Summary notes on the BR Workshop on
the efficient use of the spectrum/orbit resource
(Geneva, Switzerland, 6 May 2009)

1. The ITU Radiocommunication Bureau Workshop on the efficient use of the spectrum/ orbit resource was held in Geneva on 6 May 2009. This event, the first such one ever organized by the Bureau, showed that it might now be time to openly discuss issues often qualified as "sensitive" and hopefully make progress in adapting and improving the international satellite registration regulatory framework at the next WRC. The opening address of the Workshop by the Director of the Radiocommunication Bureau may be found at: http://www.itu.int/ITU-R/space/support/workshop-spectrum-009/doc/Opening_Speech_VT.pdf

2. Indeed, the use of space radiocommunication services has progressed considerably over the years and, as a consequence, in recent years it has become increasingly difficult for administrations to obtain suitable new GSO positions and frequencies in both the planned and non-planned satellite services and fully coordinate them in application of the relevant provisions of the Radio Regulations. In this regard, orbit scarcity is not a "paper" satellite issue only, and real overload of GSO locations does occur today in some parts of the orbit for some coverage in some frequency bands. Efficient use of the spectrum/orbit resource is one of the most crucial challenges facing the international community in efforts to promote worldwide telecommunication development and achieve the connectivity access targets set by the World Summit on the Information Society.

3. The challenge for ITU, and thus for administrations and the satellite community, is to be able to continue carrying out the vital work of recording frequency assignments in the Master International frequency Register (MIFR), thereby ensuring that frequencies and orbital positions associated with those assignments are compatible and do not result in interference. The questions behind this challenge and put forward for the BR Workshop were:

- Do ITU and the Radio Regulations, through the existing procedures for the registration of frequency assignments for space services, bring added value to administrations and the satellite community?
- What mechanisms and practical strategies can be employed to ensure efficient use of the spectrum/orbit resource and improve the existing international satellite spectrum management systems?

4. To help respond to the above questions, sixteen presentations were made and discussed thoroughly in the course of four sessions (see Annex 1). All discussions focused on the trade-offs between technical, operational, regulatory and economic efficiency for the effective use of the spectrum/orbit resource. A suggestion-oriented summary of the main issues debated during the sessions, as well as an inventory of proposals, suggestions, ideas and questions presented in a tabular format *[table under preparation]* is presented in Annex 2. In this regards, it is worth noting the converging positions put forward for consideration in the presentations, as well as the full support expressed for the ideas formulated during the discussions.

5. During the final roundtable, participants recognized that to rise to the above challenges will require the combined efforts of all members of ITU. Thus far, there have been few forums in which

all those with an interest in the effective and efficient use of the spectrum/orbit resource can get together to discuss the issue. Participants praised the Bureau for the example set by the workshop, and concluded that exchanges of views of this kind should be pursued and enlarged, in order to promote and encourage the development of proposals for enhancing access to and the efficient and effective use of the spectrum/orbit resource. In this regard, it was recommended that WR-11 Agenda items 7 and 8.1 dealing with Resolution 86 (Rev.WRC-07) and the Report of the Director of the Radiocommunication Bureau, in particular on actions in response to Resolution 80 (Rev.WRC-07) be maintained as standing items on future conference agendas. There was consensus that the international regulatory framework for registering satellite networks must be improved, and that the improved framework be operative or ready to be operative by the next WRC if ITU is to maintain its credibility, bring added value and thus remain fully relevant to administrations and the satellite community.

ANNEX 1

Wednesday, 6 May 2009 (ITU Tower, Room B)		
09:00-09:15	Opening of the Workshop	**V. Timofeev** (Director, Radiocommunication Bureau)
	SESSION 1: GENERAL PRINCIPLES	
09:15-10:45	• Efficient use of spectrum/orbit — small things can help, too *[1]*	**A. Sion, Hon Fai Ng** (BR/SSD)
	• The role of concerned parties in improving orbit/spectrum efficiency *[2]*	**Larry D. Reed** (ASRC Management Services, USA)
	• Efficient use of orbit spectrum resources: possible actions within and outside the ITU Radio Regulations *[3]*	**J. Albuquerque** (Senior Director, Spectrum Engineering, Intelsat)
	• Frequency coordination and the role of the responding administrations: mere goodwill or regulatory obligations *[4]*	**O. Arnon & Y. Tal** (Spacecom, Israel)
	Discussions	
10:45-11:00	***Coffee break***	
	SESSION 2: TECHNICAL OPTIONS TO IMPROVE ACCESS TO AND THE EFFICIENT USE OF THE SPECTRUM/ORBIT RESOURCE	

11:00-12:30	• Technical methods for the efficient use of the spectrum/orbit resource *[5]*	**L. Y. Kantor** (NIIR, Russian Federation)
	• Making the most efficient use of available spectrum/orbit resource through the use of technological developments and living regulations that evolve with technology *[6]*	**G. Shewan** (Industry Canada)
	• Spectrum inefficiencies resulting from the claimed use of steerable, multiple or large coverage area beams for the notification of FSS Ku-band satellite networks *[7a] - DOC...* • Spectrum inefficiencies resulting from the claimed use of steerable, multiple or large coverage area beams for the notification of FSS Ku-band satellite networks *[7b] - PPT*	**Dr. R. J. Barnett** (Telecomm Strategies Inc, USA)
	• Methodology for measuring GEO exploitation *[8]*	**J. G. Restrepo** (Ministerio de Communicaciones, Colombia)
	Discussions	
	SESSION 3: REGULATORY OPTIONS TO IMPROVE ACCESS TO AND THE EFFICIENT USE OF THE SPECTRUM/ORBIT RESOURCE	
14:00-15:30	• Ensuring real services for real satellites *[9]*	**J. Lothian, P. van Niftrik** (SES New Skies, The Netherlands)
	• Accessing spectrum/orbit resources-when scarcity becomes a reality! *[10]*	**A. Vallet** (ANFR, France)
	• Regulatory factors affecting the efficient use of the orbit/spectrum resource *[11a] ...* Regulatory factors affecting the efficient	**J. Christensen, R. Zhang, Y. H. Chan** (Asiasat, China)

	use of the orbit/spectrum resource *[11b continuation]*	
	• Efficient spectrum usage and the role of ITU with respect to satellite systems *[12]*	**P. Hovstad** (Telenor, Norway)
	Discussions	
15:30-15:45	***Coffee break***	
	SESSION 4: CASE STUDY	
15:45-17:15	• Increasing the efficient use of the spectrum and orbit resource *[13]*	**Teh Chin Eng** (Measat, Malaysia)
	• The importance of spectrum and orbit efficient use for wide area and developing countries *[14]*	**M. Castello Branco** (CPqD, Brazil)
	• Efficient use of orbit/spectrum by satellite systems — the impact of fees *[15]*	**G. Oberst** (Hogan & Hartson, Brussels, Belgium)
	• Efficient use of satellite spectrum and approximation of national spectrum fees *[16]*	**D-O von der Emden** (Bakom, Suisse)
	Discussions and Closure	

ANNEX 2

1. **"Technical" characteristics of satellite networks: *[10]*[1]**

Satellite network technology: [6][5]

One of the ways to increase efficiency and foster the spectrum/orbit sharing is to adopt state-of-the art technology and update technical EMC principles. During the discussions, participants recognized that at the time of launch (and beginning of operations) satellites (and associated earth stations and networks) were generally operating using the highest level of development achieved at that time.

Progress is ongoing in such diverse areas as satellite solar panel technology, adaptive modulation and coding, digital compression and replacement of analogue technology, satellite antenna advancements, improved earth station spatial selectivity, adaptive-array earth station antennas, multicarrier based transmission techniques … Combination of all these improvements allows for higher transmission rates with less spectrum, increased efficient use of spectrum at all times, and reduced susceptibility to satellite interference and interference caused to satellites as well as terrestrial systems.

Any option to improve sharing between co-primary services is directly related to the impact on service availability. In this regards, studies for developing improved sharing conditions should further explore the use of more advanced statistical methodologies and more imaginative solutions (e.g. to consider non-uniform pfd limits linked to climatic parameters (…as example taking into account rain attenuation) and/or operational constraints, rather than a single globally applied set of pfd limits).

*[**WP4A** + WP4B + WP4C]*[2]

Everybody recognised however that one of the challenges in making the benefits of all the technological innovations that have the potential to increase the capacity of the spectrum/orbit resource is ensuring that the regulatory environment can evolve in step with the technological innovations.

Satellite network parameters

GSO scarcity already exists in some parts of the orbit when in fact the potential GSO capacity may be substantially greater than really used. Foreseen approach to increase the capacity could be to thoroughly consider the set of satellite network parameters used so far for coordination purposes, the adequacy between the number of parameters and usefulness, but more importantly the ranges of values for each parameters … that might be more realistic.

"Simplified set of satellite parameters" [3][12]

Opinions have been expressed that most of the Appendix 4 information submitted in a satellite network coordination request and then recorded in the Master International Frequency Register is never used in actual coordination of the satellite network. Indeed current typical coordination requests include generally a large number of frequency assignments with a level of detailed

[1] *[--]:* Reference to presentation number in Annex 1
[2] ITU-R Groups having competence for possible consideration of the issue

characteristics which are used very rarely in coordination discussions, one of the main reasons being that many of these frequency assignments may or will never be operated.

Defining more realistic operating parameters for satellite services (typical maximum and minimum parameters of a specific satellite service) would result in administrations filing for more "real" operating parameters, allow for more realistic examination of interference/sensitivity from satellite networks and thus, facilitate sharing between satellite networks as well as with terrestrial services.

Moving from the concept of frequency assignment recording to that of frequency range recording (with associated "operational conditions"), based on a smaller number of parameters, will certainly present many challenges. Participants, however, expressed the views that this challenge should be tackled.

The group recognized that satellites tend to have homogeneous parameters. Coordination between such satellite networks can be based on a limited number of parameters, in general:

- maximum power density at the input of a transmitting earth station antenna and associated off-axis gains (i.e. maximum off-axis e.i.r.p. density towards the other party satellite)
- maximum downlink e.i.r.p. density towards specific areas on the Earth (based on the minimum antenna size entitled to protection)

As a consequence, a possible way forward could be to consider submitting a simplified set of information and associated values, in some selected bands and services, as e.g:

for each receive satellite beam:

- *G/T patterns and service area*
- *Maximum earth station uplink e.i.r.p. density for a range of off-axis angles*
- *Minimum earth station uplink on-axis e.i.r.p. density*
- *Associated frequency range*

and for each transmit satellite beam:

- *Maximum downlink e.i.r.p. density patterns*
- *Range of earth station sizes and associated receive gain patterns for which protection is required*
- *Associated frequency range*

With associated technical thresholds, such as uplink off-axis e.i.r.p. spectral density limits, antenna performance standards and downlink e.i.r.p. limits, this would prevent administrations from submitting unrealistic satellite parameters which are not within the envelope of these homogeneous "recognized" values and ease coordination difficulties.

The above approach which may be of interest for "homogeneous" systems in some specific bands and for some specific services would need to be further studied.

*[**WP4A** + WP4C]*

"Value of satellite parameters")[5]

Improvement to the current quality of some critical AP4 information submitted for coordination and notification of satellite networks may be an "easy" measure to improve the efficient use of spectrum/orbit resource. As mentioned during the discussions, small things can help too!

Carrier and transponder power *[1]*: Carrier power is used in C/I calculation and transponder power (and bandwidth) to fill the bandwidth of the wanted carrier with as many interfering carriers as can fit within their transponder bandwidth and power. Therefore higher than realistic notified power makes coordination between administration more difficult, leads to unnecessary unfavorable finding under No. 11.32A and recording under 11.41

Administrations may wish to voluntarily adjust notified power to more realistic values or to modify the Radio Regulations by e.g. restricting Power per carrier and Transponder. Such approach with power values which might be specific per frequency band and apply to current or future filings require further considerations.

*[**WP4A** + WP4C]*

Off Axis *e.i.r.p.* Density *[1]*: Excess over *e.i.r.p.* density limits (Section V1, Article 22 of the Radio Regulations) is currently governed by a commitment by administration (Appendix 4, A.16). However, excess over *e.i.r.p.* density limits recorded in the Master Register may indicate that such approach may not respond to the original purpose.

Taking account that necessary elements already exists in Appendix 4 (Antenna pattern, maximum power density and emission bandwidth), the A.16.a commitment might be considered for removal and have the off-axis e.i.r.p. density subject to calculation by Administration, checked by BR. Taking the importance of off-axis e.i.r.p. density limits in sharing, the group considered also of interest to study the application of such limits to other bands than those listed in Section VI, Article 22 of the RadioRegulations.

*[**WP4A** + WP4C]*

Repositionable beams *[1][7][13]*: Most if not all requests for coordination of satellite network and notification/recorded information contained in the MIFR reveals that majority of the C- and Ku-band coverage areas is performed with steerable capability. Taking into account that most of the time a satellite with steerable beam would cover only a small coverage area with few chances to be repositioned to other area, the recording of large reposition areas indicated as service areas may be seen as a hindrance to the entry of new satellite systems and warehousing of the spectrum and orbit resource.

Introducing a regulatory procedure that discourages inaccurate claims of beam coverage should be considered taking account of the balance between the long term rights and flexibility for satellite operations and the need for ITU community to manage the limited spectrum/orbit resources efficiently.

Noting that Appendix 4 already includes the necessary data items that quantify the degree of steerability of an antenna beam (Effective Boresight Area (B.3.b.1)), a possible

approach could be to add new items requesting supporting technical rationale for the steerability of a beam.

Another approach at the notification stage, once the satellite is in operation, could be to reflect the actual service area and to suspend the complementary area not covered by the steerable beam with a provision similar to the RR No. 11.49. Should the steerable beam not be re-positioned to other coverage area within a stipulated period, these virtual service areas and associated parameters might be then suppressed.

*[**WP4A** + WP4C + [SC & SC-WP]]*

Another aspect regarding the submission of small service area with large repositionable area is that you may coordinate the potential interference from and to your own satellite everywhere; however, the potential interference from any Earth stations located outside the service area is not taken into account. It may be then considered as only half coordinated. Indeed, if a new service area is added within the regulatory 7 year time limits, the other half would need new coordination with new date and must be brought into use within those 7 years. (No benefit after 7 years).

Possible approach for resolving such cases could be to notify more realistic service areas and beam repositionable areas, by better linking repositionable area and service area, e.g., including in Appendix 4 the necessity for the repositionable area to be within the service area (…or eliminating repositionable beams at the notification stage)

*[**WP4A** + WP4C + [SC & SC-WP]]*

Identification of administrations with which coordination is to be effected *[12]*: Most, if not all, coordination requests for GSO satellite networks involve very high number of administrations and networks involved. Such high number is triggered by the satellite characteristics but also by the coordination requirement identification methodology. The identification of administrations with which coordination is to be effected is based on bandwidth overlap and either $\Delta T/T$ or coordination arc approach.

One possible approach to remove unnecessary coordination and the use of speculative parameters to block coordination may be to extend the coordination arc approach to other services and bands, to review the current values with the view to shorten the arc, to strengthen its application by preventing the regulatory possibility for networks outside of the arc to enter into coordination and to introduce coordination pfd limits.

*[**WP4A** + WP4C + [SC & SC-WP]]*

Use of non-geostationary satellite orbit *[5]*: Spectrum/orbit efficiency may be improved by using non-geostationary satellite orbit, particularly high elliptical orbit (HEO). To promote such use, appropriate technical and regulatory changes could be considered, particularly in Article 22 of the Radio Regulations to provide advances GSO/non-GSO sharing conditions.

2. Regulatory:*[9]*

Beyond the principles, rights and obligations embedded in the ITU Constitution, Convention including the Radio Regulations, everybody agreed that the regulatory procedures for the satellite network registration are an integral and essential part of a satellite project and not a mere administrative procedure to comply with. In this regard, the ITU coordination process should be part of the design of the satellite project, in an interleaved manner, requiring inputs and feed backs from the technical side.

It was also recognized that in actual fact, independent information available today on the effective and operational use of the spectrum and orbit resource shows some divergence from the corresponding information submitted by administrations to ITU. This means that 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 ("toxic satellite assets!")

Space spectrum resources tend more and more to be considered as an administration or company share value, which may to some extent, impede competition and hinder the introduction of new and more spectrum-efficient technologies

In this regard, the group welcomed the initiative by the Bureau to issue Circular Letter CR/301 dated 1 May 2009 requesting all administrations to review the use of their recorded satellite networks and urging them to remove unused frequency assignments and networks from the Master Register. This approach was felt in the best interest of all administrations and operators.

During the discussions, participants agreed on the importance to continue ensuring that the current available BR databases (SNS, SNL) are kept up to date particularly for suspended and cancelled networks. In this regard, the last initiative by the Bureau to increase transparency of information regarding the dates of bringing into use of satellite networks by providing clear and updated information tables (May 2009) was appreciated (http://www.itu.int/ITU-R/space/snl/listinuse/)

API (6 months) ***[2][12][13]*****:** A broad survey of the ITU Space Radiocommunication Stations (SRS) database, which contains information on satellite networks submitted to the Radiocommunication Bureau (BR), shows that less than 20% of networks for which advance publication information (API) is submitted will successfully complete the notification and recording procedures. What then is the purpose of this inflation of "paper API" submissions at the beginning of the international registration process?

Views expressed during the discussions stressed the uselessness of this procedure for satellite networks subject to the coordination procedure and indicated in addition that the existing 6 month period mentioned in No. 9.1 before coordination adds no value to the registration procedure. Indeed, this procedure is triggering numerous speculative APIs which seem aimed at blocking access for other satellite networks, and prove to be very administratively burdensome for administrations.

Possible approach would be to remove API for networks subject to coordination, transferring the current orbital location restriction (±6º) and start of the regulatory clock (7 year time limit) to the first coordination request submission.

*[**WP4A** + WP4C + [SC & SC-WP]]*

Coordination: the temporal priority ***[4]*****:**

In the coordination procedure, the responding administration's regulatory precedence has been discussed as to balance and reconcile actual continued operation of existing recorded satellite networks and the governing principle of equitable access to satellite spectrum/orbit resource. It has been pointed out that temporal priority does not in itself determine or provide an absolute or exclusive right to use relevant allocation of radio-frequency spectrum. It has been also expressed that the equitable access means being granted a minimum reasonable possibility to operate, which does not necessarily mean an equal division.

No. 11.41 ***[1][13]*****:** No. 11.41 is providing some flexibility for a satellite network to be notified and recorded without completing all required coordinations and therefore is precluding to a certain extent "virtual satellites" from blocking such recording. This provision has taken more importance with the adoption of No. 11.44.1 at WRC-2000 introducing a deadline for submitting to the bureau the first notice for recording of satellite network assignments.

The current SRS data base shows however that over 70% of satellite networks so far submitted for notification purposes will be finally recorded with a reference to No. 11.41 (missing coordination agreements). For the time being the number of reported interference cases between such networks supposed to be in operation is surprisingly low, practically almost non existent. This may indicate that the recorded characteristics of such networks are more interference "aggressive" than those used in operation and this makes coordination between administrations more difficult without good reasons.

Therefore to ease the entry of newcomers while protecting the existing systems and make more room for others, the recorded characteristics should be brought closer to operational values. This means satellite networks with characteristics to be considered reasonable for the normal operation and delivery of expected services with the required quality, even allowing for a flexibility factor with regard to forecast use.

To limit the number of No. 11.41 recorded assignments, study should also be undertaken on the possibility to limit No. 11.41 application to relatively closed satellite networks and case of genuine coordination difficulties.

*[**WP4A** + WP4C + [SC & SC-WP]]*

No. 11.44.1 ***[1]*****:** Once a satellite network is recorded in MIFR (and beyond the 7 year time limit after API), the coordination request data has no more validity and should be removed from the SRS database (Such elimination would not mean a suppression of the coordination request special section which must be preserved as the regulatory basis for recording). The only essential elements that would remain and be transferred to the recorded assignments in the MIFR would be the "priority" date, 2D-date of the coordination request.

Similar thing goes for API data. If the date of receipt that starts the regulatory clock (or the 7-year deadline) and the original GSO orbital position are copied from API to the recorded network (and SRS database of today supports this) API data can be safely removed from SRS database without detriment to recorded assignments or application of the Radio Regulations provisions. (As with coordination request, this would not mean a suppression of API special section which must be preserved as the regulatory basis for recording).

As a mean to ensure that only up-to-date satellite network characteristics are taken into

account in the BR database (SNS, SRS) for coordination purpose, only the frequency assignments recorded in the MIFR at the end of Article 11 should continue being considered.

*[**WP4A** + WP4C + [SC & SC-WP]]*

In addition to allow for an easier management of the database itself, this would also permit fewer and easier coordination requirements for later comers, the recorded characteristics being generally less coordination demanding.

No. 11.44 and no. 11.47 ***[10][11]:*** Many controversies related to satellite network filings are linked with the concept of bringing into use ("…brought into regular operation" No. 13.6), either initially or after suspension. The main issue there is that there is no agreed precise definition in the Radio Regulations about bringing into use. While this was certainly not an issue when the notion of bringing into use was first applied to satellite network filing, the development of satellite operations has increased the number of possible scenarios for bringing into use a satellite network filing (launch of a new satellite, drifted satellite, gap- filer…). Until now, such issues were dealt with bilaterally. The increase of administrations accessing the orbit may augment the willingness to have a more multilateral approach.

Any new definition, to be embedded in the RR, should be consensual, and provide precise guidance on what is feasible and not, accepted and not, taking duly account of the balance between actual operational needs of satellite operators and the ITU recorded filings representing the envelopes of coordinated parameters, and the trade-off between flexibility in the understanding of the notion of bringing into use and overfiling .

*[**WP4A** + WP4C + [SC & SC-WP]]*

Resolution 49 ***[1][3][11]*****:** Resolution 49 information (Administrative due diligence) is supposed to be provided before the launch and beginning of operation of the satellite network. Indeed, the information to be submitted refers to a contractual "delivery window" for the spacecraft manufacturer and the launch or in-orbit delivery window for the launch service provider. Nothing exists in the current Resolution 49 to update due diligence information for e.g. confirmation after the launch of information already provided, or change of spacecraft for frequency assignments already recorded, or resumption of use after a suspension.

An approach to be considered to alleviate the existing difficulties could be to require updated due diligence information, as necessary, and to postpone the submission of Resolution 49 information after the event (e.g. up to one month), either the shift of an existing in-orbit satellite or the launch of a new one. Although the Bureau might not be expected to verify the accuracy of this information, other interested parties would have the means to perform such verification and, so willing, could when appropriate, challenge such information in bilateral discussion or with the ITU BR.

*[**WP4A** + WP4C + [SC & SC-WP]]*

International satellite monitoring *[11][13]*: During discussions suggestions were put forward on introducing an international satellite monitoring system to assist administrations in resolving interference problems and also to ensure the proper use of the international regulatory framework (verification of bringing into use, emission characteristics…). Indeed, many satellite operators and administrations have recognized the value of reliable monitored data and have themselves monitoring capability that may be used for that purpose. Views expressed were that introducing in the RR more deterrent enforcement mechanisms and appropriate measures particularly against the use of orbit and spectrum that is not incompliance with the RR and causes harmful interference to frequency assignments recorded in the MIFR may help.

Article 16 of the Radio Regulations on international monitoring may serve as a basis for future thoughts and proposals on this issue.

*[**WP1C**+ WP4A + WP4C + [SC & SC-WP]]*

Expiry date for satellite network filings *[12]*: The question of having an expiry date for satellite network filings that are in use was debated. Applying hard expiry dates for satellite filings was seen as detrimental for commercial satellite operation and as threat to ITU's ability to observe and regulate use of spectrum resources for satellite networks. However, the figures relating to the period of validity of frequency assignments to space stations (Resolution 4 (Rev.WRC-03)) have constantly and regularly increased from 7 to 10 years in the eighties to 20, 30 and even more nowadays.

3. Financial and economic considerations *[2][12][15][16]*

The impact of fees: Continued access to satellite spectrum requires a balance approach in the administrations' revenue generating policies that does not affect the long-term viability of satellite services and the industry as a whole. The impact of fees, auctions and other revenue generating approaches, taken as a whole from all countries in which satellite resources are provided, can make deployment of this critical infrastructure economically unfeasible. As an example, a lack of harmonized national approaches on the fee structures of planned integrated MSS and complementary ground component systems that may contribute to more efficient use of spectrum could impede development of such integrated systems.

Economic options may help in improving the efficient use of the orbit and spectrum resources. It could limit coordination filings to "serious" and more carefully tailored ones, it may increase resources to BR. On the other hand, it might be seen as an extension of ITU regulatory competence and consequential reduction in national sovereignty, not mentioning the difficulty of agreeing to fee levels and the disadvantage to entities in developing countries. Fees may not be a deterrent to major players and could decrease competition.

This topic is not within the competence of ITU, because fee structures are within the sovereignty of national administrations. Nevertheless, this topic could serve as a means of thought leadership and focusing attention on a substantial issue that is affecting the satellite community and may be one of the potential instruments guaranteeing efficient use of satellite spectrum.

A coordinated approach with respect to models for satellite fees could lead to a more efficient use of satellite spectrum globally and facilitate cost estimations by satellite operators. In this respect, ITU may provide an excellent platform for discussions on models for satellite spectrum fees, it may study and suggest calculation methods and

criteria and undertake benchmarking, i.e. compare spectrum models applied by administrations for comparable satellite services.

*[**WP1B**+ WP4A + WP4C + ITU-D SG2 (WTDC Resolution 9 (Rev. Doha, 2006))]*

4. Equitable access considerations *[8][14]*

A metric proposal: A proposed metric to evaluate the current use of spectrum and orbit resources has been presented. This kind of metric would be useful to indicate ways to evaluate the equitable access in present and future use of the spectrum and orbit resources.

Climate, geographical, economical and social aspects: These aspects have been raised to indicate the major constraints on the planning of satellite orbital and spectrum resources over large area developing countries. These constraints need to be balanced with the technical and regulatory views about the satellite resources and their equitable access over the world.

5. Training *[10]*

A more precise implementation of regulatory procedures is key to the successful continuation of the ITU process for accessing spectrum and orbit resource.

During its biennial Seminar, the Bureau is providing to all administrations useful training about the regulatory procedures and the software tools to implement them. However such events are too short in views of the level of detailed information to be provided. In addition to these existing events, smaller, more focused seminars during which specific themes would be thoroughly addressed, e.g. filing a satellite network, managing satellite networks, applying the procedures of Appendices 30 and 30A, would be of great interest. Indeed, with less people, the interaction between the Bureau and participants, as well as the possibility for participants to share their experience would be enhanced.

An increased involvement of the Bureau in organising or attending more seminars or workshops would have definitely resource and financial impact.

…to be further considered by administrations and the Bureau!