SES

2, May 2012

Mrs. Mrinal Patel
Senior Engineer, Fixed Wireless Services
Ofcom
Riverside House
2a Southwark Bridge Road
London, SE1 9HA

Re.: Ofcom Spectrum Review

Dear Mrs. Patel:

SES is pleased to submit this response to Ofcom's Spectrum Review consultation. SES requests that the Annexes 2 and 3 be treated as confidential. As a satellite service provider offering significant services to U.K. customers, SES S.A. on behalf of its various UK interests including wholly-owned subsidiaries SES ASTRA UK, Ltd, SES Satellites (Gibraltar) Ltd. and SES Satellite Leasing Ltd. (collectively, "SES"), very much appreciates the opportunity to participate in this consultation and to contribute to Ofcom's review of spectrum used for point-to-point and other services. SES also holds an approximately forty-five percent (45%) interest in O3b Limited, a non-geostationary Ka-band satellite operator located in Jersey, Channel Islands.

SES is a provider of fixed satellite service ("FSS") and broadcast satellite services ("BSS") in Europe, the Americas, Asia and Africa. Several SES satellites are located in UK orbital positions,[1] many are launched and/or operated pursuant to UK authority,[2] many have UK manufactured satellite components, and many are insured by UK entities. SES is a provider of a wide variety of important satellite services to customers in the UK including for direct-to-home ("DTH") services, satellite news gathering, private networks, broadband services, and more. For more than a decade, SES has been an important provider of satellite capacity in the UK market. In particular, more than twelve (12) million UK households receive DTH television services via SES spacecraft.

Before addressing the specific questions related to the Spectrum Review, SES would first like to comment on the fundamental importance of satellite services to UK

[1] For example, SES's AMC-18, AMC-21 and NSS-11 satellites operate at UK orbital positions filed with the ITU at the request of the Gibraltar Regulatory Authority on behalf of SES Satellites (Gibraltar) Ltd.

[2] These include satellites launched and/or operated pursuant to space activities licences issued by the UK Space Agency and the Gibraltar Regulatory Authority pursuant to the Outer Space Act 1986 (UK) and the Outer Space Act 1986 (Gibraltar) Order 1996.

consumers and the UK economy more broadly. It is important to do this because without satellites, a day in the life of UK consumers would be dramatically and negatively affected. Satellite services play an integral role in the smooth operation of the UK economy and an important part in the daily life of the UK consumer offering many essential services. Despite this fact and because satellite operators are largely wholesalers that do not have high profile "brand-names" or direct relationships with consumers, the extent of the importance that satellites play and the advanced and wide range of services offered to enhance the daily lives of UK consumers can be too easily overlooked.

The steady growth of the European commercial satellite sector indicates UK and broader European dependence on satellite services. Market data in both Europe and the UK clearly indicates that the commercial satellite sector has experienced continuous, long-term expansion such as:

- During the past decade in Europe, the number of video channels transmitted via satellite has increased from 2,052 to 5,832 (*i.e.,* 11% yearly average growth); (*)
- During the last 10 years, the satellite bandwidth used for digital transmissions in Europe has grown from 9.4 GHz to 15.7 GHz (*i.e.,* 5 % yearly average growth); (*)
- Today 94 million European homes receive television directly via satellites, and 210 thousand subscribers use satellite broadband services. (*)(**)

Sources: (*) Euroconsult ; (**) Screen Digest

As indicated by the 2011 research of Kantar Media in Annex 1, this same type of growth is driving expansion of the UK satellite services market. In fact, satellite is the leading source for television programming in the UK. With service to more than 12 million UK households, satellite provides service to more homes than terrestrial (10.32 million), cable (2.88 million) or IPTV (0.68 million) and is the leading provider of digital infrastructure. It is important to note that cable relies on satellite for distribution of signals to UK cable head-ends. Simply stated, satellite is absolutely essential for the distribution and delivery of video services in the UK.

In addition, satellites play a critical role in UK corporate and government networks. Very-Small-Aperture Terminals ("VSAT") enable high-speed, encrypted data-communications using small antennas. VSAT technology enables the provision of vital corporate and government communications such as connecting home and field-offices, off-shore drilling platforms, embassies and other agencies. Such connectivity is used for inventory management, data transfers, and Internet-connectivity. Commercial users include financial institutions, car manufacturers, oil & petrol companies, food and beverage manufacturers, and many more.

It is not unusual for satellite, at the time of an emergency or disaster, to be the only or best available communications technology. Satellite services can be quickly deployed to provide reliable, quality communications at a time when few if any other services may be available. Satellites can maintain or quickly restore broadcast, critical commercial and governmental services, and enable emergency workers, and affected citizens to

communicate. As a result, VSAT plays an integral and growing role in emergency situations, disaster-recovery and in mission critical security and defence functions.

The UK and other European governments use VSATs to link agencies, military and operational centers. In particular, this is done where there is inadequate terrestrial infrastructure or where security, redundancy and reliability are essential. Given these emergency response capabilities along with the benefit of public safety, national security and defence-related satellite services it is easy to see the vast benefits of VSAT services.

Similarly, broadband services by satellite is one of the areas where the most significant innovation has taken place in recent years in both the space and ground segments. Today, satellite broadband services are delivered at speeds comparable to terrestrial wireline. The resulting increased demand from corporations, institutions as well as from consumers who cannot benefit from quality terrestrial connectivity at home is evidence of the importance of satellite's role in this market. The role of satellite in provision of broadband is not marginal. Instead, it is fundamental for prompt and universal delivery of broadband coverage in the UK.

Finally, satellites bring critical connectivity to UK citizens including, importantly, to rural, remote and underserved areas. This means that satellite-based services such as television (DTH and cable distribution), corporate networks, broadband, telemedicine, e-government applications and education connects the otherwise unconnected or under-connected and provides the services that help keep the UK economy moving.

With this background in mind, we turn to the specific consultation questions posed by Ofcom, SES has the following comments:

Question 1

What are likely to be the key underlying factors influencing changes in demand for this spectrum (in terms of quantity of spectrum or preferred bands) over the next 5 to 10 years? Please provide band specific evidence to support your view.

There are several factors which will influence spectrum demand for satellite services over the next 5-10 years. These factors are both technical and commercial. For example, the digital television in the UK and Europe more broadly fifteen years ago, the digital media segment has grown dramatically over the last decade. The key drivers for this growth are an increase in the types of delivery channels and the rapid change in consumer behaviour. Highly diverse and high quality digital content, substantial increases in number of TV channels and in high definition ("HD") television have been major growth drivers in all delivery segments, including satellites. We believe that this trend is going to continue with the development of quadruple- HD programs and technologies. Without even including the growth of mobile users, delivering such high volume to fixed users requires powerful distribution pipes that satellites provide.

To satisfy the current digital broadcast demand, SES uses a substantial amount of capacity for video distribution in the UK. Not counting SES services provided to cable head-ends, SES satellites reach more than 12 million UK households. Specifically, a total of 58 transponders (each of 26 or 33 MHz) are used for DTH

distribution in the UK (*i.e.,* ASTRA 1N, ASTRA 2A and 2B.) Five additional transponders are used for cable feed-in using ASTRA 4A. In fact, given the increasing scarcity of spectrum (*i.e.*, transponders), we additionally use numerous Eutelsat transponders to satisfy this video distribution demand.

The sum total? SES is using 3115 MHz of satellite capacity for UK digital transmissions. All downlinks are made using the BSS and FSS bands between the 10.7 and 12.75 GHz. All uplinks are made by our well-established customers from the UK (*i.e.,* Sky, ITV, BBC, Channel 4, Arqiva, Globecast and others), using the 12.75-13.25 & 13.75-14.5 & 17.3-18.1 GHz bands.

Additionally, SES supports ESOA's comments concerning C and Ka bands filed in response to this consultation. More specifically, SES uses C-band spectrum in the UK for teleports and domestic and international services. The list of our customers and types of services are provided in Annexes 2 and 3. Today, the UK represents the largest share of SES C-band spectrum use in Europe (500 out of 950 MHz). We anticipate that this business will grow steadily.

Our customers use the C-band due to the robustness of this spectrum (relative immunity from weather conditions), the size of the satellite beams (enabling broad connectivity over very large geographical areas (*e.g.,* transcontinental services between the UK and the rest of the world) and the ability to rely on wide bandwidth (600 MHz down, 500 MHz up).

With regard to the Ka-band, SES has an ambitious programme to develop a fleet of satellites with appropriate capacity to address various customers' service needs including ***but not limited to*** provision of broadband services, satellite news gathering ("SNG") (*i.e.*, Ka-band links between gateway in Europe and satellite, and Ka-band links between satellite and end-users in Europe), data services to businesses and governments (Ka-band links between gateway in Europe and satellite, Ku-band links between satellite and end-user in or outside Europe), DTH (including enhanced and interactive services), as well as Internet and wireless backhaul, and contribution links for other networks (*e.g.* broadcast or cable television networks). Contrary to the Aegis' report statements, the main potential for growth in satellite demand will ***not*** necessarily be driven by consumer broadband terminals.[3]

It is important to highlight that the principal driver for the satellite sector's move towards use of the Ka-band is congestion in the Ku-band in Europe. This has led satellite operators to increasingly use and rely on the Ka-band to accommodate growth and advanced services. For example DirecTV one of the largest DTH services providers in the US already uses the Ka-band extensively for video distribution. In addition, SES has customers in the UK that have already invested millions of British Pounds in Ka-band SNG equipment and trucks.

Today, due to the large number of satellites serving Europe using a minimum of two degree spacing, it is generally very difficult to add additional satellites at new Ku-band orbital positions capable of serving the UK or Europe. This is due to the

[3] *See, Frequency Band Review for Fixed Wireless Services*, Aegis Final Report, 29th November 2011, at page 3 paragraph 4.

constraints imposed by coordination requirements associated with two degree spacing and the likely interference that such additional satellites would cause into neighboring satellites. Due to the fact that Ku-band satellite capacity at existing orbital positions is fully utilised satellite operators have had to include Ka-band in their growth plans resulting in newly launched satellites for the expansion of satellite services and the introduction of new services.

Annex 4 provides more information about this Ku-band congestion and its effect.

Question 5

(a) What are the main factors (technical or regulatory) that determine preferences for one band over another for satellite applications? Do these factors vary between different types of satellite applications (Mobile, Fixed, Broadcasting and Science services)? In which bands will we see the most significant changes in demand in the next 5 to 10 years, and why?

Preferences for use of one frequency over another are determined by a variety of factors. In some cases, large coverage areas are required for long-distance or regional communications (*e.g.,* backhaul, international links, point-to-multipoint broadcast distribution). C-band is ideally suited for this. SES' UK customers use C-band to provide services into Asia, Africa and Latin America, particularly into equatorial regions. C-band also enables coverage of almost one third of the Earth with a single beam. A customer with sites all over Africa can use one broadcast outbound carrier to cover all sites, reducing costs of having to uplink onto multiple beams as may be required in the Ku and Ka-bands.

Where service areas are smaller (*i.e.,* spot beams for DTH services) or size of terrestrial antennas must be smaller, Ku and Ka-bands provide better solutions than C-band (*e.g.,* SNG, DTH, broadband, VSAT, and mobile applications). The Ka-band is the expansion band that satellite operators are using for growth beyond the already congested Ku-band.

Weather may also play a determining factor in whether or not to choose a certain band. For example, customers serving areas of high rain or snow fall demand C-band as it is more resilient to interruptions due to precipitation than higher frequency bands such as the Ku and Ka-bands.

(b) A number of the frequency bands under review are currently used for satellite Permanent Earth Stations (PESs), for example to feed Direct to Home satellite broadcast services. What are the continued and future spectrum requirements for satellite PESs (E-s & s-E) likely to be and in which bands? Please provide evidence to support your views.

Several SES customers have PESs licensed with Ofcom and using C and Ku-band spectrum. SES anticipates that the use of the C-band for the teleport business will continue. In addition, the number of permanent PESs in the Ku and Ka-bands will continue to grow as the DTH business expands. SES also anticipates that use of Ka-band PESs (*e.g.,* as Internet gateways) will be implemented in the near future. SES' customers manage and license their PESs.

The following SES satellites are currently communicating with PESs in the UK, NSS-806, NSS-12, SES-4, NSS-10, NSS-7 and NSS-5. For additional information see Annex 3.

(c) During recent years, some commentators have forecast significant demand for spectrum to support satellite consumer terminals. To date this demand has been slow to materialise. Do you have information which would help inform a more accurate assessment of future demand for spectrum in bands currently shared with fixed links?

It is premature to judge whether the projected spectrum demand to support satellite consumer terminals will materialize. The consumer satellite broadband market is a nascent one. Only recently have a number of satellite operators (including one UK operator) deployed next-generation High Throughput Satellites ("HTS") to address this market, representing billions of British Pounds of investment in both satellite and supporting ground infrastructure. This market should be given the opportunity to develop by promoting spectrum harmonisation and a predictable regulatory environment.

Even before the advent of HTS, SES was a pioneer in the satellite consumer broadband market. SES provides wholesale broadband services through the brand SES Satellite Based Broadband Services (SBBS). General information about SBBS can be found from: http://www.ses.com/4233325/news/2012/10347520

SBBS works with the following UK-based ISPs to deliver broadband via satellite to consumers:

- BeyonDSL which belongs to Eurosat (www.satelliteinternet.co.uk);
- Global Technology Ltd which is our Maritime ISP (www.h2olitespeed.com);
- Rustyce Solutions (www.apogeeinternet.co.uk).

Both BeyonDSL and Rustyce services are on ASTRA 3B and also on ASTRA 1N, whilst Globaltec uses ASTRA 3B, all in the Ku-band 14 GHz.

(d) Are there factors specific to the satellite based communications sector which mean that it faces particular difficulties evidencing and satisfying demand for spectrum? If so, how might these be overcome?

SES urges the UK to foster and maintain a regulatory environment that is stable and transparent over the long term.

Satellite systems have extremely high up-front costs and long lead times before revenue can be generated. Satellites take approximately 3 years to design, build and place into operation, during which much cost is incurred and no revenue is generated. Once operational, most geostationary satellites have a useful life of 15-20 years. The purchase, launch, operation, and insurance of a geostationary satellite is highly capital intensive and may cost between USD$180-350 million (approximately £110-215 million) depending upon the type and complexity of the spacecraft. Once a spacecraft is operational, it cannot be physically altered. Satellite operators, thus, have powerful economic incentives to maximise spectrum efficiency and fully exploit their assigned spectrum quickly so as to recover their significant up-front investment.

These features of the satellite industry mean that there is often a significant lag between projected demand for satellite services and the deployment of a satellite to meet it. There is also significant risk-taking by the private satellite operator in even committing to building and launching a satellite based on demand projections. As a result, it is vital that satellite operators be able to rely on a regulatory environment (including access to spectrum) that remains stable and predictable during the combined satellite design and operational life of the satellite. And as noted in paragraph 3.16 of the consultation document, this indeed "necessitates long term spectrum planning". This is not just for the benefit of the satellite operator but, more importantly, for the benefit of the many UK consumers whose daily life is dependent upon satellite services (*e.g,*.television, radio, SNG, government services, private networks, internet, emergency applications, and much more).

In the satellite sector, harmonisation of spectrum is another essential element. It is absolutely critical that the UK remain in line with other countries with regard to access to the frequency bands used by satellites. This is very much the case for use of the C, Ku and Ka-band spectrum. It is essential for successful implementation of satellite services that all European countries comply with the Radio Regulations of the International Telecommunication Union ("ITU-RR") for the allocation of frequency bands and contribute to CEPT common designations of spectrum to satellite services, under the same conditions. We strongly urge Ofcom to also take this approach.

Question 6
What is the likely timetable for rollout of Smart Grids and what impact will these developments have on demand for spectrum in the bands covered by this review?

The time is now. SES' subsidiary SBBS has already started to offer satellite services that use spectrum covered by this review for Smart Grid applications. For example, SBBS already serves Supervisory Control and Data Acquisition ("SCADA") pilot sites. SES estimates that between 5,000 and 20,000 satellite links are already used today to monitor oil, gas and power facilities in the UK. We anticipate that the number of links use will increase.

Question 8
a) What is the likely demand for broadband wireless access applications in the spectrum under review and which bands is this likely to specifically impact? How should Ofcom consider the demand for backhaul to support such applications and is such backhaul demand likely to arise in the spectrum under review?

b) Do you consider that the emergence of rural broadband fixed wireless access will influence overall demand for the spectrum under review and to what extent? Which bands is this likely to impact most?

SES commends Ofcom for asking questions about the demand for broadband wireless access ("BWA"). Just as it has asked whether demand for satellite consumer terminals is materializing, it should ask the same with respect to

broadband wireless access. One important measure of this is the extent to which BWA operators have built out their networks and the coverage of such networks.

Ultimately, however, it is too narrow for Ofcom to just look at the demand for broadband wireless access ("BWA"). Rather, it is important to look at demand for broadband access as a whole, the variety of ways that demand can be met (*e.g.*, fixed line, fixed wireless, mobile and satellite), and the unique benefits that satellites offer. An overly narrow focus on the spectrum needs for broadband wireless access and the backhaul necessary to support it can lead to insufficient consideration of the roles that satellite and other technologies can and do play in providing or expanding broadband access.

First, once operational, satellite has the unique capability to serve any territory within its coverage area (assuming commercially viable power levels and proper coordination). As a result, satellite is uniquely capable of immediately providing broadband services to areas where terrestrial facilities have not been or can not be cost-effectively and/or timely deployed.

Given SES satellite's ability to serve the entire UK territory and because fibre and LTE are currently unable to serve the whole UK territory, SBBS sees prospects for the UK market are based on universal coverage (100% territory), In addition, because BT's very ambitious plans to deploy fibre over the UK territory don't extend beyond and access rate of 90%, SES sees a role for SBBS in the UK.

Economics have shown that the combined investment required to deploy terrestrial infrastructure (base stations) and acquire / use spectrum are unlikely to enable LTE to fill the entire gap. Depending on the consumer needs and location (from city centres to remote / rural / island areas), the investment cost structure for terrestrial infrastructure can vary greatly. In these situations, satellite-based SBBS provides an excellent, immediate and affordable solution. The important role of satellite-based broadband services in underserved or unserved areas by terrestrial solutions must not be overlooked.

Second, satellite broadband services provide a competitive alternative to terrestrial solutions, especially in areas where it is expensive to deploy or extend terrestrial networks due to geography or other factors. In this regard, satellite-delivered broadband may be able to serve as an important competitive check on terrestrial broadband pricing.

Third, satellite services can provide a competitive backhaul solution to terrestrial fibre and point-to-point microwave technologies. In this regard, satellite services can help extend terrestrial networks by providing a cost-effective backhaul solution.

Question 10

How might the economics of new fibre provision (with or without reliance on regulatory remedies – whether active or passive), as compared with wireless provision of both terrestrial and satellite based services, impact on the requirements for wireless backhaul? We are interested in the possible impact, in terms of the extent of possible substitution for wireless links and in terms of the nature of wireless links affected (urban v. rural, lower / higher frequency bands).

Fibre is a competitor to satellite for backhaul services, and the more densely fibred the UK becomes and the cheaper it becomes, the more attractive it will be as a backhaul solution. Nevertheless, satellites are, and will continue to be, used for wireless backhaul. Although this is not a significant source of revenues in Europe, European earth stations often serve as the Internet gateway or hub for countries outside Europe, notably using C-band.

In addition, satellite offers, and will continue to offer, the most cost effective way to deliver broadcast and multicast video service (*i.e.,* point-to-multi-point services). This positions satellite as an essential component of modern communications and a strong contributor to what will constitute any broadband experience, especially given that video traffic will consume most of the bandwidth of next-generation networks.

Thanks to their fundamental characteristics (*i.e.,* simultaneously delivery of services to multiple users, large coverage areas, independence from ground configuration / geography, two-way capabilities), satellites constitute the most efficient way of delivering certain key services, sometimes in a complementary manner to terrestrial infrastructure. For example, in order to deliver cost-effective multiple-play services, terrestrial operators now consider satellite as a complementary means for supporting video. This is driven by connected-TV devices (HbbTV) which enable the combination of different service sources in a seamless manner to the consumer. This approach is already used in several European countries where partnerships have been built between satellite operators and the cable/fiber operators (e.g., Orange, Deutsche Telekom). In addition to being yet another growth driver for satellites, this exemplifies how critical satellites are to the future of European communications infrastructure and services.

While the most efficient and cheapest means to transfer data from one point to another is through terrestrial wire lines, the cost equation becomes questionable when the transfer must be executed towards multiple points or to rural and remote areas. In fact, satellite is the best means for broadcasting to large audiences and is a competitive alternative for broadband services.

In terms of regulatory remedies, SES urges the UK to support an approach of technology neutrality, in the sense that there should be no preferential treatment or subsidy favouring the deployment of fibre or any particular technology to the detriment of full and fair competition. SES reiterates the importance of UK regulators and policy makers in the communications sector pursuing a technology-neutral approach, as enshrined in the EU regulatory framework.

More generally, SES believes that state aid should be focused on lowering the cost of enabling individual households and or businesses to gain access to the needed services. For example broadcast infrastructure already provides the facilities to deliver high quality video services to consumers and businesses without state aid. Therefore it would be counter productive both in terms of value creation and consumption for state aid to undermine these existing market investments by

pushing deliberately for the (more costly) deployment of certain technologies to the detriment of others already deployed and already delivering value-added services.[4]

Question 11

What issues relating to spectrum access for different services do you think Ofcom should review? How might Ofcom start to rely more on commercial decisions when determining allocations of spectrum in the bands covered by this review?

SES is quite pleased that Ofcom is undertaking to review issues related to access to spectrum. Seeking the introduction of flexibility in spectrum access arrangements is important and may be very useful. However, this should only be done where it does not harm existing providers of critical services to the public such as satellite services.

More specifically, in addition to the saturated Ku-band described in our response to Question 4 above, both C-band and Ka-band are very important for the satellite sector in Europe. The 3400-3800 MHz C-band has already been opened to BWA services throughout the EU, and the UK (Ofcom) has gone further than the EU by granting licensing rights to broadband at 3.9 GHz as well as 3.6 GHz, despite the satellite sector's expressed serious concerns.[5] Although sharing with fixed point-to-point links is possible in C-band under specific and well defined licensing conditions ensuring compatible satellite/terrestrial operations, using this spectrum for BWA for high capacity links with mobile devices raises serious coordination problems for FSS.

Studies leading up to the World Radiocommunication Conference 2007 ("WRC-07") provide evidence of the extreme difficulties that would be caused by allowing FSS and BWA services to share the same frequency band, notably when these include both fixed and mobile wireless access.[6] This evidence actually led the WRC to reject a global allocation for International Mobile Telecommunications ("IMT") in the band 3600-4200 MHz and to ensure that satellite services remained in the 3400 – 4200 MHz bands to continue critical satellite services.[7]

Under the agreement reached at WRC-07, new BWA entrants can operate in the 3400 - 3800 MHz frequency band provided that they mitigate any harmful interference they would otherwise cause to existing services, such as FSS.

Coordination criteria need to be strictly observed, ensuring that BWA deployments protect existing C-band installations. The International Telecommunication Union ("ITU") concluded that in order to provide an FSS receive earth station with

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[4] Any public support for a deviation from a technology neutral approach should be seen as a potentially market-distorting subsidization of some operators, constituting unfair state aid.

[5] *See* SES and European Satellite Operators Association comments submitted during 2009.

[6] See ITU-R Report M.2109 plus ITU Recommendations ITU-R S.1432 and SF.1006. BWA is defined by the ITU as including Mobile Wireless Access (MWA), Nomadic Wireless Access (NWA), and Fixed Wireless Access (FWA).

[7] More details about the range of critical services which our industry provides, and the problems of satellite and terrestrial compatibility as sustained by ITU studies can be found from: www.fss-toolkit.com.

protection from interference in both long-term and short-term propagation conditions, a co-frequency IMT base station must maintain a minimum distance separation of at least several tens of kilometres and potentially hundreds of kilometres relative to the FSS receive earth station. Any BWA use of the 3800-4200 MHz band would have to ensure protection not just of the earth stations operating in the UK, but also those in neighbouring countries. The geographic areas where BWA could operate would be extremely limited.

The most recent Report ITU-R S.2199 on the "Studies on compatibility of BWA systems and FSS networks in the 3400-4200 MHz band", approved jointly by ITU-R Study Groups 4 and 5, has again re-confirmed the lack of compatibility between BWA and FSS. Any increased sharing in this band would have substantial disadvantages for satellite operations, increasing the risk of interference and effectively preventing the deployment of new earth stations.

Various countries have already reported several cases of interference due to WiMAX deployed in the 3400 – 3800 MHz band only using the *Fixed* allocation in the ITU RR. Evidence indicates a clear threat to the quality of service the FSS can provide to end-users in the band. The same problem would occur above 3800 MHz and would be even more critical in the band 3800-4200 MHz as FSS is using this band more extensively in Europe than the 3400-3800 MHz band, leading to more significant constraints for any BWA application in the higher band. We urge Ofcom to preserve satellite access to and use of these bands in the UK on a non-interference basis.

SES' specific concerns regarding the Ka-band are addressed under Question 16 below.

Below we address the specific spectrum allocation and management options identified by Ofcom in paragraph 3.28 of the consultation:

> *Band segmentation*. In some cases, band segmentation is needed to provide spectrum access for use of uncoordinated earth stations satisfying the need to deploy ubiquitous satellite terminals (*e.g.*, for DTH or consumer broadband). In other cases, spectrum access using coordinated earth stations is sufficient (*e.g.*, for icensed PESs in C-band Ka-band hubs / gateways) and spectrum sharing works.
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> Reviewing the options proposed by Ofcom[8] we have the following comments:
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> *Auctions*. Due to the inherently international nature of satellite services, auctions are not a viable option for satellite services for a number of reasons. Building viable international satellite systems and using spectrum resources efficiently requires operators to secure landing rights in many countries rather than obtaining just one license in one country.
>
> Satellite beams can cover as much as one-third of the Earth's surface simultaneously. If the UK were to impose auctions for satellite spectrum, there is

[8] In section 3.28

a substantial likelihood that other countries would follow its lead. In fact, many would likely do so in ways that would not only add substantial operating costs to satellite operators but they would also likely favour any domestic satellite operators.

The uncertainty or risk of auctions in every country in which satellites offer services would severely curtail the ability of satellite operators to raise the needed capital to construct, launch and operate their systems. There is a danger that short-term revenue-generating policies will affect the long-term economic viability of new and important satellite services. UK consumers of satellite services would inevitably face higher prices and ultimately, less choice among competing providers.

Light licensing. Light licensing where users coordinate together themselves is a good policy approach provided it does not lead to further difficulties in identifying and resolving interference between co-primary services. However, light licensing could be a source of concern if it creates greater uncertainty on spectrum availability over time.

License exemption. SES welcomes greater use of license exemptions in segmented bands, in the absence of coordination needs. This enables SES and others in the satellite sector to address consumer needs without delay. License exemptions are not appropriate, however, in shared bands where frequency coordination is required for compatible operations.

Third party band managers. SES has no specific comment at this time on the greater use of third party band managers except that existing providers of critical satellite services must be protected. Introducing possible efficiency at the expense of services provided would not add value. Rules and procedures for the appointment and governance of third party managers would need to be carefully crafted.

Question 12

We would welcome views on the potential for more widespread use of market based approaches to the spectrum under review such as third party band management, and the regulatory steps which would need to be taken to facilitate this.

Please see response to Question 11 above regarding auctions and the response to Question 14 below regarding fees.

Question 13 (c) only

(a) Do you consider that any changes should be made to the Ofcom licence fixed link product set?

No comment.

(b) Might a more flexible approach to licensing, in bands where demand is unlikely to exceed supply for the foreseeable future, enable more intensive use of these bands? If so, what form might the licensing take and in which bands would this be

appropriate?

With regard to satellite spectrum, we reiterate the need for a stable, predictable and transparent regulatory environment. We reserve further comment until such time as specific suggestions may be made that could affect our services.

(c) Are there other actions which Ofcom could take to improve spectrum efficiency by encouraging migration to or use of higher, less heavily used, bands, with a view to freeing up spectrum in popular lower frequency bands?

As SES has previously explained, not all satellite spectrum is the same – their different technical characteristics make them more or less suited to different communications applications. It is important to remember that it is not always possible to simply relocate services from one band used by satellite to another. Moreover, once a spacecraft is operational, it cannot be physically altered. As a result, it is important for the successful roll-out of satellite-based networks that the regulatory framework under which the satellites and the ground stations are authorized to operate remains stable and transparent in the long run. Without this certainty, UK consumers could lose essential access to critical communications services and the investments of satellite operators could become stranded.

Question 14

What is your view on the impact of geographically uniform fees for spectrum bands included in this review? If you consider that a geographic fee modifier would promote more efficient use of spectrum, how might that modifier be constructed?

There is a need to repeat that given the international nature of satellite communication services, spectrum pricing on a large, global scale could cause enormous harm to the satellite industry. At a minimum, spectrum pricing beyond administrative cost recovery would damage competitiveness, innovation and could lead to substantial increases in consumer costs for services.

In our sector, fierce competition for orbital slots and related frequency assignments already ensures spectrum efficiency. If each country in the satellite footprint imposed spectrum pricing, the additional costs resulting from such pricing would inevitably be calculated into the downstream pricing for customers and end-users, thereby reducing consumer benefit and choice without improving this spectrum efficiency. This makes spectrum pricing particularly burdensome and would likely place satellite operators providing services in Europe in an unfavourable competitive position against terrestrial service providers.

Spectrum pricing beyond administrative cost recovery would damage competitiveness, innovation and could lead to substantial increases in consumer costs for services. This would seem to contradict Ofcom's objectives and duties as defined in Sections 3 and 154 of the 2003 Communications Act (specifically those related to efficient use of spectrum, furthering competition, promoting innovation, and protecting consumer interests.)

Remember, given that the U.K. is often seen as a leader in regulatory issues, should the U.K. impose spectrum pricing on satellite spectrum, many other countries would likely follow compounding the damaging consequences.

As previously stated to Ofcom, SES and all other satellite operators notably believe that the Administered Incentive Pricing ("AIP") policy introduced by Ofcom to charge for spectrum usage is neither an appropriate tool, nor is it necessary to stimulate efficient spectrum use by the satellite sector. As explained during the recent review of this policy,[9] we firmly believe that a tool like AIP, even if deemed attractive from a theoretical perspective, won't achieve its intended goals in practical situations and is therefore more likely than not to have significantly negative consequences on the satellite sector.

For instance, a key element of the AIP calculation is the definition, and subsequent determination, of the opportunity cost. This is a largely theoretical exercise which must take full account of technical considerations, the broad competitive landscape, public and consumer benefits. We have a serious doubt that the AIP could give sufficient weight to these considerations, or ever match reality, which is the actual demand for spectrum, and whether all needs can be accommodated with the existing spectrum, under the existing regulatory / management framework that guarantees a well coordinated sharing environment. We are further concerned that AIP may ultimately have a damaging effect on the continued ability of the satellite sector to satisfy UK societal needs and provide important public benefits for critical services.

If Ofcom were to pursue opportunity-cost-based pricing, definition and calculation of opportunity costs should not only be objectively justified, transparent, non-discriminatory and proportionate. They should also take into account the general objectives of the EU telecoms regulatory framework which include "encouraging efficient investment in infrastructure and promoting innovation, taking into account investment risks" as well as "promoting regulatory predictability."

In addition, as noted in paragraph 3.16 of the consultation document, satellite services by their nature are inherently international in scope. Due to fact and for the reason described in our response to Question 11 above, auctions are not a viable option for satellite services As for auctions, we have identical concerns that other countries would follow the UK lead but in ways that would not only add substantial and possibly untenable operating costs to satellite service providers but that would also likely favour domestic satellite operators.

The uncertainty that spectrum fees would cause in every market in which we offer services would pose both a commercial risk to the satellite operator and a risk to the consumer. There is a danger that short-term revenue-generating policies will affect the long-term economic viability of new and important satellite services. Importantly, UK consumers of satellite services would inevitably face higher prices and ultimately, less choice among competing providers.

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9 SRSP: The revised Framework for Spectrum Pricing - http://stakeholders.ofcom.org.uk/consultations/srsp/

Question 15
Are there other aspects of the review on which you have evidence that would help inform our consideration of these issues and formulate proposals for consultation?

We welcome consideration of licensing approaches that ease administration of and processing time for licenses. SES suggests that Ofcom consider the following:

Streamlined processing. Streamlined processing of applications and greater transparency of process (e.g., access to the Ofcom database);

Waivers. Implementation of a waiver process enabling for rules where a satellite operator can effectively show that such waiver of a rule is feasible such as the circumstance described in response to Question 16 with regard to the 28 GHz Ka-band below;

Temporary licences. Implementation of temporary licensing procedures to satisfy short term or urgent licensing needs. Each of these processes would enable Ofcom to serve the public interest by ensuring that the UK consumer receives important satellite services in the most efficient and timely manner possible;

Spacecraft Licence. While Ofcom has ITU-related milestones and coordination processes for UK satellite operators, for commercial and legal reasons it would be highly beneficial to satellite operators if Ofcom would issue such licences. The lack of such licenses has previously raised commercial uncertainty and legal issues for SES (*e.g.,* related to transaction and when seeking market access in other countries);

CEPT / ITU. We strongly encourage Ofcom to regulate in conformity with the ITU RR and CEPT. Diverging from ITU and CEPT decisions regarding spectrum use causes unpredictability and inability for satellite operators to continue to provide important and even critical services. (*e.g.,* Ofcom's approach to C-band).

Question 16
Is the proposed list of bands to be included within the review (as set out in Figure A.5.1 in Annex 5 appropriate?

SES has the following additional comments regarding essential satellite spectrum:

Ka Band 28 GHz
Some new satellite services in the Ka band will involve the deployment of a large number of small, transmit-receive terminals. To allow the use of ubiquitous satellite terminals, the ITU has identified a number of uplink and downink frequency bands which are *exclusively* for satellite usage.

Because of the scarcity of the spectrum resources, certain portions of the Ka-band are *shared* on a co-primary basis between satellite and terrestrial services in the ITU table of frequency allocations. Such dual use of the spectrum is possible provided that appropriate coordination is conducted in order to avoid mutual interference.

This shared spectrum (*e.g.*, in the 27.5-29.5 GHz band) can typically be used in the Earth-to-space direction by larger satellite earth stations such as hubs or gateways (1.2 m and above) that are located at specific locations so that coordination with terrestrial services can be accomplished. Such "hub" stations are invaluable as gateways to connect to the Internet and are an essential part of all satellite networks. These hubs need to be able to access large amounts of contiguous spectrum (between 500 MHz and 1 GHz or more). It is therefore critical that, in the regulation of the shared portions of spectrum, the UK ensure that such big earth stations still have the possibility to access the entirety of the shared spectrum, as identified by the ITU, on the basis of individual coordination.

Currently, only portions of the band 27.5-29.5 GHz are available for satellite earth stations in the UK, (*i.e.*, the bands 27.5-27.8285 GHz, 28.4445-28.8364 GHz and 29.4525-29.5 GHz). In addition, guard bands have been defined within those frequency ranges in order to protect services in the adjacent bands. More precisely, the 10 MHz at the upper edge of the 27.5-27.8285 GHz band, the 10 MHz at the lower and upper edge of the 28.4445-28.8364 GHz and the 10 MHz at the lower edge of the 29.4525-29.5 GHz can not be used by satellite earth stations.

This situation is a problem for satellite operators in general and for SES in particular because large parts or all of the band 27.5-29.5 GHz are generally foreseen to be used by large gateway stations on a coordinated basis, as recognized in ECC Decision ECC/DEC (05)01.

SES suggests that a waiver mechanism should be developed by Ofcom, which would allow access to any parts or the entire band 27.5-29.5 GHz for coordinated satellite earth stations. The fact that access to the band 27.5-29.5 GHz had been granted to certain permanent earth stations prior to the 2002/2003 auctions of the 27/28/29 GHz bands demonstrate that coexistence between coordinated satellite earth stations and other services in the 27.5-29.5 GHz band is technically possible.

Ka-Band 18 GHz

Furthermore, some other parts of the shared Ka-band spectrum (*e.g.*, the 17.7-19.7 GHz band) are and will increasingly be used by satellite operators for space-to-Earth transmissions to gateways as well as to terminals, given the increasing demand for two-way broadband services. Following the adoption of the Ka-band report on *The Use of the Frequency Bands 27.5-30.0 GHz and 17.3-20.2 GHz by Satellite Networks* (ECC Report 152 of September 2010), the CEPT is now studying the possibility of using the 17.7-19.7 GHz spectrum for ubiquitous FSS terminals using satellite space-to-Earth communications.

It should be a priority for the UK, as for every other national administration, to ensure that satellite users are guaranteed access to the Ka-band frequencies designated by the ITU for satellite services. SES also expects that the UK government will fully subscribe to the overall harmonisation effort within Europe to set up a regime of exemption from individual licensing could be developed in appropriate sub-bands within the 17.7-19.7 GHz band.

In addition, this shared spectrum (*e.g.*, in the 17.7-19.7 GHz band) can also typically be used in the space-to-Earth direction by larger satellite earth stations such as hubs or gateways (1.2 m and above) that are located at specific locations so that

coordination with terrestrial services can be accomplished to ensure a safe reception of the satellite transmissions. Such "hub" stations are invaluable as gateways to connect to the Internet and are an essential part of all satellite networks. These hubs need to be able to access large amounts of contiguous spectrum (between 500 MHz and 1 GHz or more). It is therefore critical that, in the regulation of the shared portions of spectrum, the UK ensure that such big earth stations still have the possibility to access the entirety of the shared spectrum, as identified by the ITU, on the basis of individual coordination.

WRC-15 Priorities

WRC-12 adopted a new agenda for WRC-15, which contains a number of items related to satellite spectrum allocations. Below, we would like to highlight two items on the WRC-15 agenda, namely Agenda Item 1.1 which relates to additional spectrum allocations to the mobile service and identification of additional frequency bands for IMT, and Agenda item 1.6 which pertains to possible additional primary allocations for FSS.

The text of agenda Item 1.1 reads as follows:

> 1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **COM6/8 (WRC 12)**;

This agenda Item is of concern for SES, particularly with respect to the C-band. Current concerns with regard to C-band and operation of BWA services in the band 3400-3800 MHz have already been expressed earlier in this document. Those concerns would intensify if proponents of mobile broadband and IMT might be looking for more C-band spectrum. SES opposes any further allocation or identification of spectrum for IMT. SES would appreciate if Ofcom would take a careful and balanced approach regarding this agenda item, taking into account the view of all concerned stakeholders.

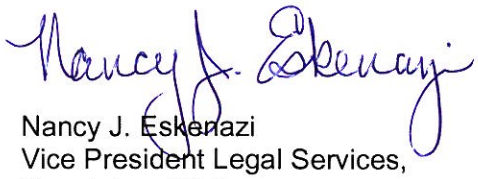
The text of agenda item 1.6 reads as follows:

> 1.6 to consider possible additional primary allocations:
>
> 1.6.1 to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1;
>
> 1.6.2 to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz;
>
> and review the regulatory provisions on the current allocations to the fixed-satellite service within each range, taking into account the results of ITU-R studies, in accordance with Resolutions **COM6/4 (WRC-12)** and **COM6/5 (WRC-12)**, respectively.

Given the current congestion in the Ku-band and the increasing need for additional spectrum for advanced and additional services, SES would very much appreciate Ofcom's support on this item.

In summary, SES commends to proactive approach taken in this consultation by Ofcom. We look forward to contributing to and working with Ofcom on spectrum matters. We remain at your disposal should you have any questions or wish to discuss our views further.

Very best regards,



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