BBC Response to
London 2012 Olympic Games and Paralympic Games
Draft Spectrum Plan

Introduction

The BBC welcomes the opportunity to respond to this consultation. Whether or not sufficient spectrum will be available to cover the London 2012 Olympic Games and Paralympic Games ("the London Games"), how access to spectrum will be managed, and how usage will be 'policed' are issues of considerable importance to us.

We have been concerned for some time now about the future availability of spectrum used in newsgathering and in covering events of major cultural or sporting significance, including the London Games, in the light of Ofcom's programme of spectrum awards. We are therefore part of the Spectrum for Programme Makers Forum (SPMF), an industry body comprising broadcasters, news agencies, hire companies and equipment manufacturers, which seeks to ensure sufficient spectrum remains available for use by wireless microphones and wireless video cameras and, for the BBC, radio cars.

We are pleased that Ofcom has published details of the supply of spectrum available for the London Games. In the light of the continuing delays to Ofcom's programme of spectrum awards, this should in theory enable public examination of future spectrum availability before substantial amounts of spectrum are auctioned under long-term licences.

In practice, however, it is likely to be only OBS, the host broadcaster for the London Games, and LOCOG who will have an overview of aggregate demand and hence be able to meaningfully comment on whether the spectrum Ofcom has identified will be sufficient. (Rights-holding broadcasters such as the BBC are likely to only know the spectrum requirements of the coverage they provide directly themselves). This needs to be kept in mind when considering the BBC's response.

In addition, it may be some time before OBS and LOCOG have a definitive view of aggregate demand, given that many broadcasters will not yet have turned their attention to the London Games (given, for example, the Vancouver Winter Games in 2010). In the light of this, there needs to be sufficient scope to successively iterate over time estimates of aggregate demand, as more information becomes available.

There are three more points the BBC wishes to make before responding to the questions in Ofcom's consultation document.

Managing spectrum access

The first of these is with regards to how access to spectrum will be managed. We think that Ofcom's proposal to have separate band managers and application processes for spectrum covered by the Government's spectrum guarantees on the one hand, and spectrum not covered by the Government's guarantees (e.g. for "cultural events" and "business-as-usual" spectrum use) on the other, risks confusion for spectrum users, many of whom will be from overseas (and not have English as a first language). We would urge Ofcom to consider having a central, well-known site through which users apply for all spectrum that they wish to have access to, regardless of whether or not this is covered by the Government's spectrum guarantees.

Furthermore, we think that having two separate band managers will (inadvertently) impede efficient use of spectrum rather than promote it. This is because it will be more difficult for two band managers to coordinate spectrum use, including managing interference at band edges. Knowing this, spectrum users will tend to apply for more spectrum than they actually need, to maximise their chances of being granted access to sufficient usable spectrum.

Finally, we are concerned that Ofcom does not appear to be contemplating having JFMG/ its successor involved in managing access to the spectrum covered by the Government's guarantees. Managing access to this spectrum will be a huge, complex task, and JFMG has considerable experience of managing the spectrum needs of events of major cultural or sporting significance. (No-one else in the UK does). It would be disappointing if Ofcom's forthcoming award of a licence to operate as a band manager has effectively ruled-out JFMG's involvement in managing access to spectrum for large parts of the Games (as any new band manager is likely to be taking up its post at precisely the time its services are most needed for the Games).

Policing spectrum usage

The second point the BBC wishes to make is with regards to policing spectrum usage.

Based on our experience of operating at previous Games, testing equipment for compliance (and 'tagging' this equipment), and then monitoring performance at venues will be key to ensuring that quality coverage of the Games takes place with the minimum amount of spectrum necessary.

The BBC recognises the resource implications associated with monitoring performance in particular. However, it is unlikely to be necessary in practice to have large numbers of monitors 'on the ground' at every venue all of the time: having an unpredictable, highly-visible presence at venues which for example bans camera crews from events for 'bad' behaviour is likely to be sufficient to act as a deterrent to such behaviour.

Facilitating the availability of further spectrum for wireless cameras

Finally, the BBC wishes to comment on the possible availability of additional spectrum for wireless cameras. While we strongly welcome the efforts Ofcom has made to date to identify additional spectrum that could be made available for use for the duration of the Games by wireless cameras, particularly in the light of the forthcoming auction of 2.5~2.69 GHz (spectrum we currently use for wireless cameras) we remain unclear as to how access to this spectrum will be facilitated.

We would urge the Government to make this available as soon as possible, so that broadcasters can become familiar with operating in these frequencies and can have confidence that equipment which operates in these bands will be available in advance of the Games. Broadcasters also need to be sure that they can operate reliably in these bands (i.e. without suffering from undue interference), given that such bands are likely to be adjacent to spectrum to be auctioned in the near future (and hence it is currently unclear who their neighbours are and what impact their operations will have on wireless camera use).

Approach

Question 1. Do you have any comments on the three approaches we have taken to spectrum planning for the London Games?

The BBC agrees with an approach to assessing aggregate demand which uses both 'top-down' and 'bottom-up' analysis, as well as publicly-available information on demand for spectrum at large events.

We agree with Ofcom's statement in paragraph 3.7 "Examining demand at [past Games and comparable] events reveals a general increase over time as more extensive use is made of wireless services. It might therefore be reasonable to assume that demand at the London Games will be higher than at past Games. The large number of different competition venues that will be used for the London Games will exacerbate this trend."

We also agree with the statement in paragraph 3.11 "Despite its inherent difficulties, we expect the bottom-up approach to deliver the best assessment of demand at the London Games as it is most likely to capture factors unique to those Games." However, in order for a bottom-up approach to give an accurate assessment of aggregate demand, it will need to incorporate information from spectrum users who are currently focused on e.g. the Vancouver Games in 2010, once they turn their attention to the London Games, as Ofcom suggests in paragraph 3.10.

Question 2. Do you have any comments on the scope for reducing demand by using fibre-wireless networks within venues?

The BBC believes that the scope for reducing demand by using fibre-wireless networks within venues is limited, given that this approach is already standard for using wireless cameras inside venues. However, higher frequencies could be used if a more complex receive array were put in place (thereby reducing demand for lower frequencies).

Question 3. Do you have any comments on the scope for reducing demand by deploying a London-wide cellular receive system?

A London-wide cellular receive system seems unlikely to be suitable for the coverage of specific sport events for the host broadcaster, because the point of delivery for the feed will always be an OB van at the venue. The host broadcaster will normally require continuous, exclusive use of a camera feed, and the additional paths or 'hops' implied by this sort of system will add to latency and reduce resilience.

Such a system could be used for 'beauty shots', provided that the same shot is not continually required. It could also be used by rights-holding broadcasters and for news coverage of e.g. preparations and more general Games stories where locations are not tightly defined. However, any such shared facility would need to be carefully managed if users are to have confidence in it (and hence use it).

Such a system would need to have sufficiently large and enough cells, given that there will be considerable clutter (buildings etc) around Games sites. Section 6.7.9 of Analysys Mason's report (http://www.ofcom.org.uk/consult/condocs/london2012/wire_wireless.pdf) suggests a "booster amp" (1W) will be needed for a radius of operation of 2.5 kilometres.

Question 4. Do you have any other comments on the scope for reducing demand by relying more heavily on wired communications?

It is difficult to see further scope for reducing demand by relying more heavily on wired communications. Wired links are always preferred to wireless links where practicable, as they are more resilient, less costly, and do not require video compression (which tends to reduce quality): there is already an incentive to wired solutions where practicable.

Question 5. Do you have any comments on the scope for maximising supply by using spectrum more efficiently?

Careful attention should be paid to the out-of-band characteristics of the transmitter equipment used. Adjacent channel leakage (ACLR) ultimately

reduces the performance of wireless cameras deployed on a 10 MHz channelisation. This can be overcome by avoiding adjacent channel deployment, but spectrum congestion will usually prevent this. It is often preferable to back-off the PA in the radio transmitter, to reduce intermodulation products and ACLR, thus increasing performance for adjacent channel deployments. It should be noted, however, that not all equipment can be backed off in this way.

Particular attention should be paid to airborne transmitters as non-linear amplifiers radiating intermodulation products typically across 3 RF channels can create a large interference footprint.

Interference from 3G base stations into PMSE receive points is also a concern. There are no guard bands between PMSE assignments and 3G installations and this often results in reduced performance at the band edges. The OOB emissions from these may severely limit the performance of receivers, particularly in the 2.0 and 2.2 GHz bands. Care should be taken to site receive antennas to avoid line of sight propagation from 3G base stations.

Question 6. Do you have any comments on the scope for maximising supply by reusing spectrum efficiently?

The BBC believes that there is likely to be some scope for increasing spectrum supply via careful planning of spectrum re-use. We believe that Ofcom should draw on the expertise of JFMG in this area, given their considerable experience of frequency coordination within the UK.

To maximise opportunities for spectrum re-use, it is worth considering operation at reduced output power; there should be sufficient power for adequate fade margin for the particular application, but ideally no more than this. For example, a mobile 1W, radio camera back can often provide adequate link margin at 10mW EIRP on short range links (e.g. 50m).

For point to point links, high gain antennas can be used to beam radiation in the required direction. Path losses for fixed links are more predictable than for mobile systems, and there is further scope for spectrum efficiency by limiting EIRP.

In calculating required C/I ratios for mobile video links, the transmission mode must be taken into account. For example the 64-QAM rate 1/2 mode is less robust than the 16-QAM or QPSK modes of DVB-T and will require a higher C/I.

While we agree that the potential to re-use frequencies arising from venue construction materials should be investigated, clearly whether or not this can in practice be done will need to be tested sufficiently in advance of the Games.

Question 7. Do you have any comments on the scope for maximising supply by using higher-frequency spectrum?

The possibilities of operation beyond 10 GHz are limited by antenna aperture, propagation characteristics and the high cost of circuit components. The required transmitter power increases as the square of frequency and hence health and safety issues can become a concern. It must also be remembered that spectrum users are unlikely to be willing to invest in equipment which operates at these frequencies unless there is a commercially viable use of this equipment outside of the period of the Games.

The BBC believes that there is some potential to use frequencies such as 7 GHz within stadia or other confined areas. Indeed, this band was identified by Sagentia in their report OF014 (http://www.ofcom.org.uk/consult/condocs/spectrum2012/shf_ehf/report.pdf).

Question 8. Would you consider using free-space optics technologies?

There are limited applications for free-space optics technologies, given that they are point-to-point and hence aren't sufficiently mobile for many applications. They also have a relatively limited range, and are vulnerable to rain and fog.

The BBC tends to use free-space optical links in countries where it is difficult to obtain a short-notice and/ or short-duration RF licence. However, our equipment uses analogue technology and is not suited to working in a high definition environment.

<u>Assumptions and summary conclusions</u>

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

The BBC would offer the following comments on Ofcom's assumptions:

Assumption VI: Wireless equipment will be retuneable to some extent.
While this is certainly true, the equipment is only retuneable over a very small range. We also think (contrary to Ofcom's assertion in paragraph 4.10) that it is likely to be difficult to hire equipment, given the number of broadcasters that may wish to do so from a limited number of suppliers.

Assumption XXIII: RHBs will deploy a satellite-dish farm at a fixed location adjacent to the IBC.
RHBs' satellite operations are likely to entail the use of mobile uplink vans as well as a static dish farm at IBC, and hence the extended Ku spectrum is likely to be fully and widely used.

Assumption XXVI: Test events will have comparable spectrum requirements to Games events, though there will be additional demand if several Games events take place at the same time.
Since most of the additional frequencies available for the Games will not be available before 2012, test events will have to use frequencies currently in use or bookable via JFMG. This is unlikely to provide much useful information as to the problems that may be experienced during the Games.

Assumption XXVIII: Spectrum use can be licensed for periods as short as – or even shorter than – one day, maximising the opportunities for frequency reuse.
Limiting the duration of spectrum licences in this way is unlikely to free up much spectrum, given that busy periods are likely to be broadly the same for all broadcasters. In addition, it may actually constrain operational flexibility – making it difficult, for example, to make changes to coverage based on (unexpected) results. We believe, therefore, that it is possible than any benefits will be outweighed by additional costs imposed.

Assumption XXIX: The spectrum plan will be subject to change in the run-up to the London Games.
The licensing process will need to strike the right balance between early allocation and flexibility to deal with changing requirements. An ability to appeal where unfavourable decisions are taken should also be included in the licensing process.

Private mobile radio

Question 10. Would you be willing to use LOCOG's land-radio network?

The BBC would be willing to use LOCOG's land-radio network, depending on the technical implementation of this network, and provided that we have been able to test it over a reasonable period of time and at several major events in advance of the Games.

We understand that LOCOG will be part of the Airwave service, but we are currently unclear as to what is on offer to broadcasters.

Question 11. If not, how would you prefer to receive land-radio services?

As stated above in our response to Question 10, the BBC would in principle be willing to use LOCOG's land-radio network. However, we currently have equipment which operates on both licensed and licence-exempt frequencies which we would wish to use throughout the Games.

Question 12. Would you be willing to use CTCSS tones/ DCS codes to allow the same channel to be used for land radio in both the Olympic Park and the River Zone?

The BBC would not be happy to use CTCSS tones/ DCS codes to allow the same channel to be used for land radio where this entails multiple use of single frequencies to provide talk-back and clean feed or cue. We would, however, be happy for this to be used for rigging, marshalling and security purposes, provided that it can be demonstrated that acceptable performance can be achieved at venues separated by a few kilometres.

Question 13. Do you have any other comments on our assessment and proposals for land radio?

The BBC uses PMR communications regularly as part of our heli-telly operations, and we expect this use to be more extensive during the Games.

Question 14. Do you have any comments on our assessment and proposals for maritime radio?

The BBC does not feel in a position to meaningfully respond to this question.

Audio links

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

The BBC welcomes Ofcom's decision to retain for use by wireless microphones and IEMs during the Games the cleared Digital Dividend spectrum. As a result of this spectrum being available, we believe that there is a strong likelihood that sufficient spectrum will be available for wireless microphones and IEMs.

Question 16. Do you have any comments on our assessment and proposals for talkback?

The BBC is keen to ensure that the impact of its radio cars on the spectrum available for talkback is duly considered.

The BBC currently makes extensive use of spectrum in UHF1 and 2 for local radio programme making using high power (25W) and bandwidths up to 50kHz in vehicle-mounted systems. During the Games, we will want to continue to do this, as well as cover the Games for our local radio network in England and our Nations radio stations, particularly as it is likely to prove extremely difficult to use GSM/ 3G devices, due to network congestion.

Currently, for any major event, the BBC maintains close contact with JFMG to ensure that both the BBC's and events' needs are met; this is likely to prove much more of a challenge for the Games.

Question 17. Do you have any comments on ADS?

The BBC does not feel in a position to meaningfully comment on this question.

Video links

Question 18. Which bands would you prefer to use for wireless cameras?

We would prefer to use bands we currently have access to (2.0 GHz, 2.2 GHz, 2.5~2.69 GHz, 3.5 GHz), given their propagation characteristics (particularly the ability to cover events taking place over wide areas, such as the marathon, rowing, sailing) and the fact that we already have (or can readily hire) equipment which works in these bands.

Question 19. Which bands would you be willing to use for wireless cameras if you cannot use your preferred bands?

If the bands mentioned in our response to Question 18 are not available for use for some reason, we would wish to use bands immediately adjacent, given their similar propagation characteristics and the fact that we already have (or can readily hire) equipment which works in these bands. This is provided of course that such bands can in fact be used, after new services are deployed in (adjacent) bands which are to be auctioned in the near future. We would also consider using spectrum at 7 GHz for 'more fixed' events, such as those within stadia.

Question 20. Do you have any other comments on our assessment and proposals for wireless cameras?

The BBC has been concerned for some time now about the future availability of spectrum for wireless cameras, in the light of the forthcoming auction by Ofcom of spectrum we currently use at 2.5~2.69 GHz, and the Ministry of Defence (MOD)'s plans to release spectrum we currently use at 3.4~3.6 GHz. We are concerned not just about the availability of spectrum for coverage of the Games, but also for coverage of other events of major cultural or sporting significance, which take place throughout the year. This is why we have formed the SPMF with other broadcasters, news agencies, hire companies and equipment manufacturers.

We are pleased that Ofcom has considered use by wireless cameras of the spectrum adjacent to that which we currently use (used by MOD, the Home Office, etc) for the period of the Games. However, as stated in our introduction, we remain unclear as to how access to this spectrum will be facilitated.

We would urge the Government to make this available as soon as possible, such that broadcasters can become familiar with operating in these frequencies and can have confidence that equipment which operates in these bands will be available in advance of the Games. Broadcasters also need to be sure that they can operate reliably in these bands, given that such bands are likely to be adjacent to spectrum to be auctioned in the near future.

Question 21. Which bands would you prefer to use for point-to-point links?

Once again, we have a strong preference to use the bands we currently have access to, given their propagation characteristics and the fact that we already have (or can readily hire) equipment which works in these bands. Spectrum from 5-12 GHz is generally suitable for point-to-point links and equipment is readily available in the existing bands (e.g. 5472-5925 MHz, 7110-7425 MHz, 8460-8500 MHz, 10300-10600 MHz, 11736-11997 MHz, 12200-12500 MHz). The preferred band depends on the particular application.

The band from 12200-12500 MHz is attractive as a wide allocation not normally required for mobile applications, but there is a risk of interference to satellite TV services (DVB-S) which normally precludes its use. Careful planning and coordination with other satellite services will be necessary since satellite LNBs tend to be designed to maximise G/T and can be quite vulnerable to interference from point-to-point links.

Question 22. Which bands would you be willing to use for point-to-point links if you cannot use your preferred bands?

Once again, if the bands mentioned in our response to Question 21 are not available for use for some reason, we would wish to use bands immediately adjacent, given their similar propagation characteristics and the fact that we already have (or can readily hire) equipment which works in these bands.

Operation at higher microwave frequencies (24.25-24.50 GHz or 48.0-48.4 GHz) may be possible, but equipment tends to be susceptible to precipitation losses (and is more expensive).

Question 23. Do you have any other comments on our assessment and proposals for point-to-point links?

Additional bands not normally allocated to PMSE (which are not adjacent to bands currently used) may be difficult to use due to poor availability of

suitable equipment. Once again, spectrum users are unlikely to be willing to invest in equipment that has no commercial application after completion of the Games.

As our response to Question 8 suggests, we believe that the extent to which alternative solutions such as free-space optics can reduce the requirement for point-to-point links is extremely limited.

Other guaranteed services

Question 24. Do you have any comments on our assessment and proposals for FSS?

The BBC believes that Ku band down-linking will be a vital part of many sub-systems used by OBS and RHBs (and the public). As such, we believe that Ofcom should not make any allocation during the Games which could interfere with Ku band downlinking at 10.7~12.75 GHz at any Games location.

Question 25. Do you have any comments on our assessment for MSS?

The BBC uses MSS extensively in order to provide coverage from around the globe, especially when terrestrial telephone networks are congested. We would hope to use this as usual throughout the period of the Games.

Question 26. Do you have any comments on our assessment for RNSS?

The BBC does not feel in a position to meaningfully comment on this question.

Question 27. Do you have any comments on our assessment and proposals for telemetry and telecommand?

Despite identifying a requirement for fifty telemetry channels in the Olympic Park, Ofcom does not seem to have suggested any licensable (exclusive-use) channels. The BBC does not believe that licence-exempt channels are acceptable for data control of most wireless cameras used by the host broadcaster. This is because control of live cameras requires a very fast response time, which cannot be achieved on a contended channel. There are currently only fifteen camera data channels licensable through JFMG.

In making licensable channels available, it should be noted that the data receivers are necessarily compact and lightweight because they are attached to a mobile camera and, as such, are limited in terms of selectivity.

Question 28. Do you have any comments on our assessment and proposals for WLANs?

The difficulty in controlling the use of Bluetooth, video senders, microwave ovens and other 2.4 GHz ISM band equipment should not be underestimated.

There is a small possibility of interference between 802.11a WLANs and wireless cameras using the 5 GHz bands. This can be minimised by careful planning, paying particular attention to WLAN access point installations and limiting the deployment to indoor locations wherever possible. Other potential sources of 5 GHz interference include 802.16d/e equipment deployed in the 5 GHz ISM band.

LOCOG may wish to consider using the 5 GHz WLAN band (IEEE802.11a) for applications where availability of 2.4 GHz capacity fails due to congestion or interference.

Football venues

Question 29. Do you have any comments on our assessment or proposals for spectrum at the six football venues?

With regards to Ofcom's estimates of spectrum demand, set out in paragraph 9.3, the BBC believes that the allowance of two channels for wireless cameras may on occasion be insufficient. We would also request that frequency coordination at these more distant venues be handled by the same authority as for closer venues.

Cultural events

Question 30. Do you have any comments on our assessment and proposals for cultural events?

The BBC broadly agrees with Ofcom's assessment and proposals. However, we would urge Ofcom to make clear as early as possible which events will be licensed on a "business-as-usual" basis, and which fall within the scope of the Government's spectrum guarantees.

We welcome Ofcom's statement in paragraph 10.17 that it "… will be ready to work with the organisers to identify how their spectrum needs might be met." We note, however, that Ofcom does not have control over all of the bands with which such spectrum needs might be met.

Non-guaranteed services

Question 31. Do any non-guaranteed public services have spectrum requirements that cannot be met through existing allocation and assignment processes?

The BBC does not feel in a position to meaningfully comment on this question.

Question 32. Do any non-guaranteed private services have spectrum requirements that cannot be met through the market and existing assignment processes? Should we make alternative arrangements for handling such requests?

The BBC does not feel in a position to meaningfully comment on this question.

Innovation and legacy

Question 33. Do you have any comments on our approach to innovation and legacy?

The BBC believes that Ofcom's approach to innovation and legacy seems sensible.

Operational issues

Question 34. Do you agree we should establish special licensing arrangements for users covered by the Government's spectrum guarantees? To what extent is your response based on what has worked well at past Games and comparable events?

The BBC refers Ofcom to our introduction, which set out our concerns regarding having separate band managers and separate licensing arrangements for spectrum use covered by the Government's spectrum guarantees, and spectrum use not covered by these guarantees, respectively. It also set out our concerns about Ofcom's band manager award effectively ruling-out JFMG (the only UK body with experience of managing access to spectrum for events of major cultural or sporting significance)'s involvement in managing spectrum access for coverage of large parts of the Games.

Licensing arrangements will need to be clearly defined, and put in place well in advance of the Games.

Licensing procedures for the Beijing Games and the Athens Games were not particularly user-friendly: for example, the same information needed to be

submitted two or three times. Procedures for the London Games will need to be considerably easier to use, given that demand for spectrum will be greater and the supply of spectrum less.

Question 35. Do you agree that an online application process using the LOCOG rate-card ordering system is the best way for guaranteed users to apply for spectrum licences? How could the licence-application process be made optimal?

The BBC believes that an online process is the most effective way of logging requests and checking the status of individual requests. We would also suggest that applicants be permitted to submit first and second choices for frequency bands, in order to optimise frequency allocation across all users. Applicants should also be given as early an assignment as possible, as they may need to procure and test equipment, such as filters and antennas, in the light of their allocation.

It will be vital, however, to ensure that any online process is augmented with direct human involvement, to resolve outstanding issues etc. We would also recommend piloting the booking process, for example, by using it for the test events.

Question 36. How can efficient sharing and coordination between Games and non-Games spectrum use best be achieved?

As suggested in our introduction, we believe that efficient sharing and coordination between Games and non-Games spectrum use can best be achieved by having the same band manager and the same application process for both (with different ‘prices’, depending on the purpose of spectrum use). We also believe that any organisation involved in the management of spectrum for the Games should have considerable experience of managing access to spectrum for events of major cultural or sporting significance.

It is possible that special arrangements need to be put in place for non-Games users of spectrum in affected areas at the time of the Games. For example, normal licences may need to be suspended or changed, and this will need to be managed. The extent of this should be minimised, and alternative arrangements offered (as early as possible).

Question 37. How can the use of licence-exempt equipment best be managed?

The BBC is pleased that Ofcom is already considering how the use of this sort of equipment can best be managed. Such devices are so widespread that they are likely to be present in large numbers at Games events, brought into the country from all over the world.

It will be important for Ofcom to take steps to ensure that users of such equipment are not exceeding the permitted power or bandwidth. (This will also be important for use of equipment which is not licence-exempt). One way this could be done is by ensuring that any equipment used ‘inside the fence’ is tested and stickered before use.

Question 38. Do you have any other comments on how best to license spectrum use for the London Games?

The BBC would draw Ofcom’s attention again to comments made in our introduction: we believe that efficient sharing and coordination between Games and non-Games spectrum use can best be achieved by having the same band manager and the same application process for both.

It will be important for there to be at an early stage an effective team of experienced frequency planning experts to manage spectrum requests.

Question 39. How can interference management be most effective in ensuring the successful running of the London Games? Are there other measures we should consider implementing? To what extent is your response based on previous experience of similar events?

The BBC believes that the vast majority of interference is not caused deliberately, but rather through non-conformity of equipment with standards and licences. As such, we believe that Ofcom’s emphasis needs to be on checking equipment performance – in particular, by having an effective monitoring and enforcement presence on site during the Games.

At the Beijing Games, equipment was checked for conformity on arrival at sites by well-resourced teams, and there was continual monitoring. A similar degree of checking will be required at the London Games, and monitoring will be required in and around the venues, including ‘outside the fence’ and at the cultural events.

The characterisation of RF transmitter equipment, including measurement of operating frequency, modulation bandwidth and spurious radiated components using spectrum analysers may prove quite cumbersome and expensive to implement. This is a particular problem for equipment using active transmit antennas (e.g. some radio microphones and wireless cameras) where the RF PA is integrated into the antenna system preventing access to RF connectors for conducted measurements. The assessment of antenna performance is particularly difficult. Alternative approaches might include external certification by a test house or the equipment manufacturer and the use of bar codes to track equipment deployment.

Actual spectrum usage at a particular venue should be monitored with carefully sited antennas feeding spectrum analysers. These can often be networked into LAN systems for remote monitoring; however, it will also be

important, as stated in our introduction, to have people ‘on the ground’. In practice, it is unlikely to be necessary to have large numbers of people at every venue all of the time: having an unpredictable, highly-visible presence at venues which for example bans camera crews from events for ‘bad’ behaviour is likely to be sufficient to act as a deterrent to such behaviour.

The BBC would also ask that Ofcom consider having an easily accessible interference reporting system, allowing for example interference to be reported via phone, email or text message. This would enable prompt reporting and hence hopefully a quicker resolution of problems encountered.

Test events

Question 40. Do you have any comments on our approach to test events?

Clearly broadcasters will find test events which most closely approximate real Games events to be most useful, and feedback on how the test events went will be vital for learnings to be maximised. Given their importance for the smooth running of the Games, the BBC would ask that spectrum licensing arrangements, and monitoring and enforcement of equipment performance, also be tested during test events.

Conclusion

In summary, the BBC is pleased that Ofcom has published information on the supply of spectrum available for the London Games, such that some public scrutiny of future spectrum availability can occur before substantial amounts of spectrum are auctioned under long-term licences. It should be remembered, however, that only OBS and LOCOG are likely to have an overview of aggregate demand and hence be able to meaningfully comment on whether the spectrum Ofcom has identified will be sufficient.

The BBC would also urge Ofcom to consider:

- facilitating the availability of a central, well-known site through which users apply for spectrum, regardless of whether or not the spectrum is covered by the Government’s guarantees;
- reviewing its proposal to have two separate band managers, as this is likely to hinder efficient use of spectrum;
- reviewing its proposals which effectively exclude JFMG/ its successor’s involvement in managing access to a substantial amount of the spectrum needed for the Games, given that no-one else in the UK currently has experience of managing the spectrum needs of events of major cultural or sporting significance;
- ensuring that there are monitors ‘on the ground’ at venues to ‘police’ spectrum usage.

The BBC would also urge the Government to make available as soon as possible the additional spectrum identified that is suitable for use by wireless cameras, so that broadcasters can become familiar with operating in these frequencies and can have confidence that equipment which operates in these bands will be available in advance of the Games.

5 August 2009