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Item: session on “Efficient use of orbit/spectrum by satellite systems”, 12 June 2008

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Background paper

Foreword

Efficient use of orbit/spectrum is one of the most crucial challenges to be met by international community in order to promote worldwide telecommunication development and reach the connectivity access targets set by the World Summit on the Information Society. Special attention has been given to this issue during the ITU Plenipotentiary Conferences (Marrakesh, 2002, Antalya, 2006) and World Radiocommunication Conference (Geneva, 2007). In particular, administrations, satellite operators and industry have been invited to look forward for improving the procedures managing orbit/frequencies access in order to reflect the latest technologies (Resolution 86 (Rev.WRC-07)), for developing concept for enhancing the Radio Regulations to meet demand of current, emerging and future radio applications (Resolution 951 (rev.WRC-07)) and for keeping procedures as current and simple as possible in order to reduce the cost for administrations and Radiocommunication Bureau (Resolution 86 (Rev. Marrakesh, 2002)).

State of satellite communication services

Satellite systems continue to play an important role in the booming market of communication and broadcasting services. The most dynamic growth areas for satellite operators, alongside the provision of traditional services – television distribution and capacity leasing – are direct-to-business or direct-to-home, and the provision of triple-play service, i.e. telephony, high-speed data transmission/internet and television and sound broadcasting programmes to fixed, transportable and mobile terminals. This is leading to the convergence of systems belonging to different space services and their gradual integration with terrestrial telecommunication networks. To meet the demand for satellite capacity, it will be necessary not only to replace satellites coming to the end of their lifetime, but also to launch new ones. The "capacity" of the orbit/spectrum resource allocated to satellite communication systems and the need to use it increasingly efficiently in order to satisfy the growing demand become a crucial issue. The debate on how to create additional room for more space stations and to use existing locations more effectively is opened. In parallel with the increased cost of satellite projects stemming from the electromagnetic compatibility (EMC) requirement, as the occupancy of the orbit increases, so does the impact of an additional factor on the economic efficiency of satellite communication system projects, namely the cost of registration of the corresponding frequency assignments with the International Telecommunication Union (ITU) including the lengthy, complex but absolutely necessary coordination procedure. Is this an actual issue, or being a consequence of limitations in the current applicable spectrum management approaches?

International spectrum/orbit management system

Overview

In the process of establishing ITU's space-related regulations, emphasis was laid from the outset on efficient, rational and cost-effective utilization. This concept was implemented through a "first come, first served" procedure. This procedure ("coordination before use") is based on the principle that the right to use a satellite position is acquired through negotiations with the administrations concerned by actual usage of the same portion of the orbital segment. If applied correctly (i.e. to cover genuine requirements), the procedure offers a means of achieving efficient spectrum/orbit management; it serves to fill the gaps in the orbit as needs arise and results, in principle, in a homogeneous orbital distribution of space stations.

The progressive exploitation of the orbit/spectrum resource and the consequent likelihood of congestion of the geostationary-satellite orbit prompted ITU member States to consider more and more seriously the question of equitable access to the orbit/spectrum resources. This tendency resulted in the establishment and incorporation in the international regulations of frequency/orbital position plans in which a certain amount of frequency spectrum is set aside for future use by all countries, particularly those not immediately in a position to make use of the resource. These plans, in which each country has a predetermined orbital position associated with the free use, at any time, of a certain amount of frequency spectrum for a national coverage, together with the associated procedures, guarantee that each country has equitable access to the orbit/spectrum resource, thereby safeguarding countries' basic rights. Such plans govern a considerable part of the frequency usage of the most resource-demanding radiocommunication services.

Limitations

The criticism of approaches based on above space plans stems mainly from the little or no use having been made so far of the plans as such. The upshot is that plans are not attractive to all countries, and the few who do benefit from them use them as "free riders". By applying the modification procedures associated with the plans, they are able to gain advantage at the expense of others who are not using the plan and who will most probably never do so. Since, in practice, modifications often result in deterioration in the conditions of use of national allotments in the plans, the proliferation of such systems could prevent administrations from using their national allotments in the future.

Regarding the non-planned services, the current regulatory procedures were developed back in the seventies, and they have successfully served their purpose until recently. However, as the resource became increasingly occupied and demand grew for satellite communications services, some administrations endeavoured to occupy the resource in order to hinder access to it for others and reserve it for their own future needs whether specified or not.

One reason of spectrum/orbit scarcity is that administrations still do not have any real incentive to relinquish unused positions, emissions or frequencies. Indeed, the conditions are obviously rife for people to erect technical barriers to prevent competitors from gaining access to the spectrum and orbit, so as to defend their own market position or, even worse, with a view to engaging in subsequent speculation on existing slots already recorded. Such occurrences have become more and more frequent of late. In practice, it results in the following:

- numerous space frequency assignments recorded in the MIFR after having completed all the required procedures, but which will either never actually be used or whose corresponding satellites have already ceased operating;

- satellite network data entered in coordination and notification notices, geared to the worst-case sharing scenario, often corresponding to the maximum and minimum operating margins, which in practice are never applied;
- although bilateral coordination negotiations often lead to specific agreements limiting or modifying the parameters of the notified network, in most cases such agreements are not reflected in the corresponding notices, which retain the operating parameters as originally notified, which are known to be either unused or overprotecting ones ;
- checks against available launch records and radio monitoring findings reveal that some administrations submit for application of the Radio Regulations inaccurate satellite and launch vehicle manufacturer information as well as launch confirmation which does not reflect reality.

The current ITU database may then unfortunately not be a true reflection of spectrum and orbit utilisation, and needlessly increases the number of networks with which a newcomer has to effect coordination for unnecessary purposes. As a corollary, the existing limitations of the international regulatory system place a substantial additional financial burden on satellite projects, making them less attractive as investments and thereby limiting the capacity of the orbit/spectrum resource. Consideration should be given for a better alignment of recorded and operating satellite parameters.

What to do to alleviate the limitations? Items to be discussed

- *technical options:*

Update sharing and interference criteria?

Review coordination triggers (coordination arc...) etc?

Review pfd, epfd and eirp limits?

Consider new requirements for antenna radiation pattern?

- *regulatory methods:*

Encourage convergence of services/application?

Planned services vs. unplanned services procedures or guaranteed access vs. efficient spectrum usage?

Simplify existing Radio Regulations procedures (API still necessary? appropriateness of Resolution 4? validity of Regulatory time-limit? etc)

Necessity of international monitoring and enforcement mechanism?

- *economical methods*

Consider spectrum trading in planned satellite services?

Introduce fee (bonds) for spectrum (orbit) use?

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