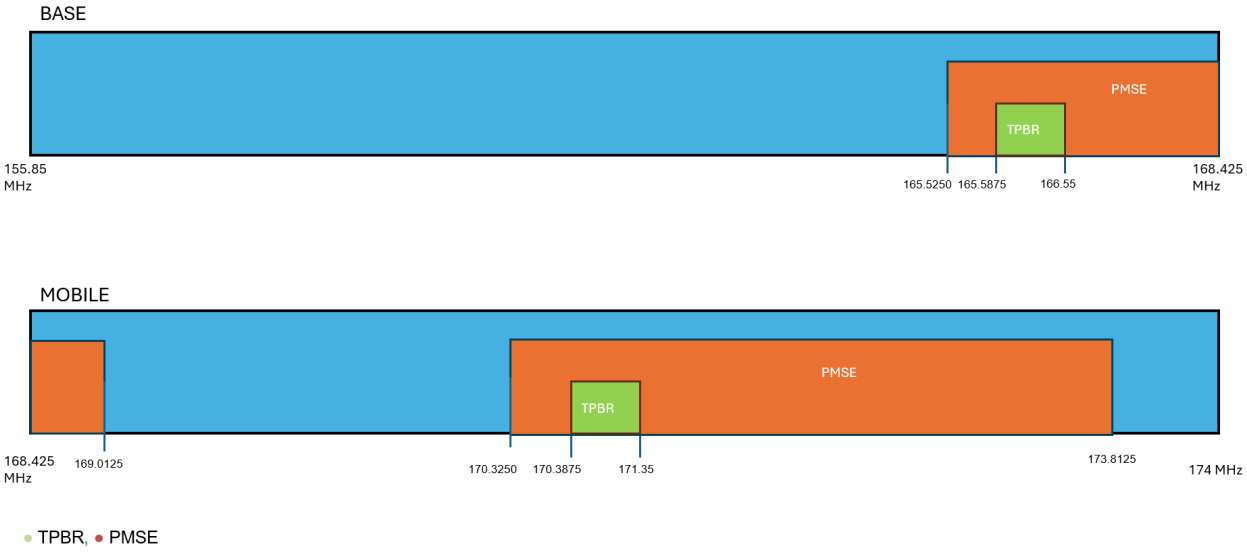

A 3.12 Figures 12 and 13 below sets out the current sub range allocations within the UHF VHF Hi band plans for the following licence types PMSE, Telemetry, and TPBR. Those licence types are assigned specific channels from within the sub ranges.[140] [141] [142] and adjacent channels maybe assigned to Business Radio licences.

[140] See tables 1 and 2 of ComReg Document 25/29 – Response to Consultation and decision on Re-opening the ThirdParty Business Radio licensing regime – published 22 May 2025.
[141] https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/telemetry/
[142] https://www.comreg.ie/industry/radio-spectrum/licensing/search-licence-type/programme-making-and-special-events-pmse/

## Figure 12: UHF Sub range allocations




## Figure 13: VHF Hi Sub range allocations




Figures 14 and 15 below show the paired frequencies for digital analogue trunked radio.

**Figure 14: Digital Trunked Radio**

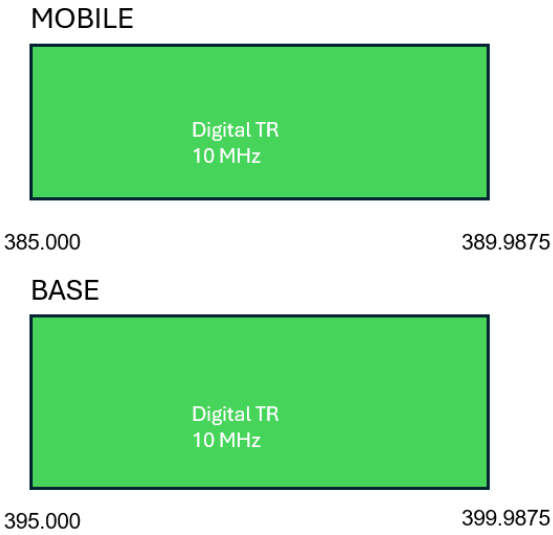
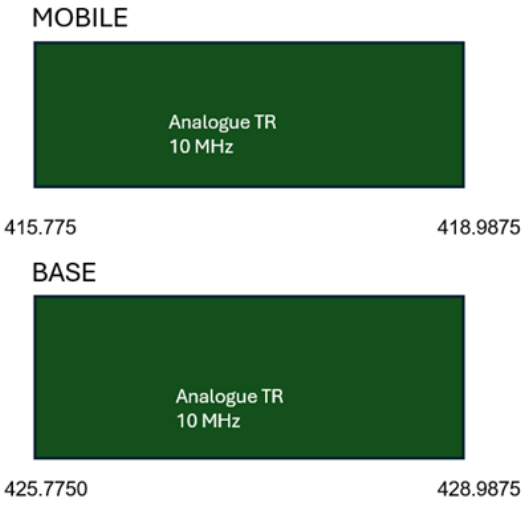



**Figure 15: Analogue trunked radio.**



# Annex: 4 Background material on usage of the 3.8-4.2 GHz Band in Europe and WBB LMP Use Cases

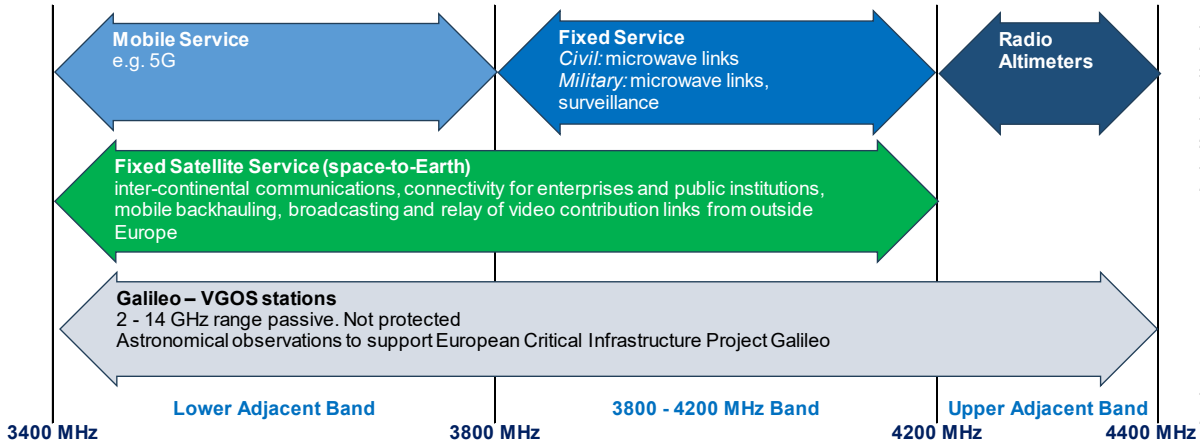
A 4.1 This Annex sets out:

- Background material on the existing use of the 3.8-4.2 MHz Band and adjacent frequency bands in Europe; and
- 5G private network use cases - as identified through ComReg's Radio spectrum management operating plan consultation process.

## Background material on existing use of the 3.8-4.2 MHz Band and adjacent frequency bands in Europe

A 4.2 Across EU member states and other CEPT countries, the 3.8-4.2 GHz band and its lower and upper adjacent bands are in use by existing services, most of long standing, as summarised in **Figure 16** below. Further information on the use of the band and its adjacent bands by these services is provided under the relevant headings below.

**Figure 16: Existing Use of 3800 - 4200 MHz and Adjacent Bands in Europe**



### Fixed Satellite Service in 3.4-3.8 GHz and 3.8 – 4.2 GHz[143]

A 4.3 The 3.4-4.2 GHz and 5.850-6.725 GHz frequency bands have long been available for use by the Fixed Satellite Service (FSS), for space-to-Earth (downlink) and Earth-to-space (uplink), respectively. The ITU has made these bands available on a primary basis. In CEPT countries, FSS earth stations have historically mainly used the 3.6-3.8 GHz and 3.8-4.2 GHz frequency bands for downlink communications, rather than the lower 3.4-3.6 GHz frequency band.

A 4.4 While the 3.8-4.2 GHz frequency band has been available for FSS use there is a limited number of 3800-4200 MHz band FSS earth stations located in Europe. The demand for FSS receivers has been more concentrated in the Ku band 10.7-12.7 GHz. Many of these are used for inter-continental communications, and applications include connectivity for enterprises and public institutions, mobile backhauling, broadcasting and relay of video contribution links from other regions to Europe for distribution.

### Fixed Service in 3.8-4.2 GHz[144]

A 4.5 The Fixed Service (FS) uses the 3.8-4.2 GHz frequency range on a primary basis in certain countries in Europe for both civil and military use.

A 4.6 Fourteen CEPT countries have indicated civil FS use of the band – primarily fixed point-to-point microwave links, commonly used for broadcast feeds and backhaul for e.g. public safety and emergency services, and transport communications networks. At least one country has indicated military FS use of the band, which includes fixed microwave links and surveillance systems.

### Mobile Service below 3.8 GHz[145]

4.6..1 The 3.4-3.8 GHz band was identified as a pioneer band for 5G in Europe and has been harmonised for WBB ECS within CEPT by ECC Decision (11)06[146] and within the EU by Decision 2008/411/EC[147] as amended by Decision

[143] Source: Section 2.1 and Section 6.2 of CEPT Report 88
[144] Section 2.2 of CEPT Report 88
[145] Sources: Section 2.4 of CEPT Report 88 and Spectrum awards for 5G in Europe, Cullen International, 14 Feb 2025.
[146] ECC Decision (11)06, "Harmonised frequency arrangements and least restrictive technical conditions (LRTC) for mobile/fixed communications networks (MFCN) operating in the band 3400-3800 MHz", last amended October 2018.
[147] European Commission Decision 2008/411/EC of 21 May 2008 "on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community".

2008/411/EC[148] and Decision (EU) 2019/235[149].

A 4.7 All EU member states and most CEPT countries have awarded long term licences for the band, on foot of which MNOs have invested heavily to roll out 5G networks in Europe.

## 5G private network use cases – ComReg's Radio Spectrum Management Operating Plan 2025-2028 consultation

A 4.8 ComReg's response to consultation (Document 24/99) noted the strong support from respondents to put in place a WBB LMP licensing framework, with the 3.8-4.2 GHz band being identified as the key band to consider. Reasons supporting this view were set out in ComReg consultation (Document 24/65) and included the harmonisation of the 3.8-4.2 GHz band for this purpose and the licensing of it across Europe. A summary of the use cases provided by consultation respondents is set out below.

### Manufacturing sector

A 4.9 For the manufacturing sector, respondents claimed that:

- private 5G networks would allow manufacturers to gain a competitive edge, as they would be better able to access new technologies which would reduce downtime and produce better products. Examples of new technologies included Autonomous Goods Vehicles, Internet of Things (IoT), Computer Vision, Augmented Reality (AR), Artificial Intelligence (AI), and Digital Twins;
- worker productivity and safety are increasingly dependent on ubiquitous broadband communications for both handheld devices (smartphones, tablets, tag-readers etc.) and wearables (man-down / lone worker alarms, AR glasses);
- in most cases, manufacturing companies have concluded that Wi-Fi, even in its latest versions, is not capable of managing the volume and

[148] European Commission Implementing Decision (2014/276/EU) of 2 May 2014 "on amending Decision 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community".

[149] European Commission Implementing Decision (EU) 2019/235 of 24 January 2019 "on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3 400-3 800 MHz frequency band".

complexity of wireless data traffic being created by Industry 4.0 technologies, and manufacturing companies are, therefore, increasingly adopting 5G private networks; and

- examples of private 5G networks in the manufacturing sector include Atlas Copco[150] (the UK), Bosch[151] (Germany), Airbus[152] (France), Agnico-Eagle[153] (Finland), Ericsson[154] (USA) and Midea, AIS, China Unicom and Huawei[155] (Asia).

### Transport/Logistics sector

A 4.10 For the transport/logistics sector, respondents claimed that:

- ensuring efficiency and catering for the growth in traffic volume at Ireland's ports and airports is of national importance. For example, 90% of Ireland's traded goods pass through Ireland's commercial port network, and freight traffic has grown almost 400% in the last two years at Rosslare Port;

- modern container ports now depend, to a great extent, on automated or semi-automated gantry cranes which enable fewer crane operators to handle more freight, autonomous vehicles to move containers between ship and road or rail haulage, AI-enabled computer visualisation for logistics and security applications, digital signage and real-time traffic routing;

- modern cranes are now able to be connected to 5G cellular networks for remote operation. These advances not only increase productivity but also improve the safety of workers;

- similar to manufacturing, ports and logistics are moving from Wi-Fi to private cellular communications to access the port technology of the future;

- examples of private 5G networks in ports today include the ports of

[150] https://tecknexus.com/5gusecase/atlas-copcos-new-uk-smart-factory-features-ericsson-5g/

[151] https://5gobservatory.eu/wp-content/uploads/2022/04/5.6.pdf

[152] https://www.airbus.com/en/newsroom/stories/2024-06-the-future-is-calling-unveiling-airbus-private-5g-network

[153] https://5gobservatory.eu/nokia-to-build-private-5g-network-in-finnish-goldmine/
[154] https://www.ericsson.com/en/about-us/company-facts/ericsson-worldwide/united-states/5g-smart-factory
[155] https://www.huawei.com/en/news/2024/5/first-5g-fully-connected-factory

Belfast[156], Blyth[157], Southampton[158], Teeside, Thames, and Tyne[159] (the UK) Rotterdam[160] (the Netherlands), Groeninge (Belgium), Hamburg, Kiel, Bremerhaven, and Wilhemshaven[161] (Germany), and Le Harve[162](France); and

- examples of private 5G networks in airports include Frankfurt (Germany) and Schiphol (the Netherlands).

### Broadcasting sector

A 4.11 For the broadcasting sector, respondents claimed that:

- the broadcast television industry across Europe and North America is now taking advantage of the wireless broadband capacity of 5G to replace the long cable runs between camera and control suite, with simple 5G wireless backpack solutions which send the signals from the cameras wirelessly;

- this is particularly relevant to Outside Broadcasting (OB) (e.g. cultural and sporting events), improves speed and quality and makes providing OB facilities cheaper and simpler. For providing OB capability in a small media market, attention to cost is crucial for remaining financially viable and continuing to democratise the media by covering events across the country; and

- examples of private 5G networks in the broadcasting sector include the BBC[163] (UK), Orange Events[164] (France), Haivision[165] and Trinity Broadcasting Network[166] (USA).

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[156] https://www.belfast-harbour.co.uk/news/bt-and-belfast-harbour-partner-to-build-the-uk-and-ireland-s-fir-269/
[157] https://www.boldyn.com/news/port-of-blyth-becomes-tech-hub-with-private-5g-network-innovation-lab-2
[158] https://www.verizon.com/business/resources/customer-success-stories/associated-british-ports/
[159] https://www.rcrwireless.com/20231102/internet-of-things/port-of-tyne-in-uk-gets-private-5g-network-from-bt-and-ericsson
[160] https://www.portofrotterdam.com/sites/default/files/2023-06/5g-communication-port-of-rotterdam-en.pdf
[161] https://blog.privatenetworks.technology/2024/04/deutsche-telekoms-campus-network-l-for.html
[162] https://www.analysysmason.com/contentassets/f3ebeb02b0454ed191e09b55b623c8e4/analysys
[163] https://www.bbc.co.uk/rd/blog/2023-05-5g-non-public-network-coronation
[164] https://www.fierce-network.com/wireless/france-television-uses-private-5g-network-olympic-torch-relay
[165] https://www.haivision.com/blog/broadcast-video/private-5g-networks-broadcast-production/
[166] https://trilogynextgen.com/how-private-5g-networking-reinvents-the-broadcast-studio/

# Annex: 5 WBB LMP – Other countries

A 5.1 This annex provides information on licensing frameworks in other European countries relevant to WBB LMP type networks.

A 5.2 Section A 5.1 provides an overview of the existing and proposed licensing frameworks that facilitate WBB LMP type networks using the 3.8-4.2 GHz Band or the similar adjacent 3.6 GHz Band.

A 5.3 Several European countries have already established long-term licensing frameworks for WBB LMP type networks using the 3.8-4.2 GHz Band in advance of the finalisation of European harmonisation measures for the band. Section A 5.2 provides information on the technical conditions that apply to WBB LMP type networks under those licensing frameworks.

# A 5.1 Other European Countries - Overview of existing and proposed licensing frameworks relevant to WBB LMP

### Table 12: Overview of existing and proposed licensing frameworks relevant to WBB LMP in other European Countries[167]

| Country<br>Band<br>Availability | Spectrum Available Overall | Spectrum in Licence/<br>Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| **Belgium**<br>3.8-4.2GHz<br>Available | 120 MHz in 3800–3840 and 3880–3960 MHz<br><br>*Eventually 200 MHz with relevant parts of band to be identified by the regulator* | 20 MHz or 40 MHz<br><br>Spectrum cap of 40 MHz | 10 years max | FCFS | Real-estate licensing<br><br>Service area as defined by a polygon | Permit holder must put the assigned frequency into use within **12 months.** | The licence framework is identified as for private local area networks.<br><br>Licences cannot be traded.<br><br>BIPT indicates three private local broadband radio networks licensed as of June 2024.<br><br>**National Info Sources:**<br>BIPT Decision 2023 based on Royal Decree 2023 |
| **Denmark**<br>3.8-4.2 GHz<br>Considered | 400 MHz in 3800-4200 MHz | No info | Up to 20 years<br><br>Shorter duration for nomadic, | No info | Local<br><br>In relation to outdoor coverage, it is not immediately expected to become | No info | 2023 consultation invited input from various stakeholders, to clarify how the frequencies in the 3.8-4.2 GHz Band can be assigned and administered appropriately taking into account ongoing work towards European harmonisation. |

[167] The information in this table is sourced from Cullen International (www.cullen-international.com), a pay subscription website, and also from national information sources, as identified in the table in relation to each country, such as the websites of national telecommunications regulators.

| Country<br>Band<br>Availability | Spectrum Available Overall | Spectrum in Licence/<br>Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| | | | sporadic local use | | possible to establish a macro-like coverage using higher transmission power. | | **National Info Sources:**<br>Digst Private Networks<br>SDFI summary of the consultation on frequencies for private networks, Dec. 2023 |
| **Finland**<br>3.8-4.2 GHz<br>Under consideration / currently available for trial | 400 MHz in 3800-4200 MHz | Case-by-case | R&D licences for up to 1 year | FCFS | Area of operation | No info | Pending EU-level harmonisation, Traficom grants one-year frequency licences for R&D use, evaluating each case individually<br><br>**National Info Sources:**<br>Traficom Local 4G/5G networks |
| **France**<br>3.8-4.2 GHz<br>Available for trial | 200 MHz in 3800-4000 MHz | Up to 100 MHz | 3 years max | FCFS | Local<br><br>Valid only in geographical areas where the professional entity has a justified need to carry out their activities | No info | The scheme is aimed at players who would like to experiment with new 5G use cases: industrial or logistics players, "vertical" players in the energy, health, or smart city sectors<br><br>Licences available for application until end 2025<br><br>72 trial licences in use by June 2025<br><br>**National Info Sources:**<br>ARCEP 5G Trial Dashboard<br>ARCEP 3.8-4.0 GHz Trial Licences |
| **France** | 400 MHz in | Assignment according to 5 | 10 years max | As requests | Localised | No info | Recent July 2024 consultation proposes to open 3800-4200 MHz for the development |

| Country<br>Band<br>Availability | Spectrum Available Overall | Spectrum in Licence/<br>Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| 3.8-4.2 GHz<br>Proposed | 3800-4200 MHz | MHz blocks, as per European harmonisation, with a cap of 100 MHz per request per zone, is envisaged. | proposed | come in or, where there is excess demand, a selection procedure absent agreement among the relevant players | | | of local mobile networks for professional (vertical) use<br><br>ARCEP set out its proposals in its public consultation on assignment of 3410-3490 MHz and 3.8-4.2 GHz, open from July to Nov 2024.<br><br>Under the proposals, before filing its application, an applicant would have to consult the stakeholders present in its planned coverage area, on their interest in the band. If there is excess demand from several players in the same area, a selection procedure would apply if they cannot form coexistence agreements or file joint applications.<br><br>**National Info Sources:**<br>ARCEP Consultation 3410 - 3490 MHz and 3.8 - 4.2 GHz bands 3 July 2024 |
| **Germany**<br>3.6 GHz<br>Available | 100 MHz in 3700-3800 MHz | Multiples of 10 MHz to max of 100 MHz<br><br>Must be plausible and justified in application | 10 years max<br><br>But no later than 31 Dec 2040 | FCFS | Real-estate licensing<br><br>In particular for business/commercial/industrial premises. Premises can comprise more than one plot in real estate terms e.g. | Frequency assignment can be revoked if use has not begun within **one year** or if it has not been used for the assigned purpose | 3700-3800 MHz is available for local applications, in particular for industrial automation / industry 4.0, but also for agriculture and forestry.<br><br>In future, BNetzA may consider allowing nationwide licence holders in 3400-3700 |

| Country<br>Band<br>Availability | Spectrum Available Overall | Spectrum in Licence/<br>Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| | | | | | several plots within industrial parks, if all the plot users apply together. | for more than one year. | MHz to use unused spectrum above 3700 MHz as temporary additional capacity.<br><br>465 licences issued (April 2025)<br><br>**National Info Sources:**<br>BNetzA Regional & Local Networks |
| **Netherlands**<br>3.6 GHz<br>Available | 100 MHz in 3400-3450 and 3750-3800 MHz | Tailored to the needs of the user based on multiples of 10 MHz and up to a max of 50 MHz per sub-band.<br><br>Possible to obtain spectrum in both sub-bands where need justified. | Until 31 Dec 2040 at the latest<br><br>To align with expiry date of the national permits in 3450-3750 MHz | FCFS | Real-estate licensing<br><br>Service area is limited to plots of land and buildings. | Permit holder must commission the frequency space within **nine months** after the permit comes into effect and must then keep it in use. | Licences are exclusively for communication between employees and systems within an organisation. Offering a public telecoms network is not permitted<br><br>The minister issued details on the assignment process and conditions for local licences on 6 Oct. 2023<br><br>.<br>**National Info Sources:**<br>Dutch Government - Issuance policy for plot-based networks |
| **Norway**<br>3.8-4.2 GHz<br>Available | 400 MHz in 3800-4200 MHz<br><br>But guard band of 3800-3840 MHz applies where | 20 MHz, 40 MHz, 60 MHz, or 80 MHz<br><br>Applicants must justify | 10 years max | FCFS | **Low Power Licence:**<br>- Per area: 50 m radius of a given location<br>- All base stations within the radius and connected terminals in/outside the radius | All allocated transmission points must be implemented within **12 months** of the licence coming into force. | No special restrictions on who may apply for licences. May not be used to expand coverage or capacity of public nationwide mobile networks<br><br>Only for networks within geographically delimited areas |

| Country<br>Band<br>Availability | Spectrum Available Overall | Spectrum in Licence/<br>Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| | networks are not synchronised with public mobile networks below 3800 MHz | bandwidth requirements | | | - Licence area is not equivalent to the coverage area<br><br>**Medium Power Licence:**<br>- Per base station<br>- Includes any connected terminals | Otherwise unused transmission points may be removed from the licence. | **National Info Sources:**<br>Nkom - Facilitating local mobile networks in 3.8-4.2 GHz<br>Nkom - Licensing guidelines<br>Nkom - Application Form |
| **Poland**<br>3.8-4.2 GHz<br>Available | 100 MHz in 3800-3900 MHz (Local Gov)<br><br>300 MHz in 3900-4200 MHz (Entities other than Local Gov)<br><br>But guard band of 3800-3840 MHz applies where | Blocks with a width of 10 MHz, but not more than 100 MHz in total. | All licences valid until 31 Dec. 2028 | FCFS | - Low power permits allow for location of any number of stations within a radius of 50 meters from the designated point.<br>- Medium power permits cover a single base station.<br>- Licence area is limited to up to 20 communes for local governments or when used by other entities for the provision of public FWA. This limit does not apply to private use. | No info | The band may not be used for extending the range or capacity of a telecoms network using frequencies in the range 3.8-4.2 GHz or for a public nationwide telecoms network<br><br>3800-3900 MHz: For local gov use only for its own needs. May not be used for provision of telecoms services<br><br>3900-4200 MHz: For entities other than local gov for their own needs or to provide public FWA<br><br>Only low-power outdoor stations are allowed in 4.0–4.2 GHz to prevent interference with aviation services.<br><br>**National Info Sources:**<br>UKE Private Networks Webpage |

| Country<br>Band<br>Availability | Spectrum Available Overall | Spectrum in Licence/<br>Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| | networks are not synchronised with nationwide telecoms network in 3700-3800 MHz. | | | | | | UKE Ordinance on 3800-4200 MHz |
| **Sweden**<br>3.6 GHz<br>Available | 80 MHz in 3720–3800 MHz | 10 MHz blocks, from 10 MHz to 80 MHz per licence | Valid until 31 Dec. 2026, with a possible 5-year extension | FCFS | Real-estate licensing<br><br>A permit is valid for both indoor and outdoor use within a property or part of a property. | Licensees must put frequencies in use and install at least one fixed transmitter within 6 months from the licence start date. | The band is available for local permits. The licence may be used for a radio network that enables terrestrial local electronic communication.<br><br>**National Info Sources:**<br>PTS 3.7 GHz and 26 GHz bands webpage, Licence conditions and Application form |
| **Switzerland**<br>3.6 GHz<br>Available | 100 MHz in 3400–3500 MHz | Multiples of 10 MHz to max of 100 MHz | At least 5 years. Depends on the investment volume. | FCFS | Local campus networks for clearly defined areas (usually polygons).<br>e.g. for company premises, hospitals or universities. Does not include larger geographical areas such as cities, regions and transport routes. | No info | Bakom awards licences for campus networks that may not be used to provide public electronic communications services.<br><br>**National Info Sources:**<br>Bakom - Private Local Mobile Networks<br>Bakom usage conditions and application form |
| **United Kingdom**<br>3.8-4.2 GHz<br>Available | 390 MHz in 3805-4195 MHz | 10, 20, 30, 40, 50, 60, 80, or 100 MHz | Indefinite, as long as annual fees are paid. | FCFS | **Low power licence**<br>- per area.<br>- For all base stations within 50 metre radius of a given location and | If spectrum not used within **six months,** Ofcom may revoke the | This spectrum should not be used to construct wide area mobile networks. Users looking to provide wide-area coverage advised to look for spectrum in other bands. |

| Country Band Availability | Spectrum Available Overall | Spectrum in Licence/ Authorisation | Duration | Award Method | Licensed/Authorised Area | Rollout / Usage conditions | Other Information |
|---|---|---|---|---|---|---|---|
| | | 100 MHz limit for any one user within 500m of an urban Medium Power base station that they already hold a licence for | Short-term licences available for less than one year. | | connected terminals in/outside the radius.<br>- For large sites, multiple licence areas can be applied for<br><br>**Medium power licence**<br>- per base station.<br>- For a Base station at a given location and any connected terminals | licence with one month's notice | **National Info Sources:**<br>Shared access licences Webpage<br>Shared Access Licence Guidance document<br>Online mapping tool for spectrum availability in 3.8-4.2 GHz - Ofcom |

## A 5.2 Other European Countries – Assessment and Technical conditions for 3.8-4.2 GHz Band WBB LMP networks

A 5.4 The information in the tables below is taken from material published by the relevant national regulators, as follows:

**Belgium**

BIPT Webpage - local private networks in the 3800-4200 MHz band

BIPT decision on private local area networks in the 3800-4200 MHz band

**Norway**

Nkom Webpage - Facilitating local mobile networks in 3.8-4.2 GHz

Guidelines on Regulation of local networks in 3.8-4.2 GHz

**Poland**

UKE Webpage - Private networks

UKE Ordinance on frequency management plan for 3800-4200 MHz

**United Kingdom**

Ofcom Webpage - Shared access licences

Ofcom Shared Access Licence Guidance document

Ofcom 'Technical Frequency Assignment Criteria for Shared Access Radio Services'

### Table 13: General technical conditions

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| **Max Base Station Power** | **Outdoor Unsynchronised**<br>▪ 18 dBm/5 MHz EIRP<br>**Outdoor Synchronised**<br>▪ 30 dBm/5 MHz EIRP<br>**Indoor Unsynchronised**<br>▪ 24 dBm/5 MHz EIRP<br>**Indoor Synchronised**<br>▪ 30 dBm/5 MHz EIRP<br>Exceptions to power limits possible on a case-by-case basis, e.g. for large industrial sites that may require a very large number of base stations. | **Low Power:**<br>▪ 18 dBm/5 MHz EIRP<br>**Medium Power:**<br>▪ 36 dBm/5 MHz EIRP | **Low Power:**<br>▪ 18 dBm/5 MHz EIRP<br>▪ non-AAS<br>**Medium Power:**<br>▪ 36 dBm/5 MHz EIRP<br>▪ non-AAS or AAS | **Low Power:**<br>▪ 27 dBm / carrier for carriers ≤ 20 MHz; or<br>▪ 21 dBm / 5 MHz for carriers > 20 MHz (EIRP per cell)<br>**Medium Power:**<br>▪ 42 dBm / carrier for carriers ≤20 MHz; or<br>▪ 36 dBm/5 MHz for carriers > 20 MHz (EIRP per cell) |
| **Max Terminal Station Power** | ▪ 28 dBm TRP | ▪ 28 dBm TRP (mobile/nomadic)<br>▪ 28 dBm EIRP (fixed) | ▪ 28 dBm TRP (mobile)<br>▪ 28 dBm EIRP (stationary) | ▪ 28 dBm TRP (including a 2 dB tolerance) for mobile/nomadic<br>▪ 28 dBm EIRP for fixed (low power)<br>▪ 35 dBm/5 MHz EIRP for fixed (medium power) |
| **Max Antenna Height** | ▪ 10 m for outdoor<br>Exceptions to antenna height limits possible on a case-by-case basis, e.g. for large industrial sites that may require a very large number of base stations. | **Low Power:**<br>▪ Indoor no height restriction<br>▪ Outdoor 10 m above ground<br>**Medium Power:** | **Low Power**<br>▪ 10 m above ground level for outdoor<br>**Medium Power**<br>▪ 20 m above ground level for outdoor | **Low Power:**<br>Outdoor antennas limited to 10m height above ground<br>**Medium Power:** |

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| | | ▪ No height restriction, but Nkom will engage in dialogue with applicant where it considers the location or height of the antenna applied for to be problematic for the efficient reuse of frequency resources. | • | Antenna heights exceeding 10m available in urban areas via exceptions process only. |
| **Permitted Deployment** | Indoor and outdoor | Indoor and outdoor<br><br>Medium-power not permitted within a zone of 10 km outside urban settlements of more than 10,000 inhabitants. However, Nkom may grant exemptions to this restriction in special cases (e.g. ports, large industrial areas, etc.), if the advantages are assessed to exceed the disadvantages. | Indoor and outdoor | **Low Power:**<br>Indoor and outdoor<br><br>**Medium Power:**<br>All UK except for Greater London which is only available via an exceptions process. |
| **Frequency Agility** | No info | Nkom reserves the right to move a licence holder's allocated frequency range within 3800-4200 MHz.<br><br>Nkom is aware that there is currently a shortage of base stations in the market that support the entire band, and will take this into account as far as | No info | Ofcom may request a licensee to change frequency from time to time for spectrum planning purposes or to deal with interference. |

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| | | possible during a transitional phase. | | |

### Table 14: Assessment and Technical conditions for coexistence between WBB LMP networks in-band

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| **Co-existence Assessment** | Case-by-case.<br><br>For each test point of network A, the field strength created by a base station (with maximum EIRP and maximum antenna height) on each test point of network B is calculated. The calculated field must be below a threshold level.<br><br>In assessing compatibility between private local networks, BIPT assumes the networks are not synchronised. | Case-by-case.<br><br>For each application received, interference is assessed by calculating I/N for the base station applied for, as potentially both interferer and victim.<br><br>Further details in Ch8 of Nkom Licensing guidelines (English) | No info | Case-by-case.<br><br>Technical assessment to ensure a new deployment would not interfere with other networks and vice-versa, based on I/N calculations.<br><br>Ofcom assumes that users are synchronised for coordination purposes.<br><br>Further details in Ofcom 'Technical Frequency Assignment Criteria for Shared Access Radio Services' document |
| **Synchronisation** | Not required | Required in some cases<br><br>Nkom permits unsynchronised networks, but may require synchronisation between different local networks if necessary in high demand areas.<br><br>The synchronisation regime in already established networks takes precedence. | Required in some cases<br><br>Required where there is a possibility of harmful interference to existing networks in a given area. | Not generally required<br><br>In cases of interference between nearby networks on adjacent channels, Ofcom encourages both parties to work together and reach a mutual agreement on how to avoid this. If the licensees cannot agree within a reasonable time, Ofcom may require them to adopt synchronisation. |

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| **Adjacent Channel Emission Mask** | Yes<br>See Table 18 below | No | Yes<br>See Table 18 below | Yes<br>See Table 18 below |
| **Other Mitigations** | No | No | No | Ofcom reserves the right to impose local level interference management measures (including requiring specific frame structures). |

### Table 15: Assessment and Technical conditions for coexistence between WBB LMP and FSES in-band

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| **Co-existence Assessment** | Yes<br>Compatibility calculations based on following protection criterion:<br>a limit for the power received by an isotropic antenna of -184 dB(W/4kHz), for a probability of 20%, at 15 m above ground level. | Yes<br>Protection areas defined around earth stations where the calculated field strength from local network base stations may not exceed a defined field strength requirement.<br>Protection area radii range from 50m to 400m.<br>Field strength thresholds are typically -142.6 dBW/m²/MHz at 20 m above ground level. | No info | Yes<br>Protection of permanent earth station receivers based on interference-to-noise ratio (I/N) calculations.<br>I/N protection criteria are:<br>Long Term - 10 dB 20% of time<br>Short Term - 0 dB 0.005% of time<br>Further details in Ofcom 'Technical Frequency Assignment Criteria for Shared |

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| | | | | Access Radio Services' document |
| **Other Mitigations** | n/a | Applications for new local networks or expansion of existing local networks near satellite earth stations may require adjustments to the disadvantage of the applicant and might ultimately result in rejection of the application. | UKE Ordinance on 3800-4200 MHz lists over 600 areas where medium power may not be used.<br>However, it is not clear if any of these areas are excluded in order to protect satellite earth stations. | n/a |

**Table 16: Assessment and Technical conditions for coexistence between WBB LMP in the 3.8-4.2 GHz Band and WBB ECS below 3800 MHz**

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| **Co-existence Assessment** | Not indicated | Yes<br>However, Nkom does not indicate how the assessment is conducted. | Not indicated | Not indicated |
| **Synchronisation** | To protect public mobile networks below 3800 MHz, private local area networks in 3800-3860 MHz must use DDDSU frame structure – with the possibility of replacing D slots with U slots | Private local networks in<br>3800-3840 MHz must synchronise with the national and public mobile networks below 3800 MHz. | Private/local networks in 3800-3840 MHz must synchronise with the public nationwide telecom network in 3700-3800 MHz. | Not required<br>However, Ofcom suggests that licensees at lower end of the band might consider adopting the synchronisation requirement outlined for users in 3.6-3.8 GHz, if they |

| | | | | |
|---|---|---|---|---|
| | | | | experience interference from users in 3.6-3.8 GHz. |
| **Out-of-Band Emission Mask** | Yes<br>See Table 19 below | No mask prescribed | Yes<br>See Table 19 below | Yes<br>See Table 19 below |
| **Other Mitigations** | No | No | No | 3800-3805 MHz guard band |

**Table 17: Assessment and Technical conditions for coexistence between WBB LMP in the 3.8-4.2 GHz Band and radio altimeters above 4.2 GHz**

| | Belgium | Norway | Poland | United Kingdom |
|---|---|---|---|---|
| **Co-existence Assessment** | No<br>BIPT considers that it is not necessary to carry out specific compatibility calculations to protect radio altimeters:<br>▪ given the power limits imposed on base stations; and<br>▪ provided that frequencies higher than those used in USA (3700-3980 MHz) are not used;<br>noting that 3960 MHz is the highest frequency available under the Belgian licensing framework. | For applications at or near airports/helicopter landing sites, NKom assesses placement in the frequency band, maximum radiated power, antenna location and antenna height. | Not indicated | Not indicated |
| **Out-of-Band Emission Mask** | No | No | Yes<br>See Table 20 below | Yes<br>See Table 20 below |
| **Restrictions near Airports** | Not specified.<br>However, BIPT strongly recommends that operators respect a safety zone and a precautionary zone around | Coexistence assessment of applications for networks near airports, as noted above. | Not indicated | Not indicated |

| | | | | |
|---|---|---|---|---|
| | airport runways, similar to the provisional measures in France.<br><br>BIPT notes that a 3m separation distance between the base station and the aircraft would respect a -19 dBm interference threshold for radio altimeters from the 2020 report from the RTCA (US aviation standards body). | | | |
| **Other Mitigations** | No | Until conclusion of CEPT altimeter studies, medium power is limited to lower half of band. | Medium-power (outdoor) is not permitted outdoors in 4000-4200 MHz. | 4195-4200 MHz guard band |

### Table 18: Adjacent Channel Emission Masks

| | Belgium | Poland | United Kingdom |
|---|---|---|---|
| **Frequency offset** | **EIRP Limit per Base Station Antenna** | **Max Avg. EIRP Density per Base Station Antenna** | **Max Mean EIRP Density per Base Station Antenna** |
| **-5 to 0 MHz from lower channel edge**<br>**0 to 5 MHz from upper channel edge** | (Pmax - 40) dBm / 5 MHz | (Pmax - 40) dBm / 5 MHz | (Pmax - 40) dBm / 5 MHz |
| **-10 to -5 MHz from lower channel edge**<br>**5 to 10 MHz from upper channel edge** | (Pmax - 43) dBm / 5 MHz | (Pmax - 43) dBm / 5 MHz | (Pmax - 43) dBm / 5 MHz |
| **< -10 MHz from lower channel edge**<br>**> 10 MHz from upper channel edge** | (Pmax - 43) dBm / 5 MHz | (Pmax - 43) dBm / 5 MHz<br><br>or value corresponding to the maximum average EIRP density for the base station antenna in the case of a radio device emitting a low signal power outside the 3800-4200 MHz range if it is less than (Pmax - 43) dBm / 5 MHz | (Pmax - 43) dBm / 5 MHz |

### Table 19: Out-of-Band Emission Masks below 3800 MHz

| | Belgium | Poland | United Kingdom |
|---|---|---|---|
| **Frequency** | **EIRP Limit per Base Station Antenna** | **Max Avg. EIRP Density per Base Station Antenna** | **Max Mean EIRP Density per Base Station Antenna** |
| **3795-3800 MHz** | For networks using the frame structure DDDSU<br>(Pmax - 40) dBm / 5 MHz<br>For other networks<br>-43 dBm/MHz | (Pmax - 40) dBm / 5 MHz | (Pmax - 40) dBm / 5 MHz |
| **3760-3795 MHz** | | (Pmax - 43) dBm / 5 MHz | (Pmax - 43) dBm / 5 MHz |
| **Below 3760 MHz** | | -2 dBm / 5 MHz | -2 dBm / 5 MHz |

### Table 20: Out-of-Band Emission Masks above 4.2 GHz

| | Poland | United Kingdom |
|---|---|---|
| **Frequency** | **Max Avg. EIRP Density per Base Station Antenna** | **Max Mean EIRP Density per Base Station Antenna** |
| **4200-4205 MHz** | (Pmax - 40) dBm / 5 MHz | (Pmax - 40) dBm / 5 MHz |
| **4205-4240 MHz** | (Pmax - 43) dBm / 5 MHz | (Pmax - 43) dBm / 5 MHz |
| **Above 4240MHz** | -2 dBm / 5 MHz | -2 dBm / 5 MHz |

# Annex: 6 Sharing and Compatibility

A 6.1 ComReg's summary and preliminary views on sharing and compatibility are as set out in Chapter 6. This Annex sets out some of the background information for each of the following sharing and compatibility scenarios:

- WBB LMP coexistence with MFCN below 3.8 GHz;
- WBB LMP coexistence with Radio Altimeters above 4.2 GHz;
- WBB LMP coexistence with the Fixed Satellite Service in the 3.8-4.2 GHz Band; and
- WBB LMP coexistence with WBB LMP.

A 6.2 The relevant background material has been taken from the following sources:

- ECC Decision (24)01;
- the draft EC Implementing Decision[168];
- the most recent working version for a draft ECC Recommendation on WBB LMP planning and co-existence with MFCN below 3.8 GHz [169] being developed by FM60;
- the most recent working version for a draft ECC Recommendation on co-existence between WBB LMP and Radio Altimeters [170] being developed by FM60;
- the most recent working version for a draft ECC Recommendation on coexistence of WBB LMP with FS and FSS[171] being developed by

[168] RSCOM24-43rev4, *"Draft elements of a Commission Implementing Decision on the harmonisation of the 3 800-4 200 MHz frequency band for the shared use by terrestrial wireless broadband systems capable of providing local-area network connectivity in the Union"*, Radio Spectrum Committee, Working Document, 2 July 2025.

[169] Latest available FM60 working draft ECC Recommendation on WBB LMP Planning and Co-existence with MFCN below 3.8 GHz, 1 July 2025, LINK

[170] Latest available FM60 working draft ECC Recommendation on Co-existence between WBB LMP and Radio Altimeters, 1 July 2025, LINK

[171] Draft ECC Recommendation (25)03, *"Guidelines for the protection of FS and FSS and their future deployment when introducing low and medium power terrestrial wireless broadband systems (WBB LMP) in the 3800-4200 MHz band also considering cross border situations"*, published for public consultation by ECC on 12 June 2025 at LINK. Consultation deadline 8 August 2025.

FM60;

- the Plum Report; and
- the existing licence frameworks already established in other European countries for WBB LMP type networks in the 3.8-4.2 GHz Band (see further Annex 5).

## WBB LMP coexistence with MFCN below 3.8 GHz

### Output from ECC Decision (24)01

A 6.3 ECC Decision (24)01 does not provide any harmonised technical conditions for the protection of MFCN operating below 3.8 GHz, but indicates that such protection may require coordination at national level, including for example:

- geographical/frequency separation;
- defining a maximum allowed power level (pfd) at the border of the WBB LMP licensed area;
- synchronised operation;
- specific sub-cases of semi-synchronised operation which only allow DL to UL modifications to the WBB LMP network compared to the frame structure of the MFCN; and/or
- defining the maximum unwanted emissions below 3.8 GHz depending on location of WBB LMP in relation to MFCN.

A 6.4 The Decision indicates that such coordination mechanisms would be further elaborated in a ECC Recommendation to be developed to assist administrations with managing coexistence between WBB LMP and MFCN below 3.8 GHz at national level as well as cross-border.

### Draft EC Implementing Decision

A 6.5 The draft EC Implementing Decision requires Member States to ensure that WBB ECS within the 3.6 GHz Band is appropriately protected in relation to WBB LMP. The draft EC Implementing Decision does not provide harmonised technical conditions for such protection but indicates that Member States may consider, among other things, synchronised operation of networks, power flux density limits, separation distances and/or frequency separation requirements.

### FM60 Ongoing Work

A 6.6 The FM60 project team within CEPT is currently developing a recommendation to provide administrations with guidance on (a) planning between WBB LMP networks in the 3.8-4.2 GHz Band and (b) co-existence of WBB LMP with MFCN below 3.8 GHz.

A 6.7 With regard to co-existence of WBB LMP with WBB ECS below 3.8 GHz, the work of FM60 is mainly focused on coexistence between WBB LMP and WBB ECS under unsynchronised operation between them, but also addresses:

- coexistence between WBB LMP and WBB ECS under synchronised and semi-synchronised operation;
- improving the resilience of WBB LMP base stations to cope better with unsynchronised or semi-synchronised operation with WBB ECS; and
- a number of alternative mitigation measures.

A 6.8 The proposed approaches currently being considered by FM60 in relation to the above, as set out in the most recent working version of the relevant draft ECC Recommendation, are further outlined below.

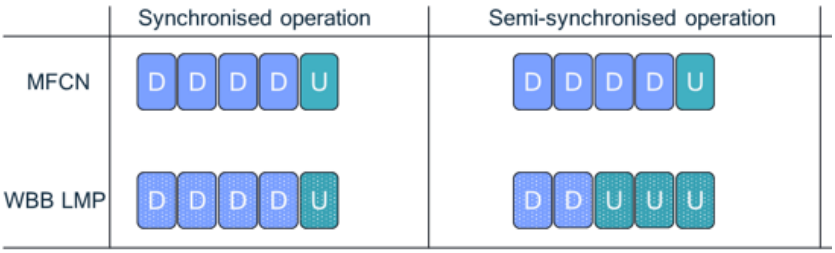
**Synchronised operation between WBB LMP and WBB ECS below 3.8 GHz**

A 6.9 FM60 indicates that WBB LMP networks can operate in the entire 3.8 – 4.2 GHz Band without risk of interference if synchronised with national WBB ECS networks operating below 3.8 GHz, provided that the WBB LMP networks are 3GPP-based and use the same frame structure as the national MFCN networks. However, the default frame structure might not suit certain uplink heavy WBB LMP use cases.

**Semi-synchronised operation between WBB LMP and MFCN**

A 6.10 FM60 indicates that a specific sub-case of semi-synchronised operation could be allowed where WBB LMP and WBB ECS both use 3GPP technology and in which the WBB LMP base station does not transmit when the MFCN base station is receiving, but where WBB LMP user equipment may transmit in the uplink when the WBB ECS base station is transmitting in the downlink, as shown in Figure 17. This would protect the MFCN base station uplink from out-of-band emissions and blocking from the WBB LMP base station, but WBB LMP uplinks may experience interference from the WBB ECS downlink.

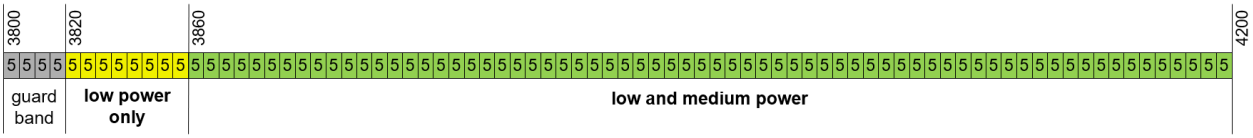
**Figure 17: Example of frame structures for synchronised and semi-synchronised operations between WBB LMP and WBB ECS (FM60)**




**Unsynchronised operation between WBB LMP and WBB ECS**

A 6.11 To protect WBB ECS against blocking by WBB LMP, FM60 is currently considering recommending (a) a guard band between 3800 – 3820 MHz where no unsynchronised operation of WBB LMP with WBB ECS would be permitted and (b) a restricted block between 3820 – 3860 MHz where only low power WBB LMP would be permitted, as shown in Figure 18.

**Figure 18: Proposed guard band and restricted block for unsynchronised operation (FM60)**




A 6.12 Further, to protect WBB ECS from unwanted emissions from unsynchronised WBB LMP above 3.8 GHz, FM60 is considering recommending reduced unwanted emission levels applicable to unsynchronised WBB LMP base stations, as shown in Table 21.

**Table 21: Reduced unwanted emission levels in 3400-3800 MHz**

| WBB LMP BS | Reduced unwanted emission level | Measurement bandwidth |
|---|---|---|
| **Low & Medium power, non-AAS** | -33 dBm e.i.r.p. | 5 MHz |
| **Medium power, AAS** | [-38 dBm t.r.p.]<br>[-43 dBm t.r.p.]<br>To be resolved | 5 MHz |

**Improving resilience of unsynchronised and semi-synchronised WBB LMP Base Stations**

A 6.13 To avoid blocking under unsynchronised or semi-synchronised operation with WBB ECS, FM60 notes that WBB LMP base station receivers may need to be more resilient compared to the harmonised 3GPP technical standards and in that connection is considering recommending improved base station receiver characteristics such as those set out in Table 22[172].

**Table 22: Improved base station receiver characteristics (FM60)**

| Parameter | Value |
|---|---|
| **Level of the wanted signal** | RefSens + 6 dB |
| **NR interfering signal in 3.4-3.8 GHz** | -15 dBm |
| The antenna connector of the BS receiver is the reference point. The reference sensitivity power level PREFSENS is the minimum mean power received at the antenna connector for non AAS BS or TAB connector for AAS BS at which a throughput requirement shall be met for a specified reference measurement channel.<br>These requirements cover both blocking and third-order intermodulation. | |

A 6.14 With regard to semi-synchronised operation, FM60 indicates that achieving the required level of filtering to improve WBB LMP base station receiver characteristics could entail a frequency separation of at least 20 MHz between WBB LMP and WBB ECS base stations, but that unwanted out-of-band emissions from WBB ECS base stations could still be an issue.

**Alternative mitigation measures**

A 6.15 FM60 is also considering including in its recommendation a number of alternative mitigation measures to manage coexistence between WBB LMP and WBB ECS, such as:

- Ensuring sufficient path loss between WBB LMP base stations and WBB ECS base stations;
- Indoor antennas;
- Increased frequency separation (e.g. 100 MHz); and

[172] Assuming 100m separation distance between MFCN BS and WBB LMP BS.

- Adjustment of antenna pointing, down-tilt and height.

### Other Countries

A 6.16 Belgium, Norway, Poland, UK have already established long-term licensing frameworks for WBB LMP type networks (i.e. private/local networks) using the 3.8-4.2 GHz Band in advance of the finalisation of European harmonisation measures for the band.

A 6.17 Of these countries, only Norway indicates that it assesses applications for licences for private/local networks to ensure protection of WBB ECS below 3.8 GHz. However, Belgium, Poland and the UK prescribe very similar out-of-band emission masks for private/local network base stations in the 3.8-4.2 GHz band to protect mobile networks below 3.8 GHz. Only the UK implements a guard band – between 3800-3805 MHz.

A 6.18 Most of these countries require private/local networks in the lower 40 to 60 MHz of the 3.8-4.2 GHz band to synchronise with public mobile networks below 3.8 GHz – except for the UK which only suggests that users in 3.8-4.2 MHz might synchronise with networks below 3.8 GHz if they experience interference from below 3.8 GHz.

A 6.19 Further detail on the relevant coexistence approaches of these countries can be found in Annex 5.

### Plum

A 6.20 Plum notes that protection of WBB ECS below 3.8 GHz may require WBB LMP deployments in the lower part of the 3.8-4.2 GHz Band to be synchronised with WBB-ECS. In that connection, Plum notes various approaches that entail synchronisation in the lower part of the band, including the relevant synchronisation requirements adopted by some countries and the proposed approach in the current draft Recommendation from FM60.

A 6.21 However, Plum recommends a light touch approach rather than mandating synchronisation. This would entail assigning WBB LMP systems that intend to adopt the standard frame structure at the lower end of the band, with other systems assigned from the top down. According to Plum, this would lead to a ‘soft’ band segmentation that would reflect demand.

A 6.22 Plum notes that the draft FM60 recommendation would limit out-of-band emissions to a level below the standard 3GPP specification for unwanted emissions under unsynchronised operation in the 3.6 GHz Band. Instead, Plum considers that it may be preferable to avoid such a requirement by careful consideration of assignments by ComReg, depending on the deployment density of WBB LMP sites.

A 6.23 In relation to the risk of blocking of WBB LMP base stations from WBB ECS base stations below 3.8 GHz, Plum indicates from recent practice that such blocking could be resolved by increasing physical separation between WBB LMP and WBB ECS base stations or by fitting a bandpass filter to the WBB LMP receiver.

## Summary of key approaches to managing interference between WBB LMP and WBB ECS below 3.8 GHz

**(1) Synchronised operation of WBB LMP with WBB ECS below 3.8 GHz**

This is indicated as a potential coordination approach but not prescribed in ECC Decision (24)01 and the Draft EC Implementing Decision. The relevant draft ECC Recommendation from FM60 considers that there is no risk of interference from 3GPP based WBB LMP networks if synchronised with WBB ECS below 3.8 GHz. Plum recommends a light touch approach rather than mandating synchronisation, with synchronised licensees intending to synchronise assigned from the lower end of band and others from the top of the band

**(2) Semi-synchronised operation of WBB LMP with WBB ECS below 3.8 GHz**

This is indicated as a potential coordination approach but not prescribed in ECC Decision (24)01. The relevant draft ECC Recommendation from FM60 considers that this could be allowed where both WBB LMP and WBB ECS are 3GPP based, but with some interference risk for WBB LMP.

**(3) Implementing a guard band and restricted band at bottom of 3.8-4.2 GHz Band for unsynchronised operation**

FM60 is currently considering recommending in the relevant draft ECC Recommendation (a) a guard band between 3800 – 3820 MHz where no unsynchronised operation of WBB LMP with MFCN would be permitted and (b) a restricted block between 3820 – 3860 MHz where only low power WBB LMP would be permitted.

**(4) Specifying maximum unwanted emissions below 3.8 GHz for WBB LMP base stations**

This is indicated as a potential coordination approach but not prescribed in ECC Decision 24(01). The relevant draft ECC Recommendation from FM60 sets out relevant limits for unwanted emissions below 3.8 GHz. Compliance with unwanted emission limits below 3.8 GHz is mandatory in Belgium, Poland and the UK. Plum notes that the relevant draft ECC Recommendation would limit out-of-band emissions to a level below the standard 3GPP specification for unwanted emissions under unsynchronised operation in the 3.6 GHz Band. Instead, Plum considers that it may be preferable to avoid such a requirement by careful consideration of

assignments by ComReg, depending on the deployment density of WBB LMP sites.

**(5) Max field strength values at WBB LMP licensed area border**

This is indicated as a potential coordination approach but not prescribed in ECC Decision (24)01 and the Draft EC Implementing Decision

**(6) Protection of WBB ECS below 3.8 GHz from blocking by WBB LMP**

In the relevant draft ECC Recommendation, FM60 is considering recommending (a) a guard band between 3800 – 3820 MHz where no unsynchronised operation of WBB LMP with MFCN would be permitted and (b) a restricted block between 3820 – 3860 MHz where only low power WBB LMP would be permitted. It is noted that the UK implements a guard band between 3800-3805 MHz.

**(7) Improved resilience of WBB LMP from blocking by WBB ECS below 3.8 GHz**

FM60 is drafting recommendations on improved receiver characteristics for WBB LMP base stations to mitigate the risk of blocking from WBB ECS below 3.8 GHz for inclusion in the relevant draft ECC Recommendation. Plum indicates from recent practice that such blocking could be resolved by increasing physical separation between WBB LMP and WBB ECS base stations or by fitting a bandpass filter to the WBB LMP receiver.

**(8) Geographical/frequency separation between WBB LMP and WBB ECS below 3.8 GHz**

These are indicated as potential coordination approaches but not prescribed in ECC Decision (24)01 and the Draft EC Implementing Decision. The relevant draft ECC Recommendation considers that filtering performance would be significantly better than 3GPP specifications at larger frequency offsets (e.g. 100 MHz).

**(9) Other mitigations**

The relevant draft ECC Recommendation suggests that interference could also be mitigated by measures such as: indoor deployment and adjustment of antenna pointing, down-tilt and height.

## WBB LMP coexistence with Radio Altimeters above 4.2 GHz

### Output of ECC Decision (24)01

A 6.24 ECC Decision (24)01 defines maximum unwanted emission levels above 4.2 GHz for WBB LMP base stations provide a general protection of radio altimeters operating above in the 4.2-4.4 GHz band, as shown in Table 23 below.

**Table 23: Maximum unwanted emission levels above 4200 MHz for WBB LMP base stations[173]**

| Frequency range | Non-AAS base station e.i.r.p. limit dBm/5 MHz per cell (Note 1) | AAS MP base station t.r.p. limit dBm/5 MHz per cell |
|---|---|---|
| **4200-4205 MHz** | 11 | 1 |
| **4205-4240 MHz** | 8 | -3 |
| **Note 1: In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.** | | |

A 6.25 However, the decision notes that coordination may be needed for AAS medium power base station in 4.1-4.2 GHz deployed in close proximity to those airports which support precision approach procedures. The decision indicates that such coordination could include no AAS medium power base station deployment closer than 1200 m from the runway threshold and 40 m laterally from the edge of the runway, or AAS medium power base stations in compliance with emission levels meeting the spurious emission limit between 4200 and 4240 MHz.

A 6.26 Further, the decision indicates that CEPT will develop an ECC Recommendation to assist administrations with managing coexistence at national level between WBB LMP in the 3.8-4.2 GHz band and radio altimeters in the 4.2-4.4 GHz frequency band.

### Draft EC Implementing Decision

A 6.27 The draft EC Implementing Decision requires Member States to ensure that radio altimeters operating within the 4.2 – 4.4 GHz band are appropriately protected in relation to WBB LMP.

A 6.28 The draft EC Implementing Decision reflects the same protection requirements for maximum unwanted emission levels above 4.2 GHz for WBB LMP base stations as in ECC Decision (24)01. It also suggests the same coordination approach for AAS medium power base stations in 4.1-4.2 GHz deployed in close proximity to those airports which support precision approach procedures.

[173] From Annex 1 of ECC Decision (24)01.

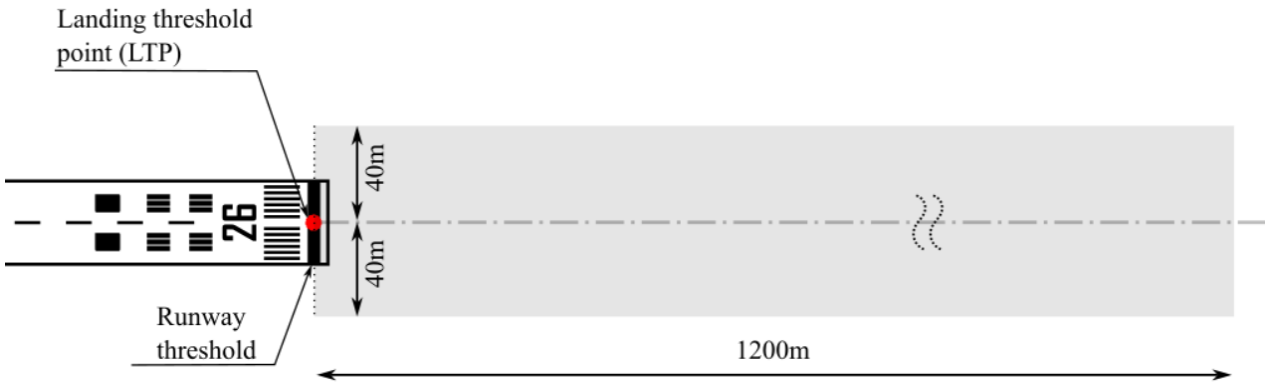
### FM60 Ongoing Work

A 6.29 A draft ECC Recommendation is being developed by FM60 to provide guidelines to support the introduction of medium power WBB LMP using AAS antennas operating in the 4.1 – 4.2 GHz frequency range close to large airport runways supporting precision guided approach, while ensuring the protection of adjacent band radio altimeters. However, the recommendation is not intended to apply where an administration is planning to authorise use of WBB LMP base stations above the maximum power threshold, as permitted in ECC Decision (24)01.

A 6.30 The current version of the draft recommendation suggests several options for adjusting parameters[174] of AAS WBB medium power base stations operating in 4.1-4.2 GHz to ensure protection of radio altimeters but focuses on the determination of coordination zones around runways as a means of protection. FM60 is considering two possible coordination zone approaches in the working document.

A 6.31 The first approach is consistent with the example coordination approach provided in ECC Decision (24)01. This approach, as illustrated in Figure 19, is based on a study described in ECC Report 362, which shows the 6 dB ICAO safety margin is fully covered for medium power AAS WBB LMP base stations positions greater than 1200 m from the runway threshold or 40 m laterally.

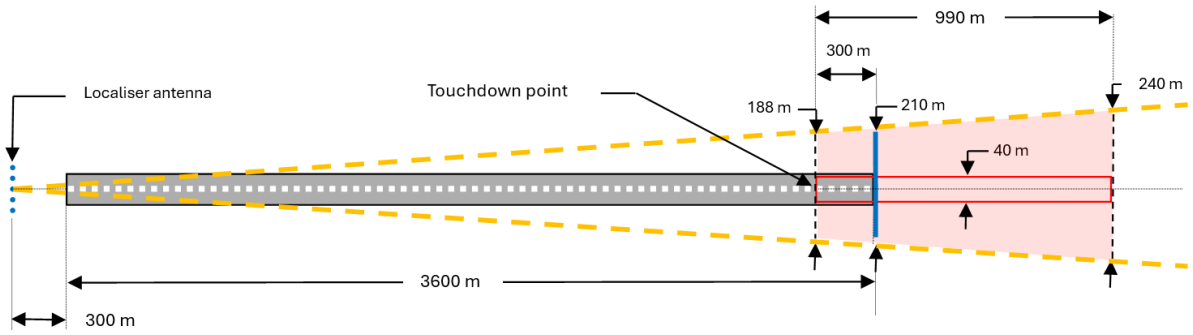
**Figure 19: Coordination zone approach - ECC Decision (24)01 example**




[174] e.g. power reduction, antenna azimuth/tilt adjustment at the AAS WBB LMP base station and geographical separation from the approach axis.

A 6.32 The second approach under consideration by FM60 is proposed by EASA[175], and entails, among other things, increasing the dimensions of the coordination zone based on the aircraft lateral deviation (Ldeviation) from the centre of the runway. This is based on an approach described in Annex 3, section 3.7.1 of ECC Report 362, which however did not define how to derive Ldeviation. EASA suggests a method to compute Ldeviation which is derived from the beam width of the Localiser[176] signal for a typical ILS approach. Figure 20 below shows an example, provided by EASA, of a coordination zone determined using this method. The method results in a trapezoid shaped coordination zone as shaded in pink on the right side of the example. Further details on EASA's proposed method can be found in the most recent FM60 working document for a draft ECC Recommendation.

**Figure 20: Example of coordination zone determined by proposed EASA method (FM60)**




## Other Countries

A 6.33 Belgium, Norway, Poland and the UK have already established long-term licensing frameworks for WBB LMP type networks (i.e. private/local networks) using the 3.8-4.2 GHz Band in advance of the finalisation of European harmonisation measures for the band.

[175] The European Union Aviation Safety Agency.
[176] The Localiser is a component of an Instrument Landing System (ILS) that provides lateral (horizontal) guidance to pilots during an approach to land. It helps in aligning the aircraft with the centreline of the runway. Source: https://www.globeair.com/g/localizer.

A 6.34 Of these countries, only Norway indicates that it assesses applications for licences for private/local networks at or near airports/helicopter landing sites to ensure protection of radio altimeters. However, Belgium strongly recommends a safety/precautionary zone around airports. Otherwise, Poland and the UK prescribe identical out-of-band emission masks for private/local network base stations in the 3.8-4.2 GHz band to protect radio altimeters above 4.2 GHz

A 6.35 These countries (except for the UK), likely due to awaiting the outcome of studies, have tended to restrict or disallow private/local networks in the upper half of the 3.8-4.2 GHz Band. Norway does not currently permit medium power in the upper half of the band, Poland disallows medium power outdoors there, while Belgium only licenses up as far as 3960 MHz. The approach in the UK is to apply a small guard band between 4195-4200 MHz.

A 6.36 Further detail on the relevant coexistence approaches of these countries can be found in Annex 5.

### Plum

A 6.37 Plum considers that protection of Radio Altimeters above 4.2 GHz is not expected to represent a significant constraint on the licensing of WBB LMP, given the very limited geographic areas and frequency range affected by the protection measures set out in ECC Decision (24)01.

A 6.38 Plum notes that the only interference risk is from AAS WBB LMP medium power systems located at a distance from the runway threshold where the antenna height is limited by the Obstacle Limiting Surface (OLS). Plum indicates that this risk can be mitigated using the coordination approach of either (a) excluding AAS WBB LMP medium power base stations from within 1200 m of the runway threshold or 40 m laterally or (b) enhancing the suppression of out-of-band emissions. However, Plum considers that this approach only covers the coordination zone required for an ideal landing path and that potential deviation in practice from that path by aircraft could be taken into account in defining the coordination zone, as EASA has proposed in the draft FM60 ECC Recommendation.

## WBB LMP coexistence with the Fixed Satellite Service in the 3.8-4.2 GHz Band

### Output of ECC Decision (24)01

A 6.39 ECC Decision (24)01 notes from ECC Report 358 that it not possible to define generic technical conditions that guarantee the protection of fixed satellite service (FSS) in all scenarios across all CEPT administrations and that instead case-by-case assessment would be required. As such, the ECC Decision does not provide any harmonised technical conditions to protect FSS in the 3.8-4.2 GHz Band. Instead, the decision indicates that CEPT will develop an ECC recommendation to provide administrations with the relevant toolkit to manage coexistence between WBB LMP and FSS receiving earth stations on a case-by-case basis.

### Draft EC Implementing Decision

A 6.40 The draft EC Implementing Decision requires Member States to ensure appropriate protection in relation to WBB LMP of satellite systems for space-to-earth communications in the Fixed Satellite Service (FSS) authorised to operate within the 3.8 - 4.2 GHz Band across the Union. As with ECC Decision (24)01, the draft Implementing Decision does not provide any harmonised technical conditions to protect FSS in the 3.8-4.2 GHz Band. Further, it notes that the harmonised technical conditions and the relevant guidance set out in CEPT Report 88 address the protection and the long-term development of incumbent users sharing the 3.8 – 4.2 GHz Band, including in particular receiving satellite earth stations.

### FM60 Ongoing Work

A 6.41 FM60 has been developing an ECC Recommendation to provide guidelines for administrations on the protection of FS and FSS systems and their future deployment when introducing WBB LMP in the 3.8-4.2 GHz Band. ECC is currently publicly consulting on a draft version of the ECC Recommendation between 12 June and 8 August 2025.

A 6.42 In relation to FSS the draft ECC Recommendation provides:

- a methodology to determine a coordination contour around an FSS Earth Station, within which coordination with FSS systems is needed before activating a WBB LMP transmitter; and
- a methodology to ensure the protection of FSS earth stations inside the coordination contour.

A 6.43 The methodology to determine a coordination contour, focusses on interference from the WBB LMP base station and does not consider interference from WBB LMP user equipment, on the basis that the user equipment is likely to operate either indoor or at low heights shielded by clutter. The coordination contour is calculated using the Minimum Coupling Loss approach (MCL), taking into account relevant I/N protection criteria, using a propagation model such as Recommendation ITU-R P.452 and including an appropriate terrain elevation model. This entails calculating the area around a FSS Earth Station where the required minimum required path loss attenuation (dB) from any WBB LMP base station is satisfied. Alternatively, a power flux density could be calculated to determine the coordination contour if more convenient for the radio planning tool used. To simplify the burden for administrations, the draft recommendation suggests that, based on results of analyses in ECC Report 358, a generic 40 km radius coordination contour could be defined around an FSS earth stations, but indicates that this may not exclude all possible cases of interference under baseline assumptions.

A 6.44 Coordination within the coordination contour entails assessment using the Minimum Coupling Loss approach described above, but with more detailed building heights and clutter information recommended. It is also recommended to assess the earth station in all azimuth directions where the earth station has line-of-sight visibility to the GSO, as the GSO satellite being pointed to could change over time.

A 6.45 FM60 indicates that the recommendation could be used to address cross-border co-ordination in general terms, but that a separate cross-border recommendation could be developed under a new work item if needed[177]. Further details on the coordination approach for FSS can be found in the draft ECC Recommendation.

### Other Countries

A 6.46 Belgium, Norway, Poland, UK have already established long-term licensing frameworks for WBB LMP type networks (i.e. private/local networks) using the 3.8-4.2 GHz Band in advance of the finalisation of European harmonisation measures for the band.

[177] https://cept.org/documents/fm-60/89234/fm60-17-draft-progress-report_draft-fm60-progress-report-to-wgfm-110_rev1

A 6.47 Three of these countries indicate that they assess compatibility between proposed private/local networks and existing earth stations. Belgium conducts compatibility calculations where the protection criterion is a received power threshold around the earth station. Norway, defines and publishes protection areas defined around existing earth stations where the calculated field strength from local network base stations may not exceed a defined field strength requirement. UK uses compatibility calculations based on interference-to-noise ratio (I/N) protection criteria.

#### Plum

A 6.48 Plum suggests that ComReg discontinue protecting FSS receivers in the 3.8-4.2 GHz Band, given:

- the absence of any currently-licensed Earth stations in this band in Ireland;
- that ComReg has not licensed any FSS systems in the band in the past decade;
- that demand for FSS receivers tends to be in the Ku-band at 10.7-12.7 GHz; and
- potentially large coordination areas between FSS and WBB LMP[178].

A 6.49 Further, Plum indicates that licence-exempt FSS receivers could still be used in the 3.8 – 4.2 GHz Band but might require careful positioning of the FSS receive antenna behind buildings, and/or the use of a larger aperture antenna to reject interference in some cases.

## WBB LMP coexistence with WBB LMP

### Output of ECC Decision (24)01

A 6.50 The ECC Decision defines low and medium in-block powers for WBB LMP base stations and WBB LMP terminal in-block requirements as part of the harmonised technical conditions.

[178] Plum notes that work of FM60 identifies a generic 40km co-ordination zone for the protection of FSS receivers and hypothetical modelling by Plum indicates that coordination around Satellite Earth Station locations in the Dublin area could be very large (up to city-wide or more), depending on WBB LMP base station power, location and antenna height.

A 6.51 The ECC Decision does not otherwise address coexistence in-band between WBB LMP networks, except to note that CEPT is developing an ECC Recommendation to provide guidance to administrations on managing coexistence between WBB LMP networks within the 3.8-4.2 GHz Band.

## Draft EC Implementing Decision

A 6.52 The draft EC Implementing Decision requires Member States to ensure that terrestrial systems providing WBB ECS within the 3.4 – 3.8 GHz Band are appropriately protected in relation to WBB LMP. Other than defining, as part of the harmonised technical conditions, the same low and medium in-block powers for WBB LMP base stations and WBB LMP terminal in-block requirements as well as the same WBB LMP terminal in-block requirements as in ECC Decision (24)01, the draft EC Implementing Decision does not set out any further technical conditions that would address in-band coexistence between WBB LMP networks.

A 6.53 Further, the draft EC Implementing Decision notes that national and, potentially, cross-border coordination may be needed to manage coexistence between different WBB LMP systems in the 3.8 – 4.2 GHz Band and also refers to CEPT's plans to develop an ECC Recommendation with guidance to CEPT administrations on managing coexistence between WBB LMP systems.

## FM60 Ongoing Work

A 6.54 FM60 is currently developing a draft ECC Recommendation to provide administrations with guidance on (a) planning between WBB LMP networks in the 3.8-4.2 GHz Band and (b) co-existence of WBB LMP with MFCN below 3.8 GHz.

A 6.55 With regard to co-existence between WBB LMP networks in the 3.8-4.2 GHz band, the work of FM60 addresses unsynchronised and synchronised operation as well as DECT-2020 NR co-existence and focuses on providing guidance to national regulators on case-by-case rather than on generic[179] planning. FM60's most recent proposals under consideration for a recommendation as they currently stand in relation to the above are further outlined below.

[179] E.g. based on maximum field strength levels at the border of the licence area.

### Unsynchronised Operation

A 6.56 With regard to unsynchronised operation between two WBB LMP networks, the FM60 working document derives maximum interference levels as recommended planning criteria to protect WBB LMP networks in relation to co-channel operation (BS to BS interference and BS to UE interference) and adjacent channel operation (BS to BS interference[180]). The recommended planning criteria from the FM60 working document for co-channel and adjacent channel unsynchronised operation are summarised in Table 24 and Table 25 below. With regard to adjacent channel BS to BS interference, FM60 is also considering an alternative approach that entails calculating the minimum required path loss to protect a victim base station receiver from unwanted emissions (e.g., adjacent channel leakage) from another base station.

A 6.57 In relation to co-channel operation (BS to UE interference) under unsynchronised operation, the relevant working document for a draft ECC Recommendation from FM60 indicates that the recommended protection criteria may lead to quite large separation distances – more than 30 km between medium power base stations with line-of-sight. Thus, reducing the separation distance might entail higher interference levels, impacting coverage or performance close to the cell edge and adaptations to radio design to cope. However, these matters have yet to be further considered by FM60.

**Table 24: Recommended planning criteria for two co-channel un-synchronised WBB LMP networks**

| Interferer | Victim | Maximum interference level | Location of Interference |
|---|---|---|---|
| WBB LMP BS | Low Power WBB LMP BS | -100 dBm/5MHz | At the connector of the victim base station |
| WBB LMP BS | Medium Power WBB LMP BS | -103 dBm/5MHz | At the connector of the victim base station |
| WBB LMP BS | UE | -98 dBm/5MHz | Within the victim WBB LMP network's coverage area, assuming a UE height of 1.5 m above ground. |

[180] The FM60 Working Document considers that for adjacent channel co-existence base station to UE interference is typically not an issue.

**Table 25: Recommended planning criteria for two adjacent channel un-synchronised WBB LMP networks**

| Base station type | Frequency separation | Maximum adjacent channel interference level at victim BS antenna connector | Minimum site-site distance without coordination (no shielding) |
|---|---|---|---|
| **low power WBB LMP** | <20 MHz | -57 dBm (5 MHz) | 150 m |
| **low power WBB LMP** | ≥ 20 MHz | -48 dBm (5 MHz) | 50 m |
| **medium power WBB LMP** | <20 MHz | -60 dBm (5 MHz) | 1 km |
| **medium power WBB LMP** | ≥ 20 MHz | -51 dBm (5 MHz) | 400 m |

A 6.58 The relevant working draft ECC Recommendation from FM60 also includes an option for managing co-channel interference between unsynchronised WBB LMP networks, based on specifying a field strength threshold at the edge of a local area network boundary of 32 dBµV/m/5 MHz at 3 m. FM60 indicates that this would be a fallback measure for cases where no agreement is reached between neighbouring WBB LMP network operators.

### Synchronised Operation

A 6.59 The working draft ECC Recommendation from FM60 indicates that base station-to-base station interference does not need to be considered in relation to co-channel synchronised operation. FM60 considers that adjacent channel co-existence is generally not an issue for 3GPP based technology with synchronisation. For base station to UE interference protection under co-channel synchronised operation, the FM60 Working Document recommends that the signal strength from the interfering base station should not exceed -98 dBm/5MHz anywhere within the victim WBB LMP network's coverage area, assuming a UE height of 1.5 m above ground. FM60 considers that this might entail similarly large separation distance as noted above in relation to the case of co-channel operation (BS to UE interference) under unsynchronised operation.

### DECT-2020 NR Co-existence

A 6.60 According to the working draft Recommendation from FM60, DECT-2020 NR protocols, such as Listen Before Talk and active transmitter power control, enable spectrum sharing and reduce interference, thus making geographical or frequency separation less critical.

## Other Countries

A 6.61 Belgium, Norway, Poland, UK have already established long-term licensing frameworks for WBB LMP type networks (i.e. private/local networks) using the 3.8-4.2 GHz Band in advance of the finalisation of European harmonisation measures for the band.

A 6.62 All these countries, except for Poland, indicate that they conduct technical assessments with interference calculations of applications for licences for private/local area networks on a case-by-case basis.

A 6.63 All countries, except for Belgium, require synchronisation between private/local area networks in some cases. Norway may require synchronisation, if necessary, in high demand areas, with the synchronisation regime in already established networks taking precedence. Poland requires it where there is a possibility of harmful interference to existing networks in a given area. The UK may require it where nearby licensees cannot reach agreement on how to manage a case of interference between them. Further, the UK reserves the right to impose local level interference management measures (including requiring specific frame structures).

A 6.64 All countries, except for Norway, apply adjacent channel emission masks for private/local area network base stations in the band, which are almost identical

A 6.65 Further detail on the relevant coexistence approaches of these countries can be found in Annex 5.

## Plum

A 6.66 A summary of Plum's recommendations on the licensing and network planning approach for WBB LMP networks is as set out in Section 6.5.2 above.