23rd IAA/IISL Scientific-Legal Roundtable
Glasgow, UK, October 2nd, 2008

Long-Term Efficiency of the Space Regulatory Framework

"Paper satellite" issue

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Satellite applications

Satellite technology offers effective technical and economic solutions for the establishment of state-of-the-art telecommunication networks, providing trunk telephony and data, direct digital radio and TV and broadband services to fixed and mobile user terminals. Satellites are also key elements in emergency telecommunications, meteorology, global positioning systems, environmental monitoring and communication services that ensure safety of life on land, at sea and in the skies. Accordingly, the demand for satellite capacity has grown, and with it, the demand for use of the orbit/spectrum resource. As the options for such use are limited by a combination of technical and economic factors, the problem of resource scarcity has arisen, along with the concern that the development of new satellite applications and networks may be held back.

The successful introduction of any radio system thus depends on the availability of radio frequency spectrum as a valuable common resource. The development of satellite communication has led to the appearance of a new, invisible international resource – the geostationary-satellite orbit (GSO). At present, most communication satellites describe a circular orbit in the plane of the Earth's equator at an altitude of about 36000 km, resulting in a 24-hour period of revolution around the centre of the Earth. They are synchronous with the Earth's rotation and would appear to be motionless in relation to a reference point on the Earth's surface. This characteristic enables the satellite to provide permanent coverage of a given area, which simplifies the design of earth stations as they are not required to track such satellites. The latter are thus located on the GSO and are designated as geostationary satellites. The very characteristics of the GSO mean that it is finite, and subject to possible congestion but not depletion as a common resource.

Various other satellite systems use non-geostationary (non-GSO) satellites, mainly for space research, earth exploration and radionavigation applications. They mostly involve low-Earth orbit (LEO) satellites, designed to operate at altitudes between 400 and 1500 km, and to a more limited extent medium-Earth orbit (MEO) satellites, orbiting at altitudes between 7 000 and 12 000 km. For non-GSO satellites the problem of orbit scarcity is less crucial, as greater flexibility exists in designing the orbital characteristics of the constellations. This flexibility would nevertheless decrease in the case of systems with numerous non-GSO satellites providing applications in for example, the mobile- or fixed-satellite services.

International space regulatory framework

International management of the use of the radio-frequency spectrum and orbits is entrusted to the International Telecommunication Union (ITU). The ITU Member States have established a legal regime, which is codified by the ITU Constitution and Convention, complemented by the Radio Regulations (RR) which enshrine the main principles and lay down the specific regulations governing the registration of satellite network frequency assignments. The Radio Regulations are revised partially or, in exceptional circumstances, completely by world radiocommunication conferences (WRCs) and constitute a binding international treaty (Radio Regulations, 2008).

The Radio Regulations constitute the unique international basis for achieving an

interference-free - or rather interference-controlled – environment for satellite operation and guaranteeing equitable access to use of the natural resources of the frequency spectrum and GSO. Two major mechanisms for the sharing of orbit and spectrum resources have been developed and implemented: the *a priori* planning procedures which include the allotment plan for the fixed-satellite service and the plan for the broadcasting-satellite service along with the associated plan for feeder links (planned services); and the coordination procedures (unplanned services). The right to use a satellite position and associated frequency bands in unplanned services is acquired through negotiation ("coordination before use") with the administrations concerned by actual use of the same portion of the orbital segment and associated spectrum. Completion of the registration procedure, including the coordination and recording of frequency assignments in the Master International Frequency Register (MIFR), establishes the rights and obligations of administrations in the domain of orbit/spectrum management, the aim being to prevent possible loss of investment, customers and revenue by minimizing the capacity that remains unusable due to potential interference.

Concerns regarding application of the registration procedures (paper satellites)

The current regulatory procedures were developed back in the 1970s, and they have successfully served their purpose since then. However, as occupancy of the resources increased and demand for satellite services grew, a somewhat abnormal behaviour on the part of administrations emerged in international satellite network registration in the second half of the 1990s. Indeed, administrations submitted an extremely high number of satellite networks to ITU each year, most probably including some speculative filings, or so-called "paper satellites". This resulted in unacceptable delays in processing space notices at ITU, pushing administrations to file more even systems in order to be sure of securing a position at the end of the registration process. Indeed, for a single real network, there could be multiple filings for different orbital positions (up to ten and more in some cases).

Additional resources, coupled with improvements in the Radiocommunication Bureau's workflow and processes, adjustments to the regulatory procedures and the provision of software packages to administrations, have resulted in the complete elimination of the backlog in processing satellite network notices (see attachment 1).

However, even this will not suffice in the long term, given the magnitude of the challenge.

As a matter of fact, independent information available today on the real use of the orbit/spectrum resource shows some divergence from the corresponding information submitted by administrations to ITU. This means that "paper satellite" issues – or, more precisely, fictitious frequency assignments recorded in the MIFR - still exist, with the majority of such assignments recorded with the indication that they have been brought into regular operation in accordance with the notified satellite network characteristics (see attachment 2).

One reason for this is that administrations have no real incentive to give up underused orbit/spectrum resources or update their satellite network parameters at the stage of notification and recording of assignments in the MIFR in order to accurately reflect their planned operations. Rather, there is a fairly strong incentive to reserve (and thus freeze) spectrum regardless of real future needs, thus *de facto* denying access to new entrants. The enforcing mechanisms that exist at present to ensure that a satellite system is operating in accordance with recorded parameters are based mainly on the goodwill of administrations. When goodwill is linked to financial consequences, enforcing mechanisms of this kind tend to be disregarded.

WRC-11 and beyond

The future development of satellite communications is closely bound up with the international regulatory procedures, which as things stand may be seen as placing some limitations on the development of new

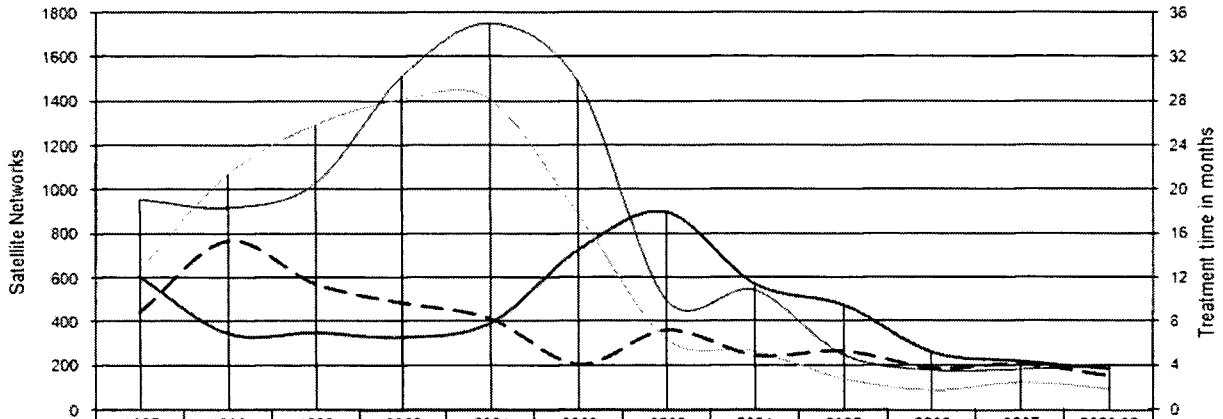
satellite projects or as being jeopardized by certain behaviour. There is thus a pressing need to take steps to guarantee and increase efficiency in the use of the orbit/spectrum resource.

ITU is 'committed to connecting the world' and satellite communication systems have an enormous potential to offer promising, high-capacity transmission capabilities in this regard. To achieve that goal, however, governments, international organizations and the private and public sectors must continue to enable ITU to carry out its vital work of recording frequency assignments in the MIFR, thus ensuring that frequencies and orbital positions are compatible and do not result in radio interference.

In this regards, WRC-11 will be a unique opportunity for the improvement of the international regulatory framework for registering satellite networks.

Attachment 1

CR/C filings and processing trends for the years 1997-2008.09



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008.09
Filings Received	447	773	576	489	416	208	365	249	268	190	209	154
Filings Published	605	346	350	328	394	728	898	570	475	258	217	182
Under Treatment	642	1069	1295	1410	1409	890	324	269	143	91	127	97
Treatment Time (Months)	19.2	18.4	20.6	30.3	35.1	29.8	10	10.9	5	3.6	3.7	4

Attachment 2

Number of GSO positions per administration recorded in the ITU International Master Frequency Register (MIFR), for which frequency assignments have been declared brought into use

Administration	Organization	Number of GSO orbital positions
ARG		2
ARS	ARB	4
AUS		9
B		7
BEL		4
BLR	IK	5
CAN		8
CHN		30
CTI	RAS	4
CYP		1
D		4
E		2
F		12
F	ESA	4
F	EUT	26
G		28
GRC		1
HNG		1
HOL		9
I		1
IND		6
INS		8
IRN		3
ISR		1
J		19
KOR		5
LBY		1
LUX		6
MEX		4
MLA		4
NOR		2
PAK		2
PNG		1
RUS		53
RUS	IK	1
S		2
S	NOT	1
SEY		3
SNG		1
THA		5
TON		5
TUR		3
UAE		4
URG		1
URS		12
USA		138
VTN		3
Total		*456*