



C BAND SPECTRUM THREAT TO SATELLITE SERVICES Information Paper

1. INTRODUCTION

The continued rollout of mobile broadband technologies using radiofrequencies around 4 GHz (“C-band”) poses an unprecedented threat to the provision of satellite services.

Satellite operators use the C band globally to provide essential telecommunication services. In many countries it serves as *the core network* for national and international communications. Its low susceptibility to interruptions due to rainfall (i.e. the resilience in the presence of heavy rain) means that it is and will remain an important band for satellite transmission, notably in least-developed regions and very large countries but also across continents for international, global communications.

The current threat has emerged from the deployment of Broadband Wireless Access (BWA) services and the proposed inclusion of so-called IMT¹ services, the global mobile terrestrial standard, within the frequency range 3.4 - 4.2 GHz at present allocated to the Fixed Satellite Services (FSS) and the Fixed Services (FS). While unused spectrum is already allocated to mobile services, making the C-band available to them as well is on the agenda for the CPM and WRC meetings this year in Geneva **under agenda item 1.4**.

2. PRESENT DAY SITUATION

The lower end of the frequency range (generally up to 3.6 GHz) is either already identified or under consideration for use by BWA services such as WiMax in several countries. In fact, customers of satellite services where WiMax services have been extensively introduced in this band have already reported significant interference and service interruptions for satellite ground stations and their related services.²

To make matters worse, certain national administrations in Europe and other parts of the world are now considering identifying new terrestrial IMT services (UMTS / 4G in Europe) within the entire band 3.4 - 4.2 GHz. Satellite services will be severely compromised if forced to try to co-exist with IMT services.

Today, all C-band frequencies across the world are used for FSS commercial services, e.g. critical applications such as distance learning, telemedicine, disaster recovery as well as television transmission in many tropical regions. Meteorological and earth observation services and certain military services (NATO) are very dependent on satellite C-band.³ C-band satellite links are known to be safe and reliable because of their superior propagation characteristics: this means that critical trunk connections are carried in these bands. All these services are now at risk.

Globally there are approximately 160 geostationary satellites operating in C-band today, and nearly two out of every three commercial satellites presently under construction (representing an overall capacity in excess of 3,000 transponders) will use the ITU FSS allocation in these bands. Many more satellites today operate communication channels in other frequency bands but depend on TT&C operations (Telemetry, Tracking and Ranging) in C-band.⁴

¹ In this document the term “IMT” refers to IMT-2000 & IMT-Advanced services.

² ESOA, SAP REG & GVF are aware of interruptions in satellite services having occurred in 2006 throughout Africa and in Australia, Bolivia, the Caribbean, China, Fiji, Hong Kong, Indonesia and Russia.

³ Fears expressed by these communities in recent positions / comments are available at www.esoa.net

⁴ Specifics on FSS use of C-band & comparison with other FSS bands are elaborated in further documents, available at www.esoa.net

Finally, developing regions such as Africa are currently implementing plans to rollout critical satellite broadband services in the C band over the next 3-5 years. This rollout is an inherent part of development policy for many governments and international organizations and is one that is much faster than that proposed for IMT services.

3. INCOMPATIBILITY

Specific considerations of the C-band mean that moving fixed satellite service C-band users to other satellite frequencies is costly and not viable for areas with heavy rainfall. Other FSS bands are also already congested. Furthermore, due to the large distances involved, satellite signals received by earth stations have very low power and are, therefore, highly sensitive to interference.

Figure 1 below shows the number and distribution of registered C-band satellite earth stations operating to the satellites of just one major operator, while Figure 2 shows C-band earth stations in Europe with 100 km circles around each one, not including receive-only stations. Studies have shown that in most locations, the exclusion zone to protect C-band stations from IMT interference would actually have an area larger than 100 km circles. It is apparent from Figure 2 that large areas fall within protection zones where IMT operation would be impossible or severely constrained: these include areas of high population densities (e.g. London, Paris, Berlin) and, in some countries, e.g. the UK, Germany, Italy or Spain, there is little free area. In Europe, therefore, **if the band 3.4-3.8 GHz were to be designated for IMT systems, large and important geographic areas would not be usable for IMT deployment.**

The protection of satellite services in all C-band frequencies by defining exclusion zones around existing C-band stations is however difficult given the number of satellite stations already deployed, many of which are of the receive-only type whose locations are not registered. Plus the implementation of exclusion zones would most definitively impact, not only the ability of FSS operators to expand operations beyond existing earth stations, but also the future market for mobile broadband services which deployment is intended to be 'everywhere'. **Given these constraints, the only responsible alternative would appear to be to find other spectrum in which mobile broadband services can operate.**⁵

4. INTERNATIONAL DIMENSION

Within Region 1 of the ITU which encompasses all of Europe and Africa, satellite services (primary allocation) today have priority over mobile services (secondary allocation) above 3.4 GHz in C-band. Yet, for UMTS/ 4G services, certain European and Far-Eastern administrations advocate this band as a harmonized band on a worldwide basis, in view of the forthcoming World Radio Conference (WRC-07).

The satellite sector globally, represented here through ESOA, SAP REG, GVF, SIA & APSCC, submits that this approach is fundamentally flawed for the reasons given herein and believes that some major countries are unlikely to support such use as they wish to protect important satellite communications. We would recall that a similar issue occurred at 2.5 GHz, which was identified for IMT-2000 at WRC-2000, when IMT proponents had claimed that existing, allocated services would not be harmed. Now it is proposed to adopt regulatory measures that would unduly constrain satellite services in this band (agenda item 1.9 of WRC-07).

5. CONCLUSION

All national regulators should be best informed of the fact that satellite operators would be severely affected at global level by any initiative to foster the deployment of mobile broadband services in C-band in all Regions of the ITU, in particular in regions such as Africa, Asia and Latin America who heavily rely on the use of this band for satellite services.

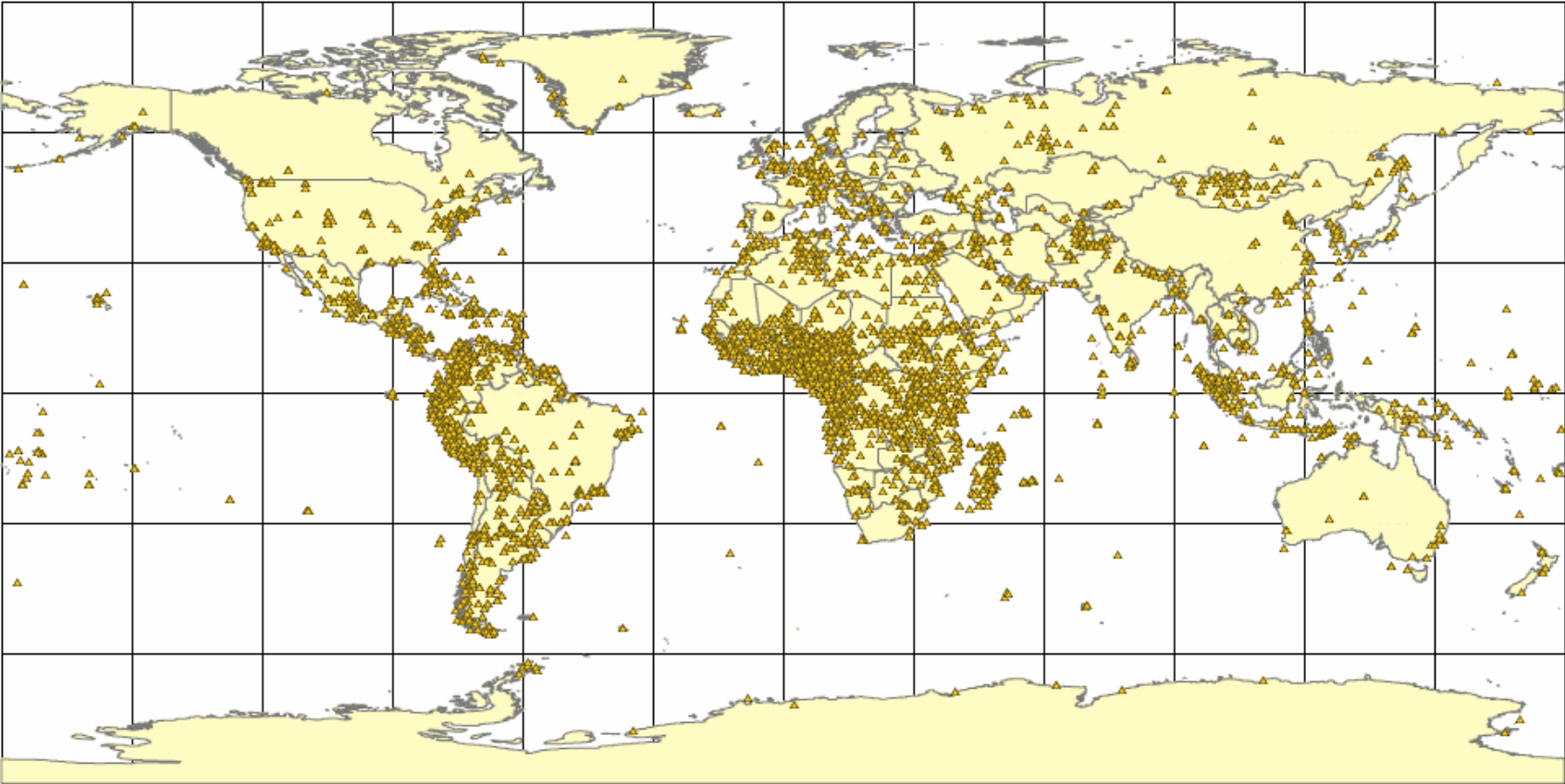
For the viability of global satellite communications, we invite the international community to maintain the current ITU allocation status on C-band, and strongly recommend the examination of alternative frequency bands for IMT services. We hope that all national administrations will make a combined and concerted effort to invoke this result.

For more information visit: www.esoa.net

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⁵ Other considerations are explained in detail in further documents to this paper, available at www.esoa.net

Figure 1 - Deployment of earth stations registered* with one major satellite operator and receiving within the 3400-4200 MHz band



▲ Denotes a site that may include one or more stations.

* This does not include non-registered earth stations such as TVROs.

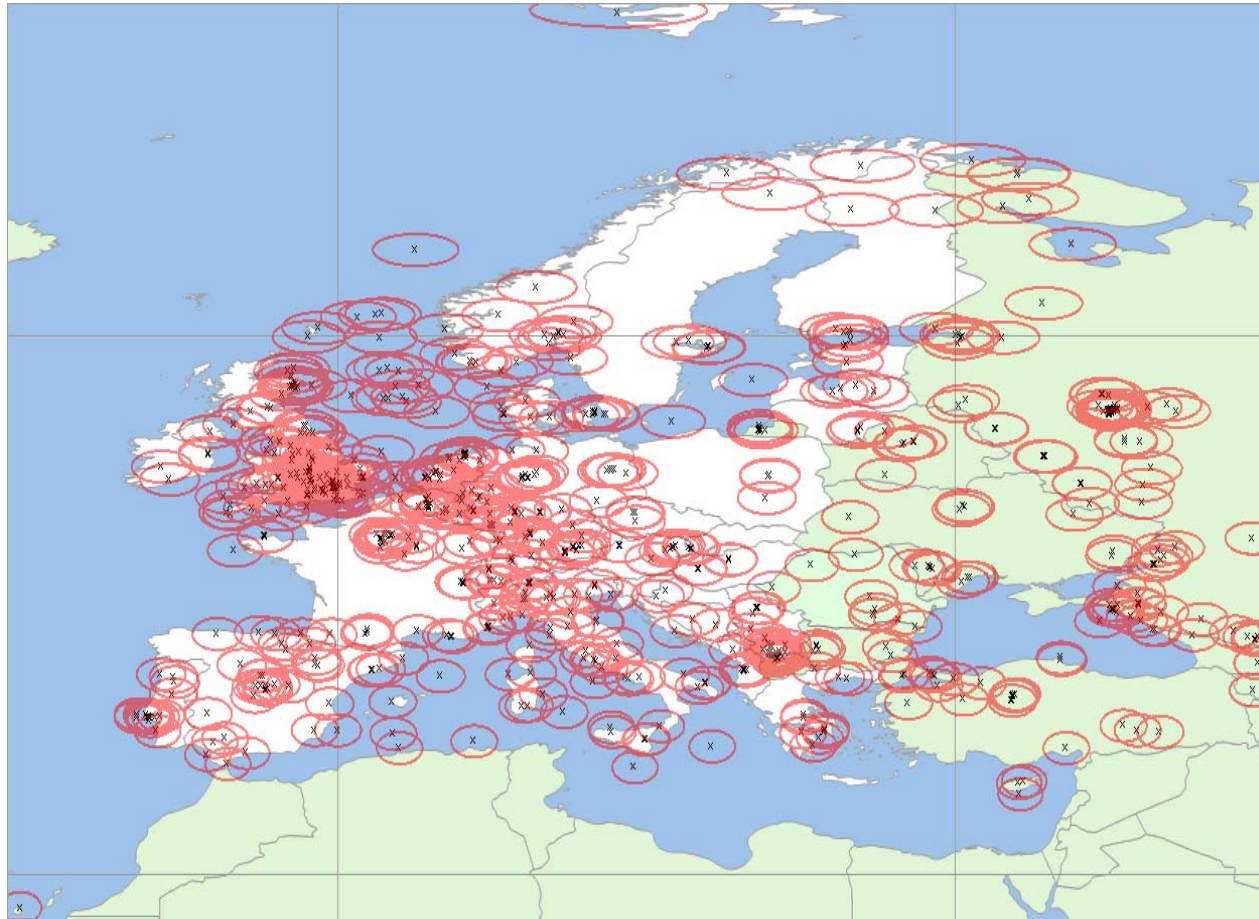


Figure 2 - Locations of registered FSS C-band Earth Stations in Europe, excluding Receive-Only Stations (data as available in 2006)