

Spectrum planning for the London 2012 Olympic Games and Paralympic Games

Discussion document

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Summary

Introduction

1.1 This discussion document addresses issues that Ofcom must consider in planning spectrum use for the London 2012 Olympic Games and Paralympic Games (the London Games). We welcome views from all interested stakeholders. We expect to consult on a draft spectrum plan after the Beijing 2008 Olympic Games and Paralympic Games (the Beijing Games).

The London Games

1.2 The London Games will take place between 27 July and 9 September 2012. They will be staged at various locations around the UK, concentrating on the new Olympic Park to be built in the Lower Lea Valley. Wireless applications will play an important role both in the build-up to and during the Games.

Our role

- 1.3 We are the independent regulator and competition authority for the UK communications industries, with responsibilities across television, radio, telecommunications and wireless-communications services. As such, we are responsible for organising a full spectrum plan for the London Games.
- 1.4 This responsibility must be seen in the context of two guarantees given by the UK Government to the International Olympic Committee (IOC) in support of London's bid for the Games. These guarantee the allocation of spectrum required for the organisation of the Games and the waiving of fees otherwise payable for that spectrum by members of the Olympic family.

Spectrum requirements

- 1.5 At the core of the issues addressed by this discussion document is identifying what applications at the London Games might require spectrum and whether they could use spectrum more efficiently. Understanding these factors will assist us in constructing the draft spectrum plan. This document seeks information and views to aid our understanding.
- 1.6 We expect spectrum to be required primarily for two broad categories of application:
 - 1.6.1 private mobile radio (PMR) by the London Organising Committee of the Olympic Games and Paralympic Games (LOCOG); and
 - 1.6.2 broadcasting by Olympic Broadcasting Services (OBS), the host broadcaster for the London Games, and rights-holding broadcasters (RHBs) that have contracted with the IOC to broadcast the Games.
- 1.7 Support services might also require more spectrum to fulfil their roles at the London Games.

Stakeholders

1.8 We are working closely with the Government, LOCOG and other domestic stakeholders. We have also discussed the spectrum requirements for broadcasting with OBS and the British Broadcasting Corporation (BBC). We hope that other stakeholders, both in the UK and overseas, with an interest in the use of wireless applications at the London Games will respond to the issues raised in this discussion document.

Introduction

The London Games

- 2.1 On 6 July 2005, London was chosen to host the Games of the XXX Olympiad. These will take place between 27 July and 9 September 2012.
- 2.2 The Olympic Games and Paralympic Games are the world's largest sporting events, with around 14,500 athletes from over 200 nations. They attract around 20,000 accredited media and millions of spectators. The London Games are also expected to attract up to 70,000 volunteers to assist with their organisation.
- 2.3 A new Olympic Park will be built on a 500-acre site in the Lower Lea Valley. Many venues in London and around the UK will also host events (see annex 5). There will also be some 40 training venues, at least 80 non-competition venues for the operation of the London Games (e.g. the International Broadcast Centre—IBC, the Main Press Centre, the Technology Operations Centre, the Olympic and Paralympic Village, logistics depots and transport centres) and a number of venues hosting cultural events connected with the Games.
- 2.4 As well as the London Games themselves, sailing test events will take place at Weymouth and Portland in 2010 and 2011, and other test events will take place at other competition venues during 2011 and into 2012. These events will also be used to test non-competition venues.
- 2.5 LOCOG will be working closely with its partners to ensure that it uses existing and emerging technologies in innovative and powerful ways.¹ Wireless technologies, in particular, will play a fundamental role both in the build-up to and during the London Games.

Purpose of this document

- 2.6 This document sets out our current analysis of the spectrum requirements of the London Games. It also explores the possibility of using spectrum—a valuable, finite resource—more efficiently to meet those requirements. It seeks information and views to aid our understanding of these factors and so assist us in constructing a draft spectrum plan, on which we expect to consult after the Beijing Games.
- 2.7 This document does not address the supply of spectrum to meet the requirements of the London Games. While we have started considering this issue, many of the details are heavily dependent on the nature and extent of the requirements to be met. We will cover these in the draft spectrum plan.

Government guarantees

- 2.8 As part of London's bid for the Games, the-then Secretary of State for Trade and Industry gave two binding guarantees concerning spectrum to the IOC.
- 2.9 Guarantee 15.8 of the bid stated:

¹ <u>www.london2012.com/plans/technology</u>.

The Secretary of State for Trade and Industry has guaranteed on behalf of the UK Government the allocation of the frequencies required for the organisation of the Games.

2.10 Guarantee 15.9 of the bid stated:

The Secretary of State for Trade and Industry has guaranteed on behalf of the UK Government to the waiving of fees payable for the allocated frequencies required for the Games.

- 2.11 The Secretary of State clarified in a letter to the President of the IOC that guarantee 15.9 applied in respect of the following constituent groups:
 - 2.11.1 athletes;
 - 2.11.2 the IOC;
 - 2.11.3 LOCOG;
 - 2.11.4 National Olympic Committees (NOCs);
 - 2.11.5 international federations of sport;
 - 2.11.6 the media;
 - 2.11.7 rights-holding broadcasters (RHBs); and
 - 2.11.8 Olympic partners (i.e. sponsors).
- 2.12 In accordance with these guarantees, we are responsible for organising a full spectrum plan for the London Games and for arranging all the spectrum licences in good time in support of the plan.
- 2.13 We have agreed with the Government that the guarantees apply to two broad categories of spectrum use by those covered: PMR and broadcasting. This means that the guarantees do not apply to other services, even though they might support the organisation of the London Games, have a presence at venues and be the subject of other Government guarantees to the IOC (e.g. concerning security). These support services include military services, emergency and public-safety services (E&PSS), security and public transport. Spectrum for these services will have to be secured through existing allocation and assignment processes. We are nonetheless working closely with members of the Spectrum Planning Group for the London 2012 Olympic Games and Paralympic Games (SPGOG—see below) and will seek to ensure that any such requirements generated by the unique nature of the Games are met and coordinated with other uses

Spectrum management

2.14 Spectrum is a resource of fundamental importance in the modern world. It is the essential input into every type of wireless application, from satellites and radars to broadcasting and mobile communications. In the UK, uses of spectrum account for nearly one pound in every thirty in the economy, and its importance is growing fast. Consumers are using ever more wireless products, and innovators are competing ever faster to supply them. But spectrum is a scarce resource in very short supply, so how it is managed is vital.

- 2.15 Our statutory duties include a requirement to secure the optimal use of the spectrum in the interests of citizens and consumers.² It is essential that the regulatory regime for spectrum respond to changes in demand for, and use of, spectrum in the UK.
- 2.16 Generally, our vision for spectrum management, as set out in the Spectrum Framework Review,³ is for market forces to play an increasingly important role in determining how spectrum is used. We believe that this will encourage efficiency in spectrum use by increasing the likelihood that it will be held by those who can make best use of it and by creating more freedom for it to be used for more valuable applications.
- 2.17 The London Games will see an increase in spectrum requirements, principally in London, where spectrum is already heavily used. Meeting these requirements, and hence the Government guarantees, will be a complex task. We are also concerned to minimise any negative impact on other spectrum users and, ultimately, on citizens and consumers who benefit from those uses.
- 2.18 It is for these reasons that we started the task of spectrum planning for the London Games in 2006, some six years before they begin, before the Beijing Games take place and far earlier than any other host spectrum regulator. Such long lead times inevitably increase the uncertainty with which we must contend, particularly in accurately assessing the spectrum requirements of the Games. But we have looked closely at past Games and comparable events, and we have already successfully planned for and met the requirements of the 2007 Tour de France. We will use this information and experience for the benefit of the London Games.

Financial and economic considerations

- 2.19 Spectrum used by one party cannot be used by another because of the interference that would be caused. In other words, there is an opportunity cost to spectrum use. Making users face this opportunity cost encourages efficient spectrum use because they will use spectrum when it generates benefits greater than the opportunity cost. This is the logic behind Administrative Incentive Pricing, which attempts to reflect the opportunity cost of spectrum use in licence fees in order to incentivise efficient use.
- 2.20 The focus of the Independent Review of Radio Spectrum Management by Professor Martin Cave was the creation of incentives and opportunities for users to make the most economically productive use of spectrum.⁴ It recommended that:

... all classes of users should face financial incentives to economise on the spectrum they occupy. . . . this will entail paying a positive price to obtain access to spectrum.

2.21 This was aimed at both public- and private-sector spectrum users, noting that for the former:

> ... the primary means of encouraging spectrum efficiency should be administratively set spectrum pricing.

2.22 The Government's response stated that:⁵

² Communications Act 2003, section 3. www.opsi.gov.uk/acts/acts2003/pdf/ukpga_20030021_en.pdf. ³ www.ofcom.org.uk/consult/condocs/sfr/sfr2/sfr.pdf.

www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1 whole job.pdf.

We will apply administrative incentive pricing where spectrum has not been auctioned.

2.23 Consistent with the duties, principles and policies set out above, we believe that where fees for spectrum users at the London Games are waived under the Government guarantees, those fees should be met by the Government. In this way, the relevant decision-makers will face incentives to ensure that spectrum is used efficiently.

Governance

- 2.24 Both the Cabinet Official Committee on UK Spectrum Strategy (UKSSC) and the Olympic Board have responsibilities and expertise of direct relevance to spectrum planning for the London Games.
- 2.25 UKSSC:
 - 2.25.1 draws up policies and strategic plans for the future allocation of spectrum in such a way as to meet the needs of users in both the public and private sectors and in industry, with emphasis on the provision of vital services and the generation of national wealth;
 - 2.25.2 oversees the management and regulation of spectrum to ensure that agreed plans are correctly implemented, that efficient use is made of available capacity and that spectrum is used to the best national advantage; and
 - 2.25.3 determines positions in line with national interests to be taken by the UK in international fora.
- 2.26 UKSSC is jointly chaired by the Department for Business, Enterprise and Regulatory Reform (BERR) and the Ministry of Defence (MOD). Membership is open to Government departments and agencies. By agreement, a representative of Ofcom is also generally in attendance.
- 2.27 The Olympic Board provides oversight, strategic coordination and monitoring of the London Games, ensuring the delivery of the commitments made to the IOC when the Games were awarded to London and a sustainable legacy from the staging of the Games. It is made up of Olympics Minister Tessa Jowell, Mayor of London Ken Livingstone, British Olympic Association Chairman Colin Moynihan and LOCOG Chair Sebastian Coe.⁶
- 2.28 In recognition of the roles of these two bodies, SPGOG was established in January 2007 to support us in meeting our responsibilities toward the London Games. Although formally a subcommittee of UKSSC, its membership extends to and beyond those represented on the Olympic Board. SPGOG's terms of reference are at annex 6.
- 2.29 It should be noted that the Secretary of State has the power under the Communications Act 2003 to give us directions in respect of our spectrummanagement functions, including to secure compliance with the UK's international

⁵ www.ofcom.org.uk/static/archive/ra/spectrum-

review/govresponsetoreview/indpreviewgovtresponsefinal.doc.

⁶ www.london2012.com/about/the-people-delivering-the-games/stakeholders/olympic-board.

obligations. The Government has advised us that it regards its guarantees to the IOC to constitute such obligations.

Structure of this document

- 2.30 This document falls into a number of parts:
 - 2.30.1 section 3 sets out our approach to spectrum planning for the London Games and the assumptions that we have made;
 - 2.30.2 section 4 considers requirements for PMR and broadcasting;
 - 2.30.3 section 5 considers requirements for support services;
 - 2.30.4 section 6 considers requirements for cultural events;
 - 2.30.5 section 7 considers other requirements;
 - 2.30.6 section 8 considers operational issues that we will need to address in due course; and
 - 2.30.7 section 9 sets out the next steps for this work.

Approach and assumptions

Approach

- 3.1 Our approach to spectrum planning for the London Games can be broken down into a number of tasks:
 - 3.1.1 identifying users who might require spectrum to organise the Games;
 - 3.1.2 identifying more accurately users covered by guarantee 15.9 of London's bid who might require spectrum;
 - 3.1.3 identifying users who might require spectrum to support the organisation of the Games;
 - 3.1.4 assessing user requirements and the types of applications that will generate them;
 - 3.1.5 assessing technology changes that might affect those requirements;
 - 3.1.6 assessing how more efficient use of spectrum, higher-frequency spectrum and wired communications might affect those requirements;
 - 3.1.7 assessing the suitability and availability of spectrum to meet those requirements; and
 - 3.1.8 constructing a draft spectrum plan for consultation, ongoing refinement and implementation.
- 3.2 Requirements capture is extremely difficult this far in advance of the London Games for three main reasons:
 - 3.2.1 not all users (e.g. RHBs and partners) have been selected or identified;
 - 3.2.2 many known users are involved with the Beijing Games and have not yet considered their requirements for the London Games; and
 - 3.2.3 technological developments cannot reliably be foreseen, and technology choices have not yet been made.
- 3.3 Nevertheless, requirements capture is very important. Different applications will require different amounts of spectrum and operate at different frequencies with different requirements to prevent interference. This will affect their ability to share spectrum in the same location with other applications. We will need to accommodate applications that are not yet in common use but might be by the time of the London Games. And we will need to decide how to deal with wireless equipment brought into the UK by users accustomed to using it in their home country.
- 3.4 We have therefore taken three different approaches to assessing user requirements and the types of application that will generate them.

Top-down approach

- 3.5 This approach examines, at an aggregated level, spectrum requirements for past Games and comparable events. The most useful comparators to the London Games are:
 - 3.5.1 the Sydney 2000 Olympic Games and Paralympic Games (the Sydney Games);
 - 3.5.2 the Manchester 2002 Commonwealth Games;
 - 3.5.3 the Salt Lake 2002 Winter Olympic Games and Paralympic Games;
 - 3.5.4 the Athens 2004 Olympic Games and Paralympic Games (the Athens Games);
 - 3.5.5 the Melbourne 2006 Commonwealth Games (the Melbourne Games);
 - 3.5.6 the Turin 2006 Winter Olympic Games and Paralympic Games; and
 - 3.5.7 the 2005, 2006 and 2007 Tours de France.
- 3.6 We will also learn as much as we can from the Beijing Games and the Vancouver 2010 Winter Olympic Games and Paralympic Games (the Vancouver Games). In particular, after the Beijing Games, there will be a formal IOC transfer-of-knowledge debrief session in London with the Beijing Organising Committee of the Olympic Games and Paralympic Games and the IOC.
- 3.7 Examining the spectrum requirements for these events reveals a general increase over time as more extensive use is made of wireless applications. It might therefore be reasonable to assume that the spectrum requirements for previous Olympic Games and Paralympic Games reflect a lower level of use than we might reasonably expect at the London Games.
- 3.8 At the same time, the Information Age Partnership notes:⁷

In gauging the spectrum required, it is important not simply to extrapolate from previous Games. The 2012 Games—characterised by digital content, IP connectivity and seamlessness—will create an unprecedented level of demand for spectrum. It is essential that the work underway to gauge the likely demand and propose the means by which it may be satisfied progresses rapidly and in close engagement with industry.

Bottom-up approach

- 3.9 This approach attempts to assess the spectrum requirements of each application associated with each class of user. Our assessment can only be as good as the information available. Obtaining relevant and reliable information is challenging given that many users are currently focusing on the Beijing Games.
- 3.10 A key aim of this discussion document is to elicit information from potential spectrum users at the London Games and to prompt them to start their own planning. We are

⁷ www.iapuk.org/sites/default/files/2012 Paper 160507.pdf.

already working closely with LOCOG and have discussed the spectrum requirements for broadcasting with OBS and the BBC. LOCOG's ability to engage in detail, particularly on PMR, will be enhanced by the selection of its telecommunications partner, expected in the first quarter of 2008. We will also incorporate information from potential users as they turn their attention from the Beijing Games to the London Games.

3.11 Despite its inherent difficulties, we expect the bottom-up approach to deliver the best assessment of the spectrum requirements of the London Games as it is most likely to capture factors unique to them.

Theoretical approach

- 3.12 This approach looks at guidance on the spectrum requirements for programmemaking at large events. Reports from the European Radiocommunications Committee (ERC) and the Electronic Communications Committee (ECC) of the European Conference of Postal and Telecommunications Administrations (CEPT) include:
 - 3.12.1 ERC Recommendation 70-03 relating to the use of short-range devices;⁸
 - 3.12.2 ERC Recommendation 25-10 relating to frequency ranges for the use of temporary terrestrial audio and video SAP/SAB links (incl. ENG/OB);⁹
 - 3.12.3 ERC Report 33—the use of radio frequencies above 20 GHz for fixed services and ENG/OB;¹⁰
 - 3.12.4 ERC Report 38—handbook on radio equipment and systems video links for ENG/OB use;¹¹
 - 3.12.5 ERC Report 42—handbook on radio equipment and systems radio microphones and simple wide band audio links;¹² and
 - 3.12.6 ECC Report 2—SAP/SAB (incl. ENG/OB) spectrum use and future requirements.¹³
- 3.13 The reports provide a useful starting point for the London Games. While particular aspects are substantially different (e.g. the distinction between host broadcaster and RHBs will affect levels of equipment use), an estimate of spectrum requirements based on this guidance can be used as a high-level crosscheck.

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

Assumptions

3.14 As many potential spectrum users are not yet able to set out their requirements for the London Games, we have had to make a number of assumptions in our spectrum planning to date. Some of these are near-certainties. Others are necessarily more speculative.

⁸ <u>www.ero.dk/doc98/official/pdf/rec7003e.pdf</u>.

⁹ www.ero.dk/documentation/docs/doc98/official/pdf/rec2510e.pdf.

¹⁰ www.ero.dk/documentation/docs/doc98/official/pdf/rep033.pdf.

¹¹ www.ero.dk/documentation/docs/doc98/official/pdf/rep038.pdf

¹² www.ero.dk/documentation/docs/doc98/official/pdf/rep042.pdf.

¹³ www.ero.dk/documentation/docs/doc98/official/pdf/eccrep002.pdf.

- 3.15 For the purposes of this discussion document, we have assumed that:
 - 3.15.1 OBS will capture live video feeds of all sporting events and make them available at the IBC to RHBs;
 - 3.15.2 RHBs will contract with the IOC to broadcast those feeds. Contracts have so far been agreed with NBC (United States), EBU (Europe), SBS (Korea), CTV (Canada), ASBU (Middle East) and Channel 9 (Australia);
 - 3.15.3 those feeds will be entirely in high definition (HD);
 - 3.15.4 HD cameras will use 10 MHz channels;
 - 3.15.5 RHBs will transport their own feeds back to the IBC in some cases;
 - 3.15.6 all broadcasters will require spectrum for reporting both within and outside venues;
 - 3.15.7 some 20,000 accredited media staff will cover the London Games;¹⁴
 - 3.15.8 optical fibre will be used at and link all competition venues within the Olympic Park;
 - 3.15.9 spectrum will be required for partners and venue setup from January 2012, for broadcasters from May 2012 and for NOCs from June 2012;
 - 3.15.10 all spectrum requirements will cease by the end of September 2012;
 - 3.15.11 wireless equipment will be retunable to some extent;
 - 3.15.12 wireless equipment is likely to be imported from participating nations;
 - 3.15.13 during the Games, PMR services will be used by NOCs and teams, LOCOG, broadcasters, marketing partners, LOCOG's suppliers, E&PSS and security services;
 - 3.15.14 LOCOG will require a PMR trunked network;
 - 3.15.15 a satellite-dish farm will be deployed at a fixed location adjacent to the IBC;
 - 3.15.16 RHBs might also use satellites to link competition venues back to their facilities in the IBC or at other locations;
 - 3.15.17 news-gathering organisations will also use satellites;
 - 3.15.18 test events will have comparable spectrum requirements to events at the Games;
 - 3.15.19 new technologies for use at the Games will need to be proven by the time of LOCOG's technology freeze in 2010; and
 - 3.15.20 cultural events will not require spectrum before the Games.

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

¹⁴ www.london2012.com/documents/oda-transport/tp-first-edition/covers-etc/tp-summary.pdf.

Requirements for private mobile radio and broadcasting

Introduction

4.1 As set out in section 2, we have agreed with the Government that its guarantees apply to two broad categories of spectrum use by those covered: PMR and broadcasting. We expect that LOCOG will have the greatest PMR requirement given its need to ensure communications within, outside and between venues. The greatest requirement overall will be for wireless cameras for broadcasting.

PMR

Land radio

- 4.2 During the Athens Games, Greek regulator EETT issued:
 - 4.2.1 2,004 licences for handheld radio systems; and
 - 4.2.2 56 licences for land mobile radio systems.

Handheld radio

- 4.3 We expect LOCOG to use handheld radios to cover all the activities needed to organise a successful Games. These include:
 - 4.3.1 private security services (e.g. at turnstiles and within competition venues);
 - 4.3.2 sport services (e.g. officials and medical staff);
 - 4.3.3 transport (e.g. for athletes and the media); and
 - 4.3.4 the management of venues, ceremonies, catering, spectator services and ticketing.
- 4.4 The local organising committees traditionally rolls out a trunk radio system to cater for its own uses. This allows better use to be made of spectrum than traditional PMR by maximising the available capacity of a group of channels. The overall gain in efficiency of spectrum use is linked to the choice of technology.
- 4.5 Other PMR users will include NOCs, individual teams and athletes, partners, broadcasters and LOCOG's suppliers.
- 4.6 To date, handheld radios have used analogue technologies. However, the European Telecommunications Standards Institute has released a digital mobile radio (DMR) standard that claims to make better use of spectrum.¹⁵ Equipment is already on the market.

¹⁵ www.etsi.org/WebSite/Technologies/DigitalMobileRadio.aspx.

- 4.7 Users are likely to bring their own wireless equipment into the UK. This will complicate spectrum requirements as the UK has a different duplex split or swapped transmit and receive frequencies from other countries. For such equipment, we anticipate a duplex split of 10 MHz, with the majority of radios using 12.5 kHz channels and the rest 25 kHz channels.
- 4.8 Overall, we believe that a TETRA trunk system, some analogue PMR base stations and a mix of DMR and analogue PMR systems will be used at the London Games.

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

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

- 4.9 A rate card is a detailed list of products and services that organisations accredited by the local organising committee can rent during Games according to the Host City Contract.
- 4.10 If LOCOG puts in place a trunk network to cater for its own use, spare capacity could be offered to other users through a rate card. Some technologies (e.g. TETRA) allow secure user groups within the network.

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

Land mobile radio

4.11 We have yet to assess requirements for land mobile radio, including whether past Games provide a reliable guide. We anticipate that there might be requirements for paging systems, short-term hire and local communications.

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

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

Maritime radio

- 4.12 SPGOG is looking specifically at the requirements of the waterborne events and how maritime radio will be managed. We do not believe that the sailing at Weymouth and Portland will have additional spectrum requirements.
- 4.13 Wireless applications used at the Olympic Park might interfere with radar used on the River Thames. We will work with all concerned, notably the Port of London Authority, to ensure that any impact is minimised.

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

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

Broadcasting

4.14 OBS was created by the IOC in May 2001 to ensure that high standards of broadcasting were maintained over successive Games. It will serve as host broadcaster for the Beijing Games, the Vancouver Games and the London Games.

As such, it is chiefly responsible for providing pictures and images of the Games as a service to all RHBs.

- 4.15 OBS's specific duties are to:
 - 4.15.1 produce the international television and radio signals of the Games;
 - 4.15.2 design, build, install, operate and then dismantle the IBC;
 - 4.15.3 install, operate and then remove facilities and equipment at competition and select non-competition venues other than the IBC;
 - 4.15.4 coordinate and provide various facilities and services to RHBs;
 - 4.15.5 represent the facilities and services needs of RHBs to the local organising committee;
 - 4.15.6 produce various features and maintain an Olympic archival service; and
 - 4.15.7 assist the local organising committee in designing and building infrastructure at venues to accommodate the needs of OBS and RHBs.
- 4.16 The Vancouver Games will mark the first time that the host broadcaster will be solely an OBS operation. In December 2006, OBS created Olympic Broadcasting Services Vancouver to serve as the on-site organisation, supervised by OBS. The London Games will also be solely an OBS operation, and Olympic Broadcasting Services London will be established at a later date.

Audio links

- 4.17 Audio links include wireless microphones, in-ear monitors, talkback, audiodistribution systems (ADS) and short-term restricted-service licences (S-RSLs).
- 4.18 We anticipate that OBS and RHBs will have significant requirements for these applications. Other broadcasters will also require audio links, as will users at cultural events.
- 4.19 During the Athens Games, EETT issued:
 - 4.19.1 3,535 licences for wireless microphones;
 - 4.19.2 241 licences for in-ear monitors; and
 - 4.19.3 976 licences for talkback.

Wireless microphones

4.20 Wireless microphones are mainly used by broadcasters or events organisers to capture interviews, music or sounds. They can be handheld or body worn, with integrated or body-worn transmitters. Wireless microphones are generally low power (50-100 mW), though some require 1 W. They are currently analogue because of the audio lag incurred when using digital technology. The bandwidth required is 200 kHz per channel.

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

4.21 We anticipate that wireless microphones will account for the largest number of licence applications.

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

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

4.22 Dolby 5.1 sound might be in use by the time of the London Games. We are unclear how this and other developments in audio technology might affect spectrum requirements.

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

In-ear monitors

4.23 In-ear monitors are mainly used by broadcasters or cultural-event participants to listen to their own voice or mixed feedback. The bandwidth can reach up to 300 kHz.

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

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

Talkback

4.24 Talkback is an intercom system mainly used by broadcasters to give directions to production-team members such as camera operators, reporters and presenters. It will also be used by LOCOG for timing, scoring, sport-production and sport-competition functions. It uses PMR-like technology but, because high-quality sound is required, typically uses 200 kHz channels. However, 25 kHz channels can suffice, and older equipment tends to use smaller bandwidths anyway.

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

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

<u>ADS</u>

- 4.25 ADS retransmit material already prepared for public use. They cover:
 - 4.25.1 services provided within a site (e.g. a sports stadium or conference centre);
 - 4.25.2 events or other temporary purposes (e.g. commentary or translation services);
 - 4.25.3 services provided at the same site or a number of different sites; and
 - 4.25.4 low-power services broadcasting in spectrum other than FM or AM, access to which has been secured separately.

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

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

<u>S-RSLs</u>

4.26 S-RSLs are granted for covering special events, special projects (e.g. training) and trial services (e.g. in preparation for applying for a community radio licence). Typical use will be an FM radio station dedicated to a specific (e.g. sporting or cultural) aspect of the London Games.

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

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

Video links

- 4.27 Video links include wireless cameras and point-to-point links. These applications are used by broadcasters for capturing and reporting live events and by closed-circuit television for security purposes.
- 4.28 During the Athens Games, EETT issued:
 - 4.28.1 98 licences for wireless cameras; and
 - 4.28.2 133 licences for point-to-point links, both fixed and mobile.

Wireless cameras

- 4.29 We expect OBS to account for most requirements for video links within venues and at road events. We expect RHBs to use video links mainly to conduct interviews both within and outside venues.
- 4.30 Wireless-camera use is directly linked to broadcasting requirements. With perhaps 200 RHBs and an unknown number of other broadcasters active at the London Games, even if not all of them use wireless cameras, we expect this to be by far the largest spectrum requirement. Moreover, wireless cameras are more susceptible to interference than other applications.

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

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

4.31 Digital wireless cameras currently require 10 MHz channels. We understand that the Beijing Games will be broadcast in HD using this bandwidth, as was the case for the 2007 Tour de France. And while there are indications that larger channel sizes might be required by as early as 2010, better encryption and modulation techniques might keep these at 10 MHz. Overall, we are unclear how HD might affect spectrum requirements by 2012.

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

Point-to-point links

4.32 Point-to-point links might be required to connect venues or to provide video signals back to an outside-broadcasting truck, for example. The need for this type of

application has reduced over the years, while optical fibre is often used for backups and intra-venue links.

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

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

Reducing the cost of spectrum use

- 4.33 The London Games will bring significant economic and social benefits to the UK. But, as with any other scarce resource, using spectrum to realise these benefits comes at a cost. In particular, there will be an opportunity cost because other services of value to society are denied use of the same spectrum. London is the most congested part of the UK for spectrum use, which therefore carries a high opportunity cost even in normal circumstances. The requirements of the Games will increase that cost.
- 4.34 It is therefore important that we encourage approaches to meeting the spectrum requirements of the London Games that will reduce that opportunity cost. This could involve using spectrum more efficiently, using higher-frequency spectrum that is less scarce and/or relying more heavily on wired communications.

Using spectrum more efficiently

- 4.35 Many applications use spectrum in line with practices born of long experience, particularly where close coordination between users is needed to avoid interference. Examples include the deployment patterns of wireless microphones and cameras at special events and outside broadcasts. These practices have evolved for good reasons, and they generally serve users well.
- 4.36 We expect the London Games to give rise to spectrum requirements unprecedented in their scale and complexity for a single event. Existing practices might be unsuited to these circumstances. New behaviours might be needed instead. These, in turn, will be influenced by the environment of Games venues, particularly in their suitability for spectrum to be reused.
- 4.37 We will examine the possibilities for making more efficient use of spectrum over the coming months. We would welcome suggestions for our consideration.

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

Using higher-frequency spectrum

- 4.38 Current wireless-camera technology primarily operates between 2 and 3 GHz. The propagation characteristics of this spectrum allow reasonably long-range communication links (including ground-to-air and air-to-ground relays) to be established.
- 4.39 At higher frequencies, the range that can be achieved for a given transmitter power and antenna gain is reduced. However, with a modest increase in power and the use of multiple receive antennæ in a diversity arrangement, it might be possible to exploit higher-frequency spectrum in addition to, or instead of, current wireless-camera links. The scope for this appears to be greatest within venues, where communication distances are shorter and operational parameters can be more tightly controlled.

- 4.40 As well as reducing the cost of spectrum use, such developments could also allow access to significantly more bandwidth, and hence better video quality, than would otherwise be possible.
- 4.41 Wireless-camera technology that operates at up to 7.5 GHz is available from some manufacturers. Above this frequency, little or no equipment is currently available. However, modules and components being produced for other applications that operate at higher frequencies might be usable in, or adaptable for, wireless cameras. It might be viable for manufacturers to develop IPTV technology built on robust commercial off-the-shelf wireless-networking technologies in order to communicate over distances of up to 200 metres or so. Indeed, 60 GHz products are beginning to become available in the United States. Over such short distances, these might allow communication links to be established to wireless-access points, which could in turn be connected to the IBC on an optical-fibre backbone. Above 60GHz, more revolutionary changes would probably be required to exploit spectrum for wireless-camera use.
- 4.42 We have commissioned Sagentia to consider the feasibility of wireless cameras using higher frequencies in the Super High Frequency (3-30 GHz) and Extremely High Frequency (30-300 GHz) bands. We will publish its detailed findings in time to inform responses to this discussion document.

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?

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?

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

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

Relying more heavily on wired communications

4.43 Manufacturers have developed fixed and mobile optical-fibre cameras in response to the introduction of HD. High-bandwidth optical fibre can carry many video streams over a single link, and the costs associated with installation have fallen. It is therefore possible to rely more heavily on wired communications, substituting for spectrum use, than has previously been the case. Indeed, OBS anticipates using a third fewer wireless-camera channels at the Beijing Games than at the Athens Games by connecting short video links (e.g. track cameras) via optical fibre.

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

4.44 Even where wireless cameras are used, the availability of optical fibre throughout competition venues in the Olympic Park might make it possible to shorten distances to network connections. This would allow lower-power use and greater spectrum reuse.

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

4.45 We understand that optical fibre will be used within and between all competition venues in the Olympic Park. We anticipate that this will carry all live video feeds back to the IBC, where they will be picked up by RHBs. This should reduce the requirement for fixed point-to-point links.

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

Requirements for support services

Introduction

- 5.1 As the description suggests, support services support the organisation of the London Games and/or have a presence at venues. They include:
 - 5.1.1 military services;
 - 5.1.2 E&PSS;
 - 5.1.3 security;
 - 5.1.4 public transport;
 - 5.1.5 construction;
 - 5.1.6 catering;
 - 5.1.7 public telecommunications;
 - 5.1.8 programme delivery (including fixed and satellite links);
 - 5.1.9 maritime services;
 - 5.1.10 healthcare; and
 - 5.1.11 other third-party contractors.
- 5.2 As set out in section 2, we have agreed with the Government that its guarantees do not apply to support services, Spectrum for these services will have to be secured through existing allocation and assignment processes. We will nonetheless seek to ensure that any requirements generated by the unique nature of the London Games can be met. We will also ensure that they are coordinated with the requirements for PMR and broadcasting.

Top-down approach

5.3 It appears that no specific assignments were made for support services at the Sydney Games, the Athens Games or the Melbourne Games.

Bottom-up approach

- 5.4 The Public Safety Spectrum Policy Group (PSSPG) is, like SPGOG, a subcommittee of UKSSC. It comprises representatives from Ofcom, BERR, the Home Office, the Scottish Government, the Department for Communities and Local Government and the Department of Health. MOD participates as required. PSSPG is chaired independently, and its technical subgroup manages day-to-day assignments of spectrum for E&PSS.
- 5.5 PSSPG is considering the extent, if any, to which the London Games create spectrum requirements for the support services within its remit.

- 5.6 The Independent Audit of Spectrum Holdings set out a framework for improving spectrum management in the public sector.¹⁶ The Government's response stated that:¹⁷
 - 2.3 Where public bodies have significant requirements for additional spectrum, there will be a presumption that these needs will be met through the market. There may be certain exceptional cases, as identified by the Audit, where it will be necessary for an administrative assignment to be made. The Government expects to minimise the need for such regulatory intervention through effective forward planning. Minor assignments, where there is no potential for distortion, will continue to be made on a first-come first-served basis, subject to agreement by the relevant sub-group of UKSSC.
 - 2.4 If requirements cannot reasonably be satisfied through existing national allocations or through the market, and there is a demonstrated safety or security critical need, or mandatory international obligation, a non-market assignment will be considered through UKSSC. If it is agreed by the UKSSC that an exception is justified, consideration will be given to formally directing Ofcom, under the appropriate provisions of the Communications Act 2003, to make the spectrum available through administrative assignment.
 - 2.5 The public body or bodies responsible for generating the requirement will meet any costs incurred in making spectrum available through non-market assignment.
- 5.7 We envisage that public support services with spectrum requirements will follow this process.

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

¹⁶ www.spectrumaudit.org.uk/pdf/caveaudit.pdf.

¹⁷ www.bandsharing-forum.org.uk/documents/governmentresponsetocaveaudit.pdf.

Requirements for cultural events

Introduction

- 6.1 Clause 35 of the Host City Contract requires the local organising committee to organise a programme of cultural events covering at least the entire period during which the Olympic Village is open. This is from two weeks before the opening ceremony of the Olympic Games until three days after the closing ceremony of the Paralympic Games.
- 6.2 London's bid split the vision for the Cultural Olympiad into three tiers:
 - 6.2.1 tier 1—mandatory ceremonial events;
 - 6.2.2 tier 2-bid commitments; and
 - 6.2.3 tier 3—a UK-wide festival.
- 6.3 Many of these events will require spectrum. We have agreed with the Government that its guarantees cover tiers 1 and 2 of the Cultural Olympiad. Requirements for tier 3 will have to be met through existing allocation and assignment processes.

Tier 1: mandatory ceremonial events

- 6.4 LOCOG's vision is to create extraordinary live spectacles for stadium audiences and international television events for the one in three of the world's population who will watch them. The mandatory ceremonial events, prescribed by the IOC, will pull the world's focus toward London and set the tone for the competition in a festival of celebration. They will require a wide range of wireless applications, including FM radio transmitters and microphones, and we expect that they will represent the peak in terms of both spectrum requirements and risk of interference.
- 6.5 The list of mandatory ceremonial events is:
 - 6.5.1 the Beijing Olympic Games handover ceremony on 24 August 2008;
 - 6.5.2 the Beijing Paralympic Games handover ceremony on 17 September 2008;
 - 6.5.3 the London Olympic Games opening ceremony;
 - 6.5.4 the London Olympic Games closing ceremony;
 - 6.5.5 the London Paralympic Games opening ceremony;
 - 6.5.6 the London Paralympic Games closing ceremony;
 - 6.5.7 Olympic Games medal ceremonies;
 - 6.5.8 Paralympic Games medal ceremonies;
 - 6.5.9 Olympic team-welcome ceremonies;

- 6.5.10 Paralympic team-welcome ceremonies;
- 6.5.11 the Olympic torch relay;
- 6.5.12 the Paralympic torch relay; and
- 6.5.13 the Olympic youth camp.
- 6.6 Although the opening and closing ceremonies of the Beijing Games will not take place in the UK, major public celebrations of both handover moments are likely to take place here. Many activities will be focused on some 60 live sites—large outdoor public broadcast screens—in London and across the UK. These will operate throughout the four years of the Cultural Olympiad, increasing in number over that period in the run-up to 2012. They will have specific spectrum requirements for wireless microphones, point-to-point and satellite links and other wireless communications.
- 6.7 The opening and closing ceremonies of the London Games are likely to raise issues of spectrum congestion as many users will be concentrated in a very small number of locations, principally the Olympic Stadium.

Tier 2: bid commitments

- 6.8 The delivery of a series of major projects and signature events forms part of the Host City Contract, to which LOCOG is committed by London's bid. The scope of this activity includes the delivery of world-standard cultural events. LOCOG will work with key partners to deliver these projects, which will carry the London 2012 brand.
- 6.9 While these projects have been scoped, they are currently in the early planning stages. It is therefore difficult to give a precise estimate of the timing and nature of large-scale public-event activity for each and therefore of spectrum requirements. We nonetheless anticipate that spectrum will be required.

Tier 3: UK-wide festival

- 6.10 The UK-wide festival will be a delegated programme adding value to the myriad cultural events taking place across the UK during the Cultural Olympiad. It will be curated by a network of Creative Programmers employed by Regional Cultural Consortia and reporting to LOCOG but delivered by many diverse organisations. Participating projects could be small or large in scale and have a regional, local or sectoral focus.
- 6.11 We anticipate that spectrum will be required for some of the larger public events.

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

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

Other requirements

Introduction

- 7.1 During the Athens Games, EETT issued:
 - 7.1.1 263 licences for fixed satellite services;
 - 7.1.2 97 licences for telemetry and telecommand;
 - 7.1.3 196 licences for wireless local-area networks (WLANs); and
 - 7.1.4 19 licences for other uses.
- 7.2 These uses are so diverse that we cannot determine in advance whether they are covered by the Government guarantees. We will consider them on a case-by-case basis. Some use spectrum on a licence-exempt basis and so are not affected by the guarantees.
- 7.3 We have also considered the ongoing spectrum requirements of applications for programme-making and special events (PMSE) during the London Games and the issue of legacy use of the Olympic Park.

Fixed satellite services

7.4 Fixed satellite services are used for data, point-to-point links, broadcasting distribution and a number of other applications. For example, the transportable earth station licences that we issue cover use for satellite newsgathering (SNG). These register and authorise equipment, not transmission. Authorisation to use equipment for transmission can only be secured through our online E-Flatco clearance and coordination system. We do not believe that there will be additional spectrum requirements for fixed satellite services.

Telemetry and telecommand

7.5 Spectrum is available on a licence-exempt basis, so no arrangements will be required for most applications. PMR channels may be required for some critical applications.

WLANs

7.6 We expect WLANs to be deployed for accredited users. Hot-spot services could also be offered to spectators and athletes. Spectrum is available on a licence-exempt basis.

PMR446-family radios

7.7 We expect PMR446 short-range radios to be used by spectators as well as users covered by the Government guarantees. Spectrum is available on a licence-exempt basis. We expect the digital version of PMR446 to be licence-exempted in good time for the London Games.

Radio-frequency identification

7.8 Radio-frequency identification applications read data held on dynamic microchips. They can be used to verify the validity of passes and tickets, and sporting events and venues often make use of them for security and turnstile management. We anticipate that they will be used at some, if not all, venues. Spectrum is available on a licence-exempt basis.

PMSE

7.9 Wireless applications are extensively used in the UK to support PMSE. In some cases, the five broad categories of use briefly described below may be linked directly or indirectly to the London Games. In other cases, they will be completely unrelated but still have spectrum requirements.

Special events

7.10 This category includes sporting, musical and theatrical events. Such events will continue to take place during the London Games. Users will have similar requirements (e.g. wireless microphones, talkback and in-ear monitors) to those at the Games.

Newsgathering

- 7.11 News reporting is often unplanned. A radio or television news team is despatched at short notice to a previously unanticipated location to cover an unfolding story. Spectrum requirements cannot therefore be predicted in advance.
- 7.12 A news team will typically comprise:
 - 7.12.1 an interviewer using a wireless microphone, an in-ear monitor and talkback to an SNG truck;
 - 7.12.2 a camera operator using a wireless camera and talkback; and
 - 7.12.3 an SNG truck capturing the live coverage, communicating with all the parties involved and relaying this back to a studio.
- 7.13 We anticipate that current users of newsgathering applications will be more active during the London Games. We also expect the total number of users to increase with the presence of many non-RHB broadcasters.

Outside broadcasts

7.14 Outside broadcasts often cover sporting events live. They are likely to use the full range of PMSE applications.

Community use

7.15 Community organisations (e.g. places of worship and schools) will continue to use wireless microphones during the London Games.

Studio-based programme-making

7.16 Television studios throughout London use wireless microphones, in-ear monitors and talkback.

Legacy

- 7.17 After the London Games, the Olympic Park will be transformed into the largest urban park created in Europe for more than 150 years. The Olympic Delivery Authority is working with the London Thames Gateway Development Corporation, the London Development Authority, the Greater London Authority and the host boroughs to develop a Legacy Masterplan Framework, which will set out a clear vision for the future pattern of development of the Park.
- 7.18 We have agreed with the Government that its guarantees do not extend beyond the end of the London Games and so do not cover legacy. Spectrum for this will have to be secured through existing allocation and assignment processes.

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

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

Operational issues

Introduction

- 8.1 We have worked closely with EETT, Australian regulator ACMA and French regulator ANFR to identify operational issues based on their experience of past Games and comparable events. We experienced these firsthand during the 2007 Tour de France.
- 8.2 We have not yet focused on operational issues given the priority of spectrum planning. We nonetheless address them here in case stakeholders wish to bring considerations to our attention at an early stage.

Licensing

- 8.3 Licensing spectrum use at past Games has traditionally been carried out by the host spectrum regulator. More recently, local organising committees have operated an online application system that validates the identity of those applying for licences. This would enable us and/or our agents to ensure that those covered by the Government guarantees have access to the spectrum that they require and are not charged licence fees, for example.
- 8.4 Licensing generally starts 18 months before the Games. For the London Games, that will be early 2011.

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

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

Enforcement

- 8.5 Enforcement will cover:
 - 8.5.1 harmful interference caused by or to spectrum use associated with the London Games; and
 - 8.5.2 unauthorised spectrum use.
- 8.6 Where harmful interference occurs, our priorities are to deal first with interference that could endanger safety-of-life services, then with problems that could disrupt the running of business (and, in this context, the London Games) and then with all other user problems.
- 8.7 Unauthorised spectrum use can jeopardise any spectrum-management plan. The London Games will place unprecedented pressure on spectrum use in the capital, so it is essential that all users, whether associated with the Games or not, obtain the correct authorisation and observe licence (or licence-exemption) conditions. We will make full use of the legal powers available to us to deal with unauthorised use, the maximum penalty for which is two years' imprisonment, an unlimited fine and the forfeiture of anything used in connection with the unauthorised use.

Question 26. Do you have any views on enforcement?

Next steps

- 9.1 We invite responses to the questions raised in this discussion document, published on 30 November 2007, by 22 February 2008. See annex 1 for details of how to respond.
- 9.2 We will be happy to discuss these questions with stakeholders during the consultation period.
- 9.3 We will publish a summary of responses as soon as possible after the closing date for their receipt. We expect to address them in substance when we consult on a draft spectrum plan for the London Games after the Beijing Games. We will continue to discuss issues with stakeholders in the meantime.
- 9.4 You can register to receive free email updates alerting you to the publication of our documents. For more details, see <u>www.ofcom.org.uk/static/subscrive/select_list.htm</u>.

Annex 1

Responding to this discussion document

This is how to respond

- A1.1 We invite written views and comments on the issues raised in this document, to be made by 5 p.m. on 22 February 2008.
- A1.2 We strongly prefer to receive responses using the online web form at <u>www.ofcom.org.uk/consult/condocs/spectrum2012</u> as this helps us to process them quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see annex 3) to indicate whether there are confidentiality issues. This cover sheet is incorporated into the online web-form questionnaire.
- A1.3 For larger responses—particularly those with supporting charts, tables or other data—please email <u>laurent.bodusseau@ofcom.org.uk</u>, attaching your response in Microsoft Word format with a cover sheet.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of this document.

Laurent Bodusseau Ofcom Riverside House 2a Southwark Bridge Road London SE1 9HA United Kingdom

- A1.5 Note that we do not need a hard copy in addition to an electronic version. We will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document and listed together in annex 4. It would also help if you can explain why you hold your views and how our proposals would affect you.

This is how to obtain further information

A1.7 If you want to discuss the issues and questions raised in this document or need advice on the appropriate form of response, please contact Laurent Bodusseau on +44 (0)20 7981 3140.

We will seek to respect requests for confidentiality

- A1.8 We believe that it is important for everyone interested in an issue to see the views expressed by respondents. We will therefore usually publish all responses, ideally on receipt, at <u>www.ofcom.org.uk</u>/consult/condocs/spectrum2012. If you think some or all of your response should be kept confidential, please specify which parts and why. Please also place such parts in a separate annex.
- A1.9 If someone asks us to keep some or all of a response confidential, we will treat the request seriously and try to respect it. But sometimes we will need to publish all

responses, including those that are marked as confidential, in order to meet legal obligations.

A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to us to use. Our approach on intellectual-property rights is explained further at www.ofcom.org.uk/about/accoun/disclaimer.

You can comment on our consultation processes

- A1.11 We seek to ensure that responding to a consultation is as easy as possible. For more information, please see our consultation principles in annex 2.
- A1.12 If you have any comments or suggestions on how we conduct our consultations, please call our consultation helpdesk on +44 (0)20 7981 3003 or email us at <u>consult@ofcom.org.uk</u>. We would particularly welcome thoughts on how we could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumer, who are less likely to give their opinions through a formal consultation.
- A1.13 If you would like to discuss these issues or our consultation processes more generally, you can alternatively contact Vicki Nash, Director, Scotland, who is our consultation champion.

Vicki Nash Ofcom Sutherland House 149 St. Vincent Street Glasgow G2 5NW United Kingdom

Tel: +44 (0)141 229 7401 Fax: +44 (0)141 229 7433

vicki.nash@ofcom.org.uk

Annex 2

Ofcom's consultation principles

A2.1 Of com has published the following seven principles that it will follow for each public written consultation:

Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

- A2.3 We will be clear about who we are consulting, why, on what questions and for how long.
- A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.
- A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.
- A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.
- A2.7 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 3

Response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all responses in full at <u>www.ofcom.org.uk</u>/consult/condocs/spectrum2012.
- A3.2 We have produced a cover sheet for responses (see below) and would be very grateful if you could send one with your response. (It is incorporated into the online web form if you respond in this way.) This will speed up our processing of responses and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore, we would encourage respondents to complete their cover sheet in a way that allows us to publish their responses upon receipt rather than wait until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form. If you are responding via email, post or fax, you can download an electronic copy of this cover sheet in Word or RTF format from www.ofcom.org.uk/consult/244504.
- A3.5 Please put in a separate annex any parts of your response that you consider should be kept confidential and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details or job title to remain confidential, please provide them in your cover sheet only so that we do not have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS				
Consultation title:				
To (Ofcom contact):				
Name of respondent:				
Representing (self or organisation/s):				
Address (if not received by email):				
CONFIDENTIALITY				
Please tick below what part of your response you consider is confidential, giving your reasons why.				
Nothing Name/contact details/job title				
Whole response Organisation				
Part of the response If there is no separate annex, which parts?				
If you want part of your response, your name or your organisation not to be published, can we still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?				
DECLARATION				
I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard email text about not disclosing email contents and attachments.				
Ofcom seeks to publish responses on receipt. If your response is not confidential (in whole or in part) and you would prefer us to publish your response only once the consultation has ended, please tick here.				
Name Signed (if hard copy)				

Annex 4

Discussion questions

Approach and assumptions

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

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

Requirements for PMR and broadcasting

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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?

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?

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

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

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

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

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

Requirements for support services

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

Requirements for cultural events

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

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

Other requirements

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

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

Operational issues

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

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

Question 26. Do you have any views on enforcement?

Annex 5

Venues for the London Games

Venue	Event
All England Lawn Tennis	Tennis
and Croquet Club	
(Wimbledon)	
Aquatics Centre	Diving, modern pentathlon (swimming), Paralympic
	swimming, swimming, synchronised swimming, water polo
Basketball Arena	Basketball (prelims), modern pentathlon (shooting and
	fencing), Paralympic wheelchair rugby
Broxbourne Canoe Slalom	Canoeing, kayaking
Earl's Court	Volleyball
Eton College Rowing Centre	Flatwater canoeing, flatwater kayaking, rowing
(Domey Lake)	Develymenia evelopy, Develymenia wheelehoir termin
Eton Manor	Paralympic archery, Paralympic wheelchair tennis
EXCEL EXHIBITION CENTRE	Boxing, Judo, Paralympic boccia, Paralympic Judo, Paralympic
	Toolewondo, weightlifting, wroatling
Fancing Arona	Fancing Derekoning, wheelehoir fancing
	Perioding, Paralympic wheelchail tencing
Greenwich Arena	Badminton, gymnastics (mythmic)
Hampden Park (Glasgow)	Football
Handball Arena	Handball, Paralympic goalball
Hockey Arena	Hockey, Paralympic 5- and 7-a-side football
Horse Guards Parade	Beach volleyball
Hyde Park	I nathion
Lord's Cricket Ground	Archery
Maritime Greenwich	Equestrian, modern pentathion (riding and running),
	Paralympic equestrian
Millennium Stadium (Cardiff)	Football
O_2 Arena	Basketball (finals), gymnastics (artistic and trampoline)
Old Trafford (Manchester)	
	Paralympic track and field, track and field, walking
Regent's Park	Cycling (road), Paralympic cycling (road)
Royal Artillery Barracks	Shooting, Paralympic shooting
St. James's Park	Football
(Newcastle)	
Velopark	BMX, cycling (track), paralympic cycling (track)
Villa Park (Birmingham)	Football
Weald Country Park	Mountain biking
Wembley Stadium	Football
Weymouth Bay and	Paralympic sailing, sailing
Portland Harbour	

Annex 6

SPGOG: terms of reference and membership

- A6.1 The Spectrum Planning Group for the London 2012 Olympic Games and Paralympic Games (SPGOG) is a subcommittee of the Cabinet Official Committee on UK Spectrum Strategy (UKSSC) and is established in response to a decision reached by UKSSC in January 2007.
- A6.2 In a letter dated 26 October 2004 to the President of the International Olympic Committee, the Secretary of State for Trade and Industry guaranteed on behalf of the UK Government the allocation of the spectrum required for the organisation of the Games and the waiving of fees payable for the spectrum so allocated. SPGOG is required to support the Office of Communications (Ofcom) in meeting its responsibility to organise a full spectrum plan for the Games—addressing uses that fall both within and without the Government guarantees—and to arrange all the spectrum licences in good time in support of the plan.
- A6.3 Membership of SPGOG is open to representatives from:
 - Ofcom;
 - the Cabinet Office;
 - the Civil Aviation Authority;
 - the Department for Business, Enterprise and Regulatory Reform;
 - the Department for Communities and Local Government;
 - the Department for Culture, Media and Sport;
 - the Department of Health
 - the Department for Transport;
 - Government Communications Headquarters;
 - the Greater London Authority;
 - HM Treasury;
 - the London Organising Committee of the Olympic Games and Paralympic Games;
 - the Maritime and Coastguard Agency;
 - the Ministry of Defence;
 - the National Policing Improvement Agency;

- the Olympic Delivery Authority;
- the Olympic Security Directorate of the Metropolitan Police; and
- the Scottish Government

as well as other members of UKSSC not identified above.

- A6.4 Ofcom chairs SPGOG and provides the secretariat. Meetings will typically be held monthly. Where appropriate, work will be progressed in the intervening periods by email correspondence. Where necessary, SPGOG will seek advice from and work with others who it determines will assist in meeting its remit.
- A6.5 Members of SPGOG are free to escalate issues within its remit to other appropriate governance processes, notably the Olympic Board.

Annex 7

Glossary of abbreviations

ACMA	Australian Communications and Media Authority
ADS	Audio-distribution systems
AM	Amplitude modulation
ANFR	Agence nationale des fréquences
ASBU	Arab States Broadcasting Union
BBC	British Broadcasting Corporation
BERR	Department for Business, Enterprise and Regulatory Reform
CEPT	European Conference of Postal and Telecommunications Administrations
СТV	CTV Television Network
DMR	Digital mobile radio
E&PSS	Emergency and public-safety services
EBU	European Broadcasting Union
ECC	Electronic Communications Committee
EETT	Hellenic Telecommunications and Post Commission
ENG	Electronic newsgathering
ERC	European Radiocommunications Committee
FM	Frequency modulation
GHz	Gigahertz
HD	High definition
IAP	Information Age Partnership
IBC	International Broadcasting Centre
IOC	International Olympic Committee
IP	Internet Protocol
kHz	Kilohertz

LOCOG	London Organising Committee of the Olympic Games and Paralympic Games
MHz	Megahertz
MOD	Ministry of Defence
mW	Milliwatt
NBC	National Broadcasting Company
NOC	National Olympic committee
OB	Outside broadcasts
OBS	Olympic Broadcasting Services
Ofcom	Office of Communications
PMR	Private mobile radio
PSSPG	Public-Safety Spectrum Policy Group
RHB	Rights-holding broadcaster
SAB	Services ancillary to broadcasting
SAP	Services ancillary to programme-making
SBS	Seoul Broadcasting System
SNG	Satellite newsgathering
SPGOG	Spectrum Planning Group for the London 2012 Olympic Games and Paralympic Games
S-RSL	Short-term restricted-service licence
TETRA	Terrestrial trunked radio
UKSSC	Cabinet Official Committee on UK Spectrum Strategy
W	Watt
WLAN	Wireless local-area network