OFCOM SPACE SPECTRUM STRATEGY CONSULTATION
SES response
10 May 2016

Introduction

SES is pleased to submit this response to this new Ofcom Space Spectrum Strategy consultation. We have chosen to respond to some questions only.

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 GB 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 more than fifty percent (50.5%) interest in O3b Limited, a non-geostationary Ka-band satellite operator located in Jersey, Channel Islands, which will submit its own comments in this proceeding.

Question 3: Do you agree with the application specific trends we have identified for the satellite sector? Are there other trends that could have implications for spectrum use?

- **Broadcasting**

SES considers that developments in UHD services will be subject to 3 trends:

1. There will be an increasing Quality of Experience (QoE) demand from consumers in general
2. There will also be an expectation for premium quality broadcasting (sports, cinema)
3. Compression will improve

At the very least, SES anticipates that the DTH market will remain stable due to the combination of trends 1 and 3. Already today, approximately 22% of satellite (DTH) channels are in High Definition (HD) as 1Q16, and there is substantial growth to be expected in the number of HD channels as consumer expectations on video quality continuously rise. Even with the ongoing switchover to MPEG4 compression, and assuming that only half of all channels will switch to HD, SES expects that the capacity needed will remain stable.

The trend 2 will contribute to a growth that is very likely to be pursued beyond 2025. UHD screen sales and household penetration are already growing substantially today.[1]

[1] http://www.rapidtvnews.com/2016040742376/trendforce-4ktv-penetration-to-pass-23-in-2016.html#axzz4782xuKtQ

Furthermore, we expect increasing pressure on broadcasters to differentiate vs. OTTs (Facebook, YouTube, etc.), and their strategy is to focus on providing premium content, which requires premium content. Therefore the uptake of UHD should at least grow to the levels of HD today and beyond in the long term.

Therefore, we consider that Ofcom's estimate (30 UHD channels by 2025) does not clearly reflect the actual evolution of the broadcasting market towards UHD. SES internal assessments show 51 UHD channels already being carried worldwide; SES alone distributes 23 today.

It is very important that no decision is taken now that may pre-empt such an evolution, with the risk of limiting future growth of the UK media industry within the next 10-15 years. The development of the 8K TV market in Japan (with NHK [2]) or Korea, for instance, showcases industry trends moving beyond 1st generation UHD, which needs to be fully taken into consideration.[3]

Another factor may further contribute to growing long-term capacity requirements: the nascent virtual reality (VR) market. Investments are being done today to develop VR from gaming to a new form of more immersive live entertainment experiences.[4] VR will require 360° high quality video resolution. VR is being experimented today, potentially driving further bandwidth requirements, and various actors have seriously started looking at it (e.g. Sky [5], Facebook [6]).

Overall, Ofcom should consider long term needs to enable the broadcasting industry to roll-out UHD, VR and 8K in the next decade to innovate and to continue developing high quality immersive visual experiences. It is important not to short sell any future growth, especially if the existing Ku-band and Ka-band capacity could contribute to provide the necessary spectrum reserve to meet it. (It is to be noted that SES or Eutelsat are using Ka-band in the 17-18 GHz band to uplink for broadcasting services, from different locations in Europe[7]).

- **<u>Broadband Connectivity</u>**

Based on its experience, SES believes the consumer broadband market will fully migrate to Ka-band (enabled with smaller beams and antennas), whilst Ku-band will be used for broadband connectivity to enterprises. Even in Ka-band, however, the cost per bit remains

[2] http://www.nhk.or.jp/8k/index_e.html#

[3] One TV programme in « Super Hi-Vision » 8K UHTV (4320p) will need one satellite transponder.

[4] http://blog.viaccess-orca.com/events/tf1-vo-raise-vr-bar-live-streaming/

[5] https://corporate.sky.com/media-centre/news-page/2016/sky-puts-viewers-at-the-heart-of-the-action-with-virtual-reality

[6] http://www.digitaltveurope.net/526452/facebook-hails-social-presence-as-next-stage-in-vr-revolution/

[7] The fact that Ka-Band is more susceptible to rain fade is not prevalent on the uplink to a broadcasting satellite as we can counter this fact by using the satellite onboard automatic input level gain control as well as uplink power control where necessary. The 17.3 - 18.3 GHz uplink band is a de-facto standard uplink band for Satellite TV broadcasting on all major EU orbital positions

relatively high, and a national universal service scheme / funding would be needed to make Ofcom's estimates possible. Nonetheless, it would be better to look at the 2030 horizon to envisage further growth and consolidation, as was done for BDUK (Broadband Delivery UK) of the DCMS.

SES doesn't believe the contention ratio of 20:1 or even 50:1 considered by Ofcom (Table 8 and related text in Annex 5) is realistic, and we'd rather expect a ratio of 200:1 for a 10 Mbps peak rate (and more than 400 for a 20 mbps peak rate).

- **Hybrid Broadcasting-Broadband (BC-BB)**

SES further expects that Hybrid terrestrial-satellite networks will constitute an important connectivity trend that will have implications for spectrum use, in terms of maintaining satellite spectrum access to Ku-band and Ka-band.

Video-centric content will be a key driver of demands on the capabilities of next generation networks (NGNs), including 5G. Communication networks are increasingly used to distribute video content, a reality which is confirmed by Cisco in its 2015 study: IP video will globally represent 80% of all internet traffic in 2019.[8] All possible network technologies (cellular, satellite, fiber) should be seamlessly integrated into an overall 5G solution to address this demand.

The most efficient use of spectrum should be recognized and encouraged: Broadcast is ideal for point-to-multipoint to complement Unicast point-to-point. Moving broadcast content to wireless unicast delivery systems is exactly the opposite of spectrum efficiency. Satellite is also ideal to ensure full coverage, ubiquity & resilience in networks notably, contributing to make connectivity robust & fully inclusive.

Creating a stable & predictable regulatory environment and ensuring "Technology Neutrality" are thus all the more essential when long-term investments have been already made and sunk for more than 10-15 years (example of typical timeline for a satellite sector).

SES therefore expects that hybrid terrestrial-satellite network architecture will combine satellite's wide coverage areas, ubiquitous access, and broadcast-ability with intelligent routing, caching and popularity metrics together with terrestrial "return channels." Sustainable and viable spectrum access for all components of the 5G ecosystem should thus be treated in a balanced fashion as all help to develop complete and efficient system for users.

Question 9: Do you agree that existing bands are likely to provide sufficient capacity for considerable growth in satellite broadband and that we do not need to prioritise the identification of new bands? Do you have any comments on the analysis we have undertaken of supply and demand?

SES cautiously agrees that the existing frequency bands in Ku and Ka are likely to provide sufficient capacity, provided they are kept well available to anticipate growth in UHD,

[8] Cisco VNI forecast and methodology, 2014-2019, The Zettabytes Era: Trends and Analysis, May 2015

Broadband and possibly other markets (e.g. Ka-band gateway distribution and contribution networks of satellite communications to VR and OTT markets through hybrid platforms). Nevertheless, further spectrum in Q/V bands will also likely be needed in a foreseeable future, starting with feeder links for HTS satellites.

Question 10: To what extent does the proliferation of filings for 'paper satellites' create costs or barriers that hinder the provision of satellite services to UK citizens and consumers?

SES fully supports and puts substantial efforts into contributing to successive World Radiocommunication Conferences (WRCs) clarifying and improving the regulatory processes portrayed in the ITU Radio Regulations. SES is however of the view that any such improvements to the current international rules must first be agreed globally in order to be applied fairly and consistently by all national administrations to ensure equitable access. SES notes that The UK Space Growth Action Plan also acknowledges the importance of this international perspective: "*Regulation is a globally competitive area and others such as the US, France and Luxembourg are doing more to reduce the regulatory burden on their industry and to encourage economic growth in the space sector*" and "*We recognise the position of Ofcom as the UK national regulator, and the constraints that this will occasionally impose, but we need to match other nations who are seen to be more supportive of their industrial goals*". (Introduction to Recommendation 2).

Unfortunately, SES concludes that some of the recent changes to Ofcom's Procedures for the Management of Satellite Filings require far more details to be provided than does the ITU-RR and may thereby hinder the provision of satellite services to UK citizens and consumers by having a negative effect on investment in the UK satellite industry.

For example, Ofcom believes that the changes into introducing additional milestones and evidence requirements will help assure that a project is making satisfactory progress with regards to the appropriateness of maintaining the filing, while SES believes that these are burdensome for all parties involved and will not provide further certainty that a project is progressing appropriately from a regulatory perspective. Given the significant capital and operational expenditure borne by the operators for satellite construction, launch and coordination efforts, SES finds that operators are best placed to determine the operational consequences of any change to their business plans and in particular if such a change will impact the ability to implement the technical parameters outlined in the relevant satellite network filing and within the regulatory deadline.

SES of course fully supports procedures for operators to inform Ofcom in case a UK satellite network filing is at risk. But to have Ofcom involved in all decision making with regards to major business plan related changes, where operators are sometimes best equipped to evaluate consequences, is neither efficient nor practical or needed. On the contrary, this additional workload solely placed upon the UK operators may reduce the interest to invest in UK satellite network filings and thereby create barriers that hinder the provision of satellite services to UK citizens and consumers.

Inefficiencies in the ITU-RR satellite coordination processes of course hinder all satellite operators, whether serving users in the UK or abroad. However, SES sees a big risk for UK citizens and consumers access to satellite services by creating national barriers in satellite

filings management procedures applying solely to operators which file through the UK – more so than any risk of proliferation of filings for 'paper satellites'.

Hence SES was very pleased to note at Ofcom's 1 April 2016 stakeholder meeting Ofcom's intention to implement its revised filing management procedures with an enabling flexible attitude, still making decisions on a case-by-case basis based on the dialogue with the relevant operator.

Question 11: Are there other actions we should be considering that could enable greater benefits from satellite broadband?

SES will respond to the separate Ofcom call for inputs on designing the broadband universal service obligation. (http://stakeholders.ofcom.org.uk/binaries/consultations/broadband-USO-CFI/summary/broadband-uso.pdf)

Question 17: Are there any improvements we should consider in how we enable existing benefits to continue, whilst exploring sharing / new uses?

SES fully appreciates Ofcom's duty to ensure spectrum is used in an efficient manner. There are several approaches to appreciate such efficiency, and one critical aspect is not to preempt the future of communication systems which have long track records in providing high QoS, constantly investing and pioneering to maintain state-of-the-art broadcasting services.

We therefore take good note of Ofcom's caution when considering spectrum sharing, when its states that

> *"we need to consider such changes carefully, including the benefits delivered by incumbent services and the incremental impact of sharing on incumbents, e.g. on their incentives to invest."*

In many instances and in various fora, SES and others from the satellite industry have explained and precisely documented why sharing between satellite communications and mobile terrestrial systems can raise serious coexistence difficulties.

Typically, sharing is not feasible when earth stations of satellite systems are deployed ubiquitously. In this situation, it is generally not possible for other services to avoid causing or receiving harmful interference. In bands for which the operation of earth stations is licence exempt, the location of earth stations is unknown, and this further restricts any possibility of sharing. Therefore any suggestion of forcing sharing would create unnecessary regulatory uncertainty and severely impact the current network and service operations.

As was stated by the satellite associations GVF & ESOA in response to the spectrum sharing consultation in 2015:

> *"Sharing or coexistence possibilities with mobile services have been explored in several bands used for satellite communications. High density mobile service (2G, 3G, 4G, and theoretically 5G) involving ubiquitous deployment of mobile terminals and base stations has put significant constraints on sharing with any other services. ESOA*

/ GVF are not aware of any successful spectrum sharing on a sustainable basis between this mobile service and the satellite service." [9]

Question 18: Do you agree that the applications we identify do not need to be a particular focus for regulatory action in the short to medium term?

SES agrees that no regulatory action is needed for the identified applications, provided the existing frequency bands are kept well available to anticipate growth in UHD, Broadband and possibly other markets (e.g. contribution of satellite communications to VR and OTT markets).

[9] http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum-sharing-framework/responses/gvf_and_esoa.pdf