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

Approach

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

SISLIVE agree that using both 'top-down' and 'bottom-up' analysis is the best available. Clearly the information necessary for 'top-down' analysis is available in advance of the more detailed 'bottom-up' approach. So the former will have to suffice until the latter is complete.

We firmly agree that demand is on an upward trend as is mentioned in the document. "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."

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

The standard method of operating wireless cameras is to use fibre or copper cables to a number of receive points around the operating area. This does not reduce spectrum demand nor significantly improve the potential for frequency re-use with a venue. It improves the quality of the received signal by making the link more resilient. However it is true to say that a more complex receive array in a stadium could in part, mitigate the inherent disadvantages of higher 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 a number of rights-holding broadcasters and news agencies 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).

To be successful, such a network should be offered as a managed service and could offer real benefits to RHBs and News orgs looking to cover background or personality stories as it would offer a high degree of mobility around the Park and wider city at low cost and maximising benefit from use of channels.

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

There is almost no scope at all for this because wherever it is practical to cable to camera position, that is already done in preference to an RF link. Wireless links are less resilient, more costly and require video compression and so compromise quality. So a wireless solution is only adopted when cabling is impractical.   However, improved digital technology in this area has led to an increased demand for mobility in cameras and microphones, and an expectation from programme makers and viewers that they can get closer to the action. Demand for wireless therefore increases with technological development.
In certain specialised camera tracking systems, fibre optic systems may replace wireless but these are very few in number.

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

We do not believe that there are any practical methods of improving spectrum supply by more efficient use of spectrum.   The offsetting technique described is merely a way of reducing the power of the interfering signal but it will still degrade link performance to a degree.

PMSE channels at band edges suffer from interference from 3G base stations as there are no guard bands between them. These base stations restrict the effective performance of receivers in the 2.0 and 2.2 GHz bands. OFCOM should seek to minimise this problem on the games by controlling the siting of such base stations.

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

One the most important factors in spectrum planning for the games will be the intelligent re-use of frequencies. It is encouraging to see that OFCOM have already begun the modelling required to maximise the benefits in this area. We believe that OFCOM should draw on the expertise of JFMG (or its successor) to do this work as they have considerable expertise borne out of their day-to-day business of frequency co-ordination and licencing in UK.

Consideration should be given to controlling the allowed EIRP on wireless cameras as it is sometimes practical to operate in a given location at relatively low power, which could allow for the same frequency to be re-used a short distance away.

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

SISLIVE believes that there is potential to use higher frequencies within stadia or other confined areas. However, it must be borne in mind that organisations will not be willing to invest in new equipment on unusual frequencies for the Games alone. Only if the bands made available are within the tuning range of equipment which can be licenced for continuing business would this investment be worthwhile.   While 7GHz looks a good possibility, the tiny amount of licencable spectrum at 10GHz and its territorial constraints mean that while it may be possible to conceive of a practical 10GHz wireless camera system, it is unlikely to be commercially viable to use on the London Olympics alone.

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

SISLIVE believes that Free-space Optical systems are not sufficiently dependable to be used for its customers due to their vulnerability to precipitation. They can be used for short distances (<1km) in certain circumstances but even here a low power RF link would be preferable.

Assumptions and summary conclusions

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

SISLIVE would like to comment on some of the assumptions.

Assumption VI: Wireless equipment is usually only retuneable over a narrow band.

Assumption XIV: SISLIVE firmly agrees that lower frequencies are very much to be preferred for wireless cameras.

Assumption XV: While the comments in the condoc. are theoretically correct, in practice the required conditions for adjacent channel working are not always achievable. For example, the movement and placing of a wireless camera is under the control of the TV director who is more interested in the camera shot he can achieve than the RF spectrum management.   It would be a mistake to assume that adjacent channel working would be possible for most operations.

Assumption XVI: While it is true that OBS will have the overview of spectrum requirements for programme making activities within games venues, they will not know about non-games spectrum use outside the fence. OBS role may be to authorise use of spectrum but not to coordinate in the technical sense. It is imperative that a single body oversees detailed frequency planning for the London area during the period of the games in a properly 'joined-up' manner. Only in this way can spectrum use be optimised inside and outside venues and parks.

Assumptions XXIII/XXIV/XXV: RHBs will be very likely to set up a satellite-dish farm close to the IBC which will have both uplinks and downlinks running continuously. Satellite delivery will be critical both for contribution into IBC and outbound from IBC to the RHB's home territory.   The extended Ku spectrum is likely to required in full, 13.75 – 14.5GHz.
OFCOM should minimise the use of fixed links in the 14.25 – 14.5GHz band close to games venues as this has the effect of restricting satellite operations.

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 XXVII: The technology freeze is intended to reduce risk but it may need to be applied selectively as in some cases manufacturers and service providers will need maximum available time to develop innovative solutions. Since it is unlikely that TV production requirements will be known in detail by 2010, care must be taken not to lose the benefits of technical ingenuity in this fast developing field.

Assumption XXVIII: While this seems an attractive option it is likely to be of little practical benefit as the demand peaks for most RHBs will tend to coincide.

Assumption XXIX: The spectrum plan will certainly be subject to change in the run-up to the London Games. The spectrum licensing process will need to strike the right balance between early allocation and flexibility to deal with late changing requirements. While plans for host coverage may be set long in advance, demands from RHBs could be affected by the best stories of their nation's athletes.
The ability to appeal against an unfavourable decisions should also be included in the licensing process.

Private mobile radio

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

SISLIVE has no comment to make at this time.

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

SISLIVE has no comment to make at this time.

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?

SISLIVE would recommend that specific tests are carried out to assess actual performance before any assumptions are made.

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

SISLIVE has no comment to make at this time.

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

SISLIVE has no comment to make at this time.

Audio links

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

We agree with OFCOM's assessment that there is likely to be sufficient spectrum available for wireless Mics and IEMs if it is carefully managed. We note that this is chiefly due to the DDR spectrum being retained for PMSE use until after the games. OFCOM's flexibility in this matter is welcomed and we would also welcome a similarly flexibility in other bands. For example 2.5 - 2.69GHz.

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

OFCOM proposals are a satisfactory starting point but it is vital that all channels are checked for intermodulation products as there will be many channels co-located. The selection of intermod free frequency pairs is a complex exercise but a vital one. At any given venue it will make the difference between a satisfactory service and a very poor service which will be reported back to OFCOM.

Question 17. Do you have any comments on ADS?

SISLIVE has no comment to make at this time.

Video links

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

We have a strong preference to use the same bands as are used for business as usual.   2.0GHz, 3.5GHz and 7GHz are all used regularly and there is large installed base of equipment among UK operators.   In particular we believe that the spectrum at 3.4 – 3.6GHz currently under MOD control should be safeguarded for the Games. This is very useful spectrum for air to ground links and there is very little available for this purpose.

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

The laws of physics determine the relative performance of the various bands but if first choice bands are not available then the alternative offer must be as close as possible in frequency.

It must be borne in mind when licencing bands specially freed up for the games that if capital equipment has to be bought which cannot be licenced for subsequent use in UK then costs will be prohibitive.   Manufacturers will probably endeavour to be helpful with modification and retuning of new gear but such capital items as antennas, filters and combiners will have to be fully funded from the games alone.   This would result in an unreasonable cost burden on members of the games family. Instances of this sort must be kept to an absolute minimum and discussed with licencees well ahead of time.

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

The whole industry has been concerned for some time 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 TV events which is our normal business activity on behalf of our clients.

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, it is not clear how access to this spectrum will be facilitated.   We need the Government to make this available as soon as possible, so that service providers can become familiar with operating in these frequencies and can invest in equipment which operates in these bands well in advance of the Games. We also need to be sure that we can achieve acceptable performance in these bands, given that they 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?

We have a strong preference to use the same bands as are used for business as usual.   7GHz is used regularly and there is a significant amount of suitable gear available in this band.

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 and other Ku band downlinking. For this reason SISLIVE would like to see this band not used for fixed links.

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

As stated earlier, it must be borne in mind when licencing bands specially freed up for the games that if capital equipment has to be purchased which cannot be licenced for subsequent use in UK then costs will be prohibitive. Manufacturers will probably endeavour to be helpful with modification and retuning of new gear but such capital items as antennas, filters and combiners will have to be fully funded from the games alone. This would result in an unreasonable cost burden on members of the games family. Instances of this sort must be kept to an absolute minimum and discussed with licencees well ahead of time.

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

OFCOMs assumptions are broadly inline with our thinking on this but the utility of free-space optics is likely to be insignificant.

Other guaranteed services

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

SISLIVE believes that Ku band down-linking will be a vital part of many of the Games' TV operations for OBS and RHBs as well as the viewing public. Therefore, 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?

SISLIVE has no comment to make at this time.

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

SISLIVE has no comment to make at this time.

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. We do not believe that licence-exempt channels are adequate for data control of most wireless cameras. 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 12 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?

SISLIVE has no comment to make at this time.

Football venues

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

We broadly agree with the comments in the consultation but note that the frequency co-ordination at these more distant venues must still be handled by the same authority.

Cultural events

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

SISLIVE believes that whether or not a particular activity is covered by the guarantee or not, the frequency management of those activities will need to be done by a single agency, in close consultation with the UK PMSE band manager. The effective joining up of games spectrum with 'business-as-usual' spectrum cannot be done in any other way.

Non-guaranteed services

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

SISLIVE has no comment to make at this time.

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?

SISLIVE has no comment to make at this time.

Innovation and legacy

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

SISLIVE has no comment to make at this time.

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?

SISLIVE is very concerned that 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, will lead to chaos. We also believe that the skills to manage spectrum effectively at this level, do not reside in OFCOM but are more likely to be found in the UK PMSE band manager, (JFMG successor). OFCOM does not have the staff or systems to undertake this work in-house. It is vital to the success of the games that this detailed frequency management is done by the most skilled and knowledgeable people.

It is important that the respective roles of OFCOM, BOCOG and OBS are clarified and made clear to spectrum users.

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?

An online process is certainly the most effective way of logging requests and checking the status of individual requests.

Applicants should be able to have first and second choices for frequency bands to optimise use across all users.

Applicants (be they suppliers to OBS or RHBs) will require an early response as they may need to procure and test equipment such as filters and antennae based on their actual allocation.

It will also be vital that there is a direct human contact to negotiate specific channels. A collaborative approach with give and take is sure to deliver the best result.

It will be useful to pilot the booking process with a few users, the test events will be an opportunity for this.

Once again we would like to stress the need for an all-encompassing system for all areas and all users, with a single coordinator or band manager.

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

We should be able to get maximum usage out of the available spectrum by having a single coordinator or band manager looking after the RHBs and non-RHBs both inside the fence and outside the fence. This would also assist in the reuse of spectrum at different sites and for shorter time periods.

Special arrangements will need to be put in place for non-games users in the affected area at the time of the games. Normal licences may need to be suspended or changed, but the extent of this should be minimised and alternative arrangements offered.

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

By definition, licence exempt equipment cannot be controlled, but it is still obliged to conform to standards, e.g. WiFi devices, PMR446 radios.
In reality, such devices are so widespread that we have to make planning assumption that they will be present in large numbers at Olympic events but OFCOM should take steps to ensure that users are not exceeding the permitted power or bandwidth. Equipment will be brought into the country from all over the world.

It is vital that equipment used inside the fence is tested and stickered before use to prevent interference. This should be applied to any transmit capable equipment regardless of its designation as licensed or licence-exempt.

This should form part of the monitoring and enforcement process.

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

We believe that OFCOM have taken the whole issue seriously and are now making some progress.   However it is now important that OFCOM assemble an effective team of experienced frequency planning professionals to be the kernel of the allocation process.
The expertise of the band manager (successor to JFMG) will be the obvious source of specialist knowledge and we encourage OFCOM to find a way to tap into this.

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?

We believe that the emphasis here needs to be on checking conformity with standards and licence terms, rather than policing, because prevention is better than cure. There are few deliberate mis-users of spectrum, the majority of interference is caused by inadvertent use or 'finger trouble'.

An effective enforcement and monitoring presence on site during the testing and operational days of the games period is vital. It will serve as a warning to be careful, and will also be able to resolve issues promptly.

At the Beijing games, equipment was checked on arrival at site for conformity by well resourced teams and there was continual monitoring. In London a similar degree of checking will be required but the monitoring will be even more important as the threat from unlicenced users is probably greater.

Having tested and stickered equipment used inside the fence will reduce the amount of interference experienced in London as it has in previous games. We would expect there to be regular monitoring of spectrum use in and around the venues including outside the fence operations and at the cultural events. If this monitoring is highly visible it should have a deterrent effect and raise the profile of the issue in the minds of all.

A user friendly interference reporting facility will be vital offering contacts via telephone. This would enable prompt reporting of interference whilst it is happening and hopefully lead to a quicker resolution of the problem. However, it will also be important to have people 'on the ground' to investigate and resolve problems.

<u>Test events</u>

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

Clearly the spectrum needs of test events will be much less than the games themselves but the Games licencing process could be trialled on a test event. Monitoring and enforcement processes could also be trialled.

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