OFFICE OF COMMUNICATIONS

Spectrum planning for the London 2012 Olympic Games and Paralympic Games

Summary of discussion document responses

Statement

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Section 1

Introduction

Discussion document

1.1 On 30 November 2007, we published a discussion document on spectrum planning for the London 2012 Olympic Games and Paralympic Games.[1] This addressed issues that we must consider in planning spectrum use for the London Games. It asked stakeholders to assess the assumptions that we were making and the approach that we were proposing.

1.2 We received 15 responses. We have published those that were not confidential on our website.[2] Annex 1 contains a summary of the points that respondents made. Annex 2 lists respondents who did not request that their details be kept confidential.

1.3 We will address all responses in substance when we consult on a draft spectrum plan for the London Games. We expect to do so after the Beijing 2008 Olympic Games and Paralympic Games. We will continue to discuss issues with stakeholders in the meantime.

Additional work

1.4 The discussion document noted that using spectrum to realise the benefits that the London Games will bring to the UK comes at a cost. It is therefore important that we encourage approaches to meeting the spectrum requirements of the Games that will reduce these costs. One of the approaches that we identified was using higher-frequency spectrum that is less scarce.

1.5 On 30th January 2008, we published a report by consultants Sagentia, addressing the feasibility of using SHF (3-30 GHz) and EHF (30-300 GHz) spectrum to provide wireless camera connectivity for the London Games and for programme-making and special events (PMSE) generally over a longer timescale.[3] Sagentia found that there is scope in principle to migrate a proportion of existing usage at 2.3 GHz to higher frequencies, with the greatest opportunity at 7.5 GHz for in-stadium outside broadcasting applications. While activity at 60 GHz will start to open up the use of even higher frequencies, existing applications are not sufficiently close to those of wireless cameras to make the technologies relevant in time for the Games.

[1] www.ofcom.org.uk/consult/condocs/spectrum2012/condoc.pdf.
[2] www.ofcom.org.uk/consult/condocs/spectrum2012/responses/.
[3] www.ofcom.org.uk/consult/condocs/spectrum2012/shf_ehf/report.pdf.

Annex 1

Summary of responses

Question 1. Do you have any comments on our approach?

A1.1 There was general agreement to and approval of our approach ("thorough", "robust", "systematic" and "rational"). Other significant messages were:

- we should not sacrifice effectiveness for efficiency;
- the London Games must not displace everything else;
- PMSE business as usual is not catered for, and there will continue to be other non-Games events;
- we must be universally inclusive in the views canvassed;
- we did not mention cellular or wide-area networks;
- there may not be enough PMSE spectrum outside London (e.g. Weymouth and Portland); and
- the Sagentia report had serious shortcomings (not specified).

Question 2. Do you have any comments on our assumptions?

A1.2 This drew the greatest number of comments. While respondents broadly agreed with our assumptions, they had some specific comments on some of them. The main comments were:

- spectrum will be needed from 2010;
- many video feeds will be High Definition (HD) but not all;
- HD video streams are moving toward 20MHz bandwidth;
- wireless cameras will pose the greatest challenges;
- there will be very high demand for private mobile radio (PMR) and the torch relay (and other cultural events) and from the test events starting in 2010 through to beyond the end of the London Games in 2012 (for decommissioning);
- we must not overlook venues outside the Olympic Park;
- we must clarify the needs of Olympic Broadcasting Services (OBS), rights-holding broadcasters (RHBs) and other broadcasters and electronic newsgathering organisations;
- test-and-development (T&D) licences will be needed;
- test events will require significantly less spectrum than the Games proper and so may not be as good a model as we had suggested;

- we must distinguish between the Cultural Olympiad and ”cultural events”;
- PMSE users must retain access to the cleared digital-dividend spectrum given the London Organising Committee for the Olympic Games and Paralympic Games’ (LOCOG) technology freeze in 2010; and
- optical fibre is the transmission medium of choice for international television and links within and between venues.

Question 3a. What is your assessment of the requirements for handheld radio systems?

A1.3 Respondents agreed with our assessment.

Question 3b. How can they be met most efficiently?

A1.4 We had several diverse suggestions:

- we should not tolerate kit that is out of spec merely because it is linked to the London Games;
- digital trunked radio should be used as analogue cannot cope;
- as they do not have a time lag, analogue repeaters should be used for crowd management;
- we must allow time for users to train on digital kit if they are accustomed to analogue;
- users’ technology must be flexible and proofed against unforeseen interference from non-compliant kit;
- one firm makes handsets that can switch between MSS/CGC and TETRA or GSM/UMTS networks; and
- we should create a register of interested parties and services to evaluate different assignment mechanisms.

Question 4. Would you want to use capacity on LOCOG’s trunk network through a rate card?

A1.5 We received mixed messages on this question, reflecting the nature of individual respondents’ involvement in the London Games. Specific comments included:

- it is a good idea;
- venues with existing systems must liaise with LOCOG about deploying LOCOG systems;
- an immutable menu on the rate cards would impede the development of new technologies; and
- there must be adequate handsets and ancillary equipment.

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

A1.6 The four respondents gave different views:

- agreement with us;
- demand will be greater than past Games;
- little demand is anticipated; and
- we must distinguish between land mobile and talkback. Demand for talkback will rise with more complex production methods compared with previous Games.

Question 5b. How can they be met most efficiently?

A1.7 The sole respondent suggested that analogue would be required as it did not suffer a time lag.

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

A1.8 It is not clear that respondents understood what we meant by this question. Comments included:

- maritime events will use PMR mostly;
- these should not include rowing events; and
- there will be a need for a 2.4 GHz data link from a buoy.

Question 6b. How can they be met most efficiently?

A1.9 It was suggested that we must liaise with the Maritime and Coastguard Agency, the Royal Yachting Association and other interested parties.

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

A1.10 We received a mixture of responses:

- definitely;
- it depends on the available technology as the 2010 technology freeze makes it unlikely that new technology will have been developed in time;
- audio lag may make them unattractive to some; and
- the infancy of the technology, some technical shortcomings and the 2010 technology freeze will limit their use at the Games.

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

A1.11 There was near-unanimity that the use of wireless microphones would reach unprecedented levels. Some respondents feared that we had underestimated these levels. Some specific comments included:

- our Digital Dividend Review will pose significant difficulties for the use of wireless microphones; and
- wireless microphones in crowds must use higher powers, which can cause problems for adjacent systems.

Question 8b. How can they be met most efficiently?

A1.12 The main message was that we should liaise with OBS (and, thereby, RHBs) and LOCOG to design cabling layouts as early as possible so that we could use as much cabling as possible, reducing the demand for a wireless solution. Respondents also said that:

- cable is cheaper than wireless;
- OBS will always favour cable if it is practical;
- the 2010 technology freeze reduces the likelihood that new technology will have been developed to use the post-digital-switchover pattern of interleaved spectrum; and
- maritime events will need more wireless-microphone channels given the large number of nations participating.

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

A1.13 The consensus was that digital applications would be far more common. However, spectrum savings realised would be used as production became more creative and ambitious. There was some concern that technology might not have been fully developed in time.

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

A1.14 There would be substantial demand. These are viewed as increasingly important for programme-making.

Question 10b. How can they be met most efficiently?

A1.15 We must liaise with the principal users (OBS, RHBs and LOCOG).

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

A1.16 Respondents thought that demand would be high. We should certainly assume higher demand than at the Beijing Games.

Question 11b. How can they be met most efficiently?

A1.17 One respondent said that only analogue would do as it did not suffer any time lag. 2.4 GHz systems are unlikely to work given interference from, for example, WiFi.

Question 12a. What is your assessment of the requirements for audio-distribution systems?

A1.18 One respondent said that these were used at their venue and that organisers were likely to want to use them more in future.

Question 12b. How can they be met most efficiently?

A1.19 The recently introduced arrangements should be maintained.

Question 13a. What is your assessment of the requirements for short-term restricted-service licences?

A1.20 There was likely to be limited demand. These could be use within venues for information specific to that venue.

Question 13b. How can they be met most efficiently?

A1.21 A Band II FM frequency was the only solution.

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

A1.22 The consensus was that their use would be much higher than at the Beijing Games but optical fibre could provide a solution for some use that would otherwise be wireless.

Question 14b. How can they be met most efficiently?

A1.23 Broadcasters are likely to know their needs no more than about 12 months before the London Games. We should liaise direct with them. Frequency sharing was one possibility. With strict power limits, 7 GHz could be used within stadia, which may permit reuse in other stadia. Outside events (e.g. sailing and the marathon) will need 2.0, 2.2 and 2.6 GHz.

Question 15. How do you think the use of HD will affect spectrum requirements?

A1.24 The consensus was that there was a move to 20 MHz bandwidth. HD requires twice the bandwidth of Standard Definition. Demand will be higher than at the Beijing Games as more countries will be using HD as standard by 2012. Audio quality must match video.

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

A1.25 They will be needed as a back-up for cabled systems or if cabled systems are too costly. Demand will be comparatively high as venues are widely spaced. They will

certainly be needed during construction as there will be no established infrastructure and for mobile links.

Question 16b. How can they be met most efficiently?

A1.26 Respondents had no suggestions.

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

A1.27 We received several suggestions. Most respondents wanted central control of assignments and effective enforcement; we should invest now in staff and equipment for monitoring. One respondent operates a venue and imposes its own spectrum-management policy within the venue. Another thought that innovation should increase efficiency. One respondent though that Administrative Incentive Pricing was the solution.

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?

A1.28 The consensus was that this was improbable. Some saw technical and quality problems, while others though that the amount of legacy equipment and the (lack of) availability of new apparatus would also limit its use. However, the Athens 2004 Olympic Games and Paralympic Games had used 3-4 GHz and, although slow, there is migration toward 7 GHz.

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?

A1.29 One respondent said that it was neither feasible nor cost-effective. Another has tested systems in EHF and questioned the reliability of Sagentia's report. This respondent did not think that apparatus would be ready in time for the 2010 technology freeze. Manufacturers will only develop equipment if it can use spectrum free from interference.

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

A1.30 One respondent wondered if operators would be prepared to meet the cost, while another saw the bigger battery pack necessary as a problem. A third said that equipment had already been developed and that it did not necessarily need line of sight.

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

A1.31 Problems cited by respondents included:

- costs of new products or of hiring equipment just for use in the UK;
- other users of these frequencies;
- power level, battery size and weight and limited propagation range; and

- unproven technology.

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

A1.32 The broad consensus was that it would. However, there was a limit to the sorts of applications and situations in which fibre could be used. We could use the Beijing Games as a guide. There were also concerns at health and safety requirements limiting the scope for any cabling.

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

A1.33 Respondents were not wholly sure about this. There were risks, for example of cross-talk. Many users prefer to use wired solutions where possible. With skilful siting of antennas, frequency reuse was possible within a venue.

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

A1.34 The consensus was a qualified "yes." All recent Games had used optical fibre. Dedicated cable links ("highways") between venues would be better. Fibre provides economic, reliable and high-bandwidth solutions that would leave a legacy for the venues and would need shorter wireless links. RF on optical can give good liaison with EHF links and quality HDTV data rates.

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

A1.35 We received diverse responses. They included:

- the Red Cross and St. John's Ambulance would be squeezed out;
- this is a separate issue from the needs of the London Games themselves;
- a 4G mobile broadband system is needed (10 MHz nationwide below 3 GHz);
- we should intervene to ensure that support services are not dependent on "normal processes," and we should not press them for undue efficiencies; and
- PMSE users must be able to liaise with support services.

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

A1.36 Most thought it a little too early to judge as many of the events have yet to be confirmed. However, there would be a significant demand for broadcast and PMR spectrum. These events may restrict the ability to service other, non-Games events. However, they should not add to the demand for spectrum during the time of the Games themselves. The opening and closing ceremonies will create extraordinary demand for wireless microphones.

Question 23b. How can they be met most efficiently?

A1.37 LOCOG should act as a clearing house for spectrum requests. Sufficient time must be allowed to assess the relative priority of events.

Question 24a. What is your assessment of other requirements?

A1.38 This attracted myriad suggestions. They included:

- newsgathering;
- fixed satellite services;
- WiMax;
- wireless local-area networks (WLANs) will be needed;
- WLANs could cause problems;
- vans for satellite newsgathering will be used;
- PMR for controlling wireless cameras;
- Ultra Wideband; and
- data links using the interleaved spectrum.

Question 24b. How can they be met most efficiently?

A1.39 Responses included:

- licensing in the context of existing use;
- local planning and management of the spectrum; and
- market mechanisms.

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

A1.40 Respondents want a central system. Their suggestions included:

- LOCOG should coordinate and validate applications, as should the Olympic Delivery Authority (ODA) for the construction phase; and
- e-licensing, T&D licences and short-term as well as *ad hoc* licences to accommodate the unforeseen.

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

A1.41 Respondents wanted licences available as soon as possible. The consensus was 18 months before the London Games. There was concern that we give incumbent users adequate notice to quit before the Games.

Question 26. Do you have any views on enforcement?

A1.42 This is a concern for many respondents, who want adequate enforcement. They stressed the importance of ensuring that users adhere to licence and other conditions, that unlicensed use be dealt with immediately and that (implicitly) we should have a highly visible presence at all venues. Other comments included:

- we should use an ”approve and tag” system as we did for the Tour de France (though one respondent actively opposed this);
- we should consider barring importation of noncompliant kit;
- out-of-spec kit from overseas will be a major problem;
- we should have a high-profile enforcement presence throughout the London Games;
- how would we police the 2010 technology freeze? and
- Games-related usage must cease as soon as the Games end, to return spectrum to “rightful” owners.

Additional comments

A1.43 Other comments received included:

- this is not just a paper exercise. It must have proper engineering;
- we must take into consideration the use of radio across the English Channel;
- the print media make significant use of radio nowadays; and
- we must give clear guidance to organisations that want to bring kit in from overseas, notably the United States, where white-space apparatus is licence-exempt.

Annex 2

List of respondents

A2.1 The following list excludes individuals who responded and respondents who requested that their details be kept confidential.

- BAE Systems
- BBC
- BEIRG
- BT
- Mr. C. Goadby
- Liquid Media Group
- LOCOG
- Northrop Grumman Information Technology
- ODA
- Terrestar Global
- Wembley National Stadium Limited