European Satellite Operators Association

A l'attention de:

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Consultation publique de l'Autorité de régulation des communications électroniques et des postes: Fréquences pour les liaisons point à point du service fixe (faisceaux hertziens): besoins futurs et perspectives d'évolution

The European Satellite Operators' Association ("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 communication services across the globe. ESOA also maintains close working relationships with other regional organisations representing satellite operators.[1]

ESOA members are grateful for the opportunity to respond to ARCEP's consultation on the spectrum used for point-to-point terrestrial fixed links (the point-to-point fixed service, or "P2P FS" – "Faisceaux Hertziens" in French). However, it is important to remind that the Fixed Service FS also includes point-to-multipoint systems ("P2MP FS"), some of which may serve mobile terminals. Many of ESOA's members operate in the fixed-satellite service ("FSS") in bands shared with FS. In some cases (for example in the C-band), it is possible for both services to share the same bands, where earth stations can coexist with point to point links. But the introduction of point-to-multipoint services, including point to mobile services, will present greater difficulties, and may in fact preclude sharing in the future, thus reducing efficiency.

The main fixed satellite service FSS bands are:

"C Band": 3 400-4 200MHz (space-to-Earth), 5 925-6 725MHz (Earth-to-space)

"Ku Band": 10.7-12.75GHz (space-to-Earth), 14.0-14.5GHz (Earth-to-space)

"Ka Band": 17.7-20.2GHz (space-to-Earth), 27.5-30GHz (Earth-to-space)

[1] For more details, see : www.esoa.net

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Some of these bands are also used by other services, including direct to home satellite broadcasting, and terrestrial point-to-point links. Therefore, although some of these bands are not directly the subject of this consultation, the internationally-agreed "pairing" arrangements as shown above mean that they would be affected by any change in the regulatory framework for terrestrial services, whether for P2P or P2MP systems and services. For the sake of brevity and clarity, we will limit our responses to those questions which are relevant to satellite operators, either in practice or in principle, or where the spectrum used by satellite services is shared with other services, or where this is proposed for future use; in some cases we give one reply to several questions. ESOA members hope that ARCEP finds these comments both constructive and useful in the formulation of broader spectrum management policy.

In addition, as ARCEP is aware, this consultation is not taking place in isolation. National regulatory authorities in other EU Member States are holding similar consultations, the multi-annual Radio Spectrum Policy Programme ("RSPP") adopted in April 2012 will result in the creation of an inventory of spectrum use and there will be a review of spectrum used throughout the European Union.

Question 2 and Question 3

In general, the regulatory framework must be as simple, and as free from burdens as possible. However, the characteristics of the services in question must be taken into account, as must the consequences of adopting a particular regulatory framework. Whereas "sharing" between the fixed satellite service and terrestrial point-to-point links can be managed in bands where FSS use is limited to fixed coordinated earth stations, this is much more difficult in the case of point-to-multipoint or point-to-mobile systems. ESOA therefore entirely supports ARCEP for maintaining a regime of individual licensing of P2P FS in order to better control risks of harmful interference from high power large-range devices.

Even "low power short-range devices", particularly mobile devices, can still cause (and suffer) harmful interference and so they must still be subject to regulation. Whilst it might not be appropriate to license each device or link individually, there is still a need for some form of coordination and technical standards. Examples include "Interface requirements" which limit power levels and channel-use, or by operating the devices as part of a network where the device is under the control of a network-management system. In the future, "cognitive" radio systems are likely to be deployed, but these are still capable of causing interference, particularly into receive-only systems such as earth stations in satellite downlink bands. This interference can be suffered by both satellite earth stations and terrestrial receivers; the problem exists for both.

For example, the introduction and development of FS links in the spectrum band 10.7 – 11.7 GHz, today extensively used by FSS (space-to-Earth) for video downlinks (TV services), needs to be monitored carefully in order to ensure proper coexistence of the two types of services.

We can only repeat to ARCEP how important it is that this band is not opened to P2MP FS and basically remains used by high capacity P2P FS links, in line with the ERC Recommendation ERC/REC 12-06.

A serious problem is also likely to arise in the lower C Band, 3 400-4 200MHz, where at present FSS (space-to-Earth) is able to share with P2P, but the introduction of P2MP systems will making sharing in this band more difficult. As we explain in more detail below, geographic separation does not always facilitate sharing and a regulatory framework which seeks to promote sharing based upon this assumption might actually increase burdens upon all operators, and lead to less efficient use of the spectrum.

The EU's Decision on the "Harmonisation of the 3 400–3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services" of 2008 opened the sub-band 3400-3 800 MHz to fixed and mobile terrestrial broadband wireless access ("BWA") systems, creating an additional need to protect satellite networks, particularly C-Band earth stations from interference and assure that critical coordination takes place. It also requires Member States to protect existing services and shall not preclude the use of the band by other services, which means that Member States need to protect existing and future FSS services "first come, first served". It is likely that in many instances IMT systems serving mobile terminals will have to avoid exclusion zones around FSS earth stations within their service areas, in order to protect those earth stations.

There is work continuing in the ITU's Study Groups on potential sharing techniques between IMT systems and FSS networks in the 3 400–3 600 MHz band, but these techniques can only be used in respect of a very limited number of earth stations at known locations and working in a specified frequency band. Some of the techniques would also have a significant impact on the cost of the earth stations and would require modifications to the existing earth station installations.

Studies by the ITU have shown that these coordination areas, and the associated exclusion zones to protect the earth station, will cover substantial areas (tens to hundreds of square kilometres). The results of the studies performed in the study cycle leading up to WRC-07 have been reconfirmed by the 2011 Report ITU-R S.2199 on the "Studies on compatibility of broadband wireless access ("BWA") systems and fixed-satellite service ("FSS") networks in the 3 400-4 200 MHz band". This report was approved jointly by ITU-R Study Groups 4 and 5. However, these techniques do not provide any solution in respect of protection of transportable earth stations or deployment of new earth stations. Therefore these techniques do not provide any basis for potential consolidation of this band for IMT or other terrestrial access technologies. Any techniques to improve sharing would actually have substantial disadvantages for one or both of the sharing parties.

In addition, many regulators do not require the registration of licence-exempt ubiquitous end-user terminals, and so it is more difficult to identify the location of such terminals for technical coordination purposes.

Finally, ESOA is very pleased to note from the general Table on P2P FS (section 1.3) that the band 14.25-14.50 GHz has been frozen to any new FS since 2004 and is aimed at becoming exclusive to FSS, with “disappearance” of existing FS links today using this band. We’d be very interested to discuss with ARCEP the exact modalities and time schedule according to which this exclusivity is to be ensured.

Question 5 and Questions 11 to 16

Due to saturation of the Ku Band, satellite operators in Europe already use and will increasingly develop the Ka Band for growth and expansion capacity for a broad range of services including video distribution (DTH, HD and 3D), public safety, broadband, private networks, satellite newsgathering, backhaul, mobile as well as fixed applications and more.

To roll-out planned Ka-Band services, satellite operators require regulatory certainty to assure access to Ka-Band spectrum. To leave any doubt regarding satellite access to the Ka-band could place at risk the delivery of critical services to consumers as well as to the substantial underlying investments that are now being made in satellite infrastructure.

Most satellite operators have either already developed or are developing Ka-Band satellite systems, but much of the Ka Band allocated to satellites is also allocated to other services or is reserved for exclusive government usage, which could constrain the development of new commercial satellite services. The Ka Band is of the utmost strategic importance to this industry and has been under development for many years. The satellite industry is particularly subject to long lead-times. Many operators now have Ka-Band satellites currently in operation and are providing service in countries across Europe, America, Asia and Africa. Many other operators are developing Ka-Band systems to be launched within the next few years that will lead to the global availability of Ka-band satellite capacity and will continue to meet the demand for Ka Band satellite systems.

Satellite companies use their satellites to deliver a full range of services, including among others broadcast and other TV program distribution. In particular, satellite has been at the forefront of digital TV & high definition television (“HDTV”) development and should also be considered as one of the best platforms for the further growth of HDTV and the development of 3-D and interactive on demand digital services in Europe. Taking advantage of the high reliability of their infrastructure, and international reach, satellite operators have also long used their networks to connect the world during the most difficult man-made and natural disasters, including both broadcast and two-way communications, both of which are essential for public-protection and disaster-relief (PPDR) operations.

The Ka Band is therefore one of the key extension bands for satellite operators in Europe. First, the space-to-Earth bands must be protected with regard to use of the same spectrum by other services. Where these other services are P2P FS systems, it might be possible to manage it.

As technology develops we see new services in the Ka Band requiring deployment of a large number of small transmit-receive user terminals. Because of the sensitivity of satellite terminals to interference and the ubiquitous nature of these terminals, it is not possible for these Ka Band satellite services to share the same spectrum over the same geographical area with other services such as terrestrial fixed P2P systems.

FSS uncoordinated earth stations (space-to-Earth) in the band 17.7-19.7 GHz may operate within CEPT on an unprotected basis with respect to the Fixed Service (FS). The adjacent band 19.7-20.2 GHz, which is allocated exclusively to satellite services, has so far been considered by satellite operators and administrations for widespread FSS earth station deployment. However, with the development of high capacity Ka band satellite systems, and traffic asymmetry that requires more downlink spectrum than uplink, there is a critical need to enable the viable operation of FSS uncoordinated earth stations under acceptable FS interference conditions within the band 17.7-19.7 GHz on a sustainable long term basis.

In urban areas, the 17.7-19.7 GHz range may be fully used by FS, or the prospect of reaching saturation is possible. While in rural and remote areas of France, it is quite likely that the saturation of FS will never be reached, even on the long term. One of the major identified applications in ECC Report 152 for Ka-Band satellite systems is broadband connectivity for users beyond the coverage of terrestrial services. Therefore, the areas where spectrum would be most needed for Ka-Band FSS broadband would generally be those of less need for the FS.

Therefore, ARCEP should characterise the FS interference environment as experienced by a FSS earth station, so that specific areas and/or sub-bands of 17.7-19.7 GHz in various rural and suburban areas and possibly urban areas can be identified as more favourable for Ka-band FSS use.

Second, appropriate access to the 27.5-29.5 GHz band (Earth-to-space) is critical to the future of FSS. The band segmentation between FS and FSS in the 28 GHz is provided by ECC Decision ECC/DEC (05)01 designating each frequency for either uncoordinated FSS earth station uplinks or FS.

ESOA's reading of this ECC Decision is that, in the paired uplink band 27.5-29.5 GHz, the bands 27.5-27.8285 GHz, 28.4445-28.8365 GHz and 29.4525-29.5 GHz are identified for the use of uncoordinated FSS Earth stations. The only exception is in the band 28.8365 – 28.9485, designated for uncoordinated FSS, but taking into account that some FS networks were already licensed in some countries at the time the Decision was approved (*decides 2*). In this specific case, new FS links were to be limited to additions on the existing networks (*decides 4*).

Furthermore, ESOA considers it very important to be able to access the full uplink band 27.5-29.5 GHz on a shared basis for coordinated Ka-band gateway stations (or Hubs), as implicitly recognized by ECC Decision ECC/DEC (05)01.

The relationship between satellite services, terrestrial fixed and terrestrial wireless services is not mutually exclusive and in many communications systems, when viewed "end to end", more than one element is used.

For example, electronic newsgathering (ENG) typically involves both wired and wireless terrestrial links, with the overall content fed back to the studio via a satellite link. As another example, some ESOA members are currently supporting to deploy modern mobile cellular networks in rural and remote areas, and the backhaul is being done by satellite, enabling the rapid deployment of modern systems to rural populations quickly and relatively cheaply, to areas un-served or underserved by the terrestrial fibre (or wire) infrastructure needed to support them.

Although the example referred to above is specifically related to the provision of services in rural and remote parts of Africa, the same paradigm can also be applied to the provision of broadband connectivity to rural and remote parts of Europe, and in the past there have been several projects in which satellite systems have been deployed in rural and remote areas in response to national initiatives, enabling resources to be devoted to upgrading terrestrial infrastructure in towns and cities. This solution to the European “Digital Divide” remains viable.

Although there are European targets on broadband connectivity speeds and penetration as part of the Digital Europe agenda, these are dependent upon large-scale fibre upgrades which are taking time, and public subsidy, to achieve and even if they are able to achieve the “headline” speeds these targets require, there remain problems such as the speed to the local cabinet, when compared to the speed experienced by the user, and variability due to contention.

Using existing and proven satellite technology can provide rural and remote connectivity in reliable and rapidly deployable solutions, more rapidly than fibre-to-the-cabinet or fibre-to-the-home is being deployed in such areas. This can also be a viable solution for suburban and outer-suburban areas.

Whether or not existing technology can meet the “headline” target speeds is immaterial given that they can provide sufficient speed, and capacity, and better predictability than fibre-to-the-cabinet and deliver a service which is perfectly adequate for all small-business and domestic needs, short of applications such as online gaming which has “extreme” low-latency requirements.

The emerging generation of high-throughput satellites is even better placed to provide such services.

Questions 6 to 10

These questions are particular to the technological development anticipated in the terrestrial sector and so ESOA will not answer on behalf of that sector. Rather, we offer comments to highlight the general situation of the satellite sector, including lead-times and general regulatory concerns.

In some cases these will also be relevant to terrestrial point-to-point link operators, such as in the case of cross-polarisation and adaptive techniques to permit frequency-reuse, improve link-resilience and to reduce interference.

Spectrum is the essential ingredient of all wireless communications systems. As satellites are a transnational, wireless-based technology, satellite operators heavily depend upon spectrum allocation by the ITU, and upon national regulators' adherence to these allocations.

Satellite systems are particularly subject to long lead times in development, and commit to long-lived assets. Satellite systems and networks require hundreds of millions of euros of investment, and years of advance planning and construction prior to deployment. Investment decisions related to development of networks are based on the business case and require market access on reasonable terms to the countries in the footprint, whose agreement is also needed to use the spectrum. Once a satellite is operational, commercial viability depends on the availability of spectrum and the applicable regulatory regimes that the satellite network will be serving.

In particular, in order to develop a satellite network, the operator must apply to the ITU for the reservation of internationally-allocated frequencies, and an orbital location, and must then secure the agreement of other countries. This period of technical negotiation is long and complicated and involves the refinement and modification of the frequencies, power-levels, and the shape of the "footprint", all of which will affect the design of the radio systems on the satellite. The ITU allows applications for these reservations to be made up to seven years before the planned date for operations to start and these technical negotiations often need the full amount of time available, and may even continue after a satellite has entered service. Therefore satellite operators require regulatory stability and predictability.

Similarly, this is reflected in customers' expectations, particularly when deploying large, international, regional or global networks, using standardised equipment and with a known level of performance and reliability, and this is particularly true for satellite operations in the C Band. It is also reflected in the expectations of the support industries, who need to know that the technology adopted, both on the ground and in space, is proven and reliable. This requires extensive testing in the laboratory, in the field, and with test payloads long before a new technique or technology is deployed commercially. Examples include spot-beam antennas to increase frequency reuse and efficiency, "ground-based beam-forming" techniques, and payloads operating in new bands. It is not possible simply to get an allocation, and then deploy.

For example, at present we are seeing the emergence of terminals operating in the Ka Band, whether for the provision of HD feeder links, provision of consumer broadband services, and many other services, all both of which can be grouped together within the objective of the emerging generation of "high throughput satellites", or to enable expansion of existing services into new bands, to relieve congestion in other bands, where the use of these new bands is possible.

The development of Ka-Band terminals, and the deployment of payloads, has taken time, but as we have noted above the commercial deployment of systems is now well underway.

Similarly, there are technical challenges to be overcome if either the Q or V Bands are to become commercially viable. At present, they are not, although this may change.

It will be necessary for the equipment to be proven, and for regulators to make the spectrum available, and for test payloads to be flown, before this can be achieved. See also our response to Question 16 (and others) above.

As technology develops we see new services in the Ka Band requiring deployment of a large number of small transmit-receive user terminals. Because of the sensitivity of satellite terminals to interference and the ubiquitous nature of these terminals, Ka Band satellite services could be vulnerable to interference from terrestrial fixed systems in the band 17.7-19.7 GHz. The sharing between FS systems and Ka-band FSS downlinks is currently under review by the CEPT (project team FM44), and these studies could lead to new sharing conditions which might impact the FS use of the band.

Question 19, Question 29 and Question 32

Unused and under-used-higher-frequency bands could be made available for localised high-data rate terrestrial systems, with backhaul being provided by upgraded fibre networks in urban areas and satellite services as a solution to the “digital divide” in rural/remote areas. This is a model which has worked well in some areas, and ESOA members are supporting it everywhere.

As we have noted above there are technical challenges to the use of the bands above Ka Band by satellite systems, which remain to be resolved before those bands become viable for satellite services, and so in this intermediate period it could make sense for these high-rate or high-capacity terrestrial networks to be deployed under geographic limitations for a fixed period of time, as it is simpler and quicker to deploy terrestrial systems in these bands, and the “churn” of equipment in the terrestrial sector enables technology to be adopted or adapted less disruptively than similar changes in satellite architecture. Similarly, further encroachment upon the C Band (3 400-4 200MHz) by terrestrial services is unnecessary.

To conclude, ESOA is grateful for the opportunity to provided comments in response to ARCEP’s consultation and we hope that ARCEP finds them useful and constructive. ESOA is willing to remain engaged in the consultative process.

Yours sincerely,

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