



Response to Ofcom Consultation: Award of available spectrum: 2500-2690 MHz, 2010-2025 MHz and 2290-2300 MHz

Background

JFMG Ltd manages the spectrum allocated for use in programme making, entertainment, special events and related activities. JFMG coordinates the use of spectrum, issues licences and collects licence fees on behalf of Ofcom. JFMG has successfully managed spectrum for Ofcom (previously Radiocommunications Agency) since 1997.

In the UK, the professional use of radio for programme making and entertainment purposes is referred to as Programme Making and Special Events (PMSE). PMSE applications include:-

- Broadcast television studio production
- Broadcast television and radio coverage of news, sport or other public events including state occasions
- Theatre and touring shows
- Music and other entertainment productions
- Conferences, and corporate presentations and events
- Making advertisements and promotional material
- Production for multi-media and webcasting
- Movie film productions
- Public address systems at events and places of worship

Consultation Questions

Question 1): *Do you agree with these proposals for the awards of the three bands or have any other comments on the contents of this document?*

Programme makers currently make significant use of the spectrum band 2500 – 2690MHz and additionally the bands adjacent to 2010 – 2025MHz and 2290 – 2300MHz. Uses include wireless cameras and temporary links, both mobile and portable. Over a period of several years the programme making industry has been aware that their arrangements to use the band 2500 – 2690MHz would be changing and there is now a 3 month rolling notice period for PMSE licensees to vacate the band.

Many users have therefore migrated into the bands 2025 – 2110MHz and 2200 – 2290MHz, making significant investment in new digital wireless cameras and other digital links. The operational benefits of digital systems, particularly the reliability of digital links and their ease of deployment, have led to increasing demand for assignments and further demand has also come with the introduction of the first High Definition wireless cameras.

Programme makers already suffer compatibility difficulties with adjacent cellular (3G) base stations above 2110MHz (Figure 1). Despite taking mitigating measures the two adjoining 10MHz channels can become unusable to programme makers. The proposed spectrum award is liable to bring similar difficulties at a further three spectrum boundaries. Potential new services in the band 2500 – 2690MHz will result in compatibility issues with the remaining spectrum available to programme makers in the range 2450 – 2500MHz, particularly the 10MHz channel centred on 2495MHz. Additionally the proposals to award the bands 2010 – 2025MHz and 2290 – 2300MHz are liable to further impact programme makers, both being



adjacent to the existing PMSE bands 2025 – 2110MHz and 2200 – 2290MHz. The award of the spectrum under consideration in this consultation document therefore has a potentially serious impact on programme makers with the risk of adjacent channel interference into the remaining PMSE spectrum, as shown in Figure 2.

JFMG seek to protect existing PMSE users in adjacent bands. This spectrum is vital to a range of programme making activities including entertainment, sports and news coverage. The consultation document and its annexes address the adjacent channel issues relating to PMSE but rely upon a number of assumptions which JFMG seek to highlight and challenge, based on evidence of measurements made of current PMSE equipment and compatibility issues with existing 3G base stations above 2110MHz.

In summary, the award proposal relies upon:

- An over optimistic estimation of adjacent channel performance for PMSE equipment as the victim
- The proposal of an over optimistic mitigating filter solution for PMSE as the victim
- An under estimation of the typical PMSE receive antenna height as the victim

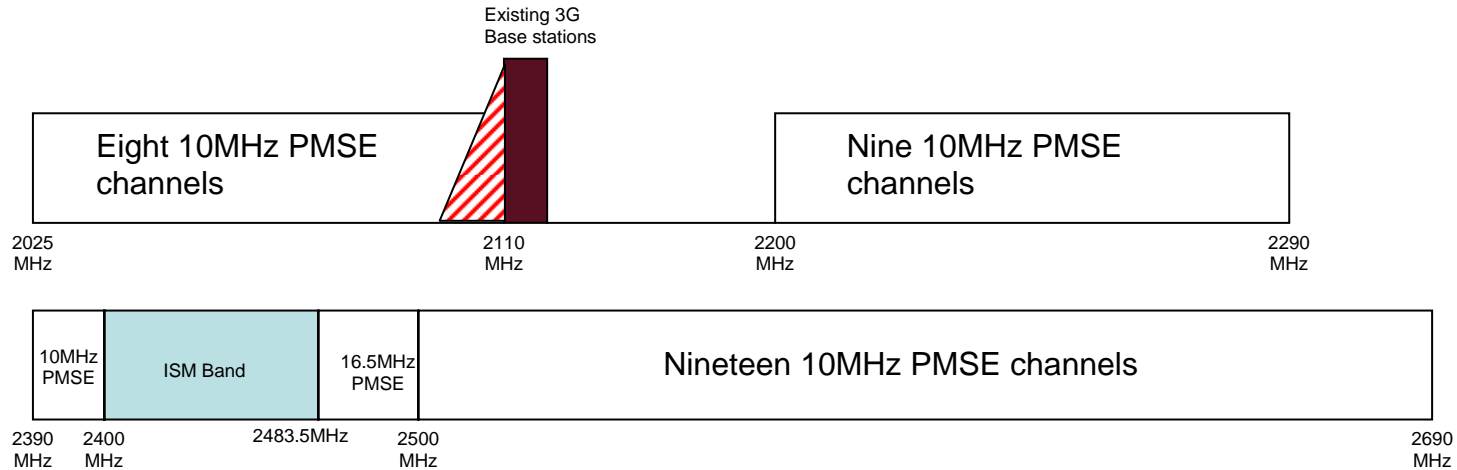


Figure 1: Existing Arrangements – shaded area shows existing impact on PMSE

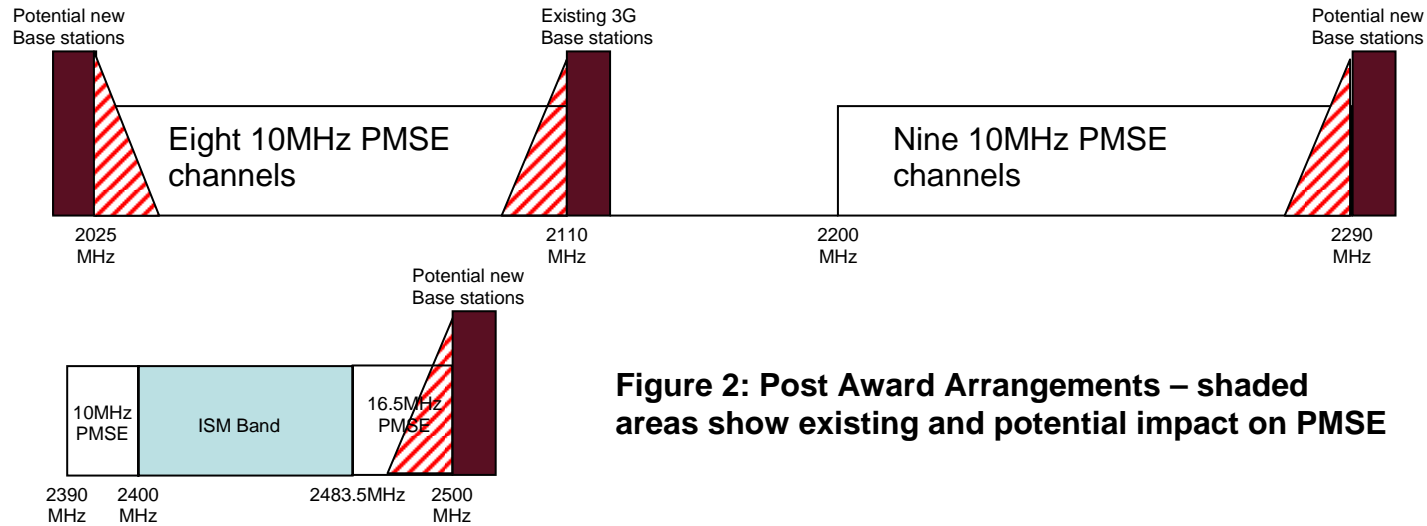


Figure 2: Post Award Arrangements – shaded areas show existing and potential impact on PMSE

Questions 2): *Do you agree with the analysis in section 5 or have any comments on adjacent interference issues?*

The spectrum to be awarded has three boundaries with remaining spectrum available to PMSE licensees. They are at 2025MHz, 2290MHz and 2500MHz. The serious impact of 3G base stations on PMSE channels below 2110MHz is already clear and it is imperative that compatibility between PMSE and potential services at the three new spectrum boundaries is fully understood. Adjacent PMSE channels must not become unusable as unofficial 'guard bands' for new radio services in the awarded bands.

The analysis carried out by Ofcom and their consultants considered the potential for adjacent channel interference (ACI) between different systems that may use the three bands and between those systems and existing systems operating in adjacent spectrum.

Assumption of Adjacent Channel Sensitivity of PMSE receivers

Table B1 in Appendix B of the Mason study characterises PMSE receivers for all of the considered applications to have a figure of 70dB for Adjacent Channel Sensitivity. The same figure is used for both a 10MHz offset and a 20MHz offset. The origin of these figures is not clear but given a typical PMSE COFDM signal the receiver is more likely to have an adjacent channel performance approaching that of an FDD base station. Measurements carried out on existing wireless cameras have suggested a figure of around 46dB for adjacent channel performance. Using a figure of 70dB in the analysis, equivalent to a TDD base station, is therefore significantly over optimistic.

Mitigation using a 30dB filter response

To further mitigate the interaction between PMSE and new adjacent services it is proposed to introduce additional filtering to protect the PMSE receiver from incoming interference. A figure of 30dB rejection is chosen in the Mason report, applying both for a 10MHz and 20MHz offset. Whilst the report appears to demonstrate compatibility with PMSE as the victim it also correctly states that filters with sufficient rejection will not permit adjacent channel working. Typical channel filter responses appear to offer no more than 6dB rejection for 10MHz. For a 20MHz offset filter rejection may approach 30dB but the adjacent 10MHz PMSE channel will have been sacrificed as an unofficial 'guard band'.

The experience of existing PMSE licensees, operating adjacent to the current 3G band below 2110MHz, supports this view. Interference characterised as intermodulation products and other receiver problems has been detected when operating close in frequency to the band boundary at 2110MHz. The temporary nature of PMSE links has made it difficult to analyse and clearly identify the source of the difficulties in the past but the strong suspicion grew that 3G base stations were the cause. Operationally the fitting of filters is difficult given that PMSE installations are by their nature temporary and require to be quickly rigged. Prominent and semi-permanent receive sites are now being deployed by PMSE licensees and this has provided more evidence that adjacent 3G base stations are a significant source of interference. Filtering is being developed and practical filters are being deployed. The responses of these filters, which achieve 30dB rejection of adjacent 3G base stations will be comparable with those proposed for the new adjacent channel relationships. Their responses show that to achieve 30dB rejection of adjacent channel 3G base stations the filter response also rejects the first adjacent PMSE channel. The second adjacent channel is also subject to filter attenuation and its performance compromised. The spectrum award as proposed will therefore result in the loss of a further three 10MHz PMSE channels, namely those centred on 2495MHz, 2030MHz and 2285MHz.



Victim PMSE receiver parameters

The analysis in the consultation document characterises antenna heights for radio cameras and Portable and Mobile links at 1.5m for both victim and interferer. This is incorrect given that typically radio camera receive antennas are located in prominent locations. Some semi-permanent installations can in fact be located on high buildings or gantries. Portable and Mobile links are also routinely deployed with significant receive and transmit antenna heights, potentially much greater than 1.5m. Consequently radio camera and link receivers will be significantly more vulnerable to adjacent channel interference than stated in the Mason compatibility analysis. Additionally new adjacent services will be more vulnerable to programme makers' link transmissions.

Other comments on the Summary section of the Mason report

To mitigate further adjacent channel interference to radio camera receivers two measures are proposed, namely use of a more directional receive antenna and more closely positioning the camera to the receiver. Applying these measures would severely restrict the operation of programme makers. Often the location of the receive antenna is less than ideal, close to the action yet it needs to overcome local clutter. More directional receive antennas will restrict the area of operation, particularly if the distance between transmitter and receiver has also been minimised.

Question 6): *Do you agree Ofcom should aim to award the bands 2500-2690 MHz, 2010-2025 MHz and 2290-2302 MHz by the end of 2007, while keeping the position on the 2.6 GHz and 2010 MHz bands under review in the light of possible developments in European regulatory fora?*

The award of the three bands should only take place once the compatibility with adjacent PMSE services is accurately characterised.