London 2012 Olympic Games and Paralympic Games

British Entertainment Industry Radio Group (BEIRG):

Response to draft spectrum plan

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Introduction to BEIRG

BEIRG is an independent, not-for-profit association that works for the benefit of all those who produce, show, distribute and ultimately consume content made using radio spectrum in the UK. Productions that depend on radio spectrum include TV, Film, Sport, Theatre, Music, Newsgathering, political and corporate events, and many others.

Comments on draft spectrum plan

Question 15. Do you have any comments on our assessment and proposals for wireless microphones and IEMs?

1. BEIRG agrees that 'most, if not all'[1] wireless microphones and in-ear monitors (IEMs) will need to be accommodated in UHF bands IV and V. This is supported by BEIRG's responses to the cleared[2], geographic interleaved[3] and band manager award[4] consultations. It is supported by the CSMG report, which states that '*nearly all equipment today is analogue and operates in UHF bands IV and V*'[5], '*UHF bands IV and V spectrum will remain critical to many PMSE users through to the medium term (2012-2018)*'[6] and '*analogue technology will remain the preferred choice of many PMSE users (over this time frame)*' [7]. It is also supported by ETSI (European Telecommunications Standards Institute), which concluded in technical report TR 102 546 that '*the combination of antenna size, equipment size and propagation characteristics mean that UHF spectrum is the only solution for practical PWMS applications in the vast majority of scenarios*'.

2. Ofcom has stated that up to 350 wireless microphones and a further 100 in-ear monitors (IEMs) will need to be accommodated in the Olympic Stadium during the opening ceremony of the London Olympic Games[8]. It is BEIRG's firm view that this will not be possible unless the cleared spectrum in channels 31-35, 37 and 61-69 are held back from new use and therefore available for wireless microphones and IEMs. Indeed, we do not share Ofcom's confidence that this number of applications will be able to be accommodated in UHF bands IV and V even if the cleared spectrum is held back from new use. Having said that, the additional 16 channels[9], comprising 128 MHz of spectrum, would make it much more likely that the total 450 devices could be accommodated.

3. Ofcom has stated that '*some 40 channels – each of 8 MHz, so totalling up to 320 MHz – could be available, particularly if we hold back rights of new use of the spectrum that will comprise the UK's digital dividend until after digital switchover (DSO)*'. This is inaccurate. If DSO is complete in London by the Olympics then 40 channels (320 MHz) could **only** be available if the cleared spectrum is held back from new use. In addition, these channels must be held back until after the Olympics and Paralympics and not just 'until after digital switchover'. If these channels are not reserved for PMSE, then only 192 MHz could be available into which up to 450 applications would need to be 'squeezed'. It is our firm view that this is neither feasible nor realistic.

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[1] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.4
[2] http://www.ofcom.org.uk/consult/condocs/clearedaward/responses/beirg.pdf see 1.8.5 – 1.8.6.
[3] http://www.ofcom.org.uk/consult/condocs/ddrinterleaved/responses/beirg.pdf see 1.6.v. – 1.6.vi
[4] http://www.ofcom.org.uk/consult/condocs/bandmngr/responses/beirg.pdf see 5.16. - 5.18
[5] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 3
[6] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 12
[7] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 12
[8] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.6
[9] Including channel 29, which is labelled as 'available if held back from new use' on table 6.

4. Ofcom has stated that 'London will switch over from analogue to DTT in April 2012'[10]. This timescale must be strictly adhered-to. If DSO is not complete in London by the start of the Olympics then the spectrum that will comprise the UK's digital dividend (channels 31-35, 37 and 61-69) will not be clear of analogue television and hence a significant proportion of those channels would not be available for wireless microphones. In this case, it would in all likelihood not be possible to accommodate the requisite number of wireless microphones and IEMs in the Olympic Park for the opening ceremony.

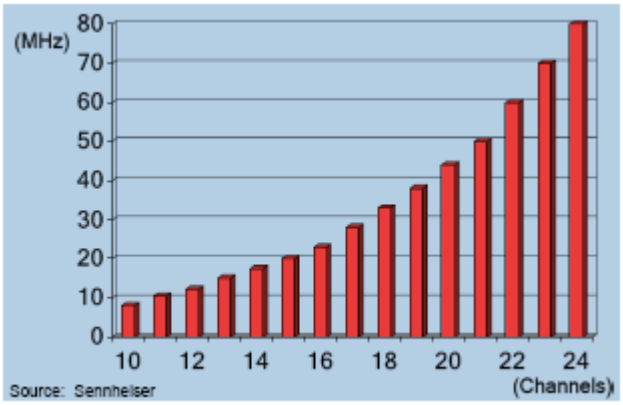
5. Ofcom has stated that '*accommodating a peak of 350 wireless microphones and 100 IEMs at the Olympic Park would require an average of 11 to be supported in each available channel*'[11]. More accurately, if 40 channels were fully available then 11.25 wireless microphones and IEMs would need to be accommodated in each individual channel. We believe that this is extremely optimistic and doubt that it is possible. If the digital dividend spectrum is not available (i.e. only channels 27 and 38-60 is) then nearly 19 wireless microphones and in-ear monitors will need to be 'squeezed' into each individual channel. We do not believe that this would be possible.

6. Ofcom has stated that '*we understand that 16 microphones per channel are routinely realised by some UK users, while a maximum of 23 microphones per channel was achieved during the London stages of the 2007 Tour de France*'[12]. It is not clear where Ofcom got this information from[13], what evidence there is to support it, the specifications of the equipment used, the proximity of users and the environment. For its part, BEIRG is extremely surprised by these figures and do not believe that it is realistic to extrapolate these to apply to Olympic Events. As BEIRG has explained in previous consultation responses, around 8 wireless microphones would typically fit into an 8 MHz TV band[14] (particularly for professional productions) at the same venue, with around 12 as a maximum.

7. The CSMG Report states that '*Digital equipment manufacturers claim that, for an isolated 8 MHz TV channel, digital wireless microphones can accommodate 10-16 transmitters (compared to a typical range of 8-12 for analogue systems*[15]. However, in practice it is not clear that these 'efficiencies' are realised. It is understood from JFMG data that one West End production using digital equipment in a theatrical show employs 32 digital wireless transmitters using a total of 40 MHz of spectrum[16]. This is less than 7 wireless microphones per channel.

8. Whilst it may be argued that digital systems are less susceptible to intermodulation distortion and hence can have multi-channel advantages, any improvements in spectral efficiency (if at all) are likely to come at the expense of audio quality and latency. This is confirmed by the CSMG Report[17]. As we presume that event production in the Olympic Park will need high-audio quality and stable, reliable transmission without latency, we strongly believe that analogue will be the preferred technology. The following chart from the CSMG report[18] provides an indication of bandwidth required for analogue to avoid intermodulation distortion:

[10] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.7
[11] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.10
[12] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.10
[13] We presume that Ofcom would use the JFMG licensing database to confirm that 16 microphones are 'routinely' realised in a single channel and 23 microphones per channel was achieved during the Tour de France. If this is the case then we would welcome confirmation.
[14] http://www.ofcom.org.uk/consult/condocs/clearedaward/responses/beirg.pdf section 1.3
[15] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 40
[16] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 40
[17] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 40
[18] http://www.ofcom.org.uk/radiocomms/ddr/documents/wirelessmics.pdf page 24



9. The chart above further demonstrates the extent to which Ofcom's assumptions for how many wireless microphones can fit into an 8 MHz channel are extremely questionable, particularly as they have not taken into account the type of equipment that is likely to be used (high-end analogue equipment). Ofcom must clearly gain a much better understanding of the limits to efficient use of UHF Bands IV and V by wireless microphones and IEMs.

10. Ofcom has said that '*it may be possible to interleave wireless microphones and IEMs in the same channel without harmful interference between the two systems if they are deployed by different users*'[19]. It is not entirely clear what 'interleave' means in this regard. It is possible to deploy IEMs within the same 8 MHz TV band as wireless microphones. If the frequencies on which they are deployed are too close together, this is likely to result in 'blocking' from the IEM.

11. Table 6 of the consultation document shows channel 29 as 'available if held back from new use'. We do not understand why this is the case, since channel 29 does not constitute part of the digital dividend and it is apparently not being used for DTT post-DSO. We would therefore expect it to be awarded to the band manager with obligations to PMSE and hence to be available for wireless microphones and IEMs. We request that Ofcom explain why it is highlighted as such on the table. We also believe that with every channel removed from the allocation, the Government is less likely to be able to meet its commitments to the IOC.

12. Ofcom has neither detailed the forecast requirement for wireless microphones and IEMs at the other London venues nor spectrum availability so we cannot judge whether equipment demand will be able to meet spectrum supply at those venues. Whilst Ofcom has said that 'forecast requirement for wireless microphones and IEMs is significantly lower than at the Olympic Park'[20], we believe that it is risky to assume that this does not need to be consulted on, particularly as

    a. Spectrum availability is likely to be less due to increased use of DTT

    b. Ofcom's assessment of the ability to accommodate sufficient wireless microphones and IEMs at the Olympic Park is wildly optimistic

Question 9: Do you have any comments on our assumptions?

13. Ofcom's 'assumption IV' is that 'wireless equipment will be retuneable to some extent'. Whilst this is true, the extent to which it is retuneable is dictated by the type of equipment used and which bands they operate in. Typical high-end wireless microphones have a tuning range of 24 to 32 MHz.

14. Ofcom has assumed that **'**radiated power for all wireless equipment will be limited to the

[19] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.11
[20] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 6.9

minimum necessary to obtain required coverage' and 'wireless microphones will need 100 mW EIRP at most, with 50 mW EIRP sufficing in most cases'[21]. This is generally accurate (although some are available at 250mW EIRP and for some less than 50 mW is sufficient).

15. Ofcom has assumed that 'the bandwidth for wireless equipment will not increase' and 'wireless microphones will generally use 200 kHz channels'[22]. This is correct.

16. Ofcom has assumed that '*new technologies will need to be proven by the time of LOCOG's technology freeze in 2010 if they are to be relied on at the London Games*'[23]. We are aware that the Minister for the Olympics has stated that 'LOCOG's current expectation is to implement a lock-down on core Games technology by the end of 2010'[24]. BEIRG would welcome greater clarity on the date of implementation of the technology freeze and, indeed, what precisely is meant by 'technology'. For example, until definitive 'white space' maps detailing the post-DSO configuration and availability of interleaved spectrum are published, PMSE manufacturers will not be able to produce the equipment that will be required to fulfill the production requirements of the 2012 Games. Under current timescales, the 'white space' maps will not be available until after the international negotiations have concluded in mid-2010. Therefore, the required wireless microphones and IEMs (i.e. those that operate in post-DSO interleaved spectrum) may not exist until after the implementation of LOCOG's technology freeze. However, these applications will, generally speaking, not use 'different technology'; they will use the same technology but be designed to operate on different frequencies, but still within UHF bands IV and V, hence the requirement for clarity on what the 'technology freeze' actually means.

17. Ofcom has made an assumption that is not listed in section 4 of the consultation. BEIRG recognises that Ofcom has attempted to demonstrate how it intends to ensure sufficient spectrum availability to deploy the required wireless equipment for the 2012 Games. However, particularly in the case of wireless microphones and IEMs, Ofcom seem to be assuming, yet have not acknowledged the assumption, that sufficient equipment will exist to exploit the spectrum available. BEIRG has already made strong arguments about the risks posed by a phased release of the 800 MHz band with regard to the size of the pool of equipment available for the Olympics[25]. BEIRG's position on this has not changed.

18. As Ofcom's plan for ensuring that sufficient wireless microphones and IEMs can be deployed at Games venues are heavily reliant on a concentrated and well-coordinated deployment of these applications in the post-DSO interleaved spectrum, Ofcom must take all necessary steps to ensure that it is both possible and commercially viable for manufacturers to produce this equipment. For example, this would involve early clarity on which frequencies will be available for PMSE post-DSO and guarantees that the spectrum in question will remain available.

19. We believe that there is a 'key factor' missing from those that might trigger changes to the spectrum plan; this is the possible early release of the 800 MHz band (or indeed entire DDR cleared spectrum) prior to the Games.

Interference-management, coordination and 'business as usual' PMSE

20. We note that, with regard to the Olympics, Ofcom are taking their enforcement and interference management responsibilities extremely seriously, as evidenced by the following:

    a. considering a validation service for wireless transmitter equipment that will be used

[21] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 4.11
[22] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 4.12
[23] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 4.39
[24] Hansard **8 Oct 2008 : Column 636W**
[25] http://www.ofcom.org.uk/consult/condocs/clearedaward/responses/beirg.pdf see pages 23-28

within key Games venues[26]

b. considering the deployment of dedicated interference-resolution teams within key Games venues[27]
c. their recognition of the need '*to ensure the spectrum they (validated users) require is as free from unauthorised use and unwanted emissions as is reasonably practicable*'[28]
d. considering taking '*enforcement action, including removing equipment and prosecution*'[29]

21. In addition to these measures, which BEIRG welcomes, we believe that RF monitors will be needed in all Games venues for coordination and frequency management purposes. As an aside, BEIRG believes that Ofcom's prioritisation of their enforcement and interference management roles to the degree laid out in the plans for the Olympics should be the norm and not the exception. The deployment of PMSE equipment such as wireless microphones and IEMs on an unlicensed basis is extremely common and these devices often interfere and cause significant disruption to licensed users, and productions suffer as a result. This needs to be recognised and appropriate action taken.

22. In their proposals for interference management, Ofcom has not taken into account the need to ensure that absolutely no interference is caused to existing and planned applications required for the production of the Olympics by 'cognitive devices'.

23. Ofcom must take any and all necessary measures to ensure that any disruption to 'business-as-usual' PMSE users is kept to an absolute minimum. As it would not be fair for these users to bear the financial burden of any disruption incurred, we believe that these costs should be met by the Government.

[26] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 13.16
[27] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 13.18
[28] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 13.17
[29] http://www.ofcom.org.uk/consult/condocs/london2012/london2012.pdf section 13.19