

**Title:**

**Forename:**

**Surname:**

**Representing:**

**Organisation (if applicable):**

**Email:**

**What do you want Ofcom to keep confidential?:**

Keep part of the response confidential

**If you want part of your response kept confidential, which parts?:**

**Ofcom may publish a response summary:**

No

**I confirm that I have read the declaration:**

Yes

**Ofcom should only publish this response after the consultation has ended:**

Yes

**Question 1: Do you have any comments on our approach?:**

In principal, the approach proposed appears robust.

We do believe, however, that greater emphasis is placed upon the needs of users such as

E&PSS and stadium support services as these are generally critical to the safe running of events (the safety certificate for some venues may even include reference to radio systems for some users in a stadium environment)

There is also no mention of Cellular & WLAN use in this opening statement and we believe all wireless technologies should be considered initially.

### **Question 2: Do you have any comments on our assumptions?:**

In principal, the assumptions contained in this section appear reasonable.

The assumptions do appear to be very focused on the Olympic Park and some account of other venues such as Wembley should be considered. This is particularly true for item 3.15.11 where, although equipment may be retunable to some extent, it may be more difficult to retune the combiners and filters that are required to support multiple services/frequencies on a shared infrastructure such as we have at Wembley.

There is no mention of what is assumed with regard to the transportation links between venues and we consider the communications requirements between the BTP/MET and WNSL to be a major consideration for events at Wembley Stadium.

Item 3.15.8 refers to optical fibre links within the Olympic Park but assumptions will also have to be made concerning either fibre or wireless links between the venues. The relevance of fibre may not be just about linking the venues but perhaps could be used to make more efficient use of spectrum within each venue if appropriate.

### **Question 3a: What is your assessment of the requirements for handheld radio systems?:**

### **Question 3b:How can they be met most efficiently?:**

In spectrum terms we agree that it is likely that the use of trunked and digital radio systems will be the most efficient.

In our experience to date the use of analogue repeater systems is more effective for Crowd Safety Management teams where no delay time can be tolerated by users when making or receiving calls. Whilst the reluctance of some users to move from repeater to trunked mode analogue systems may be overcome with time and training it is vitally important that sufficient time is allowed to train users in the use and 'expectations' of digital equipment if this is deployed.

### **Question 4: Would you want to use capacity on LOCOG's trunk network through a rate card?:**

Whilst it is not immediately obvious how this would apply to Wembley Stadium it may be appropriate to explore this nearer the time.

The scale and complexity of the stadium, combined with the fact that there are a number of existing radio systems in operation, will require detailed discussions to take place between LOCOG and WNSL with regard to the ability to deploy a LOCOG trunked system in the stadium (analogue or digital)

Consideration must also be given to the availability of suitable handsets and ancillary equipment for users to take advantage of this option if available.

**Question 5a: What is your assessment of the requirements for land mobile radio systems?:**

Wembley Stadium hosts a range of wireless technologies during events, including cellular, PMR, Tetra, ADS, wireless microphones and all the other radio devices that are used for operational and outside broadcast purposes.

The requirements and numbers of devices that make use of the different frequencies currently available differ considerably from the various event types in the stadium but we do anticipate that the 'local communications' needs for events will continue to increase over time.

**Question 5b:How can they be met most efficiently?:**

No comment

**Question 6a: What is your assessment of the requirements for maritime radio?:**

No comment

**Question 6b: How can they be met most efficiently?:**

No comment

**Question 7: Do you think that digital wireless microphones will be widely used by the time of the London Games?:**

The uptake in digital wireless microphones is difficult to predict and there are some technical issues to overcome such as audio lag that will prevent widespread adoption by users. Consideration needs to be given to legacy systems and the influx of foreign users (and equipment) to the UK for these games.

**Question 8a: What is your assessment of the requirements for wireless microphones?:**

The deployment of wireless microphones at events in Wembley to date for major events such as the FA Cup has been substantial with circa 60 separate licences issued and we anticipate this will increase for an event such as the Olympic Games.

**Question 8b: How can they be met most efficiently?:**

No Comment

**Question 9: How do you think developments in audio technology will affect spectrum requirements?:**

No Comment

**Question 10a: What is your assessment of the requirements for in-ear monitors?:**

The experience at Wembley Stadium with these devices is that there are a limited number deployed at events such as the FA Cup. We are unable to comment on the likely requirements going forward.

**Question 10b: How can they be met most efficiently?:**

No Comment

**Question 11a: What is your assessment of the requirements for talkback?:**

The deployment of Talkback frequencies at Wembley for the FA Cup was substantial with circa 80 separate licences issued and we anticipate this will increase for an event such as the Olympic Games.

**Question 11b: How can they be met most efficiently?:**

No Comment

**Question 12a: What is your assessment of the requirements for ADS?:**

There is a licenced Audio Distribution System in operation at Wembley Stadium and whilst this is predominantly used for commentary to disabled people we anticipate there will be a far greater desire from the event organisers to make better use of ADS in the stadium in future to broadcast event details and other relevant information in a variety of languages for all spectators.

**Question 12b: How can they be met most efficiently?:**

Maintain the recently introduced system for ADS-RSL requirements to allow venues such as Wembley Stadium to continue to make use of recognised systems and processes to provide effective services in this area whilst ensuring they comply with the licence conditions.

**Question 13a: What is your assessment of the requirements for S-RSLs?:**

We would have no objections to this method of providing venue specific information or commentary to spectators or visitors to Wembley Stadium, particularly if it is considered to be a more effective means of communication than ADS.

The ability to make use of FM waveband is considered favourable in this regard.

**Question 13b:How can they be met most efficiently?:**

No comment

**Question 14a:What is your assessment of the requirements for wireless cameras?:**

We anticipate a significant increase over the coming years for the deployment of wireless cameras for major sporting events in and around the stadium. The number of licences issued for the 2007 FA Cup was relatively small (13 number) but clearly we will have relevant data from major sporting events held in Wembley Stadium in the period leading up to the games that may serve as a good guide for the likely requirements at the games themselves.

**Question 14b:How can they be met most efficiently?:**

No comment

**Question 15: How do you think the use of HD will affect spectrum requirements? If yes, please provide details.:**

There are a number of deployment related considerations that will need to be taken into account in a stadium environment to make best use of the spectrum for broadcasting purposes and to deliver the quality of service user will expect for HD. Careful design of the broadcasting system to minimise interference to increase the resilience of the wireless links will help ensure the higher rates of modulation can be achieved.

**Question 16a: What is your assessment of the requirements for point-to-point links?:**

The requirements for point to point links at Wembley Stadium are unknown at this time. The stadium does have extensive fibre links to the outside and there is also a very comprehensive fibre infrastructure deployed throughout the stadium.

**Question 16b: How can they be met most efficiently?:**

No Comment

**Question 17:How do you think spectrum could be used more efficiently?:**

Coordination of spectrum through central management would appear to be the most appropriate method of ensuring spectrum is used efficiently. Wembley Stadium operate an Airspace Management policy that ensures the deployment of all radio systems in the stadium is coordinated locally as this is considered essential to protect the emergency and operational radio systems that are event day critical. The existing radio system at Wembley Stadium has been designed to minimise the signal leakage beyond the stadium demise and if other systems can be designed and implemented in a similar manner then the ability to avoid interference between systems will be increased.

**Question 18a:Do you think that wireless-camera technology operating between 3 and 7.5 GHz will be more widely available by the time of the London Games ?:**

Whilst we concur generally with the report that was issued by Segentia on the 25th January 2008 we believe further work is required to verify that the resilience of the links can be maintained at higher frequencies.

The availability of new equipment and the dominance of legacy equipment will also be key driver in the ability to make use of the 7.5GHz band

**Question 18b: Do you think that wireless-camera technology operating at up to 60 GHz will be available by the time of the London Games ?:**

No comment other than the findings from the report above suggest that equipment is unlikely to be commercially available for the Games

**Question 18c: Could existing wireless cameras be adapted to work at higher frequencies?:**

No Comment

**Question 18d: Are there any other considerations that will affect the feasibility of using higher-frequency spectrum for wireless cameras?:**

Consideration should be given to the ?trial deployment? of a system in a large stadium environment in advance of the games to ensure that the theoretical considerations can be tested in the real world environment and the design approach used adapted to suit.

**Question 19: Do you think that using optical-fibre cameras will reduce spectrum requirements?:**

Yes - certainly within venues such as Wembley Stadium where it may be possible to determine the majority of the needs for camera use in advance. Mobility for some cameras will be a requirement but this can be planned to avoid overuse of spectrum in a contained environment.

**Question 20: Do you think that using short, wireless video links to fixed, cabled access points will reduce spectrum requirements?:**

This approach would require careful design of the antenna locations to ensure that there is sufficient coverage provided and to maximise spectrum reuse within a venue. Whilst there is a comprehensive fibre system in existence at Wembley Stadium, the RF design will need to take account of the existing fibre routing to maximise the use of this existing infrastructure.

**Question 21: Do you think that using optical fibre within and between competition venues will reduce the requirement for fixed point-to-point links?:**

Yes, although the use of wireless links may be essential as a backup for fixed links between venues.

**Question 22: Do any public support services have spectrum requirements that cannot be met through existing allocation and assignment processes?:**

The support services referred to in this section of the document are critical to the safe operation of the stadium on event days and we believe a greater emphasis should be placed on these by Ofcom as part of this consultation process.

Whilst the existing allocation and assignment arrangements address the needs at Wembley Stadium this may not necessarily be taken as granted in the period leading up to the Games and this will need to be 'protected' in some way.

**Question 23a: What is your assessment of the requirements for cultural events?:**

The impact these cultural events will have on Wembley Stadium are unknown at this point in time.

**Question 23b: How can they be met most efficiently?:**

No Comment

**Question 24a: What is your assessment of other requirements?:**

The use of licence exempt services in a venue such as Wembley Stadium will still be subject to verification locally to ensure that they do not interfere in any way with the existing stadium systems. An example where conflict would occur otherwise is with WLAN systems that would most certainly interfere with the existing stadium system if they were allowed to be deployed on an ad-hoc basis in the stadium.

**Question 24b: How can they be met most efficiently?:**

Localised management of the airspace to ensure the most efficient and effective use of spectrum can be achieved.

**Question 25a: Do you have you any views on previous or possible licensing systems?:**

Further details on the proposed licensing system are required to allow us to comment but the existing centralised system, combined with a local management system at the stadium, have served the purposes of Wembley Stadium well to date.

**Question 25b: When should the licensing system start to accept applications?:**

The experience at a complex environment such as Wembley Stadium would indicate that even with the careful design of the distributed antenna infrastructure the actual performance of the radio system in the built environment can result in time consuming optimisation works. We would agree that licensing should start at least 18 months before the Games take place and that careful consideration is given by Ofcom to place onerous obligations on applicants to demonstrate that the subsequent deployment of radio systems do comply with any restrictions that are imposed to help avoid interference between systems.

**Question 26: Do you have any views on enforcement?:**

The need to "police" the use of spectrum in advance of the games at a local level should be considered. This could be incorporated as part of the airspace management process adopted by the venue owner and information shared with Ofcom as appropriate to ensure the overall enforcement of the correct use of spectrum across the venues is effective.

**Additional comments:**