Programme Making and Special Events

Strategy for video PMSE applications

Statement

Publication date: 28 October 2014

About this document

This document sets out Ofcom's strategy to ensure users of wireless cameras and video links in the programme making and special events (PMSE) sector continue to have access to sufficient spectrum to support their activities.

The strategy sets out long term access for video PMSE users to the 2 GHz to 2.3 GHz band, as well as greater use of spectrum in the 7 GHz band. This follows a likely reduction in spectrum available to these users after the proposed award of spectrum in the 2.3 GHz and 3.4 GHz bands in late 2015 or early 2016.

There will be continued access to the award bands where possible through coordination with new licensees in order to support major events.

As well as showing how these plans meet current demand, Ofcom has also published an independent study into technology developments in the PMSE sector and potential future demand. The conclusions of this study provide evidence that the long term needs of the sector can be met.

Contents

Section 1

Executive summary

1.1 This statement confirms our spectrum strategy for the video PMSE sector anticipating the reduction in spectrum available following the award of spectrum in the 2.3 GHz and 3.4 GHz bands in late 2015 or early 2016.

1.2 Our view of a sustainable long-term future for PMSE spectrum access for video link applications consists of three spectrum resources:

- PMSE allocation at 7 GHz which is the preferred resource;
- PMSE allocation at 2 GHz for applications that cannot be supported at 7 GHz; and
- Occasional borrowing of non-PMSE spectrum to meet specific demand.

1.3 On 19 February 2014 we consulted on technical coexistence issues for the planned Public Sector Spectrum Release of the 2.3 GHz and 3.4 GHz bands[1] (2350-2390 MHz and 3410-3480 MHz and 3500-3580 MHz). The bands are currently designated as Crown spectrum and are assigned to the Ministry of Defence (MOD).

1.4 The release of the 2.3 GHz and 3.4 GHz bands will reduce the number of usable 10 MHz channels available to video PMSE in the 2 to 4 GHz range from 33 to 19. This would consist of 10 channels available to any PMSE user on a bookable basis for individual events and nine channels which are currently exclusively allocated to news broadcasters (eight UK wide and one extra channel in London). Our analysis has shown that these 10 channels are sufficient to meet the requirements of 98% of events. In addition to the remaining spectrum available in the 2 to 4 GHz range there are up to 26 × 10 MHz channels available in the 7 GHz bands. Access to 7 GHz has been available for more than 15 years but users have traditionally favoured the spectrum in the lower bands and not made much use of 7 GHz.

1.5 We identified around 10 events with a demand that exceeds the 19 remaining channels available at 2 GHz meaning that even with access to the news channels, other mitigations would be required such as migration to 7 GHz or temporary access to other “non-PMSE” spectrum (borrowing).

We recognise the need for stability and security in the sector to enable investment in equipment for the future. We have therefore made provision for a rolling five year notice period of any changes to access to PMSE channels in the 7 GHz bands (7.110 to 7.250 GHz and 7.300 to 7.425 GHz) and in the bands 2.025 to 2.110 GHz, 2.010 to 2.025 GHz and 2.290 to 2.300 GHz.

1.6 We define arrangements to coordinate with new licensees in the 2.3 and 3.4 GHz bands for spectrum access to support peak demand events. Our analysis shows that demand for this additional spectrum is low and will only occur in exceptional cases.

[1] http://stakeholders.ofcom.org.uk/binaries/consultations/pssr-2014/summary/pssr.pdf

Section 2

Introduction

Background

2.1 Programme Making and Special Events (PMSE) refers to the use of wireless technology such as wireless cameras and video links ("video PMSE") and wireless microphones and in-ear monitors ("audio PMSE") in the production of multi-media content and live events.

2.2 In this document we confirm our strategy for supporting the long term spectrum requirements of the video PMSE sector. Our approach follows extensive stakeholder engagement and detailed analysis of the typical demand profile for a wide range of users.

2.3 Typically PMSE users share access to spectrum bands with other services where technical or geographic coordination allows them to co-exist. Among other bands, video PMSE applications currently use the 3.4 GHz band (and occasionally the 2.3 GHz band). Our analysis took account of the proposed award of spectrum in the 2.3 GHz and 3.4 GHz bands (2350-2390 MHz and 3410-3480 MHz and 3500-3580 MHz, the "PSSR award bands") under the Public Sector Spectrum Release (PSSR) programme[2].

2.4 We anticipate that the PSSR award bands will attract interest from mobile network operators planning to use the spectrum for high power 4G mobile, using technologies such as Long-Term Evolution (LTE). Such repurposing of spectrum to new users makes sharing much more challenging because of the increased interference risk.

2.5 We recognise the importance of the PMSE sector and we were therefore concerned to assess the impact of release on the overall amount of spectrum remaining available for video PMSE users and to ensure that these important services would continue to be supported.

Consultation

2.6 We described our video PMSE supply and demand analysis in Chapter 8 of the PSSR award consultation on technical co-existence issues published on 19 February 2014[3] (the "PSSR consultation").

2.7 Our analysis concluded that there would be sufficient spectrum remaining to support the majority of video PMSE use except for the top 10 peak demand events where we would need to mitigate a shortfall of spectrum.

2.8 We proposed that video PMSE users should have continued access to the PSSR award bands during roll out for up to five years. We have decided to allow coordinated access to the award bands where possible to support peak demand events and confirm our planned approach in this statement.

[2] The government's commitment to achieving the release of 500 MHz of public sector spectrum for civil use by 2020.
[3] http://stakeholders.ofcom.org.uk/binaries/consultations/pssr-2014/summary/pssr.pdf

2.9 We received seven responses to the questions raised on PMSE in the PSSR consultation. These are detailed in Annex 1 and have been taken into account in the body of this document.

Further demand analysis

2.10 The demand and supply analysis set out in the PSSR consultation was based upon current and previous use profiles. In our engagement with various stakeholders we did not receive any evidence to suggest that there would be a significant increase in demand for spectrum across major events beyond current levels. However, in order to provide greater assurance for our strategy in this respect we commissioned a study which was carried out by Cambridge Consultants. The focus of this work was to investigate whether new developments in production technologies or operational trends could lead to an increase in spectrum demand and hence challenge the ability of our strategy to meet it.

2.11 We discuss the Cambridge Consultants report later in this document and it is included in full as an annex. The conclusions of this study provide evidence that the long term needs of the sector can be met under our strategic framework.

Structure of this document

2.12 The rest of this statement is structured as follows:

- Section 3 sets out the video PMSE strategy;
- Section 4 details our decision and approach to providing ongoing access to the PSSR award bands;
- Section 5 provides a brief summary of the Cambridge Consultants report on technology evolution in the PMSE sector;
- Annex 1 details responses to the PMSE questions set out in the PSSR consultation;
- Annex 2 contains the Cambridge Consultants report “Technology Evolution in the PMSE Sector”

Section 3

Strategy

3.1 Our view of a sustainable long-term future for PMSE spectrum access for video link applications consists of three spectrum resources:

- PMSE allocation at 7 GHz which is the preferred resource;
- PMSE allocation at 2 GHz for applications that cannot be supported at 7 GHz; and
- Occasional borrowing of non-PMSE spectrum to meet specific demand.

3.2 The PMSE allocation at 7 GHz consists of two bands, 7.110 to 7.250 GHz and 7.300 to 7.425 GHz. A total of 260 MHz is available which is currently arranged as 26 channels of up to 10 MHz bandwidth.

3.3 With current technology, the preferred band at 7 GHz is better suited to portable wireless cameras, particularly where the transmission path is shorter and is not obstructed by trees or buildings. Typical applications include portable shoulder-carried cameras and for wireless links from remote cameras. In the longer term, we believe that a wider range of applications can be supported at 7 GHz as operational techniques are adapted and as new technological approaches are introduced.

3.4 The PMSE allocation at 2 GHz consists of two bands, 2.010 GHz to 2.110 GHz and 2.200 to 2.300 GHz. A total of 200 MHz is available which is currently arranged as 20 channels of up to 10 MHz bandwidth. In practice, the highest channel within the band 2.010 to 2.110 GHz is not considered to be usable due to interference from the adjacent band. Overall, there are 19 usable channels of up to 10 MHz bandwidth.

3.5 The spectrum at 2 GHz is required to support those PMSE applications which are not currently suitable for migration to 7 GHz. These typically include those applications where the transmission path is longer or may be liable to obstruction by trees and buildings. Examples include video links from helicopters and from motorbikes or other moving vehicles.

3.6 Occasional borrowing of spectrum from other (non-PMSE) spectrum holders has always featured in PMSE. The requirement for borrowing arises where there is an exceptional peak in demand such as at Formula 1 Grand Prix or simply where an overseas visitor's equipment is not compatible with UK PMSE allocations.

3.7 Our analysis indicates that the PMSE allocations at 7 GHz and 2 GHz can support the current and expected future demand of recurring events although borrowing additional spectrum for Formula 1 Grand Prix and exceptional events may still be needed.

Security of Tenure

3.8 We recognise the importance of a degree of stability and certainty over access to the remaining spectrum for wireless cameras for industry planning and investment.

3.9 At 7 GHz we appreciate that stability is especially important in supporting the migration of use from bands at 2 GHz to 4 GHz as investment will be needed to

increase the inventory of equipment held by users and hirers. Further, to broaden the scope of PMSE applications that can be supported at 7 GHz, the sector may also need time to adapt current operational techniques and to develop new technological approaches.

3.10 We believe that the assurance of continued PMSE access to 7 GHz until at least 2021 affords sufficient stability to support the migration of use from the bands at 2 GHz. This assurance is provided by a five year rolling notice period that will not be triggered before 2016.

3.11 At 2 GHz, stability for the remaining PMSE spectrum will enable the sector to adapt to the reduced overall availability of spectrum in the 2 GHz to 4 GHz band. Although 7 GHz is the preferred long term alternative, there may be use at 3.4 to 3.6 GHz that is not currently feasible at 7 GHz and these uses may move to 2 GHz.

3.12 We can confirm that we have been able to secure agreement with MoD for a rolling five year notice period for the band at 2.025 GHz to 2.110 GHz. A rolling five year notice period also applies to the band segments at 2.010 to 2.025 GHz and at 2.290 to 2.300 GHz.

3.13 For the 2.200 to 2.290 GHz band we are not yet able to confirm security of tenure as the MOD continue to work through their plans to reconfigure their own migration out of the award band at 2.3 GHz. However, our position remains as previously stated; both Ofcom and the MOD are clear that by the time of the award, we will need to have come to a formal position on tenure in the 2.200 to 2.290 GHz band in order to fully support our strategy for video PMSE.

3.14 We recognise the importance of occasional borrowing and have worked with MOD and other Government users to ensure their support for this continuing requirement. They have given assurance that they will continue to support loan access to their retained spectrum on the current basis.

Transitional arrangements

3.15 We also recognise the need to include transitional arrangements to provide continuity for PMSE operations until equipment is more widely available at 7 GHz.

3.16 We have implemented transitional arrangements by arranging temporary access for PMSE to additional spectrum from other spectrum holders. Additionally we confirm that access to the award bands may be possible through coordination with the new licensees to meet peak demand (discussed further in the next section).

3.17 We believe that temporary loan access to a quantity of up to seven channels of 10 MHz bandwidth in the 2 to 4 GHz band may be needed during a transitional period. This will enable demand to be met at some specific major events until it can be transferred to 7 GHz.

3.18 We have made available temporary access of up to 6 channels of 10 MHz at 1.98 to 2.01 GHz and at 2.17-2.20 GHz. This is available to Arqiva PMSE for immediate assignment to PMSE use as required where no suitable alternative solution from within PMSE spectrum can be achieved.

3.19 Further spectrum has been identified within the band 2.30 GHz to 2.35 GHz that can be accessed if necessary. In this case, the availability of spectrum is subject to coordination with other spectrum users and so its availability cannot be guaranteed.

Enhanced sharing

3.20 With a reduced overall pool of spectrum for PMSE, the current exclusive allocations to news broadcasters will represent an even more significant share and we do not consider this to be sustainable. Some of the eight channels allocated to broadcasters for day-to-day news reporting (nine channels in London) could be used to supplement the pool of spectrum available for event coverage since news broadcasters may not necessarily be operating at, or near, the event.

3.21 There is already some evidence of cooperative sharing of news channels at events. But our analysis indicates that more effective sharing of the spectrum allocated to news providers is essential to meeting the demand for 2 GHz spectrum. We do not believe current ad-hoc arrangements for accessing news channels are an effective and reliable solution at some of the biggest high profile events. As a consequence we will be meeting stakeholders to discuss how best to manage the requirements of news broadcasters and major events.

3.22 In order to make the best possible use of the available PMSE spectrum to satisfy requirements for both news applications and those of major events we have had initial discussions with stakeholders on a range of options to facilitate wider access to news allocations. The sector would like to see this resolved before the award and we can confirm that we will be engaging with stakeholders on this shortly to agree our approach.

Section 4

Continued access to the 2.3 GHz and 3.4 GHz Bands

4.1 In the PSSR consultation we discussed allowing continued access to the award bands for PMSE. We noted that there are differences between the 3.4 GHz and 2.3 GHz bands and highlighted that the 2.3 GHz band is not part of the current permanent PMSE spectrum inventory although it has been used as loan spectrum in the past. Our objectives were twofold:

- To continue coordinated access, to both bands, where possible to meet exceptional peak demand; and
- To explore whether more general access to the 3.4 GHz band during roll out of new services could be achieved in order to support the transition to other bands.

Supporting peak demand

4.2 We have decided that coordinated access will be arranged on a case by case basis with the award licensees. Our analysis of spectrum supply and demand shows that the requirement for additional spectrum outside the core PMSE bands is low and thus we expect these requests to be infrequent. Also as overall use of the 3.4 GHz band decreases we would expect fewer requests for access to this band over time.

4.3 We will request information on network deployments within a 10 km radius of the event, both already in use and planned to be transmitting during the event period (including temporary deployments). This information will be used to assess whether the spectrum is usable by PMSE and whether that use is likely to cause harmful interference to licensees' networks. This request will be made not later than six weeks before the event although it is likely that a request would be earlier. A response will be needed not later than four weeks before the event to allow time to assess whether the spectrum can be used and to factor this into the event channel plan.

4.4 The request to new licensees will detail the information needed on all base stations within a 10 km radius of the event to carry out the compatibility assessment. The information required will typically be:

- Location of base station
- Transmitting frequency
- Bandwidth
- Radiated power (per sector if appropriate)
- Antenna height

Supporting the transition

4.5 Responses to the PSSR consultation were split between PMSE stakeholders who were supportive of allowing continued general access to 3.4 GHz in order to support transition out of the band and others concerned to limit the administrative burden on new licensees. In this respect there was support for allowing coordinated access for specified events only.

4.6 We accept that allowing ongoing access for all users until notified of roll out in a particular area would present a difficult and burdensome obligation on new licensees. We therefore considered how we might balance the above concerns by identifying a set of locations and events with a typically high concentration of 3.4 GHz use based on licensing records. However, our analysis showed upwards of 40 locations where ongoing access could ease the transition to a new band. Clearly this would still represent a significant burden on new licensees.

4.7 We also considered the fact that access to this band was for some time subject to withdrawal with three months' notice and that we have already indicated that users should seek alternative PMSE spectrum as soon as possible. In view of this we are uncertain how many users would benefit from ongoing access by the time of the award ie would not have already made alternative arrangements. Consequently we have decided not to allow ongoing access to the award bands.

Section 5

Identifying and meeting future spectrum demand

5.1 We commissioned a study by Cambridge Consultants to test our assumptions around anticipated growth in demand and the ability of our spectrum strategy to continue to meet that demand coupled with advances in technology.

5.2 The report is provided in Annex 2 of this statement and overall supports our view that:

- As the sector continues to innovate there will be a steady increase in spectrum demand;
- Advances in technology will help to meet this increased demand;
- Greater use of the 7 GHz band can be expected as more equipment becomes available and users develop ways of overcoming current constraints;
- Stability and security of tenure are key to future investment in equipment development.

Annex 1

Summary of consultation responses

A1.1 This annex provides a summary of comments received from stakeholders in response to our proposed Video PMSE strategy set out in Chapter 8 of our consultation on PSSR Technical Coexistence issues for the 2.3 GHz and 3.4 GHz band published on 19 February 2014, together with our responses to these comments. A total of seven responses were received to the PMSE questions posed in the consultation.

A1.2 The organisations from whom we received responses were:

- BBC
- BT
- EE
- Spectrum for Programme Makers Forum
- Telefonica
- UK Broadband
- Vodafone

Question 1. Do you agree that the available mitigations address the potential shortfall of spectrum for PMSE at major events and that no additional regulatory intervention is necessary to protect PMSE in frequencies adjacent to the award bands?

Stakeholder Comments	**Ofcom response**
Stakeholders broadly agreed that the mitigations presented would address the shortfall in spectrum and that no further regulatory intervention would be needed. The BBC and Spectrum for Programme Makers Forum expressed concern over the mechanism for re-using news channels at events where simultaneous event and news coverage would be needed.	We have discussed this issue to some extent with stakeholders but recognise we need to meet again. We intend to do this soon and are confident that an appropriate way forward can be agreed.

Question 2. Do you agree that PMSE should have some continuing access to spectrum in the 3.4 GHz band until new services are rolled out in an area?

Stakeholder Comments	**Ofcom response**
The BBC, Spectrum for Programme Makers Forum and Telefonica agreed there should be continued access. EE and Vodafone felt respectively, that this should be implemented with the least administrative burden and only for specific locations.	We have decided to allow coordinated access at specified locations to support peak events where possible. Our reasoning is set out in Section 4.

Question 3. Which option for the provision of information about the roll-out of new services is most the appropriate? Should the requirement to supply information apply only in designated locations?

Stakeholder Comments	**Ofcom response**
As with the previous questions there was support for continued access from the BBC and Spectrum for Programme Makers Forum. They saw utilising current demand data for specific locations as key. EE said it did not support coordination of individual base stations preferring a nominated list. BT felt that this should be agreed with the new licensee after the award.	We have decided not to allow ongoing access for all users but will seek coordinated access where possible to support peak demand events.

Question 4. Do you agree that any continuing access should be limited to five years from the award of new 2.3 and 3.4 GHz licences?

Stakeholder Comments	**Ofcom response**
EE, BT and Telefonica did not support continued access beyond the five year period. Conversely the BBC and Spectrum for Programme Makers Forum did not support the limit	We have decided not to allow ongoing access to the band. We do not propose to allow access to the 2.3 GHz band except through specific coordination in exceptional circumstances where roll out permits (this recognises that the band is not currently available for PMSE but that access is occasionally coordinated with the MOD in exceptional circumstances).

Question 5. Do you agree with our assessment that there is little incremental benefit in on-going PMSE access to the 2.3 GHz award band?

Stakeholder Comments	**Ofcom response**
EE and Telefonica agreed whereas the BBC and Spectrum for Programme Makers Forum felt the spectrum should be used where possible.	As this band is not part of the current portfolio for PMSE and since our demand analysis shows that the requirement for additional spectrum beyond the portfolio is generally low we have not made provision for on-going access to this band during roll out. However, as noted above, we do expect to use the band where roll out permits, for cases of exceptional demand on a case by case basis.

Annex 2

Technology Evolution in the PMSE Sector

A Report by Cambridge Consultants

Main report: http://stakeholders.ofcom.org.uk/binaries/consultations/pssr-2014/statement/cambridge-main-report.pdf

Annex: http://stakeholders.ofcom.org.uk/binaries/consultations/pssr-2014/statement/cambridge-annex.pdf