ESOA response to the Draft RSPG Opinion on

"Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband"

2 May 2013

1. Introduction

The European Satellite Operators' Association (ESOA) is pleased to respond to the public consultation on the "Draft RSPG Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband", hereafter referred to as the "draft Opinion".

ESOA is a non-profit European organisation established with the objective of serving and promoting the common interests of European satellite operators. The Association is the reference point for the European satellite operators industry and today represents the interests of 11 satellite operators who deliver information communication services across the globe. See www.esoa.net.

ESOA has reviewed the draft Opinion and below provides comments on several aspects. Section 2 addresses the question of how much spectrum should be identified for wireless broadband. Section 3 addresses the use of the bands 3400-4200 MHz and 5725-5925 MHz, which are used by C-band FSS systems and are suggested for possible future use for terrestrial wireless broadband. Section 4 addresses the use of the bands 1980-2010 MHz and 2170-2200 MHz, which are suggested for possible future use for terrestrial wireless broadband. In section 5, we assess the amount of spectrum that could be made available for terrestrial wireless broadband in the longer term, excluding additional satellite spectrum. In section 6, ESOA identifies specific areas where we suggest changes should be made before the final version of the Opinion is adopted.

ESOA thanks the RSPG for the opportunity to comment on the draft Opinion.

2. How much spectrum should be identified for wireless broadband?

The draft Opinion covers the timescale up to 2015, where the RSPP has already set the objective of making available a minimum of 1200 MHz for wireless broadband, and also the period 2015-2020 which coincides with the longer tail of the Digital Agenda for Europe, but for which requirements for wireless broadband are not determined.

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As is stated on page 22 of the draft Opinion, "Wireless broadband can be described as high-speed wireless transmission of data and may be provided via either fixed, mobile or satellite platforms." From this definition, the draft Opinion determines that 1701.5 MHz is already available for wireless broadband, consisting of 990 MHz for "Terrestrial", 173 MHz for "Satellite" and 538.5 MHz for "WiFi". Hence, it is apparent that the first objective of making at least 1200 MHz available for wireless broadband by 2015 has already been achieved. This should be well stated and recognised in the text of the Opinion.

On the other hand, in section VIII, the draft Opinion postulates that taking the terrestrial component alone would require at least 210 MHz to meet the objective of 1200 MHz. Given that the draft Opinion has already defined wireless broadband as including WiFi and satellite spectrum, and has already stated that 1701.5 MHz is currently available for wireless broadband, it is not at all apparent why it might be considered that there is a need to find more terrestrial wireless spectrum to meet the RSPP objective. The current spectrum available for terrestrial broadband totals 1528.5 MHz, consisting of the spectrum already available for "Terrestrial" and "WiFi", a total which itself exceeds the objective of 1200 MHz. Hence, whether or not satellite broadband is included in the objective there seems to be no need to identify more spectrum for terrestrial wireless broadband before 2015. Again, this finding should be well reflected in the text.

With regard to satellite wireless broadband, the bands identified as currently available around 1.5/1.6 GHz and 2.4 GHz have been in use for many years and remain necessary to meet the continuing demands for mobile satellite systems. The systems in operation today include systems classed as "the satellite component of IMT-2000" and able to provide broadband (currently up to about 500 kbit/s) to users. The availability of higher data rates to terrestrial mobile users will continue to drive a demand for increased data rates for mobile satellite users too. These demands will be met in part by the 1.5/1.6/2.4 GHz bands already identified in Annex 1 (and also through use of other bands above 6 GHz). Hence, the bands already identified as being available for satellite wireless broadband should all remain available for that purpose. Further, it should be noted that ESOA is not seeking additional bands in the range 400 MHz to 6 GHz for satellite wireless broadband.

Given that the RSPP objective for the period to 2015 has already been met, the question must turn to how much spectrum is required for wireless broadband in the period 2015 to 2020. With regard to spectrum for *satellite* broadband, as for the period before 2015, ESOA members are not seeking additional bands in the range 400 MHz to 6 GHz. The bands in this range currently identified for satellite broadband are expected to be adequate also for the period up to 2020.

How much additional spectrum is required for *terrestrial* wireless broadband is a key question. In the last few years, many manufacturers and commentators have presented figures showing a rapid increase in the uptake of mobile data services by consumers in recent years, starting from a low base. This does not mean that recent rapid increases will continue for the foreseeable future. Inevitably, the growth in consumption of mobile data will begin to flatten out – the uncertainty is when that will occur. Even assuming further high growth in the uptake of mobile broadband data services, that does not automatically equate to a need to identify more spectrum for terrestrial mobile broadband as many techniques (some identified below) can be used to accommodate

increased mobile data requirements without the need for additional bands to be indentified for terrestrial broadband.

ESOA does not make a specific prediction, either on the demand for mobile data, or on the spectrum required to carry that data, but suggests that any estimates of long term terrestrial requirements must take account of the following factors:

- *There is a limit to the amount a data that is needed to support mobile applications.* It is not at all clear what applications might require significantly higher data rates and significantly higher data consumption than those typical of mobile use today. A comparison is often made between the data rates available to home users through wired or fibre broadband. In the home, the dominating use of broadband is for delivery of TV, in particular non-linear TV services. In the home, much larger and higher definition screens are used compared to those used for mobile devices. For mobile devices the data requirements will inevitably be much lower than those required for in-the-home use. Some of the assumptions in previous ITU-R studies, such as those in ITU-R Report M.2072 seem unrealistic. For example, that report considers some mobile users viewing mobile HDTV for a duration of up to 14 812.04 seconds per "session" at a rate of 20 Mbit/s. This equates to a consumption of 37 GByte in a period of just over 4 hours, well beyond any requirement of a mobile devices. (For comparison a high definition film available for download on iTunes has a file size of about 4 GByte). It is important that any spectrum demands use credible assumptions for the quantity the data consumed by a user and in the data rates required by individual users.

- *WiFi offloading*. As is mentioned in the draft Opinion (page 9) "Many smartphones, tablets and other connected devices offer WiFi capabilities", and currently considerable use of mobile off-loading is made by mobile operators. The draft Opinion adds a voice of concern that "mobile operators are not able to guarantee the Quality of Service over such licence-exempt spectrum". The fact that there is already extensive use of WiFi offloading suggests that the concern expressed is not a significant drawback in practice.

- *Technology improvements*. The draft Opinion addresses this point with the following text: "Increases in network capacity will also be influenced by technological developments in network elements. The improvements in technological efficiency of the radio interface (e. g. LTE, LTE advanced) leads to more efficient use of existing spectrum resources (bit/s/Hz). It is unlikely however that the development of technologies that are more frequency-efficient will be enough to satisfy the growing demand for high bit-rate data services. Moreover, it is very likely that the migration to these new spectrum efficient technologies will be made very gradually. Mobile operators will need to accommodate users on older networks (like GSM) for the coming years". We agree that technological advances such as those available with LTE Advanced and MIMO techniques will bring a significant gain in the bit/s/Hz, and hence a gain in the overall capacity of the current spectrum. The basis for the statement that "It is unlikely however that the development of technologies that are more frequency-efficient will be enough to satisfy the growing demand for high bit-rate data services" is not

reasoned. Some estimates of the improvements in the efficiency gains through new technologies planned for the next few years suggest approximately a five-fold increase in bit/s/Hz by 2020, which bring into question the basis for the draft Opinion to dismiss such technological benefits. Other technology advances such as the use of small cells within the currently available spectrum will also increase the efficiency of use of the current spectrum.

- *The benefits of terrestrial mobile, versus the economic impact of displaced services.* In considering the identification of new frequency bands for terrestrial wireless systems, the benefits of increased spectrum for terrestrial applications should be weighed against the costs of constraining on removing the existing users of the band. As more and more spectrum is made available for terrestrial mobile, the increase in the economic benefits becomes less. For example, the incremental benefit in going from 1000 MHz to 1100 MHz of available spectrum is very much less that going from 100 MHz to 200 MHz. However the impact on any victim service in the additional 100 MHz is the same. So there reaches a point where, from a narrow economic perspective alone, it does not make sense to make more spectrum available for terrestrial mobile.

- *The social impact of losing services and application displaced by more terrestrial mobile spectrum.* Further to the above point, there may be a social benefit from existing services that might be displaced by making a band available for terrestrial mobile. In the case of C-band (3400-4200 MHz), there are high social benefits from the use of certain C-band FSS applications, many of which are identified on page 21 of the draft Opinion (i.e. used for the Galileo data system, the meteorological applications, emergency applications, diplomatic missions, and provision of safety services such as the GMDSS). Other high social value applications include distribution of TV and radio broadcasting (e.g. BBC World Service), essential connections with Africa and provisions of niche TV programming for ethnic minorities. The services of high social value could be lost if C-band is used for terrestrial mobile broadband systems.

- *Passing on the cost*. Whenever a new band is made available, a new infrastructure needs to be deployed, including compatible handsets and new base stations. The new base stations must be connected to the operator's backhaul network. This all adds to the costs, which must be passed on to the consumer. As there is around 100% mobile penetration in Europe, the costs must be borne by existing consumers. Meanwhile, the average revenues per user for terrestrial mobile operators are falling in Europe. There are therefore good reasons to doubt that users are prepared to pay higher charges for the availability of higher data rate services.

- *Bands which are currently not used.* The draft Opinion identifies that some bands, nominally available for terrestrial broadband for many years, remain unused. Among these are the bands 1900-1920 MHz and 2010-2025 MHz. The draft Opinion suggests (page 23) that these bands being limited to 15 and 20 MHz in bandwidth "are not attractive enough for

manufacturers to develop equipment". This explanation is very puzzling given that other bands for terrestrial mobile have been assigned on the basis of 5 MHz channels. Perhaps there are other reasons which explain why that these bands are not used, reasons which might be overcome with improved regulatory conditions or with improved technology. Furthermore, some other bands indentified as available for terrestrial broadband are not in use in the majority of countries. In particular, the 800 MHz and 2.5 GHz bands have only recently been licensed in many Member States, or are yet to be licensed. In some countries, some parts of the terrestrial mobile bands which have been available for many years remain unused, for example as is indicated in the case of Ireland, where some of the 1800 MHz band has only recently been assigned (described on page 13 of the draft Opinion). Perhaps when these existing bands are fully brought into use, along with other improvements in spectrum efficiency, the demand for terrestrial mobile spectrum for the medium term future will be satisfied.

It is very likely that the RSPG and Member States will be presented with projections showing a very high growth in terrestrial mobile data, and consequently with arguments to make more spectrum available for terrestrial mobile. In the bullet points above, we have identified some balancing issues which need to be considered by regulators before embarking on a search for even more spectrum for terrestrial mobile. Some of these balancing issues have already been identified in the draft Opinion; others have not. Here, we have identified the balancing issues in mostly qualitative terms, but these should, to the extent possible, be addressed in quantitative terms. The draft Opinion should be revised to identify and address these points more fully.

3. Use of the C-band FSS spectrum for terrestrial mobile

The band 3400-3800 MHz is available for terrestrial mobile through Decision 2008/411/EC. The band is available to and remains in use by the fixed satellite service (FSS). In general, there has been very little uptake of this band made available for terrestrial wireless broadband for 5 years.

The draft Opinion discusses possible reasons for the limited uptake on pages 12-13. One of the reasons mentioned is "Restrictions due to legacy users in the band". The suggestion there is that due to the need to protect FSS earth stations, this has constrained the ability of terrestrial operators to deploy networks.

ESOA is certainly of the view that compatibility between terrestrial mobile systems and FSS earth stations is very difficult – a view we have argued for several years and continue to argue today. In countries which have a high density of earth stations, it is not practical for terrestrial mobile systems to be deployed in the same frequency band. However, ESOA does not believe that the need to protect FSS earth stations is a significant reason of the lack of success of terrestrial mobile systems in this band.

The lower part of C- band has relatively few earth stations in operation in Europe, and in some countries the band 3400-3600 MHz is allocated to the FSS only on a secondary basis. In a few Member States, there are apparently no earth stations in operation at all in the band 3400-3800

MHz (see annex 1 of RSPG10-28), however there is still good evidence of a lack of uptake of BWA systems in some of the same countries. For example, the high uptake of C-band terrestrial mobile applications in Ireland is mentioned on page 12, but also described in the same section is the more recent decline in use. Finland and Sweden have experienced return of BWA spectrum (see RSPG11-393). These three countries are among a handful with no FSS earth stations in the band 3400-3800 MHz, but have all experienced a lack of success for terrestrial broadband in the same band. It is clear that the blame for the lack of success of terrestrial broadband in this band must lay elsewhere.

The most likely explanation for the lack of success of terrestrial broadband in the band 3400-3800 MHz is simply the lack of demand (discussed on page 13 of the draft Opinion). Due to the relatively high frequency compared to most other terrestrial mobile bands, the coverage possible with C-band is very limited. This makes it uneconomic to provide meaningful coverage of terrestrial broadband in this band. The use of C-band for mobile broadband was touted mostly as a solution for dense urban areas, but the wide availability of WiFi might also undermine the suggested benefits of C-band. The few cases of meaningful roll-out of BWA in other parts of the world in C-band has mostly been in countries with poor wired broadband service, where fixed broadband access is used to provide broadband to homes.

With such a lacklustre recent history of BWA in C-band, and with only a vague understanding of the need for more spectrum for terrestrial mobile, it is perplexing that the draft Opinion suggests (page 22) that "...Nevertheless, the frequency range 3800-4200 MHz has the potential to play a role in the provision of electronic communications services to ensure that the future capacity needs especially in urban areas, are met. Therefore, studies should be carried out into the possibility of sharing in Europe between the FSS and terrestrial wireless broadband services."

Studies have already been carried out, particular in the run-up to WRC-07 (see in particular ECC Report 100, Report ITU-R M.2109 and Report ITU-R S.2199), and ESOA believes that new studies are not required.

Sharing is at least difficult in the lower half of the C-band downlink spectrum, i.e. the band 3400-3800 MHz, and in some countries is not possible. The upper half of the C-band downlink spectrum, i.e. the band 3800-4200 MHz, has many times more earth stations than the lower half.

Consequently, sharing between mobile broadband systems and FSS earth stations in the upper half of C-band is many times more difficult than the lower half. Given the clear lack of feasibility for the two applications to share, and given the lack of meaningful roll out of mobile broadband systems in C-band to date, conducting further studies to open 3800-4200 MHz to BWA seems pointless – and is at best undermining the FSS business confidence and reputation. Although in Annex 2 of the draft Opinion, it is suggested that the band 3400-4200 MHz might be considered for Licensed Shared Access (LSA), LSA or any other licensing regime would not overcome the fundamental and well documented technical difficulties in sharing this band between the FSS and mobile broadband.

It would likely be difficult to remove the identification of the band 3400-3800 MHz in Europe, and this is not requested by ESOA at this stage. However ESOA is of the view that the band 3800-4200

MHz, suggested as a possible band for wireless broadband is not suitable, and should simply be removed from the Opinion.

ESOA has similar concerns on the consideration of opening of some of the C-band uplink spectrum, 5725-5875 and 5875-5925 MHz, to wireless broadband, as is suggested in Annex 1 of the draft Opinion. There are two interference issues to be considered here: 1) interference from a transmitting FSS earth station to terrestrial IMT receivers; and 2) interference from terrestrial IMT stations transmitting in using these bands to FSS satellite receivers.

We are not aware of existing studies which address these issues and hence studies would be necessary if this band would continue to be considered. However, considering the first interference case in particular, there is obviously a potential for the deployment of new earth stations to be constrained by a need to protect terrestrial IMT systems. For that reason the satellite industry is doubtful that this band would be a candidate band for new IMT applications.

4. Use the 2 GHz MSS bands (1980-2010 MHz and 2170-2200 MHz)

On page 20 of the draft Opinion, the RSPG addresses the bands 1980-2010 MHz and 2170-2200 MHz and suggests that, "...the RSPG recommends that if future actions taken by Member States related to Decision 2011/667/EU result in the withdrawal of licences, the Commission should consider re-allocation of the bands to terrestrial mobile services" the Commission should consider re-allocation of the bands to terrestrial mobile services".

In May 2009 two operators, Inmarsat Ventures Limited (Inmarsat) and Solaris Mobile Limited (SML), were each awarded the rights to operate 30MHz of paired S-Band spectrum in all 27 EU Member States for 18 years[1]. The spectrum bands awarded for use by Inmarsat are from 1980 to 1995 MHz (Earth to space) and from 2170 to 2185 MHz for space to Earth communications. For SML the spectrum awarded is from 1995 to 2010 MHz (Earth to space) and from 2185 to 2200MHz for space to Earth communications. The spectrum awarded is for the provision of Mobile Satellite Services (MSS). Commission Decision 2007/98 of 14 February 2007, which designates these frequency bands for systems providing mobile satellite services, stipulates that any other use shall not cause harmful interference to and may not claim protection from mobile satellite services. This is in line with the ITU regulations.

Since that date, both operators have been working with all Member States to firstly establish a common regulatory framework to enable provision of MSS in each Member State and also to ensure the availability of appropriate technology and ecosystems for commercial exploitation. Work is on-going in this area, with both operators reporting annually to Member States detailing the status of development of their proposed mobile satellite system. Consultation with Member States is coordinated through the MSS-sub Group of the Communications Committee.

[1] Commission Decision of 13 May 2009 on the selection of operators of pan-European systems providing mobile satellite services (MSS) (2009/449/EC)

ESOA notes the interest that the Radio Spectrum Policy Group's (RSPG) draft Opinion gives to these MSS spectrum assignments, however, ESOA does not agree with the statement contained in the draft Opinion arguing a lack commercial success in respect to service provision. In addition, ESOA would maintain that the RSPG is not the appropriate body to comment on the commercial development of MSS in these bands or to speculate on the status of a current investigation being carried out in compliance with commission Decision 2011/667/EU. Responsibility rests with the Communications Committee (COCOM) only. In respect to the compliance investigation cited in the draft Opinion it should be noted that, as yet, no determination has been made and it is therefore premature to anticipate the conclusions of COCOM.

The decision taken in May 2009 to assign spectrum for the provision of pan-European mobile satellite services was an innovative action providing the opportunity for operators to offer commercial services across the European Union in hitherto unused spectrum bands. ESOA would argue that the RSPG's call for the reallocation of the spectrum bands to terrestrial mobile services is ill timed. Operators must be given the opportunity to realise the true potential of 2GHz MSS with the security that their pan-European MSS spectrum assignments are not undermined or withdrawn.

5. Spectrum available for Terrestrial Wireless Broadband in the long term

Annex 1 to the draft Opinion establishes a preliminary identification of frequency bands for wireless broadband in Europe between 400 MHz and 6 GHz. A total of nearly 3000 MHz of spectrum is already in use, or is a potential future band, for wireless broadband (the exact amount being 2951.50 MHz) the bulk of which (2778.5 MHz) is for Terrestrial + WiFi.

In excluding as potential bands for terrestrial wireless broadband the 600 MHz of FSS C-band spectrum[2] and the 60 MHz of MSS 2 GHz spectrum[3] as proposed by ESOA above, Terrestrial + WiFi would still, together, benefit from nearly 2.2 GHz of spectrum – the exact amount being 2178.5 MHz. Hence, without making any more satellite spectrum available for terrestrial wireless broadband, the IMT spectrum targets identified by most stakeholders could be met. In this scenario, satellite applications in the 600 MHz + 60 MHz of spectrum allocated to FSS and MSS would remain available to contribute to the EU broadband objectives.

6. Proposals for modification of the Opinion

ESOA proposes that the Opinion be modified as follows:

1. The Opinion should be modified so as to give use a consistent definition of wireless broadband, being as described in page 22 of the draft Opinion as "high-speed wireless transmission of data and may be provided via either fixed, mobile or satellite platforms". In particular the text in section VIII of the draft Opinion should be modified to be consistent with this definition.

[2] 600 MHz of C-band spectrum consisting of the bands 3800-4200 MHz, 5725-5875 and 5875-5925 MHz.
[3] 60 MHz of MSS 2 GHz spectrum, consisting of the bands 1980-2010 MHz and 2170-2200 MHz

2. All the issues in section 2 of this contribution which discuss the drivers against the need for more spectrum for terrestrial wireless broadband should be included in the Opinion. Some of the issues are already included, but others are not.
3. As explained in section 3 of this contribution, the bands 3800-4200 MHz, 5725-5875 and 5875-5925 MHz are not suitable as candidate bands for terrestrial mobile broadband, and the text on pages 21 and 22 of the draft Opinion should be modified to remove suggestions of these bands as having potential for terrestrial wireless broadband.
4. The bands 1980-2010 MHz and 2170-2200 MHz should remain identified for *satellite* wireless broadband, as they currently are in Annex 1 of the draft Opinion. For the reasons explained in section 4 above, the section starting on page 19 of the draft Opinion on the 2 GHz mobile satellite service bands should not suggest the possibility for re-allocation of these bands to *terrestrial* wireless broadband.