Commission for
Communications Regulation

Response to Consultation

Future Spectrum Availability For Programme Making & Special Events

Wireless Microphones/IEMs & Wireless Cameras

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1 Executive Summary

This document is a Response to Consultation 10/37[1], which considered future spectrum availability for Programme Making and Special Events (PMSE).

ComReg recognises that the PMSE sector plays an essential role in enabling state-of-the-art coverage of high-profile public events in Ireland. The PMSE sector is allocated spectrum on a secondary and temporary basis. ComReg needs to balance the demand for this PMSE spectrum against the demand by alternative users for primary access to these bands to offer innovative services.

Over the coming years, ComReg intends to make available crucial spectrum in the UHF band (470-862 MHz) and in the 2.3 GHz band for use by new electronic communication services (ECS) services on a primary basis. As a result, the PMSE sector may face a reduction in available spectrum in these particular bands.

In Consultation 10/37, ComReg consulted on possible alternatives to using spectrum in 790 – 862 MHz band for PMSE. In particular, Wireless Microphones and In-ear Monitor (IEM) equipment is currently licensed in this band. Certain respondents indicated there to be significant demand for the use of Channel 38 (606 – 614 MHz) as a replacement for spectrum which would be unavailable to PMSE in 790 – 862 MHz. Certain respondents also expressed interest in access to interleaved spectrum. In relation to this matter, ComReg has considered the Department of Communications Energy and Natural Resources (DCENR's) National Policy Framework[2] on in identifying spectrum for Ireland's Digital Dividend. This policy framework suggests that PMSE continues to be facilitated in the interleaved spectrum after analogue switch-off. In addition at the European level, the European Conference of Postal and Telecommunications Administrations (CEPT) has considered this matter through the work of the Electronic Communications Committee's Task Group 4 (ECC TG4). ECC TG4 has proposed several suitable bands for use by PMSE following digital switchover and its proposals are set out in the CEPT Report 32[3]. Of the proposals set out in Consultation 10/37, respondents in the main favoured the use of the 11 MHz FDD "Duplex Gap". However, the adoption of the FDD duplex gap for PMSE post-switch-off will depend on whether a TDD or FDD scheme is employed in Ireland. Of the other proposals set out in Consultation 10/37, respondents considered these to be less attractive due to lack of equipment and/or other compatibility issues.

Based on ComReg's careful consideration of the reasons provided by certain respondents and ComReg's view that it would be appropriate to use a replacement

[1] http://www.comreg.ie/_fileupload/publications/ComReg1037.pdf

[2] http://www.dcenr.gov.ie/NR/rdonlyres/5962FB63-6F77-49F9-BD65-A7B1A76036F2/0/DevelopmentofaNationalPolicyFrameworkforIdentifyingSpectrumfortheDigitalDividend.doc

[3] http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP032.PDF

channel aligned with the UK's channel for PMSE, ComReg intends to allocate **Channel 38**, in place of channel 69, for future Wireless Microphone/IEM licences. In particular, this proposal echoes a similar step taken in the UK and thereby should ensure similarity between the availability of such equipment in the two markets.

In relation to the matter of future availability of interleaved spectrum, ComReg considers that it is too early to identify this spectrum at this time. Future consultations will determine how interleaved spectrum might be made available after the digital switchover.

ComReg proposed in Consultation 09/49[4] to release spectrum in the 2.3 – 2.4 GHz band for new ECS. Bearing in mind that the majority of Wireless Camera transmissions are currently licensed in the 2.2 GHz and 2.3 GHz bands, there may be a reduction in the future availability of this spectrum for Wireless Camera transmissions. This matter was also considered in Consultation 10/37 and various options in relation to the future availability of this spectrum for PMSE were set out. Although certain respondents indicated an interest in retaining some spectrum in the 2.3 GHz band, they did not clearly specify how much of the band should be retained. Certain respondents also expressed an interest in securing spectrum in WiCam Bands A (2025 – 2110 MHz) & B (2200 – 2300 MHz) in the greater Dublin region. In addition, there appeared to be a strong demand for access to the U6 & L7 bands. Some respondents did however express concerns in relation to existing high-availability microwave links in these bands and the potential for interference to occur. Based on respondents' views, there appears to be very little demand for access to WiCam Band D (10.3 – 10.5 GHz).

Based on ComReg's careful consideration of the reasons provided by respondents, and its own views, ComReg intends to continue to make available the band **2010 – 2025 MHz** for Wireless Camera assignments until further notice. This band is designated to Universal Mobile Telecommunications system (UMTS) but is currently unoccupied. In addition, **WiCam Bands A (2025 – 2110 MHz) and B (2200-2300 MHz)** will continue to be made available for PMSE in the greater Dublin Area. These bands will continue to be available for PMSE on a secondary basis outside of Dublin. **The U6 (6.425 GHz – 7.125 GHz) & L7 (7.125 – 7.425 GHz) bands** will be opened for Wireless Cameras (including temporary point-to-point video links) on a non-interference, non-protected basis. Interleaved spectrum will however be severely restricted in U6 due to the large number of existing point-to-point microwave links in this band. The amount of interleaved spectrum (if any) that will be available in the upper 70 MHz of the 2.3 GHz band remains to be determined by a future consultation on the use of that band.

In conclusion, ComReg has identified alternative spectrum for PMSE users. However, some additional matters relating to spectrum availability in the 470 – 790 MHz and 2.3 GHz bands remain to be addressed in future consultations.

[4] "Release of Spectrum in the 2300 – 2400 MHz band"- http://www.comreg.ie/_fileupload/publications/ComReg0949.pdf

The rationale for ComReg's decisions in relation to this Consultation are set out in more detail below and the related policy decisions are briefly summarised in the Next Steps section at the end of this document.

2 Introduction

ComReg published a consultation on Future Spectrum Availability for PMSE (Consultation 10/37) on April 27th 2010. The purpose of Consultation 10/37 was to consider and consult upon current and possible future availability of radio spectrum for PMSE. This Response to Consultation focuses on addressing the issues raised in Consultation 10/37.

This document summarises the views of respondents in relation to the Consultation issues and sets out ComReg's considered view on these matters. In addition, we outline our position and the actions that we may need to take in response to the points raised by respondents.

2.1 List of Respondents:

There were 8 respondents to the Consultation and ComReg is grateful to all respondents for their input.

- Mr. Amir Carmel (sole trader, PMSE sector);
- Broadcast RF Ltd;
- Eircom/Meteor;
- Orbital Sound Ltd;
- Mr. Paul Hope (cameraman, PMSE sector);
- Safety & Communications Ltd;
- TV Mobiles Ltd; and
- Vodafone Ltd.

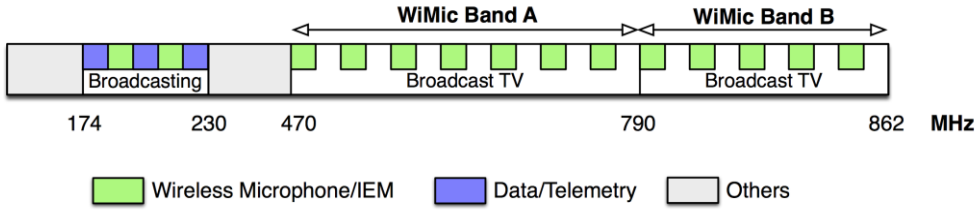
A copy of all non-confidential responses received will be available on ComReg's website[5]. A summary of the views of respondents and ComReg's considered views are set out in the next section.

[5] See ComReg document 10/68s

3 Wireless Microphones/In Ear Monitor systems

In this document, the following terms are used to refer to spectrum in the 470 - 862 MHz band:

- WiMic Band A: 470 – 790 MHz; and
- WiMic Band B: 790 – 862 MHz.



Under the current arrangements in Ireland, WiMic Bands A and B are assigned on a secondary basis for Wireless Microphones and IEMs. These arrangements will continue to apply until the Analogue TV switch-off (ASO) occurs. However, these arrangements must be considered strictly temporary.

The implementation of ECC Decision (09)03[6] on harmonised conditions for mobile/fixed communications networks (MFCN) operating in the band 790 - 862 MHz will severely restrict the available spectrum in WiMic Band B for Wireless Microphones/IEMs. In addition, contention in WiMic Band A is set to increase as digital broadcast transmitters make more efficient use of the spectrum, leaving fewer gaps than the current analogue transmitters.

As a result of all of these factors, it will become difficult to find alternative spectrum for PMSE applications with sufficiently low risk of interference. Any such interference would reduce the audio quality of Wireless Microphone/IEM transmissions and affect the integrity of primary services in the band.

The background to this issue is discussed in more detail in Consultation (10/37), Section 5. The following sections of this document detail proposals made by ComReg for alternative Wireless Microphone/IEM spectrum, along with views expressed by respondents.

3.1 After Analogue Switch-off

CEPT report 32 of Task Group (TG4) identified the following bands as possible "additional" spectrum bands for Wireless Microphones/IEMs:

1> VHF Band III (216 – 223 MHz);
2> Mobile/Fixed Communication Networks(MFCN) Frequency Division – Duplexing (FDD) 11 MHz Duplex Gap (821 – 832 MHz);
3> The "L" band (1452 – 1559 MHz);

[6] http://www.erodocdb.dk/Docs/doc98/Official/Pdf/ECCDec0903.pdf

4> 1800 – 1805 MHz in conjunction with 1785 – 1800 MHz.

ComReg sought views from interested parties on which of the above bands would be suitable for future spectrum access to PMSE as follows.

Q. 1. Which (if any) of bands 1-4 listed above should ComReg consider for wireless microphone/IEM applications in the future? Please set out the reasons for your answer. Is the necessary equipment currently available or about to become available?

3.1.1 Views of Respondents

A majority of respondents supported option 2, the proposed MFCN (FDD) 11 MHz Duplex Gap, as the most appropriate and viable solution after the analogue switch-off. A number of reasons were provided to support this:

- New equipment is on the market for this band;
- Existing equipment already covers this band; and
- The duplex gap would offer long-term secure spectrum.

One respondent suggested that the technical conditions listed in ECC Decision (09) 03 might not provide sufficient protection against interference to mobile links from PMSE. This respondent proposed that a guard band adjacent to the mobile uplink band would be necessary to protect base stations from out-of-band emissions from microphones. Furthermore, it recommended limiting high power radio links to the centre of the duplex gap.

Only one respondent opposed option 2, stating that this band will be too small and is liable to be "very noisy".

In relation to option 1, VHF Band III (216 – 223 MHz), it was submitted that this option could be considered provided equipment would be manufactured. However, its availability would require further investigation. One respondent also opposed this option stating that the band would be too small, is remote and would require overly long antennae.

Opinion on options 3 ("L" Band) & 4 (1800 – 1805 MHz in conjunction with 1785 – 1800 MHz) was uniform among all the respondents. Certain respondents expressed several concerns about these bands which would make them unattractive for PMSE, including:

- The band frequencies are too high for usable propagation characteristics;
- There is a lack of available equipment for these bands; and
- These bands are not under serious consideration by equipment manufacturers.

One respondent suggested that any decision taken by ComReg for these bands should take into consideration technical compatibility and equipment availability.

3.1.2 ComReg's Position

ComReg agrees with the views put forward by those respondents which favoured option 2. ComReg notes that certain respondents expressed concern about interference between the MFCN downlink/uplink and PMSE in the proposed FDD duplex gap. ComReg considers this issue would be addressed by use of the appropriate technical conditions for PMSE in the FDD duplex gap, which are set out in ECC Decision 09(03) Annex 3 § 3. For example, provided that these conditions are adhered to by both MFCN and PMSE operators, ComReg is satisfied that both can co-exist without interference.

In addition, ComReg agrees with the views provided by certain respondents in relation to the need for PMSE equipment to be available in order for options 1, 3 and 4 to be viable. ComReg considers that it would be inappropriate to make spectrum available to PMSE if there was no equipment likely to be available for the band. Due to the ongoing research and compatibility studies at CEPT[7] and industry levels, ComReg believes that it is too early to set out its final position on the future availability of spectrum for PMSE as set out in options 1, 3 and 4. However, it currently considers that the lack of available equipment makes these options unsuitable for the foreseeable future.

Accordingly, ComReg will continue to license spectrum in 821 – 832 MHz to PMSE users until ASO occurs and the future use of these frequencies for ECS is considered. For example, the adoption of the FDD duplex gap for PMSE post-switch-off will of course depend on whether a TDD or FDD scheme is employed, the level of demand for spectrum in this band and on other future technical considerations. In the event of a TDD arrangement being employed in the future, the 7 MHz guard band (790 – 797 MHz) suggested in the ECC Decision (09) 03 may be considered by ComReg for PMSE uses based on the technical conditions specified in Annex 3, Section 3.1 of ECC Decision (09)03.

3.2 Future Spectrum for Wireless Microphones/IEMs in Ireland

3.2.1 Channel 38 (606 – 614 MHz)

Currently, most Wireless Microphone/IEM assignments are in Channel 69 (854 – 862 MHz). However, as per the ECC (09) 03 decision, spectrum in 790 – 862 MHz will be allocated for other MFCN services. The United Kingdom's communications regulator (Ofcom) recently made available Channel 38 as a replacement for Channel 69. ComReg sought respondents' views on whether a similar practice should be employed in Ireland as follows.

[7] Further information on the status of CEPT studies can be found at http://www.ero.dk/

Q. 2. In your view, should ComReg allocate Channel 38 exclusively to PMSE (as in the UK)? Please give reasons for your answer.

Q. 3. Would this Channel be sufficient to satisfy demand? Please give reasons for your answer.

3.2.2 Views of Respondents

In the main, respondents welcomed the idea of allocating channel 38 (606 – 614 MHz) exclusively to PMSE. They noted that it would be very practical to harmonise PMSE channels with the UK, especially to provide compatibility for companies travelling between both jurisdictions. They highlighted that a channel licensed in this way (as channel 69 is now) is a proven asset to all scales of use. Furthermore, it was submitted that Ofcom's decision of allocating channel 38 as a replacement to channel 69 should secure the commercial availability of wireless microphone equipment.

Certain respondents considered that for large-scale events – particularly those with a live TV component – the bandwidth available by channel 38 alone may not be sufficient (i.e. an available bandwidth of 8 MHz). One respondent questioned ComReg's analysis of spectrum usage presented on pp. 12-13 of Consultation 10/37. This respondent stated that although the bandwidth of the equipment is nominally 200 kHz per channel, up to 400 kHz separation is required between channels. It was further proposed by the respondent that a "Vastly increased channel spacing" would be always required in non-trivial systems to avoid intermodulation products. This respondent also considered that a large touring musical could often require in excess of 40 MHz of clear spectrum for radio microphones alone and that this would be five times the bandwidth offered by channel 38.

3.2.3 ComReg's Position

Historically, 38 (606 – 614 MHz) was never used for broadcasting in Ireland. This was due to international constraints which made it difficult to co-ordinate it for broadcasting. Previously in the UK, channel 38 was allocated to radio astronomy on a secondary basis. Recently, however, the UK revised their priorities for radio astronomy, re-allocating channel 38 exclusively to PMSE, as a replacement for channel 69.

Ireland is a small and open economy. In light of this and the potential for economies of scale of equipment manufacture and roaming of services, ComReg considers that spectrum for PMSE should be aligned with spectrum available for PMSE in larger European markets, as far as possible. The recent policy change by the UK affords Ireland the opportunity to re-consider how channel 38 is used. Accordingly, ComReg

agrees with respondents' views that channel 38 should be allocated exclusively to PMSE in Ireland.

ComReg believes that the amount of spectrum available should be enough for any small- to medium events, as defined on pp. 12 of Consultation (10/37). After ASO, the minimum amount of available spectrum should continue to suffice for such events. Obtaining sufficient spectrum for very large events will depend on how much interleaved spectrum remains at that time and since this has yet to be determined, it is difficult to estimate the peak spectrum availability for Wireless Microphones/IEMs at this stage.

3.2.4 Interleaved Spectrum

Interleaved spectrum is understood to be the spectrum not assigned to broadcasting in the digital terrestrial television (DTT) frequency plan, and which may be available in given areas without interfering with DTT. In this regard the concept of making some interleaved spectrum available for PMSE was also considered in Consultation 10/37. In particular, it was considered as a possible option for Wireless Microphones/IEMs which would be localised and low-power uses. In relation to this matter, ComReg sought respondents' views on whether this spectrum would be useful as follows.

Q. 4. In your opinion, would access to the interleaved spectrum in the DTT band plan on a non-interference, non-protected basis be useful for Wireless Microphone/IEM applications? If so, why?

3.2.5 Views of Respondents

Respondents' view on this was that any access in the 470-862 MHz range would be useful to them, for as long as possible. It was submitted that spectrum in this range is essential due to the availability of existing equipment and keeping PMSE in this range helps companies focus their resources on the acquisition of better equipment for the existing frequencies. One respondent commented that adopting a similar regime to the UK (i.e. allocating channel 38 along with interleaved spectrum) would be beneficial to the entertainment markets in both countries. Another respondent added that the increased robustness of DVB-T to interference compared to analogue TV makes interleaved spectrum in the DTT band plan suitable for PMSE.

3.2.6 ComReg's Position

With the ongoing development of a DTT frequency plan, the amount of interleaved spectrum available for other services (including PMSE) cannot be accurately determined at this time.

Based on the views of certain respondents, there appears to be both strong demand and widespread availability of equipment for this band. It therefore seems to ComReg that the availability of interleaved spectrum for Wireless Microphone/IEM

applications in the future should be considered once the DTT frequency plan is developed.

Furthermore, ComReg is cognisant of DCENR's National Policy Framework on in identifying spectrum for Ireland's Digital Dividend[8]. The Policy Framework sets out a number of National Policy objectives for Ireland's Digital Dividend and National DTT. In this regard, ComReg notes that the ongoing use of interleaved spectrum by PMSE services is facilitated in identifying spectrum for Ireland's Digital Dividend and ensuring that National DTT broadcasting spectrum requirements are accommodated.

In light of the above, ComReg proposes to continue to license PMSE in interleaved spectrum at least until ASO occurs. ComReg intends to provide further information on the availability of future interleaved spectrum for PMSE users in Ireland in further consultations.

3.2.7 863 – 865 MHz (Sub - Band)

This band is 2 MHz wide and is licence-exempt in Ireland and across Europe. To assess whether this band was used by the PMSE sector, ComReg posed the following question.

Q. 5. Is the sub-band 863 – 865 MHz suitable for PMSE? Are there any difficulties or issues with this band, such as interference or lack of available equipment?

3.2.8 Views of Respondents

Respondents' views indicate that this band is used extensively for PMSE on a small-scale, amateur basis – typically for indoor events. Equipment is readily available and low-cost, but the band has several drawbacks:

- the 2 MHz bandwidth can only support a very small number of microphones/IEMs;
- the band is used extensively for licence exempt communication by baby monitors, amateur wireless microphones and cordless telephones, leading to a significant risk of interference; and
- one respondent claimed that there is no guard band between the upper end of the proposed MFCN uplink (862 MHz) and the lower edge of the 863 – 865 MHz band.

One respondent recommended that any use of the 863-865 MHz band by wireless microphone/IEM applications should be subject to appropriate technical conditions to protect against interference being caused to mobile/fixed communication network services in the 790-862 MHz band in the future.

[8] Development of a National Policy Framework for identifying spectrum for the Digital Dividend, February 2009

Only one respondent considered the band not to be useful, stating that it was too remote from other usable spectrum (post-2012) to warrant consideration for PMSE use.

3.2.9 ComReg's Position

In relation to the concern expressed by some respondents in respect to interference and bandwidth, ComReg notes that, according to CEPT recommendation ERC/REC 70-03[9], the technical conditions set out would be enough to protect against interference to MFCN services. Also, there is in fact a 1 MHz guard band between the proposed MFCN uplink and the lower end of the 863 – 865 MHz sub-band.

In addition, responses to consultation indicate that this band is clearly very useful for small-scale indoor events.

In light of the above, this band will continue to be available for PMSE use on the existing non-interference, non-protection basis.

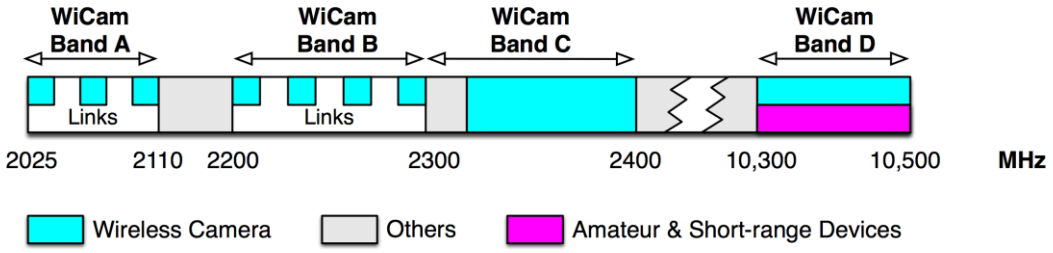
[9] http://www.erodocdb.dk/Docs/doc98/official/pdf/REC7003E.PDF

4 Wireless Cameras

In this document, the following terms are used to refer to spectrum in the 2 GHz and 10 GHz bands:

- WiCam Band A:2025 – 2110 MHz;
- WiCam Band B:2200 – 2300 MHz;
- WiCam Band C: 2300 – 2400 MHz; and
- WiCam Band D: 10.3 – 10.5 GHz.

Wireless Cameras are mainly assigned spectrum in WiCam Band C (2.3-2.4 GHz) in Ireland.



4.1 Future Spectrum for Wireless Cameras in Ireland:

As discussed in Consultation 10/37, the proposed award of 2.3 GHz spectrum ("WiCam Band C") for wireless broadband services will reduce the amount of spectrum available for future Wireless Camera applications. ComReg sought views of interested parties as to the level of interest in maintaining some 2.3 GHz spectrum for PMSE in the future, as follows:

Q. 6.	**In your view, is it important to maintain some spectrum in WiCam Band C (2.3 – 2.4 GHz) for future Wireless Camera applications? How much might be reasonably required? Please give reasons for your answer.**

4.1.1 Views of Respondents

Almost all respondents suggested that some spectrum be kept in WiCam Band C (2.3 – 2.4 GHz). Most respondents cited the fact that their current Standard Definition (SD) Wireless Camera equipment operates in the 1.9 - 2.5 GHz range. They explained that equipment can neither be upgraded nor modified to operate in other

frequency ranges. One respondent commented that until broadcasters upgrade to High Definition (HD) production, this SD wireless camera equipment would continue to be required to maintain current contracts. Therefore, from the perspective of certain respondents, retaining access to spectrum in the 2.3 GHz band would be desirable. However, these respondents did not clearly specify how much of the band should be retained.

One respondent opposed the retention of spectrum in the band for wireless cameras as it claimed that the upper 70 MHz of 2.3 GHz spectrum identified in Consultation 09/49[10] would already be congested due to the requirement for a guard band adjacent to 2.4 GHz. It was the view of this respondent that subtracting the guard band from this 70 MHz block would leave only barely enough spectrum to accommodate 3 – 4 operators deploying LTE / WiMax services. With respect to the lower 30 MHz of WiCam Band C, this respondent was concerned that the existing RurTel services be protected from interference. For these reasons, this respondent did not see scope for the retention of spectrum in WiCam Band C for PMSE.

4.1.2 ComReg's Position

ComReg understands PMSE users' concerns that spectrum in WiCam Band C be retained. It also acknowledges other respondents' views about spectrum allocation for new communication networks and existing RurTel services. Considering all of these factors, ComReg will continue to license the 70 MHz of spectrum for PMSE users until the 2.3 GHz spectrum competition occurs. As set out in Response to Consultation 09/76[11], ComReg will continue to protect RurTel services in the lower 30 MHz of the 2.3 GHz band. In geographical areas where RurTel services are not present, ComReg intends to license Wireless Cameras in the lower 30 MHz of the 2.3 GHz band until further notice. Retaining spectrum for PMSE in the upper 70 MHz of the band will depend upon the results of the upcoming 2.3 GHz spectrum competition.

4.1.3 ***WiCam Band A (2025 – 2110 MHz) & WiCam Band B (2200 – 2300 MHz)***

There are currently only a handful of short-distance Fixed Links in the Greater Dublin area which occupy these bands. ComReg sought respondents' views if these bands could be made available exclusively for Wireless Camera assignments as follows.

[10] "Release of Spectrum in the 2300 – 2400 MHz band"- http://www.comreg.ie/_fileupload/publications/ComReg0949.pdf

[11] http://www.comreg.ie/_fileupload/publications/ComReg0976.pdf

Q. 7.	**In your view, should ComReg consider making WiCam Bands A and B available exclusively for Wireless Cameras in the greater Dublin area? Please give reasons for your answer. (The bands could possibly continue to be available on a secondary, non-interference, non-protected basis for Wireless Camera assignments elsewhere in Ireland.)**

4.1.4 Views of Respondents

All respondents suggested that spectrum in both WiCam Bands A and B should be allocated exclusively to PMSE. The reasons given were broadly in line with those given for Question 6 above. In addition, one respondent stated that exclusivity would be good, and that they would need this spectrum for occasional point-to-point video links. Another respondent agreed with the proposal to allocate WiCam Bands A and B exclusively to PMSE in the greater Dublin area only if sufficient demand could be demonstrated. However, this respondent also supported the continuing allocation of WiCam Bands A and B to PMSE on a secondary basis in the rest of the country.

4.1.5 ComReg's Position

As outlined in Page 6 of Consultation 10/37, a "Wireless Camera" setup is broadly defined as either a portable or mobile camera with an integrated wireless transmitter or a temporary point-to-point link carrying a video stream. This therefore addresses the concern expressed by one respondent in relation to using this spectrum for occasional point-to-point video links.

Based upon the demand expressed by respondents, ComReg intends to license Wireless Camera setups in WiCam Bands A and B exclusively in the greater Dublin area. In the rest of the country, wireless camera setups will continue to be licensed on a secondary, non-interference, non-protection basis.

In the greater Dublin area, new long-term (non-PMSE) fixed point-to-point links will no longer be licensed in WiCam Bands A and B. However, the existing fixed links will remain until they are no longer needed.

*4.1.6 **WiCam Band D (10.3 – 10.5 GHz)***

Currently, this band is used for Wireless Cameras, short range devices and amateur services. ComReg recognised the low demand for assignments in this band and sought respondents' views on the reasons for this low demand as follows.

Q. 8. What, in your opinion, are the reasons for the low demand for Wireless Camera frequency assignments in WiCam Band D? Are there (for example) interference, propagation characteristic or equipment availability problems which affect this band?

Q. 9. Is there anything that could be done to increase the usage of this band?

4.1.7 Views of Respondents

The reason for low demand given by the respondents was that no manufacturers could offer a working system at these frequencies. Respondents indicated that this band is not suitable for professional use and the general equipment available at this range is for point-to-point links. It was also submitted that line-of-sight to the receiver is essential and accuracy of TX-to-RX alignment needs to be good.

One respondent commented that camera assignments in the 2 GHz band are more attractive than those in higher frequencies (such as the 7- or 10 GHz bands) due to propagation characteristics. In addition, it was noted that:

- wireless transmission in 2 GHz can be successful at lower EIRP, allowing for camera-mounted, battery-powered wireless transmitters;
- using higher-frequency bands requires increased transmit power;
- the higher EIRP causes a radiation hazard for the camera operator's head, requiring the transmitter to be located away from the camera and connected by a cable which reduces the cameraman's freedom of movement.

4.1.8 ComReg's Position

In the past, some assignments were made for Wireless Camera operations in 10.3 – 10.5 GHz band. Although there is not much demand for this band in particular for short – medium term events, ComReg believes that for large events when spectrum in 2 GHz bands is completely occupied use of the 10.3-10.5 GHz band could be useful. For this reason 10.3 – 10.5 GHz band will continue to be made available for Wireless Cameras.

*4.1.9 **U6 (6.425 GHz – 7.125 GHz) & L7 (7.125 – 7.425 GHz)***

U6 & L7 bands are currently used for microwave fixed links. ComReg consulted on whether these bands could be made available for Wireless Camera assignments similar to Wicam Bands A & B (where assignments would be made on a non-protected, non – interference basis, interleaved with fixed links) as follows.

Q. 10. Is there equipment available for use in the U6 and L7 bands for Wireless Camera applications? If so, should ComReg open these bands for such applications on a secondary, non-interference non-protected basis?

Q. 11. Apart from equipment availability concerns, do you foresee any other issues which may affect the operation of Wireless Cameras in interleaved spectrum within the U6 or L7 bands?

4.1.10 Views of Respondents

Respondents' views were divided into two groups. The first group (representing mainly PMSE users) noted that there is equipment available for use in both the U6 & L7 bands for wireless camera applications. They highlighted that equipment manufacturers such as Link Research and Gigawave have wireless camera systems available in the 6.8 – 7.5 GHz range. Some respondents commented that they have already invested in wireless camera setups operating in these bands. In addition, one respondent reports successful testing in Thomond Park, Limerick using a demonstration system in this frequency range. This group of respondents suggested that U6 & L7 are very useful bands to occupy when 2 GHz bands are completely occupied. One respondent specifically mentioned that, should an "international event like the Ryder Cup" come to Ireland again, that they would certainly like to use these 7 GHz wireless camera frequencies. Furthermore, if U6 and L7 were to be opened for use, then these operators indicated they would focus their future wireless camera investment in this band.

The second group of respondents (made up of parties operating fixed microwave links in the U6 and L7 bands) stressed that it is important that PMSE does not impact on other licensed users of spectrum. They recommended that PMSE should not be deployed in the U6 and L7 microwave bands. The reason given by the respondents was that many operators use these bands for high capacity point-to-point microwave links, designed for very high levels of availability (99.999%). According to one respondent, it would be "extremely difficult" to ensure that PMSE would not interfere with these microwave links if they were located in the same region. Another respondent suggested that strict technical conditions should be imposed on PMSE users to avoid the risk of interference being caused to fixed links.

Only one respondent expressed scepticism about the long-term availability of wireless camera equipment in the U6 and L7 bands.

With respect to Question 11, only one response was received and this respondent commented that – provided the bands are managed properly – there are no other issues affecting the operation of wireless cameras in U6 and L7.

4.1.11 ComReg's Position

ComReg notes the concerns expressed by operators of fixed point-to-point microwave links. As noted in Consultation 10/37 pp. 22, "great care would have to be taken to ensure that interference [is] not caused to any fixed links which might require quite strict technical constraints on the wireless camera equipment".

The U6 Band extends from 6.425 – 7.125 GHz. There are more than 200 fixed point-to-point links distributed across the country within this band. For this reason, contiguous spectrum for PMSE is not available. However, this band might be suitable for PMSE indoor events where the risk of interference is low. The availability of spectrum in this band for outdoor events will depend heavily on geographic location.

The L7 Band extends from 7.125 – 7.425 GHz and there are only a handful of fixed point-to-point links within this band. As a result, the amount of interleaved spectrum in L7 is considerably more than that available in U6.

Considering these factors and the views of respondents, ComReg intends to make available frequencies in the U6 band for interleaved access by PMSE only in the case where the event is indoors or located sufficiently far from existing fixed links. ComReg also intends to make available frequencies in the L7 band for interleaved access by PMSE users on a non-protected, non-interference basis, similar to WiCam Bands A and B.

4.1.12 ***Other bands:***

ComReg sought respondents' suggestions for any other bands that could be considered as a possible option for PMSE in the future as follows.

Q. 12. In your opinion apart from those listed above, are there any other bands which ComReg should consider for Wireless Camera applications in future? If so, please indicate what bands should be considered giving reasons for your answer.

4.1.13 Views of Respondents

Only one response was received to this question and this respondent commented that no other bands are "required" but that the 2.5 – 2.7 GHz band could be considered as an option.

4.1.14 ComReg's Position

ComReg has commenced a process to consider the future use and licensing options of this band (ComReg Document No. 10/38 and 10/58, 10/58s). A consultation on this matter will be issued in due course as there is currently an opportunity for interested parties to consider the inputs received by ComReg to date on the matter.

5 Next Steps

In this consultation response, ComReg has made clear its position on certain issues and its views on others. There are however certain areas in which ComReg has not finalised its positions or its views.

Having taken into account the views of respondents and the needs of other spectrum users, ComReg will adopt the following policy with regard to PMSE licensing:

- Channel 38 will be made available exclusively as a replacement to Channel 69 for Wireless Microphones and IEMs after the Digital Switchover occurs;
- The amount of interleaved spectrum available (if any) in the bands 470 – 790 MHz and 2330 – 2370 MHz will be determined in future consultations;
- In geographical areas in which RurTel services are not present, Wireless Cameras will be licenced in the band 2300 – 2330 MHz on a non-protected, non-interference basis until further notice;
- The U6 and L7 bands will be opened for Wireless Cameras (including temporary point-to-point video links) on a non-interference, non-protected basis. The use of interleaved spectrum will however be severely restricted in U6 due to the large number of existing point-to-point microwave links in this band;
- As mentioned in Consultation (10/37), Page 11, the 2010 – 2025 MHz band (designated for use by UMTS services) remains unoccupied. It will therefore be continued to be made available for PMSE assignments until further notice;
- WiCam Band A (2025 – 2110 MHz) and WiCam Band B (2200-2300 MHz) will be made available exclusively for PMSE in the greater Dublin Area. These bands will continue to be available for PMSE on a secondary basis outside of Dublin; and
- WiCam Band D (10.3 – 10.5 GHz) will continue to be available for Wireless Cameras pending any technological developments in the area.

ComReg will update the PMSE Guidelines Document (08/08) to reflect these policy developments in due course. There may additional updates to this document following the digital switchover, the analogue switch-off, the 2.3 GHz spectrum competition or any other relevant events.

Annex A – Glossary of terms

Term	Explanation
CEPT	European Conference of Postal and Telecommunications
DCENR	Department of Communications, Energy and Natural Resources
DTT	Digital Terrestrial Television
ECC	Electronic Communications Committee
ECS	Electronic Communication Services
EIRP	Effective Radiated Power
FDD	Frequency-Division Duplexing
HD	High Definition
IEM	In-Ear Monitor
LTE	Long Term Evolution
MFCN	Mobile/Fixed Communication Networks
MMDS	Multi-channel Microwave Distribution Service
Ofcom	The Office of Communications (UK Communications Regulator)
PMSE	Programme Making & Special Events
RX	Receiver
SD	Standard Definition
SRD	Short Range Device
TDD	Time-division Duplexing
TX	Transmitter
CEPT ECC TG4	ECC Task Group 4 “digital dividend”
UHF	Ultra High Frequency
UK	United Kingdom
UMTS	Universal Mobile Telecommunications System
VHF	Very High Frequency