International Regulatory Aspects of Radio Spectrum Management

(Implications for Developing Countries like India)+

by Ram S. Jakhu*

Introduction

The human history shows that our urge to communicate with other human beings has remained insatiable, irrespective of miraculous technological developments and the establishment of extensive telecommunications facilities and networks all around the world. Different modern means of telecommunications have been developed and are being used presently to communicate effectively, instantly and extensively to every corner of the globe. Though the global telecommunications industry has already become a $1 trillion market annually, there still exists a great potential for growth since about two-third of the world's population does have reasonable access to basic telecommunications and those who have such access want and need more, better, cheaper and faster services.

It is generally accepted that telecommunications infrastructure and services are indispensable tools for socio-economic and cultural development of a country. In other words, (a) telecommunication "facilities and services are not only the consequence of economic growth, but a prerequisite for overall development; and (b) telecommunications are an integral part of the national and international development process". Recent progress in telecommunication and computer technologies shows clearly the important role that can be, and is being, "played by telecommunications in the development of agriculture, health, education, transport, industry, human settlement, trade, transfer of information for social welfare and in the general economic and social progress of developing countries". Therefore, a large number of developed countries have started allocating more resources to a further expansion of their telecommunications. Also the developing countries and international financial institutions are being urged to give higher priority to the development of this sector.

The global telecommunications industry consists of several means of communications, however wireless (radio) communications, including satellites, are the fastest developing means since they provide extensive, better, cheaper and faster services. According to the 1999 edition of the ITU's World Telecommunication Development Report, the growth of mobile cellular (wireless) communications has been astounding. In 1990, there were only about 11 million subscribers. This number has reached to over 300 million at the end of 1998. The Report forecasts that revenue from such mobile services will overtake revenues from fixed line services around the year 2004. However, in order to function properly, all radiocommunications including satellites use appropriate radio frequencies. In addition to establishing rates and regulation for interconnection, mobile services are facing problems of shortage of appropriate

radio frequencies and interference-free links. Wireless links must be interference-free because any interference in radiocommunications could deteriorate their quality. Since radio frequencies do not respect national borders, it is necessary that their management, particularly the securing of legal guarantees against any interference and access to appropriate radio frequencies, must be effected at international level. Therefore, radio frequency spectrum has been primarily, essentially and extensively managed internationally.

The legal principles and rules as well as policy decisions, which effect international management of the radio frequencies, have been adopted primarily through inter-governmental conferences organised by the International Telecommunication Union (ITU). This paper analyses the decision-making process in the ITU and certain relevant basic principles that attempt to manage the rapidly increasing demand for radio frequencies (and associated orbital positions). The paper also attempts to show the obsolescence of the ITU's approaches and procedures concerning access to radio frequencies (and associated orbital positions) and describes recent efforts that are being made to discuss more efficient and effective management of radiocommunications so that some equitable management of telecommunications could be achieved. The purpose of describing the ITU decision-making process and procedures is to highlight the implications for developing countries, India. Since these countries are generally not able to fully and effectively participate in the ITU decision-making, they remain deprived of the equitably shared use of an international natural resource (i. e. radio frequency spectrum), which is indispensable for the provision of effective and efficient telecommunications services.

Some Technical and Commercial Aspects of the Radio Spectrum

Radio frequencies (radio waves), with which electronic devices communicate, are electromagnetic radiation, and are measured in hertz, i. e. cycles per second. The entire radio frequency spectrum, consisting of frequencies arbitrarily lower than 3000 GHz as regulated by the ITU Radio Regulations, is divided into different categories or bands. Two important physical characteristics (natural principles) of radiocommunications must be understood; i. e. first, for two radio stations to effectively communicate, they must use the same frequency; and second, if two or more radio stations are operating at the same frequency, within the same geographical area, at the same time, there is a likelihood of mutual interference which could reduce the quality of the communication or make it unintelligible. There are several physical and technical limitations on the utilisation of radio frequencies; therefore only a limited portion of the radio frequency spectrum is useful for specific telecommunication services.

It is important to note that the radio frequency spectrum is an international resource that must be shared by all countries and several telecommunications services. Hence, there is a strong competition for use of the radio frequency spectrum. This fact has been recognised in the presently applicable ITU

Constitution, which specifies that the radio frequency spectrum is a limited natural resource that must be equitably shared by all countries. It should be noted, however, that the radio frequency spectrum has always been a limited resource, irrespective of technological developments; hence the reason for the ITU's regular and complex involvement in the management of the radio frequencies. The limited availability of the appropriate radio frequencies has direct and important implications for the management of this resource for all telecommunication services of all the countries.

Telecommunication satellites, which operate with the use of radio frequencies, play a significant role in the provision of both international and national telecommunication services. Therefore, in addition to a large number of developed countries, several developing countries like Argentina, Brazil, China, Mexico, India, Indonesia, Thailand etc, have also launched their satellites for domestic services. Satellites are considered to be the fastest and easiest way of establishing extensive and most reliable telecommunications. There are several orbits from where a satellite can be operated. The geostationary satellite orbit [hereinafter the GSO]is the most used orbit. The 24-hour "visibility" of a satellite in the GSO makes it uniquely advantageous for telecommunications and certain other services. On the other hand, being closer to the Earth, satellites in Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) can provide effective mobile service to small handheld terminals - a kind of cellular service via satellite. This is the main reason for the popularity of these orbits and a good number of companies have been/are planning to launch several constellation of satellites for global mobile telecommunication services. However, they have been facing serious problems relating to the shortage of appropriate radio frequencies. On the other hand, the geostationary orbit is *limited*. It is an international natural resource (physical phenomenon) which can be/is being used for various purposes. The limited nature of the orbit is due to natural and technological factors. The natural limitation is that it is a three-dimensional belt, band or ring that lies at approximately 36,000 km. only above the equator of the Earth and nowhere else. Only a limited portion of the orbit is of use to a country since the satellite must be in a position to "see" the area that it is required to serve it. Hence, there is a direct link between a particular portion of the geostationary orbit and the country that wishes to be served. Moreover, the GSO can be used only with specified and limited radio frequency bands. Both the international and limited nature of the radio frequencies and geostationary orbital positions necessitate their management at the international level.

Given the present and future demand for appropriate radio frequencies (and positions in the GSO), new entrants into telecommunications market are already facing difficulties. The problem of limited and difficult access to appropriate radio frequencies (and orbits for satellite telecommunications) is not a new one, but has been becoming more serious. Countries like Canada and Australia took the decision to establish their domestic satellite telecommunication systems primarily because of the fear of losing appropriate geostationary orbital positions to other

countries. On the other hand, countries like India and Indonesia faced serious difficulties in having access to appropriate radio frequencies even for their first satellite systems in the 1970's. The latest cases of such problems are satellite systems like SKYBRIGE.

A perceptional shift is taking place in the telecommunications field. Before the 1980s, telecommunications services were dominated by governments and intergovernmental co-operative ventures, mainly by monopolies or dominant national public carriers. This situation has dramatically been changing with the rapidly increasing privatisation of national carriers and intergovernmental co-operative ventures as well as with the opening of telecommunication markets to competition, both at local and international levels. With the previous Nation/State system, domestic telecommunications were usually under the control of a government, and the State participation in international operating organisations was justified on the basis of the principle of national sovereignty. However, the expansion of telecommunications networks and the technological advances have encouraged, and are continuously promoting, significant changes in this sector. This new trend in telecommunications is stimulating revolution in new wireless systems, such as satellite constellations, whose number is rapidly increasing. A number of authoritative estimates predict a huge market growth in the field of satellite telecommunications, though they vary in some details. For example, a 1999 report by the Futron Corporation and the Satellite Industry Association estimated that the world-wide market for satellite products and services is$66 billion, with a 15 percent annual growth rate. According to this report, "Satellite services are currently the largest and fastest growing segment of the industry, worth $26. 2 billion. Satellite services delivered directly to the end-user (such as DTH television) have been the prime source of revenue growth. " "On-demand" broadband data services are considered to be a lucrative market over the next two decades. More and more satellites are being, and will be, placed in space. This means that there will be an increased pressure on the already scarce and extremely congested radio frequency spectrum. Given the trends towards monopolisation of all economic sectors in the hands of some private telecommunication mega-carriers from only a limited number of countries that the world is continuously witnessing, there exists a potential for concentration of all of them within a handful of countries, especially since there exists an unbalanced and inequitable management system for the radio frequency spectrum, which is an indispensable resource for telecommunications of all kinds.

Decision-Making Process in the ITU

As noted earlier, the international principles and rules, which mange the use of the radio frequency spectrum, have been adopted primarily through international conferences organised by the International Telecommunication Union. This body has been at the centre of all telecommunication technological, management and regulatory activities in the world. The invention and practical exploitation of electric telegraphy necessitated the establishment of the International Telegraph

Union in 1865. It was later transformed to become the International Telecommunication Union with an elaborate and complex organisational structure to deal with telecommunications of all kinds. The primary reason for the ITU's growth has been the nature of its activities, especially radiocommunications, which have been/are developing rapidly and necessitate extensive international co-operation for their successful operation, not only at the international level but also within the national boundaries of each State. Indeed, no State can afford not to co-operate with other States as far as radiocommunications are concerned. It is for this reason that currently over 190 States are members of the ITU, which makes it the most universal international organisation in the world. In light of this fact, it is interesting to examine the ITU's decision-making process for the management and particularly the sharing of an international resource, the radio frequency spectrum.

The 1947 Atlantic City Intergovernmental Conference created the ITU's new organisational structure, which remained valid until the coming into force of the 1994 ITU Constitution and Convention. In 1947, it became a specialised body of the United Nations, and for the first time had undertaken an additional task of systematically managing the radio spectrum by arranging the international radio frequency list. The necessity for this task arose out of the rapidly increasing congestion in the radio frequency spectrum.

In recent years, the ITU member States made several efforts to modernise its organisational structure and decision-making process. The ITU's constituent instrument had been an international treaty, known as the International Telecommunication Convention, the latest version of which was adopted at Nairobi, Kenya, in 1982. This Convention was divided by the 1989 Nice Plenipotentiary Conference into two parts known as the Constitution and Convention of the ITU. The legal principles and provisions of a more permanent nature were included in the Constitution, which was designed to be relatively more difficult to amend as compared to the Convention. A new organ, known as the Telecommunication Development Bureau(BDT), was created to replace the Technical Assistance Unit of the ITU General Secretariat so that telecommunication development, particularly in the developing countries, could be given higher profile and attention in the ITU.

A special Plenipotentiary Conference was convened in Geneva, in December 1992, with a purpose "to change the structure of the ITU and the manner in which it is governed. " The Conference revised comprehensively the Nice decisions and developed a new ITU Constitution and Convention. Second, the new three-sector structure was adopted in order to give the organisation a framework to operate more efficiently. The new organisational structure of the ITU consists of the Plenipotentiary Conference, the Council, the Radiocommunication Sector, the Telecommunication Standardisation Sector, the Telecommunication Development Sector, the World Conferences on International Telecommunications, and the General Secretariat. This organisational structure

of the ITU is in a number of ways quite different from the one under the 1982 ITU Convention. For a comparative view, see Figure 1 below. This is the current structure of the ITU and thus will be discussed in some details in order to understand the decision-making process in this international organisation.

Figure 1: Organisational Structure of the International Telecommunication Union

1982 CONVENTION	1994 CONSTITUTION & CONVENTION
PLENIPOTENTIARY CONFERENCE	PLENIPOTENTIARY CONFERENCE
ADMINISTRATIVE COUNCIL	COUNCIL
WORLD ADMINISTRATIVE RADIO CONFERENCES (Radio Regulations) AND REGIONALADMINISTRATIVERADIO CONFERENCESCCIR (Recommendations)INTERNATIONAL FREQUENCY REGISTRATION BOARD (IFRB)	RADIOCOMMUNICATION SECTOR:1. WORLD RADIOCOMMUNICATION CONFERENCES (Radio Regulations) AND REGIONAL RADIOCOMMUNICATIONCONFERENCES2. RADIOCOMMUNICATION ASSEMBLIES (Recommendations)3. RADIOCOMMUNICATION STUDY GROUPS (Recommendations)4. RADIO REGULATIONS BOARD5. RADIOCOMMUNICATION BUREAU
CONSULTATIVE COMMITTEE ONINTERNATIONAL RADIO (CCIR)(Recommendations)CONSULTATIVE COMMITTEE ONINTERNATIONAL TELEPHONE AND TELEGRAPH (CCITT) (Recommendations)	TELECOMMUNICATION STANDARDIZATION SECTOR:1. WORLD TELECOMMUNICATION STANDARDIZATION CONFERENCES (Recommendations)2. TELECOMMUNICATION STANDARDIZATION STUDY GROUPS (Recommendations)3. TELECOMMUNICATION STANDARDIZATION BUREAU
WORLD ADMINISTRATIVE TELEGRAPH AND TELEPHONE CONFERENCES: (Telecommunication Regulations)	WORLD CONFERENCES ON INTERNATIONAL TELECOMMUNICATIONS (Telecommunication Regulations)
TELECOMMUNICATIONS DEVELOPMENT BUREAU(created only in 1989)	TELECOMMUNICATION DEVELOPMENT SECTOR: 1. WORLD AND REGIONAL TELECOMMUNICATION DEVELOPMENT CONFERENCES (Recommendations, Guidelines,Directions and Priorities)2. TELECOMMUNICATION DEVELOPMENT STUDY GROUPS 3. TELECOMMUNICATIONS DEVELOPMENT BUREAU AND

ADVISORY BOARD

GENERAL SECRETARIAT GENERAL SECRETARIAT

The Plenipotentiary Conference

The Plenipotentiary Conference continues being the supreme authority of the ITU and is comprised of the delegations representing all member States. It meets every four years and focuses on long-term policy issues. As an intergovernmental organ, this body is responsible for, among other things, the strategic planning and policy, the adoption of modifications to the ITU Constitution and Convention, and all the decisions on internal questions, budget, and elections, of the organisation. It elects the members of the Council, the Secretary-General, the Deputy Secretary-General, the members of the Radio Regulations Board and the Directors of the three new Sectors of the organisation - Radiocommunication, Standardisation, and Development. In the Plenipotentiary Conference (as well as in other conferences, meetings and sessions of all other organs of the ITU) decisions were taken on the basis of one-member one-vote.

During recent years, more active participation in the ITU by private entities has been allowed. For example, the 1994 Kyoto Plenipotentiary Conference adopted a new provision in the ITU Convention for granting of "observer status" to operators, scientific or industrial organisations and organisations of an international character at the Plenipotentiary Conference. However, the right to vote would remain a prerogative of member States. There has been a distinction between the "Members of the Union," which have been only States and entities and organisations, other than States, have been referred to as "members of the Sectors". The 1998 Minneapolis Plenipotentiary Conference further gave increased rights to the private entities by making important decisions that relate to:

i. the delegation of certain powers to the Development and Standardisation Sectors' Advisory Groups, where Member States and Sector members will participate on an equal footing, and the transfer of authority to Study Groups to adopt technical standards directly, when they do not have regulatory implications;
ii. the addition of the recommended procedure that allows non-government agencies and organisations to directly apply for ITU's membership to the Secretary General; and
iii. the introduction of a new member category of "Associate" for small entities and organisations that are only interested in some subject and will pay a reduced fee.

It is interesting to note that while the 1998 Conference gave more rights to the ITU's private sector members, it reduced the number of members of the Radio Regulations Board from fifteen to twelve by making an important modification in the ITU Constitution.

The ITU did not want to leave aside new actors in the telecommunication field,and thus, the participation by private entities in the ITU has been increased. At present the ITU consists of more than 190 member States and about 500 non-governmental members, which represent manufacturers and operators. The ITU has started to reconsider the financial contributions by private entities. If their contribution is increased, the consequence will be the grant of more prerogatives. The trend for the future appears to be the progressive privatisation of the ITU. There is a general concern that private (exclusive) interests of private companies might jeopardise public(inclusive) interests that are supposed to be represented by governments. The real challenge is to determine the extent to which policy, law and decision making process at the international level should/could be left to the pressures from private entities, especially when some of them are far richer and more powerful than a good number of countries in the world. The debate being continues within the ITU, which though has already taken some significant decisions primarily on the insistence of a handful of major countries.

The 1994 Kyoto Conference brought another important innovation in the ITU. The Conference made a strategic shift from ITU's traditional technical role to a policy-oriented approach so that the ITU could play a leading role in a new era of a global information economy and society. The ITU recognised that, as a result of the changes that have occurred in the telecommunications field, public policies, legislative frameworks, regulatory institutions and other institutions (such as the WTO, which regulate trade in telecommunications goods and services) now play a very important role in the telecommunication sector. The need to broaden the scope of the organisation's activities was considered. For this purpose, the ITU created a new forum, the World Telecommunication Policy Forum [hereinafter WTPF] in order to provide a framework for discussion of telecommunication policy issues. The first WTPF took place in Geneva in 1996 which adopted several voluntary principles to help national policy makers, regulatory authorities, GMPCS operators and service providers to manage the introduction of new GMPCS systems. The second WTPF, convened in Geneva in 1998,addressed (a) the telecommunication policies, regulations and regulatory structures of ITU Member States; and (b) the implications of the WTO agreement for developing countries, particularly with respect to policies, regulations and financial strategies to promote the development of telecommunication networks and services.

The issue of management of radio frequency spectrum is not merely a technical matter. It is a policy issue that was never fully discussed at length in ITU Plenipotentiary Conferences. No policy discussion took place on this issue until 1973 when the Plenipotentiary Conference incorporated in the ITU Convention a general provision with respect to the radio frequency spectrum. This provision has since been revised and forms a part of the above-mentioned Article 44 of the present ITU Constitution. The provision is discussed in details below, however it should be noted here that this has not changed much in practice in the actual inequitable practice for the use of the radio frequencies. It may be appropriate

that a World Telecommunication Policy Forum be convened to address the major policy issues related to the management of the radio frequencies.

The Council

The Council acts as the governing body of the ITU between the Plenipotentiary Conferences. It consists of representatives of the elected State Members of the Council. The Council considers "broad telecommunication policy issues … in order to ensure that the Union's policies and strategy fully respond to the constantly changing telecommunication environment. " The Council plays no direct and significant role in the management of the radio frequency spectrum.

Administrative Conferences

The second most important level of decision-making within the ITU is that of administrative conferences, which are convened to consider telecommunication matters related to a partial or complete revision of the administrative regulations, or any other question within their competence. Administrative regulations include (a) Telecommunication Regulations and (b) Radio Regulations. The Radio Regulations form an important part of the ITU Constitution and Convention. Administrative conferences, which deal with radiocommunication matters, are convened at the global as well as regional levels in the form of World Radiocommunication Conferences (WRC's) and Regional Radiocommunication Conferences (RRC's), which were formerly known as World Administrative Radio Conferences (WARC's) or Regional Administrative Radio Conferences (RARC's) respectively. A regional conference could consider and decide specific telecommunication matters of a regional nature only. Various WRC's drafted, adopted and revised Radio Regulations, which are international treaties binding on those States that ratified them. The WRC's are composed of (a) national delegations of ITU member States; (b) observers of the UN, its specialised agencies, and of regional telecommunications organisations and international organisations; (c) the permanent organs of the ITU and (d) the representatives of recognised private operating agencies, duly authorised by the concerned ITU Members. It is important to note that only national delegations had the right to vote in administrative conferences. The decisions at the WRC's are made on the basis of one-member one-vote. As a general rule, a delegation whose views were not shared by the remaining delegations is expected to endeavour, to the extent possible, to abide by the opinion of the majority. However, ifa decision would prevent the government of a delegation from approving the revision of the Radio Regulations, that delegation is allowed to make reservations regarding such a decision. This had often been done in the form of a footnote to a particular Regulation adopted by a WRC.

Since the Plenipotentiary Conferences are primarily concerned with the overall organisation and operation of the ITU, World Radiocommunication Conferences have been in fact the most important organs of the ITU for drafting and adopting

the detailed and precise principles and rules to manage the actual use of the radio frequency spectrum (and the geostationary orbit). The WRC's meet regularly every two years with the main purpose of reviewing and revising the Radio Regulations [hereinafter the RR's]. Many countries, especially the developing ones, are unable to participate fully and effectively in the Radiocommunication Conferences and thus are not in a position to sufficiently protect and enhance their interests; hence their continuing frustration with respect to the results of these conferences. Though only the government delegations are entitled to vote, active participation in such Conferences by private entitles shows that the interests of the developed countries and powerful private entities often prevail. The WRC's convened in 1995 and 1997 clearly witnessed the emergence of very influential private operators, like IRIDIUM and TELEDESIC, which secured decisions favouring them extensively. Corridor politics is often very active, particularly when at almost all conferences and meetings, a formal voting is normally avoided. Though the developing countries command numerical majority in the ITU, the actual number of their delegations is usually lower than those from the developed countries. Invariably, several committees of a conference meet at the same time and the delegations from developing countries face the difficulty in effectively participating in these committees where important decisions are made. The WRC's often meet for several weeks and deal with complex issues that generate thousands of pages of documents, the study of which is often beyond the physical and intellectual capabilities of a large majority of the developing countries delegations. Therefore, due to the lack of technical and financial resources the developing countries are often handicapped in effectively participating in the decision-making process in the ITU Radiocommunication Conferences.

Three Sectors

The three new sectors of the ITU - Radiocommunication, Standardisation, and Development - are essentially derived from the reallocation of the functions of the former International Telegraph and Telephone Consultative Committee (CCITT) and International Radio Consultative Committee (CCIR) as well as Administrative Conferences. All of the CCIR activities relating to the management of the radio frequency spectrum have been transferred to the new Radiocommunication Sector. The Sector works through World Radiocommunication Conferences, Regional Radiocommunication Conferences, the Radiocommunication Bureau [hereinafter the RB], the Radiocommunication Assemblies, the Radiocommunication Study Groups, and the Radio Regulations Board (hereinafter the RRB). The Radiocommunication Sector is responsible for the management of the radio frequency spectrum. In this regard, the role of, and the decision-making in, the WRC's and RRC's have been discussed above.

The Radiocommunication Assemblies and the Radiocommunication Study Groups, are the real technical organs of the ITU, which draft and adopt technical recommendations relating to radiocommunications. Although these

recommendations are not binding on the ITU member States, they are highly important in the ITU decision-making process since they form the bases on which the WRC's and RRC's adopt legally binding regulations. The delegations of all ITU member States are entitled to participate in the activities and meetings of the Radiocommunication Assemblies and the Radiocommunication Study Groups. Furthermore, the followings are also allowed to attend these meetings: recognised private operating agencies, with the approval of the concerned ITU member States; international organisations and regional telecommunications organisations; and scientific or industrial organisations concerned with the study of, or manufacture of equipment for, telecommunications. The Radiocommunication Assembly mainly prepares the list of questions to be studied and then allots them to appropriate Radiocommunication Study Groups for detailed consideration. Study Groups report back to the Assembly on their findings that might be approved, modified or rejected. A Study Group may set up Interim Working Parties to conduct intensive study of certain aspects of the question under examination by that particular Group. Therefore, the real work of formulating recommendations is done by the Study Groups and their Interim Working Parties, which are comprised of scientists and technical experts in the matters under consideration. The provisional or draft reports or recommendations prepared by the Study Groups are generally approved without modification, or with minor changes, by the Radiocommunication Assembly.

Although participation in the work of all meetings of the Radiocommunication Assemblies, Study Groups, and Interim Working Parties is open to all ITU member States, very few actually participate in these meetings. Those who participate primarily come from the developed countries. Private entities, mainly from the developed countries, who possess necessary technical expertise and financial resources are becoming very active participants in, and thus are influencing the decisions of, the Radiocommunication Assemblies, Study Groups, and Interim Working Parties. Both the level and quality of participation in work of these bodies show an imbalance of power and influence and their recommendations and reports generally reflect a bias in favour of the more powerful group of nations.

The Telecommunication Standardisation Sector, was created by consolidating all of the ITU's standardisation activities in order to reduce deficiencies that were found on the work of the organisation, such as the lack of co-ordination of the ITU standard-setting bodies, overlapping of their activities, and the inefficiency of their methods. The Sector has been mandated to "study technical, operating, and tariff questions and issue recommendations on them with a view to standardising telecommunications on a world-wide basis. " It comprises all the standardisation functions of the former CCITT and the CCIR. The structure of and decision-making process in this Sector are similar to the one in the Radiocommunication Sector.

The Telecommunication Development Sector, continues with the Telecommunications Development Bureau (BDT) that was created by the 1989 Nice Plenipotentiary Conference. Similarly, this Sector works through World Telecommunication Development Conferences and Regional Telecommunication Development Conferences that meet once in four years. The 1994 Plenipotentiary Conference strengthened the role of the ITU in stimulating telecommunication development. The goal of the Conferences of the Development Sector is solely directed towards general policies. These Conferences adopt recommendations, resolutions, and reports, but not binding regulations as is the case of WRC's.

The World Conference on International Telecommunications

The World Conference on International Telecommunications has replaced the World Administrative Telegraph and Telephone Conference (WATTC). The role of this new body is to adopt and revise the International Telecommunication Regulations [hereinafter ITRs]. The ITRs now in force were adopted in the 1988 WATTC in Melbourne. The purpose of these Regulations is to establish general principles regarding the provision and operation of international telecommunication services as well as the telecommunication means used. These Regulations complement the ITU Convention and Constitution and apply to every means of telecommunication to the extent that they do not contravene the Radio Regulations.

The Radio Regulations Board

The International Frequency Registration Board (IFRB), one of the four permanent organs of the ITU before 1994, was primarily concerned with the application of the decisions made by other organs of the ITU, including the WARC's and RARC's. This Board was created in 1947, and was considered so important that the US, at the 1959 Plenipotentiary Conference, favoured electing its members for life. By the time of the 1965 Plenipotentiary Conference, however, its very existence was threatened since the US and other developed countries no longer saw a need for it. The Board survived the 1965 Plenipotentiary Conference mainly because of the developing countries that considered this body their strong and independent ally for providing them with appropriate unbiased expert advice for the use of radio frequencies and for protecting their interests; however, its membership was reduced from 11 to 5. Since then, it had gained popularity with the developing countries and its functions had been enlarged. The IFRB's importance lied in the proper application of the Radio Regulations at the international level. The IFRB played a significant role in the settlement of problems of interference, its functions were of a semi-judicial nature, and it was an independent body within the ITU. However, the new Radio Regulations Board, that replaced the IFRB, was created as a part-time body of 15 individuals, meeting four times a year, as opposed to the permanent nature of its predecessor, the IFRB. According to the current ITU

Constitution and Convention, the new Radio Regulations Board has relatively limited and less defined functions. It is the Radiocommunication Bureau, which acts as an executive arm of the Radio Regulations Board and holds the investigations of complaints of harmful interference and of requests for registration of radio frequency assignments. Though the Radio Regulations Board is still the body to provide the last recommendation in a case of harmful interference, but it does so only after the report from the Director of the Radiocommunication Bureau. In case of an unsettled dispute, it would be referred to a World Radiocommunication Conference.

To conclude this section, it can be said that the ITU had always been the most important international forum (centre) through which its member States had harmonised their actions for the attainment of common goals with respect to telecommunications of all kinds. However, during the late eighties, the ITU's role and functioning started facing significant challenges primarily posed by the impact of technological revolution in the telecommunications field. Therefore, the ITU redesigned its mandate, functioning, organisational structure and decision making processes and has consequently transformed itself significantly. However, the imbalance in participation and influence in the ITU decision-making process not only continues but also is becoming serious favouring the developed countries and the private telecom entities. Therefore, new management approaches, particularly the regulatory mechanisms and guarantees in the use of radio frequencies, might be needed to ensure that no severe difficulties are encountered by certain countries or companies whenever they are ready to establish their radiocommunication systems.

Access to and the Use of Radio Frequencies

The management of radio frequencies is effected at national level as each State chooses and assigns radio frequencies (and orbital positions to its space) stations as it wishes, mainly from amongst the radio frequencies allocated by the ITU. Therefore, the ITU is mainly concerned with the allocation of radio frequencies among various radiocommunication services, and not among its member States.

The general legal principle with respect to the international management of radio frequencies (and the orbital positions) is contained in the provisions of Article 44,(formerly Art. 33) of the 1994 ITU Constitution as amended by the 1998 Plenipotentiary Conference. The Article specifies that:

"(1)Members shall endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end, they shall endeavour to apply the latest technical advances as soon as possible; (2) In using frequency bands for radio services, Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural

resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries".

This article was originally adopted by the 1973 Plenipotentiary Conference where various proposals were put forward with respect to the ITU's role in the distribution of scarce natural resources. At that Conference, developing countries stressed that the ITU "should be given the means of ensuring the fair distribution of such limited resources as the frequency spectrum or the geostationary orbit, to avoid a situation in which the first-comer rich countries would monopolise the best services". While no definition of "equitable access" may be found in the Constitution, Convention and the Radio Regulations, two provisos which qualify the term make its meaning clear; i. e. countries may have equitable access only in conformity with the Radio Regulations; and the special needs of the developing countries and the geographical situation of particular countries must be taken into account while making use of the spectrum/orbit resource.

Article 44 emphasises the obligation to use the orbit/spectrum resource "efficiently" and "economically", but does not define these terms. It is left to the discretion of each ITU member State to interpret what efficient and economic use is. The Article is believed to have introduced the concept of equity or equitable access, which relates to the principles of justice and fairness with respect to the use or for the sharing of the spectrum/orbit resource. Giving effect to this concept, the ITU has *a priori* distributed geostationary orbital positions and associated radio frequencies among its members. However, it has been done, so far, only in the case of a limited number of allotment plans. It is said that about 80% of the radio frequencies are being used and/or controlled by the developed countries because the ITU radio frequency distribution process is such that it favours those who register their radio frequencies first. Therefore, this Article remains a general principle without much practical effect and an imbalance in the actual control of the radio frequency spectrum continues.

Radio Frequency Distribution Processes

As mentioned earlier, since the ITU Constitution and Convention contain very broad and general principle (Article 44) relating to radiocommunications, numerous ITU Radiocommunication Conferences have adopted more specific and detailed decisions in the form of Radio Regulations. The ITU Radio Regulations allocate particular bands of radio frequencies to each specifically defined radiocommunication service. For the purpose of frequency allocations, the world has been divided into three regions and these allocations are included in the Table of Frequency Allocations of the ITU Radio Regulations.

An ITU Radiocommunication Conference may distribute or allot a particular allocated band of radio frequencies to different countries. This process is also called *a priori* planning or "engineering" of the radio frequency spectrum. The decisions of such a WRC are included as "allotment plans" in the ITU Radio Regulations. However, it has been done, so far, only in the case of allotment plans for very limited services and bands. The rarity of such plans is attributable to (a) the unwillingness of major ITU member States to accept any restrictions on their freedom of action in the use of the radio frequency spectrum and (b) to a largely ineffective participation and influence by the developing countries in the decision-making process in the ITU.

The countries assign radio frequencies to their particular stations in accordance with their national radio regulations, which are required to be in conformity with the ITU Radio Regulations. If the allocation is an international process by nature, the assignment is a national process. In practice, each country (Administration) chooses and assigns a particular radio frequency to its radio stations, as it deems convenient for its interests,keeping in mind that each ITU member State is required "to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the Table of Frequency Allocations. "

"First Come - First Served" Procedure

For the purpose of management of radio frequencies, the ITU processes notifications, registrations, and possible co-ordination of radio frequency assignments by member States in order to avoid harmful interference. The process of registration of the radio frequency (and orbital position) is essential because the international rights of States with respect to the protection against harmful interference to their radio frequency assignments are derived solely "from the recording of those assignments in the Master International Frequency Register [hereinafter the Master Register]. "

The process of co-ordination is more a bilateral negotiation between the concerned States than an ITU process. If, after the publication of the Weekly Circular, any State observes that its system could be affected by the one that is being planned to be established, that State will send its comments to the publishing State. Afterwards, both States will try "to co-operate in joint efforts to resolve any difficulties, with the assistance of the Radiocommunication Bureau, if so requested. " Therefore, the intervention of the Radiocommunication Bureau is not automatic. It is informed of the problem by the States and will participate if this is requested by either of the parties. However, if after consultations between the concerned States and after the Bureau's recommendations the disagreement remains unresolved, "the Administration which requested co-ordination shall … defer the submission of its notice of frequency assignments. " Therefore, the ITU's Radiocommunication Bureau does not have much authority, and at the end, the principle of "first come, first served" regulates the problem; i. e. the State

which registered its radio frequencies first has the right against interference from late comers and is under no legal to accommodate the later comers nor to co-ordinate with them

The ITU Radio Regulations contain detailed procedures relating to the notification and registration of radio frequency assignments. A radio frequency assignment to a transmitting station and to its associated receiving stations must be notified to the Radiocommunication Bureau:

a. if the use of that assignment is capable of causing harmful interference to any already registered service of another country; or
b. if that assignment is to be used for international radiocommunication; or
c. if it is desired to obtain international recognition for that assignment.

Before the registration of the notified radio frequency assignment, the Radiocommunication Bureau examines its conformity with the relevant provisions of the Constitution, Convention, and Radio Regulations, with the Table of Frequency Allocations, with the co-ordination procedures with other States, with the probability of causing harmful interference, and with an applicable world or regional allotment plan. If this examination leads to a favourable finding, it will be registered in the Master Register. From the date of notification, the notifying country becomes legally entitled to use the notified radio frequency and to an international right against harmful interference from late comers. If the Radiocommunication Bureau finds the information unfavourable, the assignment could be registered with a symbol indicating that it will not cause harmful interference to previously registered radio frequency assignments. If harmful interference is anyway caused, the Radio Regulations indicate that the late State will "immediately eliminate this harmful interference. "

The Radiocommunication Bureau lacks the right of action in the settlement of interference disputes. The Radio Regulations only states that all countries shall co-operate in the resolution of interference problems. The Radiocommunication Bureau can only intervene in case a State requires its service. Also, the only actions that the Bureau is supposed to take are: the request for co-operation of the concerned States, the analysis of the situation, and the adoption of conclusions with a recommended action for the parties involved. Taking this timid intervention of the Radiocommunication Bureau into account, it should not be surprising to notice a lack of confidence in the ITU as an organisation and as an international manager of the radio frequency spectrum. Bender correctly states that, "the ITU has no mandatory jurisdiction over telecommunication disputes. Nor can it enforce its findings that an unauthorised use of the radio frequency spectrum interferes with an authorised use".

A priori Allotment Procedure

The ITU Radio Regulations prescribe different procedures for co-ordination and registration of radio frequencies that are a part of an allotment plan. For example, for broadcasting satellite service operating in the 12 GHz band such procedures are included in Appendixes S30 and S30A of the Radio Regulations. For the fixed satellite service operating in 4/6 and 11/13 GHz bands, Appendix S30B of the Radio Regulations is applicable. When a country intends to bring into use a frequency assignment to a radio station in the planned band and service, it must notify this frequency assignment to the Radiocommunication Bureau. The Bureau examines each notice *(a)* with respect to its conformity with the Constitution, the Convention and the relevant provisions of the Radio Regulations; *(b)* with respect to its conformity with the appropriate allotment plan. If the Bureau's findings are favourable it records the notified frequency/orbital position in the Master Register. However, if the Bureau's findings are unfavourable it returns the notice to the notifying State with the reasons for its findings and recommendations for modifications. On re-notification, if the Bureau still finds the modified notification unfavourable, the notifying State is obliged not to use that radio frequency and orbital position. Therefore, if the notification and registration procedure is not successfully completed, the assigned radio frequency, and associated orbital position, cannot be recorded in the Master Register.

A priori plans are an exception to the general principle of "first come, first served". The importance of the date of notification to the Radiocommunication Bureau is irrelevant for the determination of the rights of States with respect to the use of the allotted radio frequencies. This is so because these plans contain a specific number of radio frequencies and orbital positions that have been allotted to all States on an equitable basis taking into consideration their specific needs. Each State is entitled to have access to them prior to the actual use of its allotted radio frequencies and orbital positions. However, States are obliged not to use any radio frequency,for which provisions have been made in the allotment plans, in derogation of the provisions of the Radio Regulations, not even on a non-interference basis. If a State wishes to use a radio frequency, which did not receive a favourable finding from the Radiocommunication Bureau, it can do so only for a specified period, and in agreement with the affected States. In such cases, that State is not entitled "to justify the continued use of the frequency (as well as the orbital position) beyond the period specified unless it obtains the agreement of the State (s) concerned".

Current Problems in the Use of Radio Frequencies

The ITU's procedures have been abused during recent years due to the increase in demands and competition among applicants. The ITU Radio Regulations oblige the ITU member States to limit their demands for radio frequencies and orbital slots to the minimum necessary to provide services. However, the ITU is not a supranational organisation and cannot enforce its Regulations over the sovereign States that form part of it. Since such Regulations generally remain

unenforced, the objective of efficient and equitable use of resources also stays unfulfilled.

In the case of satellite telecommunications, the main problem is the so-called issue of "paper satellites," which refers to satellite systems which exist on paper only, but not in reality. In many of these cases, the system exists only in a project form, or sometimes not even that, and the only intention on the part of the notifying country is to obtain utilisation rights through early registration with ITU of desirable radio frequencies and orbital positions, as such rights are mostly acquired on the "first-come first-served" basis. These "paper satellites" are sometimes designed to be marketed under some sort of lease or rent arrangements to those States or companies that might not be in a position to acquire appropriate registrations with the ITU. Excessive notification filings with the ITU of such "paper satellites" have started costing the ITU extensively because of the increased workload of the Radiocommunication Bureau.

The Asia-Pacific region faces particular problems. In 1996, the President of Asia-Pacific Satellite Communications Council, expressed that there were 250 filings for C-/Ku band slots in this region. However, only 35 slots were available and there was no way to find out which ones would be serious projects and which were paper satellites because the ITU had no efficient procedure to determine the viability of each notified satellite system. The scarcity of orbital slots and the controversy that it provokes, emerged once more in 1998 when INTELSAT presented the following data about the most used C- and Ku bands in 1998:

OPERATOR/COUNTRY	SLOTS REGISTERED	SLOTS USED
INTELSAT	25	19
UNITED STATES	74	36
FRANCE	9	2
RUSSIA	58	25
EUTELSAT	18	6
LUXEMBOURG	9	2
INTERSPUTNIK	18	1

These statistics about the use of the radio frequency spectrum and associated orbital positions showed that the paper satellite problem was very wide spread. INTELSAT announced its intention of "deregistering" eight orbital slot registrations with the ITU in order to "set an example [for] efficient use of scarce orbital resources. " These slots were registered by INTELSAT but were never used.

The leasing of radio frequencies (and associated orbital positions) is becoming more common. Many international consortiums have an interest in leasing these resources because they avoid all the complex process of international co-ordination and registration. The developing countries can exchange their orbital

slots for millions of dollars or for services that they cannot develop. For many of these countries, putting a satellite in orbit is actually an expensive proposition. It has been proposed that perhaps the ITU's allotment system should regulate the leasing of orbital positions, and assure that the members that rent their slots use the obtained funds appropriately in accordance with the ITU's purposes, and that money should not stay in particularly limited hands.

In order to solve the problem of paper satellites, the ITU at its WRC'97 adopted two main measures, namely; the administrative due diligence procedure and charging processing fees for assignment filings. All fixed, mobile and broadcasting satellite systems are subject to an administrative due diligence procedure under which each notifying State is required to provide evidence of seriousness of its intention of establishing a satellite network. In 1998, the Radiocommunication Bureau published a letter for all member States with a form to be filled in order to comply with the administrative due diligence provisions and gave instructions to the States to include the relevant data. Secondly, the ITU had adopted an approach of charging processing fees for satellite filings. This measure is a market mechanism in line with the "user-pay" principle; so that the ITU is in a position to recover administrative expenses from the users of the radio frequencies (and orbital slots). The ITU is taking this measure as there will be an increase in participation by the private sector, which could share the ITU administrative cost. In this regard, the 1998 Minneapolis Conference instructed the Council to implement, as soon as possible, the approach of processing charges for all satellite filings received by ITU after 7 November 1998. The Council in its 1999 session has established a schedule of fees for various classes of satellites network filings.

The ITU's goal for these two measures, administrative due diligence and cost-recovery, is to put financial and filing overflow under control. It is too early to judge the effectiveness, in practice, of these measures. Moreover, there is yet no limitation on the period of use of radio frequencies and orbital slots by States. Once a State starts using a particular radio frequency and orbital position, its use of this resource might practically be perpetual in nature and thus continue hindering the use of same radio frequencies by other States.

Auctioning the Radio Frequency Spectrum

Recently certain countries have introduced trade mechanisms, such as auctions, in the use of radio frequency spectrum. For example, in March 1995, the United States started auctioning radio frequencies for Personal Communications Services. The United Kingdom used auctions for national and regional services but only in more congested areas. Canada followed the U. K. example and charged the fees according to the demand; i. e. more congested or more used parts should bring-in more money. It is believed that the introduction of radio spectrum pricing would have the effect of making users more aware of the scarcity of this resource and also dissuading them from the hoarding radio

frequencies without actually using them (as is the case of paper satellites). Putting a price to the radio spectrum also promotes its equitable access and efficient use, although a negative aspect is that the radio spectrum could end up in the hands of only one or a few operators. Argument against the introduction of market principles is that the warehousing and leasing of these radio frequencies favour their acquisition by the wealthiest or the most technologically advanced countries or companies. Other ways to avoid this market treatment could be to guarantee equitable access to radio frequencies (a) by adopting more but flexible allotment plans, especially for the most congested radio frequency bands and (b) by vesting the ITU with property rights over the orbital slots and radio frequencies and entitling it to charge utilisation fees. These measures, it could be argued, would lead to the further politicisation of the ITU management process. However, by all means the process of managing radio frequencies is already politicised.

International Telecommunication Regulatory Authority?

The ITU clearly lacks strong and effective management mechanisms and enforcement powers. However, not all countries desire such powers to be vested in this organisation. According to some, the solutions to the problem of radio frequency spectrum and orbital warehousing and trafficking must come from outside the ITU. Countries must find a means to boycott those countries that act in bad faith and the ITU must not have more authority because this would lead to the politicisation of the organisation. On the contrary, it has been argued that the ITU should be accorded more freedom and powers to act. The idea of vesting ITU with property rights and more management powers over radio frequencies (and orbital slots) could be studied from a perspective of analogies with another international regime. For example, the international regime for the deep seabed resources was originally designed under the 1982 United Nations Convention on the Law of the Sea. This regime was modified by the Agreement Relating to the Implementation of Part XI of the Convention on the Law of the Sea, which entered into force on 16 November 1994. Under the new regime, the seabed resources that are declared to be the "common heritage of mankind" would be exploited by an international body in co-operation with the private sector. Perhaps this model could inspire a similar approach that the ITU member States might take by vesting the ITU with more management powers over the radio frequencies (and orbital positions) and by transforming itself as an International Telecommunication Regulatory Authority, somewhat similar to the Federal Communications Commission of the US.

Use of Radio Frequencies in the Liberalised Trade Environment

There is a strong trend towards liberalisation of trade in telecommunications, primarily pushed by the World Trade Organisation (WTO), together with the privatisation of operators and the consequent proliferation of private actors participating in the ITU. Such liberalisation has been achieved under the Agreement on Basic Telecommunications that was concluded on 15 February

1997 and is annexed to the General Agreement on Trade in Services. It involves over 80 countries that account for more than 90 percent of global telecommunications service revenues and attempts to open markets, promote competition, and prevent anti-competitive conduct. Most of these countries are expected to replace their traditional regimes of regulated monopolies with pro-competitive policies. The Agreement covers all sectors of basic telecommunication services including *inter alia* voice telephony, data transmission, telex and telegraph, leased circuit services - irrespective of the transmission technology used (radio-based or satellite-based). The Agreement ensures that the open markets must be available for entry by the operators of all WTO Members on a non-discriminatory basis. A set of principles, included in the so-called *Reference Paper*, was adopted in order to establish a regulatory environment conducive to open market entry. These principles cover matters such as competition safeguards, interconnection guarantees, transparent licensing processes, and the independence of regulators. The *Reference Paper*, annexed to the Agreement on Basic Telecommunications, provides regulatory guidelines to the countries to follow in their liberalisation processes.

In the *Reference Paper*, the most important and relevant issue from the perspective of this paper is the one that deals with the use of the radio frequencies. Any procedures for the allocation and use of the radio frequencies must be carried out in an objective, timely, transparent and non-discriminatory manner. The current state of nationally allocated frequency bands will be made publicly available, but detailed identification of frequencies allocated for specific government uses is not required. The allusion to transparency and non-discrimination is a reiteration of Most Favoured Nation and National Treatment obligations. However, the obligation to act in an "objective and timely … manner" is new. In this respect, the reference to the time requirement is interesting. Though the *Reference Paper* does not establish a more specific obligation, an excessive time delay in the allocation or use of frequencies and orbital positions could be taken to the dispute resolution system of the WTO. Since the beginning of the negotiations, a problem existed pertaining to the consideration of the technical limitations to the radio frequencies. This issue arose because of the awareness on the part of the negotiators that due to natural limitations of the radio frequency spectrum, the number of suppliers or service providers could be limited. Therefore, the issue was how to consider non-discriminatory limitations on the number of suppliers, and whether it would be necessary or not to regulate them as limitation on market access.

The types of limitations on market access that can be imposed are defined by Article XVI of the GATS Agreement. They include limitations on the number of service suppliers whether in the form of numerical quotas, monopolies, exclusive service suppliers or the requirements of an economic needs test. This is why some delegations pointed out that Article XVI did not apply to limitations in the radio frequency spectrum since they were strictly of technical nature. Due to confusion on the subject, a number of countries included remarks on their market

access commitments indicating that the commitments for radio services were "subject to the availability of spectrum," or similar wording. Also, the WTO *Negotiating Group on Basic Telecommunications* which worked on the text of this agreement, issued a Note on *Market Access Limitation on Spectrum Availability*, clarifying that spectrum management was not necessary to be listed under Article XVI. It specifically established that this question was subject to Article VI, "Domestic Regulation," of the GATS Agreement, and to other provisions, and that "countries which have made additional commitments in line with the Reference Paper on regulatory principles are bound by its paragraph 6 [*Allocation and use of scarce resources*]. Therefore, words such as "subject to availability of radio frequency spectrum" are unnecessary and should be deleted from Members' schedules. Therefore, this Note clarifies that under the current situation, the countries that have included above-mentioned remarks with their commitments as well as the countries that did not adopt them, will all benefit from the same protection derived from Article XVI of the GATS Agreement.

Two points need to be noted here: (a) liberalisation of telecommunication services, will increase the proliferation of private service providers both in national and foreign markets and consequently will increase the demand for already scarce radio frequencies and (b) national regulatory procedures relating to radio frequency assignments ought to be in conformity with the requirements as specified in the *Reference Paper*; *i. e.* such assignments must be carried out on a non-discriminatory basis and in a transparent manner. Since the radio frequency assignments are currently within exclusive "domestic jurisdiction" and are carried out primarily in accordance with national interests and priorities, there is a possibility this prerogative could be abused to block competition primarily from foreign service providers. Perhaps the ITU should study this issue carefully and adopt recommendations and/or regulations for harmonised assignment mechanisms that could serve the interests both of private telecommunication companies and the ITU member States.

Conclusions and Recommendations

A rapid proliferation of players in the telecommunication industry has increased unprecedently the demand for (or the shortage of) appropriate radio frequencies. It is becoming obvious that, not all public and commercial operators would be able to operate freely their telecommunication systems without competing for, and effectively procuring, the required resources like radio frequencies (and associated orbital positions). This increase in demand started posing new challenges to the ITU's traditional management system. Therefore, since the late eighties the ITU has been convening a series of very important conferences in order to reassess its mandate, functioning, organisational structure and regulatory systems and consequently has changed them significantly several times. For the first time since its reorganisation in 1947, the ITU started undergoing major restructuring in 1989. It is said that the new organisational

structure under the 1994 Constitution and Convention has been designed to make ITU more functional.

Though the developing countries command numerical majority in the ITU, due to the lack of their technical and financial resources they are often handicapped in effectively participating in the decision-making process in the ITU Radiocommunication Conferences and Radiocommunication Assemblies. Thus they are often unable to secure an equitable share of an international limited resource (i. e. the radio frequency spectrum), which is indispensable for rapidly increasing wireless services. Threat to their interests could be expected to increase due to more active participation in the ITU by private entities. It is therefore necessary for the developing countries, like India, on their own or jointly with others, to make extra efforts to actively and extensively participate in the ITU decision-making at all levels in order to protect and enhance their interests in the equitable sharing of this international resource.

The privatisation and liberalisation of telecommunications are increasing the number of private companies (service providers) in national, international and foreign markets. The ITU has been making significant efforts in strengthening and expanding the role of non-governmental entities in the ITU's affairs. These entities would significantly influence the ITU policies and decisions. The trend for the future appears to be the progressive privatisation of the ITU. However, there arises a general concern that exclusive interests of private entities might jeopardise public(inclusive) interest, which is supposed to be represented by governments. Given the trends towards monopolisation of all economic sectors in the hands of some private mega-carriers that the world is currently witnessing, there exists a possibility of monopoly or oligopoly over important radio frequencies by a few operators within a handful of countries. This is evident from a recent example of global monopoly over the radio frequencies for the GMPCS by some American companies.

The current management system of radio frequency spectrum is based on a principle of avoidance of harmful interference. All the users of radio frequencies must avoid causing harmful interference to the earlier registered radio frequencies. Besides an exception of very limited allotment plans, the radio frequency bands (and orbital positions) are accessed in accordance with the practice or principle of priority ("first-come first-served"); i. e. the State which notifies its intention of starting a radiocommunication service using certain radio frequencies is protected against harmful interference from the late comers. It is important to note that the State, which has registered its system first, is under no obligation to accommodate the late comers. This practice has resulted in major inequity in the use/control of appropriate radio frequencies among various countries, and the developing countries have largely been deprived of their due share.

Moreover, the ITU's procedures have often been abused due to the increase in demand and competition among the users of the radio frequencies. In order to have priority over appropriate radio frequencies, several States have started notifying and registering radio frequencies and orbital positions more than they needed; thus creating an obligation of co-ordination for other States. Such faulty regulatory procedures, increasing demand for the satellite networks and the consequent race for radio frequencies have caused the abuse of the system and resulted in the rise of the so-called "paper satellite" problem, which is real and wide-spread. In order to solve this problem, the ITU has adopted two main measures, namely; the administrative due diligence procedure and charging processing fees for satellite filings. However, it is too early to judge their effectiveness in practice.

Introduction of radio spectrum auctioning has also been proposed in order to make the users more aware of the scarcity of this resource and also to dissuade them from hoarding frequencies without using them. However, international auctioning of radio frequencies could result in control over important frequency bands in the hands of a few operators or countries. The warehousing and leasing of these radio frequencies would favour their acquisition by the wealthiest or the most technologically advanced countries.

The ITU lacks effective dispute settlement authority in cases of harmful interference between two or more States. The ITU Radiocommunication Bureau can only intervene in case a State requires its service. Moreover, the Bureau does not have much authority and plays a timid role. Mostly, interference issues are governed by the principle of "first come, first served". The Radio Regulations Board, composed of 12 part-time members, is also a weaker body than its predecessor, the IFRB. Therefore, there exits a lack of confidence in the ITU as an organisation and as an international manager of the radio frequency spectrum. The ITU is not a supranational organisation and cannot enforce its Regulations over the sovereign States. Therefore, the objective of efficient and equitable use of resources also remains unfulfilled and abuse continues.

The *Reference Paper* attached to the WTO's Agreement on Basic Telecommunications requires that national regulatory procedures relating to radio frequency assignments must be carried out on a non-discriminatory basis and in a transparent manner. However, as these assignments are currently within exclusive "domestic jurisdiction" and are carried out primarily in accordance with national interests and priorities. Thus there is a possibility that this prerogative could be abused to block competition primarily from foreign service providers.

This brief description of some of the major problems relating to the international management of the radio frequency spectrum lead to one conclusion that the current ITU management approaches, regulations and procedures are inadequate and increasingly failing to prevent abuses and inequity in the use of radio frequency spectrum. In addition, a serious concern is gaining momentum

as how to protect public interest while telecommunications are being, and will be, provided by private and foreign service providers who would have a single goal of enhancing and protecting their exclusive monetary interests. In order to address these problems and concerns, it is essential to strengthen the ITU by giving it more enforcement powers regarding the distribution of radio frequencies and improving its decision-making process where equitable participation should be guaranteed to all its member States. Particularly, the ITU should be granted more powers to examine notifications of radio frequencies and to decline their registration in certain cases, for example, if an excessive number of unrealistic applications have been filed. The adoption of various flexible allotment plans for more congested radio frequency bands in order to ensure equitable access by all counties is another measure which should be taken by the ITU member States.

The granting of more powers to the ITU, no doubt, is an interim solution that could be achieved in the near future. However, eventually we need to create an independent global institution - International Telecommunication Regulatory Authority - something like national telecommunication regulatory bodies (independent of service providers) with real powers of decision, effective management of radio frequency spectrum, dispute resolution, imposition of sanctions and enforcement.