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Dear Mr Green,

Subject: Inmarsat Reply to the RA Consultation Document “Introducing Recognised Spectrum Access”

Please find attached Inmarsat’s comments on the preliminary proposal to introduce Recognised Spectrum Access (RSA) for satellite downlinks presented in the consultation document.

Inmarsat has an interest in this issue, since we operate satellite downlinks at L-band and C-band and may use other bands in the future. Inmarsat’s use of L-band is for mobile user terminals that are exempted from licensing. C-band is used for large feeder link Earth stations that have individual licences. There is currently one Inmarsat LES in the UK, operated by BT at Goonhilly.

I hope you find the attached comments useful. Please contact me if I can provide any clarification or further information.

Yours sincerely,

Don Kennedy
Director
International Regulatory Affairs



Inmarsat Answers to the Consultation Document Questions

Question 1: Do you agree in principle that RSA should be introduced for satellite services?

Inmarsat Reply: No. The benefits listed as justification for introducing RSA either are not benefits at all for satellite services or can be achieved just as easily without RSA. The alleged benefits mentioned in the consultation document are discussed below.

A. “[RSA] would provide incentives for spectrum efficiency”. It is wrong to assume that spectrum is used inefficiently if operators are not subject to spectrum pricing. There are other incentives for using spectrum efficiently. Many satellite bands are congested and satellite operators have to use any methods at their disposal to be able to meet their spectrum requirements. This is the case in the bands where Inmarsat operates, i.e. L-band and C-band.

- **L-band.** There is tremendous competition for spectrum in bands below 3 GHz generally and the spectrum shortage for MSS at L-band in particular has been recognised for several years. For this reason, the Administrations responsible for L-band MSS networks, including the RA, have entered into two regional MoU to facilitate more efficient use of the spectrum. These MoU were developed under the ITU frequency coordination procedures of the Radio Regulations and allow the satellite network operators, of which there are currently 8 in the ITU Regions 1&3 coordination, to meet every year to agree on spectrum plans that accommodate the short term spectrum requirements of real operational networks. However, even with this process in place it is not possible to fully meet the requirements of the networks. Inmarsat and other L-band MSS operators therefore have to continuously apply spectrum efficiency improving methods to be able to meet its spectrum needs.
- **C-band.** Also at C-band, where Inmarsat operates its feeder links, spectrum is scarce. The coordination methods at C-band are different from the multilateral process used at L-band. At C-band, coordination is carried out in the traditional bilateral fashion. There are over 150 satellites currently operating at C-band around the 360° geostationary orbit. Considering that a satellite network has to be coordinated with all other networks within $\pm 10^\circ$ orbital separation, it is easy to see that this coordination process can be extremely difficult. It is also obvious that satellite operators need to use any spectrum efficiency measures they can to achieve coordination and be able to successfully operate their systems and serve their customers.



B. “RSA would offer greater security and assurance of spectrum quality”. There are three mechanisms in place today for the RA to provide assurance of spectrum quality to users. These are:

i) Frequency coordination. Satellite networks are coordinated through the ITU procedures defined in the Radio Regulations, a treaty that the UK has acceded to. This coordination process ensures that the satellite networks are protected against interference from, and do not cause unacceptable interference to, other satellite networks and terrestrial systems. Hence, satellite downlinks of networks that have been successfully coordinated will not cause unacceptable interference to systems operated in the UK.

ii) Licensing. Earth stations that have individual licences are protected as part of the licence. Before such licences are issued, a coordination exercise is performed to ensure that interference will not be caused to or from the Earth station.

iii) The allocation process. Allocations are made in the Radio Regulations based on detailed studies of compatibility between different radio services. The ITU also produces guidelines on how to avoid interference between services. Generally, the UK (RA) will follow the ITU allocations and procedures. If any deviation is made, it will be done only based on detailed technical studies to make sure that no unacceptable interference is caused.

Using these mechanisms, the RA provides high spectrum quality for users of satellite downlink spectrum in the UK, without the use of RSA. Even with the introduction of RSA, the RA would need to continue to follow ITU procedures for frequency coordination and allocation. These procedures provide all the necessary security and assurance of spectrum quality. RSA is therefore an additional and unnecessary procedure, which potentially could conflict with existing and well established international procedures.

C. “RSA would enable the benefits of spectrum trading to be extended to satellite services”. The consultation document does not discuss spectrum trading between satellite systems. Hopefully this is in recognition of the fact that spectrum access in satellite bands is best managed through the frequency coordination process. This process allows satellite operators to arrive at the most efficient use of the spectrum and geostationary orbit. A new satellite operator seeking access to spectrum coordinates its requirements with other operational and planned satellite systems. The operator may have to adapt its system parameters to get the required spectrum access, but generally it is possible to accommodate new systems through this process. The result is a highly efficient use of the spectrum. Trading of RSA between operators would inevitably lead to gross



inefficiencies unless it was only a change of ownership with no change of use. A new satellite system is very unlikely to have any use for an RSA that is tailor-made for a different satellite system, whereas a general RSA that would “fit” a wide variety of satellite systems would lead to inefficiencies. Further, since satellite networks generally serve more than one country, trading a national licence (or RSA) would be pointless, unless identical licences are traded in all countries where service is provided.

The consultation document states that trading would provide a flexible boundary between terrestrial and satellite services in shared bands, but it is not clear how trading could successfully achieve this. In general, the international nature of satellite systems (contrasted with the national nature of terrestrial systems) makes spectrum trading between satellite and terrestrial systems unfair, favouring spectrum access for terrestrial systems over satellite systems. A satellite operator would be unable to compete in a bidding contest for spectrum with terrestrial operators due to technical and economic reasons (see below).

In addition, in many cases spectrum trading between satellite and terrestrial systems is simply not necessary or feasible. In cases *where sharing between a terrestrial and a satellite service is feasible* (with limited constraints), there is no need to choose between the two services, and terrestrial and satellite operators can both use the spectrum, provided some appropriate technical constraints are complied with. This is the case for example in bands that are shared between FSS and FS systems. As with sharing between satellite systems discussed above, both types of service can be accommodated through frequency coordination, leading to a much more efficient use of the spectrum than spectrum trading could ever achieve.

In cases *where sharing is not feasible*, the UK could not unilaterally decide (through spectrum trading or any other mechanism) to re-allocate spectrum between satellite and terrestrial services. For example, it would not be feasible for the UK to license terrestrial services while other countries operate satellite services, since either the UK terrestrial service or the satellite services in other countries would then suffer interference. In this situation, internationally harmonised use of the spectrum is needed and spectrum trading is not feasible.

In many satellite bands there is also a high degree of sharing between satellite systems. This would further complicate the implementation of spectrum trading. A terrestrial system may only be able to operate interference free if all satellite systems in the band are removed. It would not be possible to allow spectrum access for a terrestrial system on the basis of trading the RSA of one satellite system, since the new terrestrial system may be incompatible with other satellite systems in the band.



D. RSA would enable the RA to charge for spectrum. If RSA is needed for the RA to be able to charge for the use of spectrum by satellite operators, this is the only “benefit” given in the consultation document that stands to scrutiny. However, it is at best questionable whether high spectrum fees for satellite services benefits the UK economy as a whole. The specific conditions of satellite operators have to be taken into account in considering any spectrum charges for satellite services. Factors relevant to satellite services include:

- that satellite operators provide service in a large number of countries (in Inmarsat’s case globally) and therefore potentially have to pay fees in all those countries;
- that satellite systems achieve greater spectrum efficiency by using beams that cover multiple countries with the spectrum assigned to those beams available in all those countries, but only partially used in each country;
- the high cost and long lead times of satellite manufacturing;
- the size of the market (for example, a global mobile-satellite network may require a similar amount of spectrum as a national terrestrial mobile network, but typically serves a much smaller number of customers in each country);
- the value of satellite services, for example in providing additional choice for consumers, in providing communication to users where no alternative exists, and in providing safety of life communications for maritime and aeronautical users;
- the effect of spectrum fees on end user prices.

The consultation document claims that terrestrial operators that have to win access to spectrum through auctions would be at a competitive disadvantage versus satellite operators, who do not pay for spectrum access. This is incorrect since the conditions for terrestrial and satellite operators are vastly different, for example:

- Terrestrial and satellite operators do not compete for the same market. For example, whereas terrestrial systems generally serve high population density areas, satellite systems generally serve low population density areas.
- Even from a purely technical point of view, terrestrial operators could not feasibly serve most of the users of satellite networks even if they wanted to, due to the practical and economic constraints of deploying terrestrial systems in rural and remote areas, not to mention maritime and aeronautical environments. Conversely, satellite systems could not compete with terrestrial systems in the areas where terrestrial systems are most prevalent. Satellite systems are also constrained by shadowing in many areas, e.g. in urban areas.
- Terrestrial systems are generally national whereas satellite systems are international.
- Terrestrial and satellite systems have different infrastructure requirements leading to different costs and deployment schedules.

E. “RSA could provide a mechanism for making available the UK’s allocation of spectrum-orbit resource”.



This statement is confusing. If at all, this idea could only apply in planned bands, i.e. in bands where an allotment plan exists, e.g. the Ku band broadcasting-satellite band. However, even in such bands the principle discussed above applies, i.e. if sharing is feasible there is no need to choose between satellite and terrestrial use, and if sharing is not feasible international interference issues would not permit the UK to re-allocate a satellite band for terrestrial services. In non-planned bands, of course, the UK does not have a pre-allocated spectrum-orbit resource at all. Any spectrum-orbit resource that the UK could get access to in such bands would only become available as a result of frequency coordination. Once coordinated, the ITU procedures assume that the coordinated spectrum and orbital location are used by the satellite network it was coordinated for. If that satellite network ceases operation, it is not lawful for the UK to operate a terrestrial network in that spectrum that may cause interference to other satellite networks (including foreign networks) that are coordinated in accordance with ITU procedures.

Question 2: For which satellite services and in which bands should RSA be introduced?

Inmarsat Reply: Inmarsat recommends that RSA is not introduced in any satellite bands. As discussed above, RSA provides no benefits that can not be provided through the existing regulatory framework.

Question 3: How should the recognition granted by RSA be defined and what technical and other factors should be included?

Inmarsat Reply:

What is needed for satellite downlinks to operate satisfactorily is primarily considered allocation decisions and suitable coordination procedures. This includes measures such as those listed under section 4.3.2 of the consultation document. As discussed above (under Question 1), these measures are already in place in satellite bands and thereby spectrum use by satellite downlinks is already recognised, in the absence of RSA.

Question 4: Would tradability of RSA and interchangeability with licences be advantageous and how useful would it be in practice?

Inmarsat Reply:

As discussed under Question 1, spectrum trading is not feasible in satellite bands.

Question 5: Should RSA be perpetual or fixed term and what factors should be



taken into account in deciding security of tenure?

Inmarsat Reply: N/A

Question 6: How should spectrum pricing principles apply to RSA?

Inmarsat Reply:

N/A if Inmarsat's recommendation not to apply RSA to satellite services is accepted.

Question 7: How should administrative incentive pricing fees be calculated in practice?

Inmarsat Reply: Please see comments under Question 1.

Question 8: Are there services other than satellite for which application of RSA could be advantageous?

Inmarsat Reply: No comment.