INTERNATIONAL REGULATION OF SATELLITE TELECOMMUNICATIONS AFTER THE SPACE WARC

by

© Milton L. Smith III

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ABSTRACT

The Space WARC resulted in significant changes to the regulatory regime of satellite telecommunications. This dissertation examines the Space WARC and its effects. The basis for an understanding of the relevant issues is established by an overview of the resources and technology involved in satellite telecommunications, a summary of the institutional framework, and a review of the events leading to the Conference. The legal and regulatory regime applicable to satellite telecommunications before the Space WARC is examined, including aspects of international space law and international telecommunications law, and the goal of the Conference -- equitable access -- is analyzed. Both sessions of the Space WARC and its important intersessional period are reviewed, and its results are detailed. The compliance of the new regimes of satellite telecommunication with international space law and the issues of space law raised at the Conference are also examined. An analysis and conclusions complete this study.

RESUME

La Conférence de radio administrative mondial (CRAM) Espace a abouti à des changements significatifs du régime règlementaire des télécommunications par satellite. Cette dissertation examine la CRAM d'espace et ces effets. Pour la compréhension des problèmes de base l'auteur fait d'abord un survol des ressources et de la technologie utilisée par les satellites de télécommunication, un résumé de la structure des institutions existantes, et un examen des évènements qui ont mené à cette Conférence. Le régime législatif et règlementaire applicable aux télécommunications par satellite avant la CRAM Espace est étudié , notamment les aspects de droit international spatial et de droit international des télécommunications. L'auteur consacre une attention particulière au but de la Conférence qui était l'accès équitable aux fréquences et à l'orbite géostationnaire. Les deux sessions de la CRAM Espace ainsi que la période intérimaire pendant laquelle les négociations ont eu lieu sont présentées ici avec leurs résultats. La compatibilité des nouveaux régimes de télécommunication par satellite avec le droit spatial et les problèmes de droit spatial qui ont été soulevés à la Conférence sont présentés dans les différents chapitres. Enfin une analyse globale et des conclusions terminent cette étude.

LIST OF ACRONYMS

AIAA	American Institute of Aeronautics and Astronautics
ASETA	Association of State Telecommunication Undertakings of the Andean Sub-Regional Agreement
BSS	Broadcasting-Satellite Service
CCIR	International Radio Consultative Committee (ITU)
CCITT	International Telegraph and Telephone Consultative Committee (ITU)
CITEL	International Committee for Telecommunications
COPUOS	Committee on the Peaceful Uses of Outer Space
ESA	European Space Agency
EUTELSAT	European Telecommunications Satellite Organization
FCC	Federal Communications Commission (U.S.)
FSS	Fixed-Satellite Service
GHz	Gigahertz
GSO	Geostationary-Satellite Orbit
IAF	International Astronautical Federation
IEEE	Institute of Electrical and Electronics Engineers
IFRB	International Frequency Registration Board (ITU)
IIC	International Institute of Communications
INMARSAT	International Maritime Satellite Organization
INTELSAT	International Telecommunications Satellite Organization

ITU	International Telecommunication Union
KHz	Kilohertz
MHz	Megahertz
MSS	Mobile Satellite Service
NASA	National Aeronautics and Space Administration (U.S.)
NASARC	Numerical Arc Segmentation Algorithm for Radio Conferences
NTIA	National Telecommunications and Information Administration
ORB-85	Space WARC First Session
ORB-88	Space WARC Second Session
RARC	Regional Administrative Radio Conference (ITU)
SONA	Satellite Organizations and Their Notifying Administrations
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organizations
U.S.	United States of America
USSR	Union of Soviet Socialist Republics
WARC	World Administrative Radio Conference (ITU)

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PREFACE

Use of the geostationary orbit by telecommunication satellites is one of the most important uses of outer space. The regulatory regimes governing that use have recently undergone significant revisions. These revisions, which were made at the Space WARC, will affect the use of the geostationary satellite orbit by telecommunication satellites for the foreseeable future. This study is the first in-depth assessment of the Space WARC and its impact on the international regulation of satellite telecommunications. The evaluation of the intersessional period, the examination of the work of the Second Session, the appraisal and critique of the results of the Second Session, the analysis of space law issues raised at the Space WARC, and the inquiry into the compliance of the new regulatory regimes with principles of international space law, are submitted as contributions to original knowledge.

Several sections of this study are taken from previously published articles that were written solely by this author. All of these have been updated and revised. Authorizations to reproduce these publications as part of this dissertation have been secured. Chapter 1 is based upon "The Orbit/Spectrum Resource and the Technology of Satellite Telecommunications: An Overview," 12 Rutgers Computer and Technology Law Journal 285 (1987). Chapter 5 is an extract from "Space WARC 1985: The Quest for Equitable Access," 3 Boston University

International Law Journal, 229 (1985). Chapter 11 is based upon "Space Law/Space WARC: An Analysis of the Space Law Issues Raised at the 1985 ITU World Administrative Radio Conference on the Geostationary Orbit," 8 Houston Journal of International Law 227 (1986). The following articles, although not contained directly in this study, formed the basis for certain sections of it: "The Space WARC: Reflections on 1985, Prospects for 1988," Proceedings of the 29th Colloquium on the Law of Outer Space 139 (1986); "Equitable Access to the Orbit/Spectrum Resource," Proceedings of the 30th Colloquium on the Law of Outer Space 263 (1988); and "Allotment Planning for Telecommunication Satellites," 5 Space Communications and Broadcasting 359 (1987).

This study would not have been possible without the encouragement of my dissertation supervisor, Dr. Ram Jakhu. He instilled in me an interest in satellite telecommunications when he taught that course in 1984 at the Institute of Air and Space Law. Later that year, when I elected to further my studies on satellite telecommunications for my Master's thesis, he served as my advisor. Dr. Jakhu spent many hours encouraging and guiding my studies. His continued inspiration and assistance is greatly appreciated.

My study of the Space WARC has spanned over four years. During this time I was fortunate enough to serve on the U.S. Delegations to both sessions of the Conference, and to participate in intersessional preparations for the 1988 Session. I wish to extend my appreciation to the other

Delegation members for their kind assistance throughout this long period. Special thanks go to: Mr. Harold Kimball, the Executive Director of the 1985 U.S. Delegation; Mr. Warren Richards, the Executive Director of the 1988 U.S. Delegation; Mr. William Hatch; Mr. Tom Tycz; and to Ambassador Theodore F. Brophy, whom I had the pleasure of serving as Legal Advisor during the Second Session.

Although there are many other individuals who have encouraged and supported my studies, special thanks are expressed to Colonel Jeffrey M. Graham, the Staff Judge Advocate of U.S. Air Force Space Command who has encouraged and enabled my continued involvement in Space WARC issues. Also Major Thomas J. Murphy, whose tireless efforts in the final preparation of this manuscript are deeply appreciated. Special recognition and thanks also go to Ms. Cynthia McFarlin for her typing support.

This dissertation is dedicated to my mother, Mrs. Dorothy S. Hare, whose love, support, and encouragement I can always count on.

Milton L. Smith

March 3, 1989

INTRODUCTION

For six weeks during the summer of 1985, and for six weeks during the fall of 1988, delegates from over one hundred countries met in Geneva for the International Telecommunication Union's (ITU) World Administrative Radio Conference (WARC) on use of the geostationary-satellite orbit (GSO) and the planning of the space services that utilize it. The essential objective of this two-session conference, known as the Space WARC, was to guarantee all countries equitable access to the GSO and the frequency bands used by communication satellites.[1] The Space WARC was the most important conference in the history of space telecommunications, and it resulted in significant changes that will affect satellite communications well into the next century. This dissertation undertakes a comprehensive examination of the Space WARC, including its background and results. The objective of this study is to explore the impact of the Space WARC on the international regulation of satellite telecommunications.

Over 25 years have passed since the first satellite provided a communication link from the GSO. During that period, world telecommunications have been transformed by the use of satellites. Over 100 communication satellites now operate in the GSO, and of all the applications of space

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1. ITU, World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, Administrative Council Resolution No. 895 (May, 1983).

technology, satellite telecommunication is the most widely used and the most beneficial to world-wide economic progress. The direct economic impact of communication satellites is considerable. They generate revenue of over five billion dollars annually,[2] and the construction of communication satellites provides the satellite industry with a global market of nearly four billion dollars per year.[3] These direct economic impacts will continue to grow; in 1989, over 15 communication satellites are scheduled for launch.[4] Furthermore, satellite communication has a tremendous indirect economic impact on increasing the efficiency of many other economic activities ranging from finance to agriculture.[5]

Telecommunication satellites have such a significant economic impact because they have developed into critical elements of the global telecommunications network. Communication satellites are often the most effective and least expensive telecommunication system available. Consequently, almost every nation has joined at least one international satellite organization, and the number of countries with their own satellite system increases yearly.

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2. "Strong Orders Signal End of Slump for Communications Satellite Market," Aviation Week & Space Tech., Dec. 19, 1988, at 85. *See also*, Aerospace Industries Association of America, Inc., A Current Perspective on Space Commercialization (1985).

3. *Id.* at 86.

4. *Id.*

5. *See generally* The Missing Link (1984) (Report of the Independent Commission for World Wide Telecommunications Development).

Developing as well as developed countries have found communication satellites to be an indispensable part of their telecommunication systems. Since the 1960's, developed countries have been using communication satellites for international and domestic traffic, both through INTELSAT and their own satellites. In the late 1960's, developing countries started using communication satellites for their international needs through INTELSAT, and in the 1970's some developing countries began to use INTELSAT satellites for domestic telecommunication needs as well. In the late 1970's, as the benefits that flow from telecommunications became more evident, a few developing countries began to establish satellite systems of their own. Although most developing countries still do not have sufficient traffic requirements to justify establishment of their own satellite communication system, they recognize a need for future access to the resources necessary for satellite communication systems, particularly on a subregional basis.

Over the past 25 years, technological advancement has resulted in increasingly efficient use of the GSO and the radio frequency spectrum, together referred to as the orbit/spectrum resource. Nevertheless, as a result of the increasing demands being placed upon that resource, many nations, particularly developing nations, became concerned that the capacity of the resource might be reached or access to it made prohibitively expensive. Those nations became particularly dissatisfied with the regulatory regime governing use of the orbit/spectrum resource. They considered it to be inherently discriminatory because they believed that it protected early users of the orbit/spectrum resource to the detriment of subsequent users.

The regulatory regime for satellite communications that has been established within the ITU serves a very important function. Development of satellite communications depends on the existence of a stable legal regime that will provide adequate international protection for the large investments required to establish a satellite communications system. The ITU's regulatory regime provided the requisite stability for satellite communications to thrive. Developing countries, however, questioned the equitability of the system. Thus, a movement by developing nations was initiated to change the legal and regulatory regime applicable to satellite communications. The Space WARC was the culmination of that movement.

When the Space WARC began in 1985, two groups were brought together that had very different opinions regarding the proper course for the future international regulation of satellite communications. Developing countries wanted to partition the orbit/spectrum resource and allot a specific orbital position and associated frequencies to every country regardless of current need. This type of "a priori" planning was considered necessary to guarantee future access to the orbit/spectrum resource. Additionally, it was part of a larger effort by developing countries to secure access to and benefits from resources in areas that are not subject to national sovereignty.

On the other extreme, developed countries wanted to preserve the existing regulatory regime that had served them well. Any system of *a priori* planning, they argued, would waste the orbit/spectrum resource by giving countries an allotment that they had no need for or ability to use. Furthermore, such planning would be inefficient since an *a priori* plan must be based upon current technology even though the plan may have a long duration. Developed countries pointed to the great advances being made in satellite communications and asserted that those advances guaranteed future access to the orbit/spectrum resource for all countries.

The basis for those differing opinions, the manner of their resolution over a period of years, and the changes brought about by the regulatory regime that emerged, are the key subjects of this study. The first five chapters establish the background of the Space WARC. Chapter 1 reviews the technology of satellite communications. A general understanding of this complicated technical subject is required for an appreciation of the issues underlying the Space WARC. Chapter 2 analyses the international framework of satellite communications. This framework is comprised of international and regional organizations as well as nations. Focus is placed on the players of most importance to the Space WARC. Chapter 3 summarizes the pre-Space WARC regulatory regime of satellite telecommunications. The aspects of this regime that most concerned the developing countries are highlighted. Chapter 4 provides the historical background for the Space WARC. It traces the development of the ITU regulatory regime and reviews the key events leading to the Space WARC. This chapter sets the stage for the 1985 session of the Space WARC. Chapter 5 examines the goal of the Space WARC -- equitable access to the orbit/spectrum resource. The legal concept of equity, the concept of equitable access in the ITU, and the circumstances relevant to equitable access are explored.

This study then progresses to the period of the Space WARC. The conduct of the First Session of the Space WARC and its results are the subjects of Chapter 6. This contentious session set the basic outline of the new legal regime for satellite communications. However, it left many questions unanswered and much important work to be done in the intersessional period before the Second, and final, session of the Space WARC. Chapter 7 covers the work done during the intersessional period. This work was essential to the ultimate success of the Space WARC. The key preparations of various ITU organs, other organizations, and nations are reviewed. Chapter 8 reviews the Second Session of the Space WARC. The work of the Conference is reviewed and the key results are summarized.

A more detailed analysis of the key decisions of the Conference is then undertaken. Chapter 9 examines the new ITU regulatory regime for the fixed satellite service. This was the service of main concern to developing countries, and was the service impacted to the greatest extent by the Space WARC.

Having explored the regulatory aspects of space telecommunications law, this study moves to a discussion of international space law. Since communication satellites operate in outer space, international space law is a necessary aspect of the international regulation of satellite telecommunications. Chapter 10 analyses the compliance of the new ITU regulatory regimes with space law, and Chapter 11 discusses the key issues of space law that were raised at the Space WARC.

Finally, conclusions are drawn in chapter 12 about the impact of Space WARC decisions on the future of satellite communications and the relationship of the Space WARC to other international developments.

CHAPTER 1

THE ORBIT/SPECTRUM RESOURCE AND THE TECHNOLOGY OF SATELLITE TELECOMMUNICATIONS: AN OVERVIEW

Telecommunication satellites use two primary resources: the geostationary satellite orbit (GSO) and the radio frequency spectrum, together forming the orbit/spectrum resource. The purpose of this chapter is to present, in layperson's terms, a review of the technical factors underlying the policy issues surrounding the Space WARC. One simply cannot comprehend the concerns of developing nations without a basic understanding of the inherent limitations on the orbit/spectrum resource. Likewise, one cannot grasp the concerns of developed nations without a corresponding knowledge of the great technological advances in satellite telecommunication that have directly affected use of the orbit/spectrum resource.

A. <u>The Geostationary Satellite Orbit/Spectrum Resource</u>

Radio frequencies and the GSO have been declared by treaty to be "limited natural resources."[1] In practice, these resources must be used together and are therefore called the

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1. International Telecommmunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 33 (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention]. One author argues, however, that the GSO and the radio frequency spectrum have been mislabeled as (Cont. on next page)

orbit/spectrum resource. The limits of the orbit/spectrum resource can best be understood by examining the limits of its components.

1. The Geostationary Satellite Orbit: Uses and Limitations

A satellite that orbits the earth above the equator at an altitude of approximately 36,000 km (22,300 mi) will have a period of revolution approximately equal to that of the earth. Because the satellite revolves at the same rate as the earth, it appears to be motionless and stationary relative to a viewing point on the earth. Such a satellite is called a geostationary satellite, and the path it follows is the GSO.[2] There is only one GSO.

The GSO is actually a band around the earth with three dimensions and a finite volume. Because of numerous forces acting upon it, a geostationary satellite is not exactly stationary. Rather, it moves in a figure-eight pattern within

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"limited natural resources." See Doyle, Equitable Aspects of Access to and Use of the Geostationary Satellite Orbit (paper presented at IAF Congress, Brighton, U.K., Oct. 1987).

2. The relevant definitions in the Radio Regulations are:
Geosynchronous Satellite: "An Earth satellite whose period of revolution is equal to the period of rotation of the Earth about its axis." ITU, Radio Regulations, art. 1, No. 180 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations].
Geostationary Satellite: "A geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator and which thus remains fixed relative to the earth ...." Id. at No. 181.
Geostationary-satellite orbit: "The orbit in which a satellite must be placed to be a geostationary satellite." Id. at No. 182.

the orbit volume.[3] Station-keeping maneuvers must be executed periodically for the satellite to maintain its nominal position. A satellite is usually maintained within 0.1 degree east or west of its nominal position on the equatorial plane. This results in the satellite moving within an area of about 150 km around its nominal position, at an altitude that varies by about 30 km. Thus, the GSO is a band around the earth 36,000 km above the equator, about 30 km thick and 150 km wide.[4]

Telecommunication satellites placed in the GSO have many advantages. From the GSO, a satellite can have line-of-sight

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3. Various forces act upon geostationary satellites. The first is man-made. It consists of the launch propulsion and the station-keeping propulsion which is used to keep the satellite in its proper location. The others are natural and include: the attraction of the mass of the earth, the oblateness of the earth, the ellipticity of the equator, the attraction of the moon and the sun, and solar radiation pressure. See Physical Nature and Technical Attributes of the Geostationary Orbit 4-6, U.N. Doc. A/AC.105/203 (1977) [hereinafter cited as The Geostationary Orbit]; Perek, Physics, Uses and Regulation of the Geostationary Orbit, or, Ex Facto Sequitur Lex, Proc. 20th Colloq. on the L. of Outer Space 400, 402-03 (1977).

4. Efficient Use of the Geostationary Orbit 5, U.N. Doc. A/CONF.101/BP/7 (1981) [hereinafter cited as U.N. Doc. BP/7]; Perek, supra note 3, at 403. If station-keeping stops, the satellite will begin to drift and will no longer remain stationary. Therefore, one of the factors limiting a geostationary satellite's useful life is the amount of fuel it can carry for station-keeping propulsion. See ITU, CCIR Report 556-1, Factors Affecting Station-Keeping of Geostationary Satellites of the Fixed Satellite Service (1978).

communication with about one-third of the earth.[5] A beam from one satellite can cover the whole of almost any country. A system of three satellites can provide global coverage. Thus, geostationary satellites can be important links in domestic and international telecommunication networks.

Geostationary satellites also generally form the least expensive telecommunication satellite system available. Although telecommunication satellites can operate in other orbits, they are not always at a fixed position relative to a point on the earth. This has two significant consequences for non-geostationary satellites: first, for continuous communication to and from a particular point on earth, more than one satellite is needed;[6] second, earth stations with steerable antennas are required to track the satellites across

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5. Very low elevation angles from the earth station to the satellite greatly increase interference. Therefore, areas of high northern or southern latitudes cannot be served by a satellite in the GSO. P. Sawitz, Spectrum-Orbit Utilization, An Overview, at 43-1 (paper presented at National Telecommunications Conference, Dec. 1975).

6. The non-geostationary system used by the USSR, for example, has twelve satellites. The USSR's Molniya satellites, the "mainstay of the Soviet space-based communications network," use Molniya orbits that have low perigees (400-600 kms) and high apogees (39,000-40,000 kms). N. Johnson, The Soviet Year in Space: 1983, at 17 (1984). Because of their orbital mechanics, they spend over seventy-five percent of their orbital period high over the northern hemisphere. This permits long intervals of communication in that area. Id. This system is needed by the USSR due to their extensive northern areas, which cannot be served by geostationary satellites. See supra note 5.

the sky. This necessitates significantly more complicated and more expensive earth stations. Therefore, the GSO offers the best location for communication satellites.[7]

Given the expanding use of telecommunication satellites and the practical need to position them in the GSO, it is important to explore the physical capacity of the orbit. Any orbit may contain only a limited number of satellites. An orbit becomes physically saturated when it is impossible to insert a new satellite without significantly increasing the probability of collision with an existing satellite.[8] Theoretically, with the current station-keeping accuracy of plus or minus 0.1 degree, 1,800 satellites could be uniformly spaced 0.2 degrees apart in the 360 degrees of the GSO arc without any risk of collision.[9] There are less than one tenth that many operational satellites in the GSO.[10] Therefore, although this theoretical calculation has major

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7. Geostationary telecommunication satellites also have a longer life expectancy than satellites in other orbits, primarily because they do not have to cross the Van Allen radiation belt every orbit. See N. M. Matte, Aerospace Law: From Scientific Exploration to Commercial Utilization 86 (1977).

8. Perek, supra note 3, at 404.

9. U.N. Doc. BP/7, supra note 4, at 12. At GSO, one degree of orbital arc equals approximately 736 kms. Thus, satellites separated by 0.2 degrees have a distance between them of nearly 150 kms.

10. In May, 1984, there were 115 operational satellites in the GSO and 160 in various stages of planning. H. Kimball, Implications for the Future of Satellite Communications 2 (paper presented at 1984 Annual Conference of the IIC, West Berlin, Sept. 21-23, 1984).

weaknesses,[11] it is generally accepted that the danger of collision is remote. Orbital saturation is not a significant constraint on use of the GSO.[12] The primary limitations lie elsewhere.

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11. Not all locations in the GSO are equally useful. Certain areas are much more valuable for telecommunication purposes than others. Satellites over the Atlantic Ocean relay communications between Europe and North America. Satellites over the Indian and Pacific Oceans also relay communications between continents. Additionally, satellites serving North America can cover all areas of the continental United States. These four locations are the most intensively used areas of the GSO. U.N. Doc. BP/7, _supra_ note 4, at 19. These areas often have more than one satellite assigned to a single orbital location. _See_ The Geostationary Orbit, _supra_ note 3, add. 4, at 7. Satellites in the same orbital location must use different frequencies to avoid interference, or serve geographically separated areas. _See infra_ note 40, and accompanying text.

Because geostationary telecommunication satellites are concentrated in certain areas of the orbital arc, a calculation based on uniform spacing is misleading. This theoretical collision calculation also ignores the increasing problem of space debris, the collection of nonfunctioning satellites, spent rocket stages, and various parts that go into orbit along with satellites. M. Menter, Space Objects: Identification, Regulation and Control (paper presented at John Bassett Moore Society of International Law Symposium on International Law and the Environment, Panel on Space Debris, Charlottesville, Virginia, Oct. 20, 1978). Presently, the danger of collision with space debris is low, but it has been recognized as a problem that is likely to become serious in the future, and as one requiring further study. _Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space_ 70, U.N. Doc. No. A/CONF.101/10 (Vienna, Aug. 9-21, 1982) [hereinafter cited as UNISPACE 82 Report].

12. _See_ U.N. Doc. BP/7, _supra_ note 4, at 12-14. A 1977 U.N. report estimated that, based on the size of current satellites, the danger of collision was less than one collision per five hundred years. The Geostationary Orbit, _supra_ note 3, at 7. As larger space structures are used, however, collision danger will increase. _Id_.

2. The Radio Frequency Spectrum: Uses and Limitations

To perform a useful function, satellites must communicate with earth via the radio frequency spectrum.[13] Several factors constrain use of the radio frequency spectrum by satellites.

As a result of the physical characteristics of radio waves, only certain frequencies are suitable for communication via satellite. For example, in the lower end of the radio frequency spectrum, signals tend to follow the curvature of the earth. In the upper end of the spectrum, signals suffer significant propagation losses (i.e., reflection, refraction, and absorption) when they travel through the earth's atmosphere.[14] For these and other physical reasons, the groups of frequencies, or "bands," optimally suited for most satellite telecommunication purposes lie between 1 to 10

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13. The radio frequency spectrum is that part of the electromagnetic spectrum which is between zero and 3,000 GHz. 1982 Radio Regulations, supra note 2, art. 1, No. 6.

14. See M. Smith, Radio Frequency Allocation in Space Communication, in "World Wide Space Activities," Subcommittee on Space Science and Applications of the House Committee on Science and Technology, H. R. Rep. No. 352, 95th Cong., 1st Sess., 516, 519 (1977). Propagation may result in signal depolarization and attenuation of signal strength. Water vapor presents a particular problem. Attenuation due to precipitation and clouds "is generally negligible at frequencies below 10 GHz and increases with increasing frequency above 10 GHz." See U.N. Doc. BP/7, supra note 4, at 14.

GHz.[15] However, advancing technology has extended the upper range of frequencies suitable for use by telecommunication satellites, and bands up to 15 GHz are now routinely used.[16]

In addition to physical constraints, there are two types of ITU regulatory constraints on the frequencies that satellites can use. Both result from the ITU's task of preventing harmful interference to users of the radio frequency spectrum. To minimize interference problems, the ITU is responsible for evaluating the needs of the various radiocommunication "services"[17] and for allocating frequencies to them.[18] ITU allocations to services constitute the first type of regulatory constraint.

Although there are many space services that use the GSO, only a few have or plan to have a significant number of

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15. Sawitz, supra note 5, at 43-2.

16. See infra notes 54-56 and accompanying text; see also infra note 65.

17. A "service" is defined as "the transmission, emission and/or reception of radio waves for specific telecommunication purposes." 1982 Radio Regulations, supra note 2, art. 1, No. 20. Some 37 different services, including 17 different space services, are defined in the Radio Regulations. Id., Nos. 20-57. Services follow a functional breakdown (broadcasting, meteorological, etc.), and a breakdown by type of Earth terminal (fixed, mobile, maritime mobile, and aeronautical mobile). In the future, use of digital signals, which are technically identical regardless of service, may render service-based allocations obsolete. See Rothblatt, International Cooperation in Regulating 12 GHz Band Geostationary Satellite Communications: Technology, Geopolitics and the Common Heritage of Mankind, Proc. 23d Colloq. on the L. of Outer Space 189 (1980).

18. Allocation is a central part of the ITU's frequency management process. See discussion infra ch. 2, note 22 and accompanying text.

geostationary satellites. The major use of the GSO is for telecommunication satellite services.[19] There are three telecommunication satellite services using the GSO. The largest by far is the "fixed satellite service" (FSS). This service is for communication via satellite between fixed earth stations,[20] and was the first type of satellite telecommunication system developed. The FSS carries television, telephone, telegraphic, and telex traffic, and it has the capability to carry other types of information.[21] More than ninety-five percent of the geostationary satellites that are operational or planned are in the FSS.[22]

The other two space telecommunication services are the mobile satellite service (MSS) and the broadcasting satellite service (BSS). The MSS is for communication via satellite with earth stations located on ships, aircraft, and land vehicles.[23] This service initially progressed slowly, but commercial interest "has increased dramatically over the past

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19. Other satellites that use the geostationary orbit include meteorological and space research satellites. Their numbers are few, and none present significant prospects for congestion of the geostationary orbit/spectrum resource. U.N. Doc. BP/7, _supra_ note 4, at 10-11.

20. 1982 Radio Regulations, _supra_ note 2, art. 1, No. 22. The FSS is also referred to as "point-to-point" service.

21. _See_ U.N. Doc. BP/7, _supra_ note 4, at 9.

22. Kimball, _supra_ note 10, at 3.

23. 1982 Radio Regulations, _supra_ note 2, art. 1, Nos. 29, 31 & 35.

several years."[24] The traffic volume and frequency requirements for this service are considerably less than those for the FSS.[25] The BSS carries television or radio signals, via satellite, from a fixed earth station to large numbers of small, inexpensive receiving stations.[26] There are few BSS satellites, and their frequency requirements will not be a problem for the foreseeable future.[27]

The FSS, due to its intensive utilization, was the focus of the Space WARC.[28] The ITU has allocated several frequency bands with differing characteristics to the FSS. The principal allocations, according to pairings of uplink and downlink, are: the 6 GHz band for the uplink and 4 GHz band

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24. U.S. Dept. of Commerce, Space Commerce: an Industry Assessment, 45 (1988) [hereinafter cited as Space Commerce]; Klass, Carriers, Manufacturers Assess Aerosat Communications Systems, Aviation Week & Space Tech., Jan. 9, 1989, at 54.

25. *See* U.N. Doc. BP/7, *supra* note 4, at 9.

26. 1982 Radio Regulations, *supra* note 2, at art. 1, No. 37.

27. *See generally*, Final Acts of the International Conference: Technological Evolution and Perspectives of Television Distribution and Direct Broadcasting by Satellite in Europe (report of a conference held in San Marino, Sept. 28-29, 1984).

28. FCC, First Report and Order, Gen. Doc. No. 80-741, F.C.C. 85-94, at 5 (Mar. 1, 1985); FCC, Fourth Notice of Inquiry, 98 F.C.C. 2d 402 (1984), Gen. Doc. No. 80-741, F.C.C. 84-194, 49 Fed. Reg. 21, 419, at app. B page 4, (adopted May 10, 1984); U.N. Doc. BP/7, *supra* note 4, at 18; Kimball, *supra* note 10, at 3; *see also* T. Srirangan, Equity in Orbit: Planned Use of a Unique Resource 8 (paper presented at 1984 Annual Conference of the IIC, West Berlin, Sept. 21-23, 1984).

for the downlink[29] (written as 6/4 GHz) "C" band, which has been used for the longest time and lies in the frequency range with propagation characteristics optimally suited for use by telecommunication satellites; the 14/11 and 14/12 GHz "Ku" band, which is outside the optimum range but generally satisfactory for most purposes; and the 30/20 GHz "Ka" band, which is outside the optimum range and used primarily on an experimental basis.[30] The FSS frequencies within the C and Ku bands are used extensively by telecommunication satellites, except for certain frequency bands that were allocated to the FSS at the 1979 WARC. Those frequencies are often referred to as "expansion bands," while the frequencies used extensively since before the 1979 WARC are referred to as "conventional bands." Most telecommunication satellites of the FSS use either the conventional C band, the conventional Ku band, or both.

The second type of ITU regulatory constraint on the use of frequencies involves the system established to protect registered users of allocated frequencies from interference caused by other potential users of those frequencies. For space services using the GSO, this regulatory regime involves a three-step procedure culminating in recording of a satellite's frequency assignment, orbital position, and

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29. Uplinks and downlinks refer to the groups of frequencies on which information is transmitted either from the earth to a satellite, or vice versa. Allocations to the FSS specify whether they are for uplink or downlink. 1982 Radio Regulations, supra note 2, art. 8.

30. For precise allocations, see id.

relevant technical and operating characteristics in the ITU's Master International Frequency Register.[31] Recording entitles a satellite's assignment to "international recognition and protection against harmful interference."[32]

Another factor constraining use of the radio frequency spectrum is primarily a result of that use. Interference is the "degradation of performance of a communications system due to unwanted signals."[33] Interference can come from various sources and can occur in the uplink or downlink. Mutual interference, which is interference from neighboring satellite systems operating on the same frequencies, is the most significant for a telecommunication satellite.[34]

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31. See id. arts. 11 & 13; and discussion infra ch. 3, notes 20-38 and accompanying text.

32. Id. art. 13, No. 1491.

33. U.N. Doc. BP/7, supra note 4, at 15. Interference is defined by the ITU as "[t]he effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy." 1982 Radio Regulations, supra note 2, art. 1, No. 160.

34. Braun, 2 Degree Spacing: Its Impact on Domestic Satellite Systems, Satellite Communications 32 (Nov. 1981). Other sources of interference for satellite systems are: (1) internal interference of the satellite itself from adjacent or cross-polarized transponders; and (2) terrestrial interference from microwave systems sharing the 4 and 6 GHz bands. Id.

Mutual interference has been cited as the "primary problem limiting the use of the geostationary arc ...."[35] It cannot be reduced to zero when a frequency band is shared in a geographical region.[36] While equipment can be designed to handle certain levels of interference,[37] there is always a level above which intelligible communication is no longer possible.

Interference with a satellite telecommunication system depends on a combination of factors including: antenna characteristics of the earth station and satellite, modulation methods, power levels, propagation effects, and station-keeping and pointing accuracy of the satellite.[38] The most important factor is the limited directivity of antennas.[39] In general, the consequences of interference for geostationary telecommunication satellites are that: (1) satellites located near each other in the GSO (for example, at

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35. Sawitz, _supra_ note 5, at 43-3.

36. _Id_.

37. The CCIR develops standards for telecommunications equipment. _See_ 1982 ITU Convention, _supra_ note 1, art. 11.1(1); _see also_ _Role of the CCIR in Space Telecommunications Technology_, U.N. Doc. 101/BP/IGO/14 (1982).

38. Sawitz, _supra_ note 5, at 43-1.

39. A perfect antenna would radiate energy in a beam from the transmitting antenna directly to the receiving antenna and nowhere else. In practice this cannot be done. The energy radiated from an antenna is divided into three components: "the main beam, in which the power is sufficient for reliable communication; the sidelobe area, in which the power is insufficient for communication but may interfere with communication; and the rest of the circle, in which the power level is sufficiently low to avoid interference." U.N. Doc. BP/7, _supra_ note 4, at 8.

less than a four degree separation) must either use different frequencies or serve widely separated geographical areas; and (2) satellites using the same frequencies must be spaced at a "minimum separation angle" in order to serve geographical areas that are not widely separated.[40]

3. Other Limitations on Use of the Orbit/Spectrum Resource

To provide useful service to an area on Earth, a satellite must be located in a certain area of the geostationary orbit. These limitations involve the concepts of area of visibility, coverage area, service area, and service arc. The area of the earth's surface that is visible from a geostationary satellite is a circle with a radius of 9,050 km drawn about the point on the equator directly below the satellite (the satellite sub-point).[41] As distance from the satellite sub-point increases, the elevation angle of the earth station antenna to the satellite (measured from the horizon) decreases; an earth station located at a satellite's sub-point has an elevation angle of 90 degrees, whereas an earth station located far from

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40. In general, as separation increases interference decreases. See U.N. Doc. BP/7, supra note 4, at 17.

Minimum required orbital spacing also depends on: (1) earth station and satellite antenna gain and sidelobe discrimination, (2) transmitted power, (3) receiving system sensitivity, and (4) sensitivity to interference. Fourth Notice of Inquiry, supra note 28, app. C, at 5.

When planning a geostationary satellite telecommunication system, in addition to the frequency and orbital location, other matters must also be considered. They include the effect of solar interference, loss of solar power, fuel required for station-keeping, and the need for an in-orbit spare. See The Geostationary Orbit, supra note 3, at 6.

41. See U.N. Doc. BP/7, at 5.

the sub-point could have an elevation angle of five or ten degrees. As the elevation angle of the earth station to the satellite decreases, the distance that a radio signal must travel through the earth's atmosphere from the earth station to the satellite increases. Because the atmosphere attenuates a signal, there are limits on elevation angles permitting communication with a geostationary satellite. These limits will vary with earth station and satellite power levels and other factors. Nevertheless, there will be an area limited by earth station elevation angle from which communication with the satellite is possible. That area is known as the area of visibility.[42]

The coverage area is the area, within the area of visibility, that is actually covered by the satellites communication antennas.[43] The service area is the portion of the coverage area in which the earth stations are actually located and for which service is actually provided. The service area can be as large as the coverage area, but no larger.

The area in the GSO in which a satellite may be located and still serve its service area is the satellite's service arc. If the service area is the same as the area of visibility then the satellite must be located at the central longitude of the service area and will have a narrow service arc. If the service area is much smaller than the area of

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42. Id. at 6.

43. Id.

visibility, then the satellite has location flexibility about the central longitude of the service area and will have a broad service arc.

Satellites serving large areas generally have a small service arc and less flexibility in positioning than satellites serving small areas. The service arc for common user systems, which typically have a large service area, can be quite narrow. In the INTELSAT Atlantic region, for example, satellite location cannot be varied by more than 1.5 degrees without reducing the elevation angle of the farthest earth stations to less than five degrees, which is the limit for satisfactory operation of the pertinent satellite.[44] The service arc is only slightly larger for the primary INTELSAT Indian and Pacific Ocean satellites; both have a service arc of three degrees.[45]

In summary, the GSO is a unique and critical resource for cost-effective satellite telecommunication. Although the orbit has a limited volume, physical saturation is not a significant constraint. The primary limitations on the orbit/spectrum resource derive not from the orbit, but from the radio frequency spectrum. Use of the radio frequency

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44. ITU, Report to the Second Session of the Conference: World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, at 13 (Geneva, 1985) [hereinafter cited as Report to the Second Session].

45. Id. Other factors, such as heavy rain, and possibly sand or dust storms may require an earth station elevation of greater than 10 degrees, thus reducing the service arc. Id. at 46.

spectrum by geostationary satellites is limited primarily by physical characteristics of radio waves, ITU regulatory restrictions, and mutual interference. Considerations relating to area of visibility coverage area, service area and service arc also place limitations on practical use of the orbit/spectrum resource, especially for common user systems.

B. <u>Satellite Technology: Past, Present, and Future</u>

An understanding of how satellites use the orbit/spectrum resource requires a basic knowledge of satellite technology. This section presents a simplified description of a satellite telecommunication system and of a typical satellite. It then reviews significant advances in satellite technology and their consequences by discussing as examples the INTELSAT series of satellites. Thereafter, other technological advances that may affect use of the orbit/spectrum resource are surveyed.

A satellite telecommunication system contains two major components: the satellite and the earth station. A system will involve at least two earth stations and may involve more than one satellite. The earth station transmits a signal on the assigned uplink frequency from its antenna to the satellite. This signal is picked up by the satellite's receiving antenna. A transponder then amplifies the signal, changes its frequency to the assigned downlink frequency, and transmits the signal from the satellite's transmitting antenna back to another earth station antenna. Satellite transmitting antennas are either global (covering all of the earth viewed from the satellite), hemispheric, or narrowly shaped spot beams.[46] Terrestrial telecommunication networks carry the signal between earth stations and end users.

A "standard" satellite is assigned 500 MHz for uplink and another 500 MHz for downlink in the conventional C band.[47] That total bandwidth is apportioned into units for use by individual transponders, each of which usually has a total bandwidth of 40 MHz. Within that bandwidth, each transponder can carry a certain amount of information.

The first commercial communications satellite, INTELSAT I (Early Bird), was launched in 1965. It used the C band and had a capacity of either 240 circuits or one TV channel. Antennas were confined to the heavy traffic corridor between Europe and North America. Only two earth stations could access the satellite at a time.[48] By 1967, INTELSAT II had the same capacity, but it had hemispheric antennas and multipoint access for earth stations in its coverage area.[49] The first INTELSAT III was launched only a year later, in 1968. It had a capacity five times greater than

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46. U.N. Doc. BP/7, _supra_ note 4, at 18. For a good overview of satellite telecommunication systems, _see generally_ S. Prentiss, Satellite Communications (1983).

47. U.N. Doc. BP/7, _supra_ note 4, at 18.

48. INTELSAT, Annual Report 39 (1978).

49. _Id_.

INTELSAT I or II, for a total of either 1,500 circuits or four TV channels, or combinations of both.[50]

The first INTELSAT IV was orbited in 1971. It could handle 4,000 circuits and two TV channels. It had two global receiving antennas, two global transmitting antennas, and for the first time, two steerable spot beam antennas that could focus beams to high density routes with greater power efficiency.[51] The first INTELSAT IV-A, launched in 1975, improved capacity to 6,000 circuits. This was accomplished by frequency reuse in the C band; the same frequencies were used by two antennas, one of which beamed east and the other west. Because there was wide geographical separation of service areas, interference was within acceptable limits.[52] Frequency reuse has become a major means of increasing use of the orbit/spectrum resource.[53]

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50. *Id.*

51. *Id.* at 23, 40.

52. *Id.* at 25, 40.

53. Frequency reuse in the north-south direction by satellites in the same region of geostationary arc is an important technical issue. Many developing countries are located much further south than the developed countries. If those countries can use the same frequencies, then access to the geostationary orbit/spectrum resource by the developing countries is not prevented due to use by developed countries. A 1981 U.N. Report concluded that "*if* North American and USSR domestic services use directional antennas, they can avoid interfering with South American or Asian services using satellites in the same arc." U.N. Doc. BP/7, *supra* note 4, at 19 (emphasis added). It thus appears that for frequency reuse of this nature to work, (1) the service areas should be widely separated, i.e., while the U.S. and Mexico may not qualify, Canada and Mexico should, and (2) the satellites must use spot (Cont. on next page)

The first INTELSAT V was orbited in 1980. It incorporated a number of technological advances that allowed its capacity to be significantly increased to an average of 15,000 circuits and two TV channels. This was the first INTELSAT satellite to use the Ku band in addition to the C band. The C band was reused four times, accomplished as before by east and west pointing hemispheric beams, and that reuse was then doubled through "polarization."[54] The Ku band was reused twice by use of east and west pointing spot beams.[55]

All five INTELSAT 6 satellites have a capacity of up to 120,000 circuits and three TV channels using the C and Ku bands. The C band is reused six times through two hemispheric beams and four zone beams using dual polarization. The Ku band is reused twice by east and west pointing spot beams.[56]

These dramatic increases in the capacity of INTELSAT satellites demonstrate the advances made in telecommunication science. They have been brought about primarily through spot

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beam antennas. See also Beakley, Satellite Communications, Growth and Future, Telecommunications 19, 23 (Nov. 1980); and Ackerman & Weinberger, Satellite Systems for Industrialized Nations--After WARC 79, in "A Collection of Technical Papers" 776 (paper presented at AIAA 8th Communications Satellite Systems Conference) (1980).

54. Electromagnetic waves can be polarized so that "two signals can be transmitted and received independently at the same frequency." U.N. Doc. BP/7, supra note 4, at 7.

55. INTELSAT, Annual Report 12 (1983) [hereinafter cited as 1983 INTELSAT Annual Report]. Reuse by polarization is not as practical at frequencies higher than 10 GHz due to effects of precipitation, which can depolarize the signals. U.N. Doc. BP/7, supra note 4, at 20.

56. INTELSAT, Annual Report 7 (1988) [hereinafter cited as 1988 INTELSAT Annual Report].

beams enabling frequency reuse, and the use of higher frequencies.

Significant advances, however, have also been made in other areas of satellite technology. Advances in antenna technology have been particularly noteworthy. The radiation pattern of the earth station's transmitting antenna is "one of the most important factors in determining the interference between systems of geostationary satellites."[57] A reduction in earth station sidelobe gain levels is "one of the most important factors determining the efficiency of use" of the GSO.[58] Improvement in antenna characteristics prompted the U.S. Federal Communication Commission (FCC) to reduce orbital spacing for C and Ku band systems.[59] Improved antenna technology has also led to smaller and less expensive earth station receiving antennas.[60] Nevertheless, an important general rule remains: for smaller earth station antennas,

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57. ITU, Recommendations and Reports of the CCIR, 1978: Fixed Service Using Communication Satellites, vol. IV, Rep. 453-2, at Sub Sect. 2.1 (1978) [hereinafter cited as Fixed Service CCIR Report].

58. See ITU, CCIR Report to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (WARC-ORB(2)), Executive Summary at 9 (Geneva, 1988) [hereinafter cited as CCIR ORB-88 Report].

59. Spacing in the C band was reduced from four to 2.5-3.0 degrees for existing systems, and to two degrees for future systems. First Report and Order, supra note 28, at 9-18. In other areas of the world, spacing for satellites in the C band is usually between three and five degrees. U.N. Doc. BP/7, supra note 4, at 17.

60. INTELSAT approved a standard earth station with an antenna diameter of about five meters. Lowndes, Intelsat
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either higher-power satellites[61] or higher frequencies are required.[62]

Other satellite technologies may result in further improvements in orbit/spectrum use. These include: increased use of spot beams,[63] intersatellite links,[64] use of even

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Alters Earth Station Standards, Aviation Week & Space Tech., Jan. 16, 1984, at 203. This earth station, however, has less performance than large INTELSAT antennas and is designed primarily for use in isolated areas of developing countries. Id.

61. A ten decibel increase in satellite Equivalent Isotropically Radiated Power (EIRP) can result in a significant reduction in earth station antenna size and a great reduction in cost. Application of Space Telecommunications for Development Service Prospects for the Rural Areas at 7, U.N. Doc. A/CONF.101/BP/IGO/15 (1982) [hereinafter cited as U.N. Doc. BP/15]. Higher power may also be effectively achieved locally through use of spot beams.

62. Generally, as the frequency increases the required size of the antenna decreases. Lanpher, ACTS: The Case for U.S. Investment in 30/20 GHz, Satellite Communications 22, 30 (May 1983).

63. Spot beams are an extension of the concept used in INTELSAT satellites where frequency reuse is obtained by using east and west pointing beams. Multiple spot beams allow focusing of a satellite's radiated power and frequency reuse by service to many geographically separated areas. Rothblatt, supra note 17. For a discussion of advanced antenna concepts such as contoured beams, multiple beam, and beam hopping antennas, see De Vincenti, Trends of the Antenna Systems On-Board New Generation Telecommunications Satellites (paper presented at 37th Cong. of the IAF, Oct. 1986). NASA's Advanced Communications Technology Satellite (ACTS) will use intersatellite laser links, mechanically steered antennas, baseband switching, and both fixed and hopped beam antennas. Lovell, Cuccia & Campanella, Communications Satellites in the Fiber Optics Era (paper presented at 37th Cong. of the IAF, Oct. 1986).

64. Satellite-to-satellite links can avoid multiple earth-to-satellite hops for very long distance communication, thereby increasing orbit/spectrum efficiency. They are now technically, but not economically, practical. Schaefer,
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higher frequencies,[65] use of large space platforms or satellite clusters,[66] digital signal transmission,[67] more

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Technology & the Future of Satellite Communications, Proc. 28th Colloq. on the L. of Outer Space 298, 299 (1985).

65. Satellites that operate in the 30/20 GHz bands are being tested in the United States, Japan, and Europe; the U.S. system may use twenty spot beams for extensive frequency reuse. Id.; see also Lowndes, Acts Test Linked to Lead in Technology, Aviation Week & Space Tech., Apr. 9, 1984, at 76.
Higher frequencies have certain distinct advantages other than not being in an intensively used area of the spectrum. They permit use of smaller earth station antennas, closer satellite spacing, and, because terrestrial services do not use the same frequencies, earth station antennas can be located in cities and even on customer premises. Unfortunately, higher frequencies have a strong drawback. They are subject to significant attenuation by rain, which requires diversity in earth station location, power boosting, or reduction of data rate. Wadsworth, Longitude-Reuse Plan Doubles Communications Satellite Capacity of Geostationary Arc, in "A Collection of Technical Papers" 198 (paper presented at AIAA 8th Communications Satellite Systems Conference)(1980). Nevertheless, advancing technology is permitting use of higher frequencies. The Japanese already are using 30/20 GHz frequencies for operational purposes; the ESA's Olympus satellite, scheduled for launch in 1989, will have a 30/20 GHz payload; and the Italian Space Agency plans to launch Italsat in 1990 or 1991 that will use 30/20 GHz and carry an experimental package using 40/50 GHz. See Pirard, Italsat: Moving to Ka-band, Satellite Communications 23-24 (July, 1988).

66. Large space platforms would allow interconnection of missions and offer significant economies of scale while conserving the orbit/spectrum resource through reuse of several frequency bands. Satellite clusters connected by intersatellite links offer similar advantages, but would not be as cost efficient. See NASA, The Next Step: Large Space Structures, NASA Facts NF-129 (1982); Carey, Developing the Concept of a Geostationary Platform, in "A Collection of Technical Papers" 192 (paper presented at AIAA 8th Communications Satellite System Conference)(1980); Comsat Clusters May Improve Coverage, Aviation Week & Space Tech., Sept. 3, 1984, at 233; Das, A Report on the Technical Aspects of Regulatory-Policy Issues of Geostationary Platforms (Study Conducted for the FCC, NTIS No. PB 82 142191, 1981); Pelton, Is There a Space Platform in INTELSAT's Future?, in "A Collection of Technical Papers" 408 (paper presented at AIAA 8th Communications Satellite System Conference)(1980).

67. Digital encoding has several advantages, including low (Cont. on next page)

efficient signal processing schemes,[68] use of laser transmissions,[69] and improved station-keeping and antenna pointing.[70]

Operating techniques that may lead to more efficient use of the orbit/spectrum resource are also being developed. These include more efficient combinations of satellites in orbit,[71] uplink/downlink reversal,[72] use of slightly

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power requirements for a fixed signal quality, amenability to bandwidth compression, and facilitation of signal processing on-board the satellite. U.N. Doc BP/7, supra note 4, at 21.

68. Time-division multiple access (TDMA), for example, makes a more efficient allocation of satellite capacity to earth terminals based upon demand than does frequency division multiple access (FDMA). Ackerman & Weinberger, supra note 53, at 776; U.N. Doc. BP/7, supra note 4, at 21.

69. Laser transmissions could effectively eliminate interference and allow reduced satellite spacing. Laser signals, however, are very sensitive to weather conditions and would require earth stations much more complex and expensive than those required for radio signals. The Georgetown Space Law Group, The Geostationary Orbit: Legal, Technical and Political Issues Surrounding Its Use in World Telecommunications, 16 Case W. Res. J. Int'l. L. 223, 232 (1984).

70. See CCIR ORB-88 Report, supra note 58, at 52 ("the current regulatory pointing error limit of 0.3 [degrees] should be reduced to 0.2 [degrees]".). See also, Weiss, Relating to the Efficiency of Utilization of the Geostationary Orbit/Spectrum in the Fixed-Satellite Service, 68 IEEE Proc. 1484, 1488 (1980).

71. Orbit/spectrum utilization is more efficient when satellites with similar characteristics are placed next to each other. Satellites may even be collocated if: their service areas are well separated; their characteristics are similar; and their administrations are willing to coordinate with each other. See Weiss, Maximizing Access to the Geostationary-Satellite Orbit, 53 Telecommunications J. 469, 473 (1986); Fixed Service CCIR Report, supra note 57, at Sub. Sect. 8.

72. With uplink-downlink reversal, in theory, a satellite
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inclined geosynchronous orbits,[73] and alternatives to use of the GSO such as use of eccentric twelve-hour orbits.[74]

Improvements in other areas of technology can also advance the efficient use of the GSO. Advances in launch vehicle technology resulting in increased payloads have permitted use of heavier satellites capable of a variety of missions.[75] Additionally, important developments in fiber optic technology have established cable as a viable alternative to satellites for many purposes.[76] Many telecommunication experts consider that there will be a natural shift from satellites to

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could be inserted in orbit between two satellites using the frequencies currently assigned for uplinks and downlinks. The new satellite would reverse those frequencies and use the standard uplink for its downlink, etc. New problems of interference, however, may result. U.N. Doc. BP/7, _supra_ note 4, at 20. This technique is not used by the United States due to potential sharing problems with space and terrestrial systems; it may be useful in other areas of the world where use of the spectrum by terrestrial services is not as intense. Fourth Notice of Inquiry, _supra_ note 28, at 26.

73. These plans would require use of more satellites and steerable earth station antennas, but could double or triple the capacity of the geostationary orbit. Ackerman & Weinberger, _supra_ note 53, at 777; Wadsworth, _supra_ note 65, at 198.

74. _See_ The Geostationary Orbit, _supra_ note 3, add. 4, at 5-7.

75. Edelson, Marsten & Morgan, _Greater Message Capacity for Satellites_, IEEE Spectrum 56, 62 (March, 1982).

76. Klass, _Prospect of Competition Jolting Intelsat Members_, Aviation Week & Space Tech., June 25, 1984, at 171, 177. One study projects that the satellite share of North Atlantic communications traffic will decline from fifty percent in 1986 to twenty-nine percent in the mid-1990's. Lowndes, _Pricing Strategy is Key to Satellite Market Share_, Aviation Week & Space Tech., Nov. 24, 1986, at 45.

fiber optic cables for certain services, thereby relieving some of the pressure on the orbit/spectrum resource.[77]

While technological advancement of satellite telecommunications has been impressive and will continue to expand the theoretical capacity of the orbit/spectrum resource, certain qualifications need to be mentioned. First, a constraint on the rapid implementation of new technology is the existence of very expensive facilities that use current technology. Their technological obsolescence would entail a significant economic cost. Second, although satellite technology for use above 15 GHz is changing rapidly and affects the state of the art, technology for use below 15 GHz is changing at a more moderate pace and mainly affects factors of cost or performance.[78] Finally, no discussion of satellite technology would be complete without stressing the complex interface between different components of satellite systems. For example, greater radiated power from a satellite may enable the use of smaller earth station antennas, but the use of such smaller antennas generally requires a wider spacing of satellites. Also, increases in satellite power can adversely affect terrestrial systems.[79]

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77. See Schaefer, supra note 64 at 299; and Lovell, Cuccia & Campanella, supra note 63.

78. See Fourth Notice of Inquiry, supra note 28, at 4.

79. UNISPACE 82, supra note 11, at 18. For additional information on communications satellite technology, see generally, Prentiss, supra note 46.

C. Capacity of the Orbit/Spectrum Resource

Having reviewed the physical and regulatory factors limiting use of the orbit/spectrum resource and the technological advances permitting its increasingly more efficient use, it is appropriate to examine how these factors interact to establish orbit/spectrum resource capacity.

A 1977 U.N. study examining the potential limits of the orbit/spectrum resource determined that "[i]t is impossible to state how many satellites can be accommodated in the geostationary orbit."[80] This conclusion results from the nature of the resource. Unlike most physical resources, such as coal or other minerals, the orbit/spectrum resource is not consumed by use. It is a reusable, non-depletable resource. Its capacity is limited mainly by technology, which advances continually. Furthermore, capacity depends on so many technical factors that its quantification at any certain time is very difficult.[81] A technical report prepared for the Second Session of the Space WARC attempted to quantify orbit capacity. Depending on satellite spacing and frequency reuse factors, the theoretical number of satellite coverage areas

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80. The Geostationary Orbit, supra note 3, at 1.

81. The major technical factors affecting orbit/spectrum utilization efficiency include: earth station antenna gain, satellite and earth station antenna sidelobe gain, permissible interference, and network dissimilarities. Weiss, supra note 71. Although specific capacity of the orbit/spectrum resource cannot be calculated, it is possible to examine a proposed satellite system, with all of its parameters defined, and determine whether it will significantly interfere with existing and planned systems. See The Geostationary Orbit, supra note 3, at 1. This is accomplished through procedures established by the ITU. See infra ch. 3.

had a "viable range" of 240 to 600.[82] Although numbers of satellite coverage areas do not equate with numbers of satellites, this wide range shows that calculating orbit capacity remains difficult. Nevertheless, the orbit/spectrum resource is demonstrably finite. Although its maximum capacity is impossible to specify, certain aspects of this resource are approaching their limits.

Concern has been repeatedly expressed that some of the more desirable dimensions of the resource are reaching saturation. A report prepared for the U.S. Congress as early as 1977 concluded that the C band "is the most highly used part of the spectrum and is, for all intents and purposes, already completely filled."[83] This report, however, was prepared prior to the 1979 allocation of expansion bands to the C band. A 1981 U.N. report on use of the GSO declared that certain areas of the orbit were "virtually full" with respect to the conventional C band.[84] In 1983, the FCC stated "we no longer warrant that we will be able to grant every orbital assignment that may be requested by qualified applicants."[85]

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82. See CCIR ORB-88 Report, supra note 58, at 61-63.

83. Smith, supra note 14, at 519.

84. U.N. Doc. BP/7, supra note 4, at 18.

85. FCC, Licensing of Space Stations in the Domestic Fixed-Satellite Service at 36, para. 76, FCC Doc. No. 81-704 (Apr. 27, 1983). An ITU Report stated "there are certain orbital segments and frequency bands that are already congested, and this may lead to coordination processes which (Cont. on next page)

In contrast to studies that detail the saturation of the conventional C band, other studies have concluded that the overall capacity of the orbit/spectrum resource is sufficient for at least the remainder of this century.[86] These studies, however, base their estimates on the use of advanced technologies, higher frequencies, and the C and Ku band expansion bands. Understandably, the results of studies based on the implementation of advanced technologies and the most efficient use of the orbit/spectrum resource will vary greatly from those based on use of current technology and use of the conventional C band.[87] Regardless of the technology employed, however, studies generally agree that at least for

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may be complex and costly." ITU, CCIR Preparatory Meeting (ORB-85), Joint Meeting, Doc. B/152 (Rev. 1), at 3 (July 17, 1984).

86. One study concluded that orbit/spectrum capacity would be "adequate to meet the foreseeable needs of the Fixed Satellite Service for the remainder of this century." Weinberger, Communication Satellite Spectrum Conservation Through Advanced Technology 30 (paper presented at EMC 80, International Wroclaw Symposium on Electro-magnetic Compatibility) (1980).

87. Typical of this relationship is a U.N. study that concludes that "foreseeable technology will permit the geostationary orbit to accommodate the growth of existing systems and the introduction of new systems for new users for at least the next two decades." U.N. Doc. BP/7, supra note 4, at 23-24. This study also acknowledged, however, that: (1) future systems may have to use advanced technology to gain access to the orbit; (2) use of advanced technologies may become mandatory; and (3) these technologies are probably going to be more expensive, and therefore the burdens imposed will "fall most heavily on the developing countries ...." Id. at 24.

the conventional C and Ku bands, some areas of the orbit/spectrum resource will be saturated by the end of the century.[88]

Saturation of the C band is of particular concern to developing countries. Technologically, it is the most well-developed band because it has been in use the longest. Its physical characteristics are also the most desirable for developing countries, which often have high rainfall areas that result in adverse propagation effects when higher frequencies are used.[89] Moreover, the C band is the most economical to use because the associated equipment, which is based on established technology, is generally less expensive than equipment based on newer technology. Fortunately, satellite systems designed for use of conventional C band technology can use the C band expansion bands "without significant cost to systems operating only in these bands."[90]

In addition to orbit/spectrum availability, developing nations are also concerned about economic factors. Use of new

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88. A NASA chartered study concluded that, by the early 1990's, U.S. capacity in the C and Ku band will be saturated. Studies Forecast Satcom Shortage, Aviation Week & Space Tech., Feb. 25, 1980, at 42; see also Lowndes, U.S. Facing Competition for Satellite Positions, Aviation Week & Space Tech., Mar. 8, 1982, at 103. Another author concluded that even with technological improvements, the capacity of the lower bands is finite and will be overtaken by growth in the late 1980's or mid-1990's. Lanpher, supra note 62, at 22.

89. See supra note 14; U.N. Doc. BP/15, supra note 61, at 12.

90. Report to the Second Session, supra note 44, at 5.

technologies and higher frequencies may involve additional costs. The concept of "saturation point" embodies the idea that at some point the incremental cost of obtaining more channels will rise dramatically.[91] Furthermore, the satellite systems most desirable for developing nations may not use the orbit/spectrum resource as efficiently as it could be used.[92]

D. Summary

The foregoing discussion demonstrates two important points. First, the concerns expressed by many developing countries before the Space WARC regarding the limitations of the orbit/spectrum resource and potential constraints on their future access to it had a basis in fact. The orbit/spectrum resource is becoming congested in the bands most desirable for use by developing countries. Second, the traditional reliance of developed nations on advancing technology to resolve the

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91. Lanpher, *supra* note 62, at 22.

92. Small, simple earth stations are necessary for use of satellites by rural, sparsely settled areas. *See* *Appropriate Modern Telecommunications Technology for Integrated Rural Development in Africa (AMTT/IRD)*, 49 Telecomm. J. 677, 682 (1982); *see generally* Pierce, *A Global-Domestic (GLODOM) Satellite System for Rural Development*, 46 Telecomm. J. 745 (1979). Such stations, however, require high power satellites, which do not use the orbit/spectrum resource in the most efficient manner. *See* UNISPACE 82 Report, *supra* note 11, at 18.

problems of orbit/spectrum resource limitations[93] was also well based and was supported by the history of the past twenty-five years. These two factors played important roles at the Space WARC.

93. During the Space WARC period, one U.S. spokesman stated that "[w]e believe technology will continue to improve to always make space for somebody." Rosenberg, Geosynchronous Orbit, Commercial Space 62 (Spring 1986).

CHAPTER 2

THE INSTITUTIONAL FRAMEWORK

This chapter reviews the major institutions and organizations involved with orbit/spectrum resource issues. Two institutions are examined in particular detail: the ITU, the forum for the Space WARC; and INTELSAT, one of the largest users of the geostationary orbit. Other institutions are covered in a more general manner, stressing aspects of particular relevance.

A. International Organizations

1. The International Telecommunication Union

The ITU is the sole specialized agency of the U.N. for international telecommunications.[1] It has the largest

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1. International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, Annex 3 (Nairobi, 1982)(ITU Doc. No. ISBN 42-61-01651-0) [hereinafter cited as 1982 ITU Convention]. The ITU is a direct descendant of the International Telegraph Union, which was formed in 1865. For a history of the ITU _see_ Leive, International Telecommunications and International Law: The Regulation of the Radio Spectrum (1970); and Glazer, _The Law-Making Treaties of the International Telecommunication Union Through Time and in Space_, 60 Mich. L.R. 269 (1962). _See also_ Noll, The Institutional Framework of the ITU and Its Various Approaches To International Telecommunication Law and Treaty Conferences, in "World Telecommunication Forum" (1985) (this conference was organized by the ITU and sponsored by the American Bar Assoc.)

membership of any international organization.[2] The general purposes of the ITU are:

> a) to maintain and extend international cooperation ... for the improvement and rational use of telecommunications of all kinds, as well as to promote and to offer technical assistance to developing countries in the field of telecommunications;
>
> b) to promote the development of technical facilities and their most efficient operation with a view to improving the efficiency of telecommunications services, increasing their usefulness and making them, so far as possible, generally available to the public;
>
> c) to harmonize the actions of nations in the attainment of those ends.[3]

To accomplish these purposes, certain duties are assigned to the ITU. Three of these are of particular relevance. These duties are to:

> a) effect allocation of the radio frequency spectrum and registration of radio frequency assignments in order to avoid harmful interference between radio stations of different countries;
>
> b) coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio frequency spectrum;
>
> c) foster international cooperation in the delivery of technical assistance to the developing countries and the creation, development and improvement of telecommunication equipment and networks in developing countries by every means at its disposal, including

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2. The ITU has over 165 member countries. Membership is limited to sovereign states. 1982 ITU Convention, supra note 1, art. 1. While the ITU fully recognizes the sovereign rights of each nation to regulate its telecommunications, the vast majority of nations have joined the ITU out of a realization that international cooperation in use of the radio frequency spectrum is necessary due to the potential of harmful interference from stations operated by other nations.

3. Id. art. 4(1).

through its participation in the relevant programs of the United Nations and the use of its own resources, as appropriate.[4]

Two international agreements define the organization and operations of the ITU: the Convention,[5] and the Regulations.[6] The Convention is the basic instrument, or constitution, of the ITU.[7] It creates the ITU as an international legal entity, fixes its structure, defines its purposes and membership, establishes its relationship with the U.N. and other international organizations, and sets forth certain general provisions relating to telecommunications.

The Radio Regulations are extremely detailed provisions of over 1,700 pages, which are created or revised at Administrative Conferences.[8] The provisions of most importance to the Space WARC are Chapters III and IV. Chapter III covers the allocation of the frequency spectrum to various services and general rules for assignment and use of frequencies. The very important Table of Frequency Allocations is found there. Chapter IV sets forth the rules for coordination, notification, and registration of

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4. *Id.* art. 4(2).

5. *Id.*

6. ITU, *Radio Regulations* (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations]. In addition to the Radio Regulations, there are also Telephone and Telegraph Regulations. Only the Radio Regulations, however, are directly related to issues which were addressed at the Space WARC.

7. *See* Noll, *supra* note 1, at 20-22.

8. *Id.* at 23-24.

frequencies.[9] These two chapters have been called "the heart of the Regulations,"[10] and have been a source of controversy since the 1947 Atlantic City Conferences. The Radio Regulations, like the Convention, is a treaty that binds the governments that have approved them.[11]

The ITU is organized into four permanent bodies: the Secretariat; the International Frequency Registration Board (IFRB); the International Radio Consultative Committee (CCIR); and the International Telegraph and Telephone Consultative Committee (CCITT). Three other bodies are convened periodically: the Plenipotentiary Conference; the Administrative Council; and Administrative Conferences.

The Plenipotentiary Conference is the "supreme organ" of the ITU.[12] It is composed of the delegations of ITU member countries.[13] These Conferences are supposed to be convened

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9. Part A of the Regulations also includes terminology and definitions, rules regarding measures against interference, administrative provisions for stations, and technical characteristics of stations. Part B contains provisions relating to groups of services and to specific services and stations. The Radio Regulations also contain 44 appendices, which supplement certain areas of Parts A and B. Allotment plans that have been approved are also included in the appendix. 1982 Radio Regulations, _supra_ note 6.

10. G. Codding & A. Rutkowski, The International Telecommunications Union In A Changing World 215 (1982).

11. Mili, _International Jurisdiction in Telecommunication Affairs_, 40 Telecommunications J. 122, 181 & 287 (1973).

12. 1982 ITU Convention, _supra_ note 1, art. 5(1).

13. _Id._ art. 6.1.

every five to six years.[14] The Plenipotentiary Conference is the "political organ" of the ITU.[15] It determines the general policies of the ITU, sets guidelines for the other ITU bodies to follow between Conferences, and is the only ITU body empowered to revise the ITU Convention.[16] All decisions of the Conference are by majority vote.[17]

Administrative Conferences are held either at the world level or at the regional level in one of the three ITU Regions.[18] These Conferences formulate the detailed Regulations governing use of the geostationary orbit and the radio spectrum. They are therefore of great practical importance. Conferences also may adopt Recommendations and Resolutions regarding the establishment of procedures, study of certain matters, or convening of other Conferences.

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14. Id. This schedule is not always met. The 1982 Nairobi Conference was held nine years after the preceding Malaga-Toremolinos Conference. At Nairobi, however, Article 6 was amended to specifically state that the interval between Conferences will not exceed six years. The next Plenipotentiary Conference is scheduled for June 1989, in Nice, France.

15. Mili, supra note 11, at 176.

16. 1982 ITU Convention, supra note 1, art. 6.2. Other important functions of the Plenipotentiary Conference include the conclusion or revision of agreements between the ITU and other international organizations; establishment of the ITU budget and fiscal limits; election of the Secretary-General, his Deputy, and members of the IFRB; and the handling of other telecommunications questions as necessary. Id.

17. Id. art. 77.14.

18. Id. art. 7.1. The three ITU Regions are: (1) Europe, Africa and the USSR; (2) Australia, Asia and the south Pacific; and (3) the Americas. 1982 Radio Regulations, supra note 6, art. 8, Nos. 393-95.

Recommendations and Resolutions, in contrast to Regulations, are not legally binding.[19] A Regional Administrative Radio Conference (RARC) may discuss only telecommunications issues of a regional nature, and its decisions must conform with the Regulations.[20] The agenda of a World Administrative Radio Conference (WARC) may include the complete or partial revision of the Regulations.[21]

One of the important functions of a WARC is the allocation of portions of the radio spectrum to the different telecommunication services. Frequencies may be allocated to a service on an exclusive or shared basis. If the allocation is on a shared basis, two services may have equal rights, or there may be a primary and secondary service. The allocation of frequencies is so important that it has been referred to as the "legislative process" of the ITU.[22]

Since World War II, there have been three WARCs with broad jurisdiction over the Regulations. These WARCs were held in 1947 at Atlantic City, and in 1959 and 1979 at Geneva. Such general WARCs are rare, and the next one is not expected until 1999. Specialized conferences with limited jurisdiction over

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19. See, Noll, supra note 1, at 25. However, if a Radio Regulation refers to a Resolution or Recommendation, the substance of the Resolution or Recommendation could be viewed as incorporated by reference. Id. at 26. See also Christol, The International Telecommunication Union and the International Law of Outer Space, Proc. 22d Colloq. on the L. of Outer Space 35, 42 (1977).

20. 1982 ITU Convention, supra note 1, art. 7.3(2).

21. Id. art. 7.

22. Leive, supra note 1, at 19.

parts of the Regulations are much more frequent. Specialized Conferences which have affected space telecommunications are: the Extraordinary Administrative Radio Conference of 1963; the 1971 WARC for Space Telecommunications; the 1974 WARC for Maritime Mobile Telecommunications; the 1977 WARC for Broadcast Satellite Service; the 1983 RARC for Broadcast Satellite Service;[23] and, of course, the Space WARC.[24]

Conference decisions are made by majority vote of the ITU delegates attending, with each nation having one vote.[25] In addition to ITU members, certain observers may attend the conference in an advisory capacity. These include observers from the U.N., certain regional and international organizations, and recognized private operating agencies.[26]

Once decisions have been made, delegations are to conform to them as far as possible.[27] However, a Reservation may be made to a decision if such decision would prevent a government

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23. For a discussion of these Conferences, see infra ch. 4.

24. An Administrative Conference may be called for by: (1) a Plenipotentiary Conference; (2) a recommendation of a previous WARC if approved by the Administrative Council; (3) the request of one-quarter of the members of the Union; or (4) a proposal by the Administrative Council. 1982 ITU Convention, supra note 1, art. 54.2(1). The Space WARC was called for by the 1979 WARC and approved by the Administrative Council.

25. Id. art. 77.14.

26. Id. art. 61.3.

27. Id. art. 77.16(1).

from approving the Regulations.[28] The ability to make Reservations enables all governments to sign the Final Acts of a Conference even if they disagree with certain provisions and may not follow them.[29]

The other periodically convened body of the ITU is the Administrative Council. The Council is composed of 41 members elected by the Plenipotentiary Conference "with due regard for equitable distribution of the seats ... among all regions of the world."[30] It generally meets once a year for about three weeks. It acts on behalf of the Plenipotentiary Conference during the interval between Conferences.[31]

The Secretariat is a permanent and continuing body of the ITU. It is headed by a Secretary-General who ensures the administrative and financial regulations adopted by the

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28. Id. art. 77.16(2). In a Plenipotentiary Conference, Reservations may also be made to a change in the Convention. Id.

29. For a further discussion of the Reservation process, see Codding and Rutkowski, supra note 10, at 211-213 & 217-218.

30. 1982 ITU Convention, supra note 1, art. 8.1(1).

31. Id. art. 8.3. The Council has three main duties. First, it facilitates implementation of the Convention, Regulations, and decisions of various ITU conferences, and performs any duties assigned by the Plenipotentiary Conference. Second, it ensures efficient coordination of ITU work and exercises financial control over permanent ITU organs. Finally, it determines the technical assistance policy and promotes international cooperation for provision of technical assistance to the developing countries. Id. art. 8. See also Codding & Rutkowski, supra note 10, at 139-158.

Administrative Council are carried out.[32] The Secretariat is responsible for a variety of functions that are crucial to the smooth functioning of the ITU.[33]

The other three permanent bodies of the ITU are the IFRB, the CCIR, and the CCITT. These bodies perform very important technical functions. The CCIs are the "real technical organs of the ITU" and constitute its "nucleus."[34] The CCITT, being concerned with telephone and telegraph matters, was not significantly involved in Space WARC issues. The CCIR, however, was very involved.

The duties of the CCIR are to "study technical and operating questions relating specifically to radio communication and to issue recommendations on them."[35] In conducting its studies the CCIR must pay "due attention" to issues regarding the "establishment, development and improvement of telecommunications in developing countries

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32. 1982 ITU Convention, supra note 1, art. 9.1(3).

33. The Secretariat provides support services for Plenipotentiary and Administrative Conferences, and for meetings of the Administrative Council and Consultative Committees. It coordinates the flow of information dealing with the work of the ITU and the international telecommunications community in general. Additionally, it is the daily contact point between the ITU and its members.

34. Mili, supra note 11, at 562.

35. 1982 ITU Convention, supra note 1, art. 11.1(3); see also Role of the CCIR in Space Telecommunications Technology, U.N. Doc. 101/BP/IGO/14 (1982).

...."[36] Studies conducted by the CCIR serve as the basis for the technical decisions of the Administrative Conferences, and often aid the work of the IFRB. The CCIR consists of a Plenary Assembly with a Director and a specialized staff,[37] and study groups set up by the Assembly.[38] The Study Groups are assigned technical questions by the Assembly. They generally form working parties to make in-depth examinations of different aspects of the questions assigned, and they prepare reports and recommendations for the Assembly. Recommendations approved by the Plenary Assembly, while not legally binding on ITU members, are "universally recognized and respected."[39] Moreover, CCIR recommendations are important to the ITU law-making process because they form the basis for the regulations ultimately adopted by the Administrative Conferences.

Of particular importance to the Space WARC was Study Group 4 on "Fixed Service Using Communication Satellites," and its Interim Working Party (IWP) 4/1 on "Technical Considerations Affecting the Efficient Use of the Geostationary Orbit." IWP 4/1 had primary responsibility for the CCIR's preparation for

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36. 1982 ITU Convention, supra note 1, art. 11.1(3).

37. Id. art. 11.3(c).

38. Id. arts. 11.3(b) & 72.

39. Mili, supra note 11, at 565.

the Space WARC.[40] It prepared a report for the first session covering technical aspects and a range of possible plans to ensure equitable access to the geostationary orbit/spectrum resource.[41] It also prepared an extensive report to the Second Session of the Space WARC.[42]

Participation in CCIR activities is open to a wide variety of interested groups. These include all ITU member countries, private operating agencies recognized and approved by an ITU member, international and regional telecommunication organizations, and scientific or industrial organizations engaged in the study of telecommunications problems or the manufacture of telecommunications equipment.[43] All organizations other than members serve in an advisory capacity

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40. The 1979 WARC invited the CCIR to conduct preparatory studies and provide the first session of the Space WARC with technical information "concerning principles, criteria and technical parameters including those required for planning space services ...." 1982 Radio Regulations, supra note 6, Res. No. 3 (BP).

41. ITU, Report of the CCIR Conference Preparatory Meeting (CPM), Joint Meeting, Study Groups 1, 2, 4, 5, 7, 8, 9, 10 and 11 Geneva, 25 June-20 July, 1984, (1984) (in 2 Parts) [hereinafter cited as CPM Report].

42. ITU, CCIR Report to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (WARC-ORB(2)) (Geneva, 1988).

43. 1982 ITU Convention, supra note 1, art. 68.

only, except that a private operating agency may act on behalf of a member if the member so informs the CCIR.[44]

The IFRB is the last of the permanent bodies of the ITU. It is primarily involved with application of the Regulations during the registration process through which nations receive rights to interference-free use of radio frequencies and geostationary orbit locations.[45] The main responsibility of the Board is the orderly recording in the Master International Frequency Register of frequency assignments and of positions assigned satellites in the geostationary orbit.[46] Its duties also include: (1) furnishing advice to ITU members "with a

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44. Id. art. 68. Although CCIR studies and recommendations are of great importance, its composition and working methods have been criticized. In the Plenary Assemblies, and especially the working groups, there is a lack of significant participation by developing countries. This is laid to two factors. First, due to the large number of meetings and their highly technical nature, developing countries often lack a sufficient number of experts to participate. Second, where such technical expertise exists, the financial resources to send representatives may not. While solutions to this problem have been proposed, the situation remains unchanged. This has sometimes led to suspicion by developing countries of CCIR work products. At the Space WARC, however, such suspicion was not evident. For a discussion of this problem and proposed solutions, see Codding & Rutkowski, supra note 10, at 102-105; and Jakhu, The Legal Regime of the Geostationary Orbit, 248-250 (1983) (Doctoral Dissertation on file at the McGill University, Institute of Air & Space Law).

45. This process is discussed, infra ch. 3.

46. 1982 ITU Convention, supra note 1, art. 10.4(a) & (b). In accomplishing the task of recording frequencies and GSO positions, the IFRB must make findings. These findings determine, to a large extent, the legal status of the information recorded, and require interpretation of the ITU Convention and the Radio Regulations. In this respect the IFRB functions in a quasi-judicial manner. In performing this function, the Board is guided by its Rules of Procedure and Technical Standards. The Standards are based on relevant (Cont. on next page)

view to the equitable, effective and economical use of the geostationary satellite orbit, taking into account the needs of Members requiring assistance, the specific needs of developing countries, as well as the special geographical situation of particular countries";[47] (2) performing other duties related to use of the geostationary orbit/spectrum resource that are assigned by an ITU Conference or by the Administrative Council;[48] and (3) providing technical assistance in preparation for radio conferences to other ITU organs and developing countries.[49]

The IFRB has increasingly undertaken activities of a developmental assistance nature. It provides advice to nations on their frequency management problems, including advice on which frequencies and equipment would best meet

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Radio Regulations, decisions of Administrative Conferences, Recommendations of the CCIR, and the state of the radio art. 1982 Radio Regulations, supra note 6, art. 13, No. 1582. The IFRB Rules of Procedure were published at the Second Session. See ITU, WARC-ORB-88, Doc. 19.

47. 1982 ITU Convention, supra note 1, art. 10.3(c).

48. Id. art. 10.3(d). An example of such other duties is the invitation to the IFRB by the 1979 WARC to participate in the ground work for the First Session by carrying out technical preparations, and by preparing a report on the operation of relevant provisions of the Radio Regulations and difficulties members may have incurred in gaining access to the geostationary orbit/spectrum resource. 1982 Radio Regulations, supra note 6, Res. No. 3. That report was presented at the First Session. See ITU, WARC-ORB-85, Doc. 19. See also ITU, World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, Administrative Council Resolution No. 895, at Invites 1 (1983) (copy attached at appendix A) [hereinafter cited as Space WARC Agenda].

49. 1982 ITU Convention, supra note 1, art. 10.3(e).

their needs. Additionally, due to the increasing complexity of the Radio Regulations, the IFRB holds periodic seminars to assist developing countries in their understanding of the ITU and the Regulations. Funds from the U.N. Development Program (UNDP) have been made available to increase participation by the developing countries in these seminars.[50]

The IFRB is composed of five individuals who are elected by the Plenipotentiary Conference in such a manner as to ensure "equitable distribution amongst the regions of the world."[51] This provides for a distribution of power between the developed and developing countries. Board members must be thoroughly qualified in the radio field and have experience in the assignment and use of frequencies.[52] Members of the IFRB serve not as representatives of their countries or regions, but as "custodians of an international public trust."[53] Due to its independent character, equitable representation, and specific duties of assisting developing countries, the Board is perceived by many developing countries as a protector of their interests.[54]

At the Space WARC, developing countries frequently asked for IFRB interpretation of various proposals. In essence,

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50. Codding & Rutkowski, _supra_ note 10, at 125-126.

51. 1982 ITU Convention, _supra_ note 1, art. 10.1.

52. _Id_. art. 57.1(1).

53. _Id_. art. 10.2. ITU member countries must respect the independent nature of the IFRB and not attempt to instruct or influence Board members. _Id_. art. 57.4.

54. Codding & Rutkowski, _supra_ note 10, at 122.

they sought to use the technical expertise of the Board to compensate for the relative lack of expertise within the delegations of some developing countries. Therefore, the Board had significant influence at the Space WARC.

2. Other United Nations Bodies

In addition to the ITU, several other U.N. organs are involved with issues relating to use of the geostationary orbit/spectrum resource. The General Assembly has elaborated principles on the use of outer space in numerous Resolutions.[55] In 1961, the General Assembly unanimously passed a Resolution expressing the belief that "communication by means of satellites should be available to the nations of the world as soon as practicable on a global and non-discriminatory basis ...."[56] Other Resolutions of similar import have been passed.[57]

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55. The precise legal effect of U.N. General Assembly Resolutions is unsettled. See N. M. Matte, Aerospace Law, Telecommunications Satellites 30 (1982). Nevertheless, Resolutions have significant political importance at the very least.

56. G.A. Res. 1721 (XVI) of Dec. 20, 1961, "International Co-operation in the Peaceful Uses of Outer Space."

57. Resolution No. 2601 reaffirmed the principle of universal accessibility to communications satellites and called upon states negotiating international agreements in this field to bear that principle in mind. G.A. Res. 2601 (1960). Resolution No. 1963 recognized the potential contribution of communications satellites to the expansion of global telecommunications facilities and the possibilities they offer for increasing information flow and furthering U.N. objectives. G.A. Res. 1963 (1963).

The U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) is the only intergovernmental body concerned exclusively with all aspects of the peaceful uses of outer space. Its Legal Sub-Committee has been responsible for the drafting of most of the international agreements relating to outer space.[58] One issue on the COPUOS agenda is the definition and delimitation of outer space including questions relating to the geostationary orbit. COPUOS in recent years, however, has been ineffective in resolving issues on its agenda, and serious doubts have been expressed about its ability to cope with the legal questions arising from future outer space activities.[59]

The U.N. Educational, Scientific and Cultural Organization (UNESCO) is also involved with issues related to the geostationary orbit/spectrum resource. It is one of the chief forums where developing countries have been making efforts toward the establishment of a "New International Communications and Information Order."[60] It has also conducted studies in developing countries relating to the use

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58. For detailed examination of the part played by COPUOS in the drafting of agreements, see Christol, The Modern International Law of Outer Space (1982).

59. Matte, Institutional Arrangements for Space Activities: An Appraisal, Proc. 24th Colloq. on the L. of Outer Space 211 (1981).

60. See generally, UNESCO, Many Voices One World (1980) (Report by the International Commission for the Study of Communication Problems).

of satellite communications to assist in educational and cultural development.[61]

The U.N. Development Program (UNDP) provides financial assistance to developing countries for certain telecommunication projects and for feasibility, fellowship, and training allowances. Assistance for projects is only available to a requesting country that is capable and willing to contribute to the total cost; UNDP funds are unavailable to countries too poor to spend any of their money. Moreover, requests for financial assistance far exceed the available funds.[62]

3. International Common User Organizations

Most nations using satellites for telecommunications do so through participation in "common user organizations."[63] While some of those nations have domestic systems of their own, they use common user organizations for most of their

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61. See N. M. Matte, Aerospace Law: From Scientific Exploration to Commercial Utilization 42-3 (1977).

62. Matte, supra note 55, at 39-40.

63. A common user organization is "an organization of two or more ITU Administrations that jointly own and operate a satellite system for their international and/or domestic requirements." W. Dizard, Space WARC and the Role of International Satellite Networks 15 (1984). Most common user organizations are designed to weigh the interests of their members at least proportionately, if not equally. See Levy, Institutional Perspectives on the Allocation of Space Orbital Resources: The ITU, Common User Satellite Systems and Beyond, 16 Case W. Res. J. Int'l L. 171, 178 (1984). Common user organizations are also referred to as Multi Administration Systems, but their definitions are not necessarily the same. See infra ch. 6, notes 61-65 and accompanying text.

international telecommunication needs. Although common user organizations will remain "the major providers of satellite services now and in the future"[64] they are not eligible for ITU membership and have "no direct administrative or legal representation within the ITU."[65] Common user organizations may attend Administrative Conferences and CCIR meetings as observers, and their interests in the coordination and notification processes[66] are handled by individual nations known as "Notifying Administrations."[67] At the Space WARC, common user organizations were active observers and used their influence over member nations to further their interests. The largest common user organization is INTELSAT.

a. INTELSAT

INTELSAT, the International Telecommunications Satellite Organization, was established in 1964 by the U.S. and ten

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64. Levy, _supra_ note 63, at 176.

65. Dizard, _supra_ note 63, at 9. ITU membership is limited to nations. _See supra_ note 2. The paradox of INTELSAT, the largest single user of the geostationary orbit/spectrum resource, not being eligible for ITU membership has been commented on. Jakhu recommends creation of an "associate membership" category in the ITU for international organizations such as INTELSAT. Jakhu, _supra_ note 44, at 224.

66. These processes are addressed _infra_ ch. 3.

67. Dizard, _supra_ note 63, at 9. For example, all INTELSAT satellites are registered with the IFRB by the U.S. on behalf of INTELSAT.

other nations.[68] The tremendous success of INTELSAT has done much to promote the use of satellites for telecommunications throughout the world.[69] INTELSAT currently consists of 114 member countries, and over 172 nations use INTELSAT satellites.[70] INTELSAT provides almost two-thirds of the world's public international telecommunication services, as well as domestic telecommunication services for many countries.[71] It has thirteen operational satellites in the geostationary orbit and plans for more.[72]

INTELSAT created a new form of international organization. This form is fixed by two international agreements. The INTELSAT Agreement is signed by sovereign states,[73] whereas the Operating Agreement is signed either by governments or by their designated public or private telecommunications

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68. Leive, Essential Features of INTELSAT: Applications for the Future, 9 J. Space L. 45, 46 (1981).

69. For a history of the development of INTELSAT *see* Snow, International Commercial Satellite Communications, Economic and Political Issues of the First Decade of INTELSAT (1976).

70. INTELSAT, Annual Report, at 1 (1988) [hereinafter cited as Annual Report].

71. In 1988 INTELSAT was providing domestic service for over 30 nations. *Id.* at 3.

72. *Id.* at 2.

73. Agreement Relating to the International Telecommunications Satellite Organization, Aug, 20, 1971, 23 U.S.T. 3813, T.I.A.S. No. 7532 [hereinafter cited as INTELSAT Agreement]. This Agreement sets forth the basic provisions, principles, and structure of the organization.

entities.[74] These agreements establish INTELSAT as both an international governmental organization and an international corporation functioning on a commercial basis.[75] Each INTELSAT Signatory contributes to the capital requirements and receives a return on its investment. Contribution and return

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74. Operating Agreement Relating to the International Telecommunications Satellite Organization, Aug. 20, 1971, T.I.A.S. No. 7532. The Operating Agreement sets forth detailed financial and technical provisions. In most countries, the state exercises monopoly control over telecommunications through a government department or ministry of "Post, Telegraph and Telephone" (PTT). The Operating Agreement is generally signed for such countries by their PTT. In the U.S., government monopoly over telecommunications does not exist; the Communications Satellite Corporation (COMSAT) signed the Operating Agreement for the U.S.

75. INTELSAT is organized into four bodies. The Assembly of Parties consists of the states party to the INTELSAT Agreement. Each state has one equal vote. The Assembly meets every two years and primarily considers aspects of interest to members as sovereign states. INTELSAT Agreement, _supra_ note 73, art. VII.

The Meeting of Signatories consists of the Signatories to the Operating Agreement. It meets yearly and considers commercial matters of interest to the Signatories as investors. Each Signatory has one equal vote. _Id._ art. VIII.

The Board of Governors is the principal managing body of INTELSAT. It meets at least four times a year and has responsibility for the "design, development, construction, establishment, operating and maintenance of the INTELSAT space segment and ... for carrying out any other activities which are undertaken by INTELSAT." _Id._ art. X. It is composed of Signatories with an investment share, individually or in groups, which is not less than a certain, annually determined minimum level. The membership criteria are such that all regions of the world have a representative. The Board uses a weighted voting procedure. _Id._

Finally, there is an Executive Organ headed by a Director General who is the INTELSAT Chief Executive and legal representative. _Id._ art. XI. The Executive Organ is located in Washington, D.C., and manages the daily operations of INTELSAT.

is determined by the concept of the "investment share." A Signatory's investment share is proportional to its utilization of the INTELSAT space segment.[76]

INTELSAT's main objective is to provide the space segment required for international public telecommunication services to all areas of the world on a commercial basis.[77] INTELSAT earth stations are owned and operated by the local entities, but INTELSAT establishes detailed specifications and operating rules.[78] Domestic telecommunication services may be furnished so long as they do not impair INTELSAT's main objective of providing international service.[79]

The practice of leasing spare satellite transponder capacity to states for domestic telecommunications started in 1975 with service to Algeria.[80] This practice expanded and

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76. Id. art. 6(a). In 1988 each Signatory received a 13.5% return on its investment share. Annual Report, supra note 70, at 38.

77. INTELSAT Agreement, supra note 73, art. III(a). The "space segment" consists of "the telecommunications satellites, and the tracking, telemetry, command, control, monitoring and related facilities and equipment required to support the operation of these satellites ...." Id. art. I(h).

78. Leive, The Intelsat Arrangements, in "Legal Implications of Remote Sensing From Outer Space," at 167 (Matte & DeSaussure ed. 1976).

79. INTELSAT Agreement, supra note 73, art. III(c).

80. Pelton, Communications: Developing Nations Faster, Satellite Communications 21 (July, 1984).

over 30 states, mainly developing countries, now use INTELSAT for domestic telecommunications.[81]

Originally, INTELSAT would not invest in new space segment resources to satisfy the demand for increased domestic capacity.[82] In the 1980s, however, INTELSAT took actions that have led to improved domestic telecommunication services for developing nations. These actions include Vista, a service for isolated and remote communities with low traffic requirements, and other specialized services.[83]

Another INTELSAT program that has proven beneficial to developing countries is the Assistance and Development Program. This program, which started in 1978, provides assistance to INTELSAT Signatories and users on the design, planning, construction and operation of earth station facilities. Over 100 countries have benefited from this program.[84]

Members of INTELSAT are not totally free to use or establish domestic or international satellite telecommunications systems of their own. A certain "priority" has been granted to the INTELSAT system by its members. In the Preamble to the INTELSAT Agreement, the parties expressed

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81. Annual Report, *supra* note 70, at 3.

82. Kelley, *The Present Status and Future Development of the INTELSAT Leased System*, in "A Collection of Technical Papers" 419, 422, (paper presented at AIAA 8th Communications Satellite Conference)(1980).

83. *See* Annual Report, *supra* note 70.

84. *Id.* at 31.

the goal of forming a single global satellite telecommunications system. To achieve that goal, members accepted certain limitations on their right to establish or use other satellite services, and they must consult with INTELSAT before establishing a satellite system.[85]

As a considerable user of the geostationary orbit/spectrum resource, INTELSAT had important interests at stake in the Space WARC. INTELSAT provided formal inputs to the ITU throughout the period of the Space WARC.[86] INTELSAT attended the Space WARC as an observer and wielded considerable strength through its developing country members.[87]

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85. Three classes of satellite telecommunications services are recognized in the INTELSAT Agreement: domestic, international, and specialized. Specialized services include space research, meteorological, and earth resource services. INTELSAT Agreement, <u>supra</u> note 73, art. 1(1). Since the primary INTELSAT objective is the provision of international services, limitations on the establishment or use of non-INTELSAT satellites for domestic or specialized service are the least restrictive. The member must merely consult with INTELSAT to ensure "technical compatibility" with the existing and planned INTELSAT space segment. <u>Id</u>. art. XIV(c) & (e). This consultation is aimed at assessing potential interference to the INTELSAT system. Galante, Intellink Vol. 1, No. 6, at 9 (1980). On the other hand, a member desiring to establish or use a non-INTELSAT satellite for international service must consult to ensure technical compatibility and to ensure such action will not cause "significant economic harm" to the INTELSAT system. INTELSAT Agreement, <u>supra</u> note 73, art. XIV(d).

86. <u>See</u> INTELSAT, Contributions to the Conference Preparatory Meeting (CPM), Doc. BG Temp. 85-115 (Feb. 29, 1984); and Annual Report, <u>supra</u> note 70, at 37.

87. One INTELSAT report that was sent to Signatories and users, states that "the objective of the INTELSAT System (Cont. on next page)

b. INTERSPUTNIK

In 1971, the USSR and eight other socialist states entered into an agreement creating INTERSPUTNIK[88] as an "international system of communications via satellites."[89] The USSR did not join INTELSAT in 1964 for a number of political reasons.[90] While any country may become a member of INTERSPUTNIK, few additional states have joined this organization.[91] As with INTELSAT, member states or their recognized operating agencies own their earth stations, and INTERSPUTNIK supplies the space segment.[92] The space

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Members and Users at the Conference should be to ensure the availability to their system, under any planning method agreed upon at the WARC, of the adequate orbit and spectrum resources which are necessary for the orderly growth and development of the INTELSAT System". INTELSAT, WARC-ORB 85/88, 3, Ref. A/84-34 (Oct. 18, 1984).

88. Agreement on the Establishment of the INTERSPUTNIK International System and Organization of Space Communications, Nov. 15, 1971, U.N.T.S. 862:3 [hereinafter cited as the INTERSPUTNIK Agreement].

89. Id. art. 4(1).

90. See Matte, supra note 55, at 141-2. The USSR still is not an INTELSAT member. However, the USSR has entered into a Memorandum of Understanding with INTELSAT that establishes the basis for the USSR's use of the INTELSAT space segment. See Soviet Signs Pact with INTELSAT, Washington Post, Aug. 28, 1985, at G1.

91. INTERSPUTNIK Agreement, supra note 88, art. 22. There are 15 members of Intersputnik. See N. Johnson, The Soviet Year In Space 1987, at 41 (1988).

92. Id. art. 4.

segment may be owned by INTERSPUTNIK or by members who possess such systems.[93]

The first satellites used by INTERSPUTNIK were Molniya satellites of the USSR, on which INTERSPUTNIK leased communication channels. These satellites do not use the geostationary orbit.[94] In the 1980s, the USSR started using geostationary satellites for its communication needs, and INTERSPUTNIK has leased channels on them.[95]

The INTERSPUTNIK Agreement requires INTERSPUTNIK to coordinate its activities with the ITU and to cooperate with other organizations involved with satellite telecommunications.[96] A representative from INTERSPUTNIK attended the Space WARC as an observer. Although the Soviet Union had considerable influence at the Space WARC with its allies, INTERSPUTNIK had no detectable independent influence.

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93. Id.

94. N. Johnson, The Soviet Year In Space: 1983, at 17 (1984). Molniya satellites use Molniya orbits, which have low perigees (400-600 km) and high apogees (39,000-40,000 km). Due to their orbital mechanics, they spend over 75% of their orbital period high over the northern hemisphere. This permits long intervals of communication in that area. Id. at 17. Geostationary satellites are unable to serve large areas of the USSR because of their high latitudes. See supra ch. 1, note 5 and accompanying text.

95. U.N., Multilateral Intergovernmental Co-Operation in Space Activities, U.N. Doc. A/CONF.101/BP/10, at 33 (1981) [hereinafter cited as BP/10]. INTERSPUTNIK currently leases transponders on two "statsionar" satellites in the GSO. UNESCO, Satellites For Education and Development 9 (1985).

96. INTERSPUTNIK Agreement, supra note 88, art. 7.

c. INMARSAT

The Convention establishing the International Maritime Satellite Organization (INMARSAT) was signed in 1976.[97] It came into force in 1979,[98] and INMARSAT became operational in February, 1982.[99] The purpose of INMARSAT is to provide the space segment for improved maritime communications and, as practicable, aeronautical communications.[100] INMARSAT is a hybrid organization similar to INTELSAT and must operate on "a sound economic and financial basis ...."[101] Membership in INMARSAT is open to all nations,[102] and 54 states including the U.S. and USSR are members.[103] Moreover, the INMARSAT space segment is available for use by ships of all nations,

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97. Convention on the International Maritime Satellite Organization, Sept. 1976, 31 U.S.T. 1, T.I.A.S. No. 9605, 15 ILM 1052 [hereinafter cited as INMARSAT Convention]. As with INTELSAT, the Convention is supplemented by the Operating Agreement on the International Maritime Satellite Organization which may be signed by a government or its "competent entity." _Id_. art. 2.

98. Matte, _supra_ note 55, at 149.

99. U.N. Doc. A/CONF.101/BP/IGO/9, at 25 (April 21, 1982).

100. INMARSAT Convention, _supra_ note 97, art. 3. The Convention was amended in 1985 to give INMARSAT competence to provide aeronautical satellite communication services.

101. _Id_. art. 5(3).

102. _Id_. art. 32.

103. U.S. Dept. of Commerce, Space Commerce: an Industry Assessment 38 (May, 1988) [hereinafter cited as Space Commerce]; _see also_ Dann, _Public and Private Enterprise in Satellite Telecommunications: The Example of INMARSAT_, Proc. 29th Colloq. on the L. of Outer Space, 193 (1986).

members and non-members, on a non-discriminatory basis.[104] Over 6,000 vessels from over 80 nations use INMARSAT.[105] INMARSAT initially leased transponder capacity on three satellites in the geostationary orbit. It is planning to launch three of its own geostationary satellites beginning in 1989.[106]

A consultation procedure similar to that embodied in Article XIV of the INTELSAT Agreement,[107] but not as encompassing, is included in the INMARSAT Convention.[108] If a member, or any person it has jurisdiction over, intends to establish or use a space segment for a purpose similar to those of INMARSAT, it must notify INMARSAT to ensure technical compatibility and to avoid significant economic harm to the INMARSAT system.[109] After consultation, INMARSAT makes a non-binding recommendation.[110]

INMARSAT was an observer at the Space WARC. It participated in Conference preparatory meetings and provided

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104. INMARSAT Convention supra note 97, art. 7.

105. Address by Dr. A. F. Ghais, INMARSAT Director of Engineering and Operations, in Brighton, U.K. (Oct. 15, 1987) (Presentation to the 38th Congress of the IAF-Session 49).

106. Klass, Carriers, Manufacturers Assess Aerosat Communication Systems, Aviation Week & Space Tech., Jan. 9, 1989, at 54.

107. See supra note 85 and accompanying text.

108. INMARSAT Convention, supra note 97, art. 8.

109. Id. art. 8(1). Consultation is not required for other types of systems.

110. Id. art. 8.

statements regarding the Space WARC to all its members for them to "take into account when developing their national positions."[111] Its influence was present in the proposals of several administrations.

4. Regional Common User Organizations

a. EUTELSAT

In 1977, the European Space Agency (ESA) adopted a resolution calling for a separate organization to operate the ESA communication satellites on a commercial basis.[112] Shortly thereafter, 17 European telecommunication organizations signed the Interim EUTELSAT Agreement.[113] By 1988, organizations from 26 European nations had joined EUTELSAT.[114] EUTELSAT's main objective is constructing, establishing, operating, and maintaining the European space segment for a wide range of regional or domestic public telecommunication services such as telephony, data exchange,

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111. See INMARSAT letter of March 20, 1985, to all INMARSAT Parties (containing a statement approved by the INMARSAT Council on March 6, 1985, regarding WARC-ORB-85/88). See also ITU, WARC-ORB-85, Doc. 85 (INMARSAT Statement).

112. Aviation Week & Space Tech., Feb. 28, 1977, at 52.

113. Agreement on the Constitution of a Provisional Telecommunications Satellite Organization. Extracts of this agreement can be found in Matte, supra note 55, at 312. See also ECS, The European Communication Satellite, 50 Telecommunications J. 513, 516 (1983).

114. See Space Commerce, supra note 103, at 38.

television distribution, and business services.[115] ESA has authorized EUTELSAT to establish a space segment with four geostationary satellites.[116] A representative from EUTELSAT attended the Space WARC as an observer, and submitted a conference document.[117]

b. PALAPA

The PALAPA-B system is owned and operated by Indonesia. It followed the PALAPA-A system that was used by Indonesia starting in 1976. The system, when complete, will consist of at least two geostationary satellites.[118] It is an extension of the Indonesian domestic system and also serves Malaysia, Singapore, Thailand, and the Philippines. The system provides domestic telecommunication services between remote areas of one country, as well as international services between remote areas of different countries.[119] INTELSAT

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115. U.N., Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, at 84, U.N. Doc. No. A/CONF.101/10 (Vienna Aug. 9-21, 1982) [hereinafter cited as UNISPACE 82].

116. See ESA Approves Expansion of EUTELSAT Orbital Network, Aviation Week & Space Tech., Mar. 31, 1986, at 131.

117. ITU, WARC-ORB-85, Doc. 86.

118. Bullock, Indonesian SATCOMS Stitch a Scattered Nation Together, Space Markets 12-20 (Spring 1988).

119. Kosuge, Space Telecommunication and Regional Cooperation, Proc. 22d Colloq. on the L. of Outer Space 53 (1979).

traffic to and from urban areas of these countries is not affected.[120]

The PALAPA system is distinct from all other common user organizations in that the space segment is owned and operated by a country, not an organization. Other nations may lease use of the space segment, but they have no ownership interest and no planning or managerial control.

c. ARABSAT

The Arab Corporation for Space Communications (ARABSAT) was formed by the countries of the Arab League in 1976, with the objective of establishing, operating, and maintaining a telecommunication system to serve the Arab region.[121] It is composed of twenty Arab nations,[122] and it has two geostationary satellites. The system is capable of providing regional and domestic telephony, telex, data transmission and television.[123]

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120. Although problems were encountered, these satellites were successfully coordinated with INTELSAT. See FCC, First Report of the Advisory Committee for the 1985 WARC on the use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It, at 4-37 (1983) [hereinafter cited as 1983 U.S. WARC Report].

121. UNISPACE 82, supra note 115, at 83. For an unofficial English translation of this agreement see, Manual on Space Law, Vol. IV, at 345 (Jasentuliyana & Lee ed. 1979).

122. See N. Goldman, American Space Law 62 (1988).

123. UNISPACE 82, supra note 115, at 83. See also U.N. Doc. A/CONF.101/BP/IGO/4 (ARABSAT Satellite Communications System). These satellites were coordinated with INTELSAT. Matte, supra note 55, at 137-8.

ARABSAT also sent a representative to the Space WARC as an observer.

d. Other Potential Regional Systems

The African Union of Posts and Telecommunications has examined the possibility of establishing an African regional satellite network.[124] Five Andean nations are in the process of establishing a satellite system to provide regional service.[125] Additionally, regional satellite systems are being considered in the Caribbean and the Pacific Ocean areas.[126]

B. National Satellite Telecommunication Systems

1. Why Nations Establish National Systems

Due to economic, technological, or political motivations, an increasing number of states have established nationally owned and operated domestic satellite telecommunication systems. Even developing countries are moving in that direction.[127] Prior to examining the status of national systems for domestic telecommunications it is important to

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124. Aviation Week & Space Tech., Aug. 20, 1984, at 11.

125. ASETA Agrees on Andean Satellite System, Telecom Highlights International (Oct. 12, 1988).

126. See Doyle, Regulating the Geostationary Orbit: ITU's WARC-ORB-85-88, 15 J. Space L. 1, 23 (1987).

127. U.N. Doc., A/CONF.101.BP/IGO/9, April 21, 1982, at 15. Indonesia was the fourth nation and the first developing country to establish a domestic satellite telecommunication system. Sunaryo, The Indonesian Space Program and Its (Cont. on next page)

understand why many developing countries believe so strongly that they need satellite telecommunications and why they might consider a national system instead of merely using INTELSAT or a regional system.

Long distance communications linking rural communities with other rural and urban areas of a country are very important to growth and development. They can provide assistance in education, agriculture, health, and other activities. In fact, telecommunication has been likened to transportation and electrification as "essential infrastructure without which rapid economic and social development may be impossible."[128] An ITU study indicated the cost/benefit ratio for investment in telecommunications can be as high as 100 to one for developing countries, and another study showed there is an 80 percent correlation between telephones per capita and per capita GNP.[129]

As the benefits flowing from telecommunication become more evident to developing countries, it is not surprising they want to share in them. In developing countries, however, the costs of providing long distance telecommunication services have traditionally been very high due to the long distances involved and the hostile terrain often encountered. Moreover, in developing countries the need for telecommunication

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Socio-Cultural Impact 2 (paper presented at IIC 1984 Annual Conference, West Berlin, Sept. 21-23, 1984).

128. Parker, Communication Satellites for Rural Development, Telecommunications Policy, at 309 (Dec. 1978).

129. Pelton, supra note 80, at 19.

services must compete with other pressing problems for scarce funds. Yet many of these countries will find a satellite telecommunications system significantly more economical than its terrestrial alternatives.[130] This is so because satellite systems are generally cost-insensitive to distance, more reliable, easier to maintain (for the ground stations), and offer a much greater degree of flexibility than terrestrial systems.[131] In general, most developing countries seeking nation-wide telecommunications service will find access to a satellite system to be an essential component. Systems optimally designed for developing countries, however, have not been available in the past.

INTELSAT and other common user organizations have not proven totally adequate for the needs of many developing countries. The INTELSAT space segment, although used by developing countries, was designed primarily for international traffic so the associated earth stations are generally larger and more expensive than a rural domestic system should have.[132] Thus, while INTELSAT can provide telecommunications service for urban areas of developing

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130. See ITU, The Missing Link 34 (Dec. 1984) (Report of the Independent Commission for World-Wide Telecommunications Development).

131. Parker, supra note 128, at 311-12.

132. In the past, INTELSAT earth-stations have cost $2 million or more. Such a large investment is only justified for a developed terrestrial system with substantial traffic. Application of Space Telecommunications for Development, Service Prospects for the Rural Areas 7, U.N. Doc. A/CONF.101/BP/IGO/15 (1982) [hereinafter cited as U.N. Doc.
(Cont. on next page)

countries, it cannot provide affordable service to many sparsely populated and remote rural areas.[133] Some countries have found the answer in regional satellite systems. Such systems, however, are only established or planned in a few areas of the world.

As a result of this situation, certain developing nations have concluded they will need to establish their own satellite system to meet their telecommunication needs.[134] In order to do so they need three things: financial resources, technical resources, and access to the geostationary orbit/spectrum resource. It is through the Space WARC that they sought to establish their "guaranteed access" to the latter while accumulating the needed financial and technical resources.

BP/15]. The objective for a rural system should be to place a small number of telephones with satellite links in as many places as possible, rather than having a large number of telephones in fewer locations. Appropriate Modern Telecommunications Technology for Integrated Rural Development in Africa (AMTT/IRD), 49 Telecommunication J. 677, 682 (1982). For a further discussion of satellite systems optimally designed for use by a developing country, see Parker, supra note 128, at 311-12; and Pierce, A global-domestic (GLODOM) satellite system for rural development, 46 Telecommunication J. 745, (1979). See also, ITU, Economic and Technical Impact of Implementing a Regional Satellite Network (Geneva, 1983).

133. An ITU report acknowledges that the growth in telecommunications has been "largely for the international services and, in the developing countries, [has] been observed to some degree in the capitol cities. In many developing countries little has been achieved in the rural areas." U.N. Doc. BP/15, supra note 132, at 1.

134. Some of these nations are also motivated by a desire to become regional satellite powers.

The trend toward nations owning and operating their own satellite telecommunications system is not necessarily irreversible. Certain of INTELSAT's new services, such as Vista, are helping to provide satisfactory domestic satellite service to some areas of developing countries on a planned basis.[135] Furthermore, the creation of new regional systems would also help ameliorate this trend.

2. The United States

The U.S. has the largest number of geostationary satellites for domestic telecommunications of any single country. In the U.S., any qualified entity may establish and operate a domestic satellite telecommunications system.[136] As a result of this open entry, numerous systems providing the space segment for telephone, television, and most other telecommunication services are in operation.[137]

Several U.S. corporations are also considering the establishment of private international systems. The privately

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135. See supra note 83 and accompanying text.

136. This "open entry" policy is a result of an FCC decision known as the "Domsat" or "Open Skies" decision. See Domestic Communication-Satellite Facilities, First Report and Order, 22 F.C.C. 2d 86 (1970); Second Report and Order, 35 F.C.C. 2d 844 (1972), modified, 38 F.C.C. 2d 665 (1972). But because of orbital saturation this open entry policy may not last. See supra ch. 1, note 85 and accompanying text.

137. As of Feb. 10, 1989, the U.S. had 29 domestic communication satellites in the GSO. Telephone interview with Ms. Cecily Holiday, Chief, FCC Satellite Radio Branch (Feb. 10, 1989). Many U.S. corporations own and operate domestic satellite telecommunication systems. See generally, Matte supra note 55, at 165-69.

financed U.S. Pan Am Sat has already been established.[138] These systems must be coordinated with INTELSAT.[139]

3. The USSR

The USSR also has a large system of telecommunication satellites. Although their Molniya series satellites do not operate in the geostationary orbit,[140] three other communications satellite systems do. These systems are the Ekran, Raduga, and Gorizont. Ekran satellites provide direct television broadcast services. Raduga and Gorizont satellites provide domestic and international telecommunication services.[141] Use of the geostationary orbit by the USSR has been increasing. In early 1988, the Soviets had 26 satellites in the geostationary orbit, and they have plans for as many as 70.[142]

4. Canada

Canada has been a long-time user of telecommunication satellites. It has had up to six satellites in the geostationary orbit providing extensive telecommunication services and conducting experiments with direct television

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138. *See* Space Commerce, *supra* note 103, at 42.

139. *See supra* note 85 and accompanying text.

140. *See supra* note 94 and accompanying text.

141. *See* Matte, *supra* note 55, at 170; Johnson, *supra* note 94, at 18-19.

142. Johnson, *Soviets Expand Use of GEO*, Satellite Communications 31 (July 1988).

broadcasting.[143] Plans for next-generation satellites are under way.[144]

5. Other Nations

Other nations with geostationary satellites serving domestic telecommunications needs are Australia, Brazil, China, France, India, Indonesia, Italy, Japan, Mexico, the United Kingdom, and West Germany.[145] Many other countries are examining the possibility of establishing satellite communication systems.

C. Summary

In summary, while many nations of the world with a need for domestic satellite communications service secure that service through common user systems, a trend has developed toward individual systems. That trend is a result of numerous factors, one being a concern that the geostationary orbit/spectrum resource is becoming saturated and that nations

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143. Matte, *supra* note 55, at 171-72.

144. *Telesat Seeks New Rates, Market Plan*, Aviation Week & Space Tech., Sept. 3, 1984, at 177.

145. *See* Space Commerce *supra* note 103, at 43.
The reason for Australia's decision to establish a domestic satellite telecommunication system is typical of many countries. The decision was made after a study concluded "[i]t is in Australia's interests to establish the orbital positions it will need ... and to ensure that these positions are not lost to her by allocation to other countries ...." Commonwealth Government (Australia) Task Force, *National Communications Satellite System, Report*, at 84 (1978), as quoted in Matte, *supra* note 55, at 174. The "AUSSAT" system carries telephone, television, radio, and business communications to remote corners of the country.

must act now to secure their access. The trend, however, is not necessarily permanent. Moreover, it is clear that most nations will not have the resources or need for a satellite system of their own in the foreseeable future.[146] In recognition of this fact, one of the developing countries' prime objectives at the Space WARC was to protect their options to establish subregional systems.[147]

One of the interesting aspects of the Space WARC was that the developing countries were often led by countries without satellite systems, such as Algeria, Kenya, and Colombia. The developing nations that have satellite systems were clearly not as interested in making radical changes to the ITU regulatory regime as they had been in the 1970s when they led the movement for the Space WARC. The reasons behind this change of attitude are manifest. As satellite owning nations, they now have an interest in preserving the basic protection offered to their systems under the regulatory regime. Therefore, when a developing country having a satellite system did take a leadership role it often served as a moderating force.[148]

146. See Dizard, supra note 63, at 14.

147. See infra ch. 6, note 70 and accompanying text.

148. See e.g. infra ch. 6, notes 30-31 and accompanying text.

CHAPTER 3

THE PRE-SPACE WARC ITU REGULATORY REGIME FOR GEOSTATIONARY SATELLITE TELECOMMUNICATIONS

The primary impetus for the Space WARC was the developing countries' dissatisfaction with the ITU regulatory procedures for gaining access to the orbit/spectrum resource. The following discussion highlights basic aspects of that extremely complex regulatory regime. For simplicity, the present tense is used even though the Space WARC made many changes to it. Those changes are examined in Chapters 8 and 9.

A. <u>The Process of Acquiring Vested Rights</u>

Management of the orbit/spectrum resource is necessary to ensure interference-free operations by satellite telecommunication systems. This management is handled at the international level mainly by the ITU. A central part of the ITU's management process is allocation of radio frequencies to the various services by Administrative Conferences. Allocation is defined as "[e]ntry in the Table of Frequency Allocations of a given frequency for the purpose of its use by one or more terrestrial or space radiocommunication services ...."[1]

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1. <u>See</u> ITU, <u>Radio Regulations</u>, art. 1, No. 17 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations]. The Table of Frequency Allocations divides the world into three regions and reflects the (Cont. on next page)

Allocations are made to services, not countries. Following allocation, however, countries may enter into agreements for further distribution of frequencies. Two or more ITU members may conclude "special agreements," which must conform to the general allocation scheme, for sub-allocation to particular countries of a combination of frequency bands and services.[2] Such arrangements made on a multilateral basis are called "plans." The sub-allocation process, called "allotment," is defined as the entry of a designated frequency in an agreed plan for use by one or more administrations in a radiocommunication service.[3] Allotment plans are devised by a competent RARC or WARC. Before the Space WARC, the only planned service using the geostationary orbit/spectrum

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distribution of radio frequencies to them. The Table divides the frequency spectrum into over 500 separate frequency bands. Allocations have been made up to 275 GHz. Id. art. 8. Most frequency bands are allocated to the same service world-wide, but allocations of a band may differ from one region to another. Two other factors further complicate the Table. First, different radio services are often allocated the same frequency band. The ITU has established rules for sharing frequency allocations that set priority among the services. Id. art. 8, Sect. 2. Second, there are many footnotes to the Table. These footnotes correspond to particular frequency bands and indicate additional allocations, alternate allocations, and the manner in which certain states deviate from the allocation scheme. Id. art. 8, Nos. 426-436.

2. See id. art. 7; and ITU, International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 31 (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention].

3. 1982 Radio Regulations, supra note 1, art. 1, No. 18.

resource was the BSS.[4] The legal consequences of allocation and allotment are significantly different.

After frequencies have been allocated to services, or allotted to countries, they still need to be designated for use by individual "stations."[5] This procedure is not conducted directly by the ITU, but by administrations in accordance with certain principles and rules established by the ITU. This procedure, known as "assignment," is the authorization given by an administration for one of its radio stations to use a radio frequency under specified conditions.[6] Thus, while allocations and allotments result from international cooperation within the ITU, assignments result from national action.[7] The ITU Convention sets forth principles to guide administrations in their assignments. In

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4. For details of the BSS plans, see infra ch. 4, notes 40-51 and 79-86 and accompanying text.

5. A "station" is defined as "[o]ne or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a radiocommunication service ...." 1982 Radio Regulations, supra note 1, art. 1, No. 58. A geostationary telecommunication satellite is a station located in the geostationary orbit.

6. Id. No. 19. Assignments to services using the geostationary orbit also involve an orbital location.

7. See Cooper, Satellite Telecommunications: The Implementation of International Conventions in Canada, 11 Annals Air & Space L. 187, 192 (1986).

general, assignments must be made in accordance with the Table of Frequency Allocations or an applicable allotment plan.[8]

Article 33 of the ITU Convention substantially impacts frequency assignments.[9] The first paragraph of Article 33 establishes the principle that states should limit their use of the radio frequency spectrum to the minimum essential level. Two aspects of this principle are important. First, this is a goal as opposed to a duty; the admonishment is not "shall limit," but "shall endeavor to limit."[10] Second, no sanctions or rewards are established. Each state is the sole judge of whether it is meeting the goal. This part of Article 33 also specifies that in attempting to meet this goal, states

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8. 1982 Radio Regulations, supra note 1, art. 6, No. 342.

9. Article 33 provides:

> 1. Members shall endeavor to limit the number of frequencies and the spectrum space used to the minimum essential to provide in a satisfactory manner the necessary services. To that end they shall endeavor to apply the latest technical advances as soon as possible.
>
> 2. In using frequency bands for space radio services Members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources and that they must be used efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to both, taking into account the special needs of the developing countries and the geographical situation of particular countries. 1982 ITU Convention, supra note 2, art. 33.

10. Id.

should use the latest technology "as soon as possible."[11] This last phrase is important. To use the latest technology, it must not only be available, but also affordable and practical. It is likely that the latest technology will be affordable and practical for the developed nations before it will be so for developing countries. In such cases, the developed nations have more of an obligation than do the developing countries to see that stations seeking assignments use the latest technology.[12]

The second paragraph of Article 33 also sets forth important principles relevant to frequency assignment. It states that radio frequencies and the geostationary orbit are "limited natural resources," which must be used "efficiently and economically" in order to ensure "equitable access."[13] Although this is a very important concept, none of the key terms are defined. Efficient and economical use of the orbit/spectrum resource has a logical connection with the level of technology employed. Advanced technology should result in more efficient, and probably more economical, use of these resources. The requirement to use these resources

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11. Id.

12. An excellent example of a developed country demanding use of more costly technology by its assignments is the impact of the reduction in orbital spacing ordered by the U.S. See supra ch. 1, note 59 and accompanying text.

13. Id.

"efficiently and economically" is therefore linked to the obligation to use the latest technology as soon as possible. The concept of "equitable access" is discussed in Chapter 5.

Article 35 contains another key provision of the ITU Convention.[14] It creates the obligation for all states to ensure that their stations do not cause "harmful interference"[15] to stations in other countries that are operating in accordance with the Radio Regulations. The last aspect of this rule is fundamental. In essence, it grants protection only to stations that operate in accordance with the Radio Regulations. Such protection is necessary for the long-term viability of any station. As a practical matter, such protection is necessary for any satellite system to be established since, without adequate protection, financing is impossible to secure. There are two methods in the Radio Regulations through which this protection against harmful interference can be vested. One is registration by the IFRB of an assignment of an allocated frequency. The other is allotment in a plan.

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14. Article 35, paragraph 1 provides:
All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other members or of recognized private operating agencies, or of other duly authorized operating agencies which carry on radio service, and which operate in accordance with the provisions of the Radio Regulations. 1982 ITU Convention, <u>supra</u> note 2, art. 35.

15. Harmful interference is "[i]nterference which ... seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with these Regulations." 1982 Radio Regulations, <u>supra</u> note 1, art. 1, No. 163.

1. Allotment Plans (the BSS)

In general, once a plan allots frequencies to countries, rights against harmful interference are vested when the plan becomes effective. Plans are designed so that assignments made in accordance with them will not cause harmful interference. Since rights are vested at the time of allotment, the requirement of registration is merely a formality and the registration procedure is rather simple. For example, the plan for the BSS in Regions 1 and 3 requires an administration to notify the IFRB of an assignment between three years and 90 days prior to the date it will be brought into use. The IFRB examines the notification to determine its conformity with the Convention, Radio Regulations, and the plan. Upon a favorable finding, the Board records the notified frequency and orbital slot in the Master International Frequency Register.[16]

2. Assignment of Allocated Frequencies (space services other than BSS)

The registration procedure for allocated frequencies is quite different. Time of registration is of the essence because rights do not vest until registration, when formal

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16. Id. Appendix 30, art. 5.2.1 Although the date of receipt of the assignment notice is placed in the Register, all assignments recorded in accordance with the Plan have equal status. Id. art. 5.2.2.

international recognition is granted.[17] Time sensitive registration schemes for natural resources are not unique; they are also found in real estate and water law. In telecommunications law this practice is often referred to as the "first-come, first-served" rule. The first station to be registered by the IFRB will be protected (served) against harmful interference. This rule places a premium on early use of the orbit/spectrum resource. It may also impose a penalty on latecomers who have a duty to ensure that their assignment will not cause harmful interference with a registered assignment.[18] Nevertheless, this regulatory regime has never failed to accommodate a satellite system and has also been referred to as "last come, always served."[19]

The procedures for the registration of frequency assignments in the allocated bands of the unplanned space telecommunication services are complicated and time consuming. They are set out in the Radio Regulations in Articles 11 and

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17. 1982 ITU Convention, supra note 2, art. 10.4(a).

18. To avoid causing harmful interference, latecomers may have to alter certain technical aspects of their proposed system, such as frequency, orbital slot, or area of coverage. Conceivably, latecomers could even be prevented from establishing a particular satellite telecommunication system. However, this has never occurred.

19. See Emerging Competitive Forces in International Communication (address by Mr. Dean Burch to ABA Annual Meeting, July 8, 1985).

13 and their associated Appendices 3, 4, 28 and 29.[20] These procedures involve three steps: (1) advance publication[21] of the proposed system through the IFRB; (2) coordination[22] of potential problems concerning other countries; and (3) notification[23] of the satellite system. Successful completion of these three steps results in registration.[24]

Advance publication is initiated two to five years prior to bringing a station into service, by sending the IFRB information specified in Appendix 4 of the Radio Regulations.[25] The IFRB publishes that information in a weekly circular that it sends to all other administrations, who then have four months to comment on potential interference with their existing or planned space telecommunication services.[26] The Regulations set forth a procedure for an administration receiving comments to follow. This procedure

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20. 1982 Radio Regulations, _supra_ note 1. Where a footnote in the Table of Frequency Allocations requires an agreement with an administration, the provisions of Article 14 must also be followed. _Id_. art. 14.

21. _See id_. art. 11, sect. I.

22. _See id_. art. 11, sects. II, III and IV.

23. _See id_. art. 13, sect. I.

24. _See id_. art. 13, sects. II and III.

25. 1982 Radio Regulations, _supra_ note 1, art. 11, No. 1042. This information includes: date of bringing into use; frequency range and other technical characteristics of the planned system; and geostationary orbital location. _Id_. Appendix 4.

26. _Id_. art. 11, Nos. 1044-1047. Comments are sent to the administration concerned with a copy to the IFRB. _Id_. No. 1047.

consists primarily of bilateral negotiations between the involved administrations.[27] The main purpose of advance publication is to discover potential problems at an early stage in system planning, thereby facilitating the incorporation of any design changes that may be necessary.[28]

Coordination follows advance publication and is a similar process. Coordination, however, is based on much more detailed technical information regarding the system. Coordination is initiated by sending Appendix 3 information to the IFRB.[29] During the coordination process administrations

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27. The administration must first attempt to meet its requirements without considering possible adjustment to the characteristics of geostationary satellite networks of other administrations. Id. art. 11, No. 1051. If it cannot do so, the administration concerned may apply to commenting administrations to solve the difficulties. Id. These administrations then together attempt to reach "mutually acceptable adjustments" to geostationary orbit locations, frequency usage, or other characteristics; they may also seek assistance from the IFRB. Id. art. 11, No. 1050-1054.

28. DuCharme, Bowen & Irwin, The Genesis of the 1985/87 World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, 7 Annals Air & Space L. 261, 270 (1982).

29. 1982 Radio Regulations, supra note 1, art. 11, Nos. 1073-1074. The IFRB examines the information to determine the result of advance publication and to identify administrations whose services might be affected, then it sends the information and the results of their examination to other administrations. Id. art. 11, Nos. 1075-1078. To determine which administrations need to be included in the coordination process, the Regulations set out detailed criteria with a view to including any administration that might experience interference above certain levels to its space or terrestrial services as a result of the system being coordinated. Id. art. 11, Nos. 1059-1071.

attempt to resolve any difficulties.[30] While IFRB assistance may be requested, coordination is mainly a matter of bilateral negotiation.[31] However, there is no legal obligation for an administration whose previously registered station may be interfered with, to change any characteristics of its system. The negotiating parties, therefore, do not have equal bargaining power. Although the coordination process has never failed to accommodate a system, the results have not always been completely satisfactory to the administrations seeking coordination.[32]

Notification, which follows coordination, is required to obtain "international recognition" and protection against

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30. Id. art. 11, Nos. 1083-1085.

31. Id. art. 11, Nos. 1088-1094. Although coordination traditionally is accomplished on a bilateral basis, nothing in the Radio Regulations precludes multilateral meetings.

32. India "successfully" coordinated their INSAT system with the USSR and INTELSAT, but believes that they "paid a fairly heavy and severe penalty" for the orbital location and frequencies ultimately achieved. Rutkowski, Six Ad-Hoc Two: The Third World Speaks Its Mind, Satellite Communications 22, 23 (March 1980). Indonesia also had coordination difficulties with the USSR and INTELSAT. See FCC, First Report of the Advisory Committee for the 1985 WARC on the use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It, at 4-37 to 4-39 (1983) [hereinafter cited as 1983 U.S. WARC Report]. Mexico experienced some difficulties with the U.S. and Canada in coordinating its Morelos satellite system. See Jasentuliyana, The Developing Countries and the Geostationary Orbit 7 (paper presented at 13th Annual Friedman Conf. on the Global Telecommunications Revolution, Columbia Univ., March 29, 1985).

harmful interference for an assignment.[33] Administrations send the assignment notice to the IFRB not earlier than three years before the date the assignment is to be brought into use and not later than three months before that date.[34] The IFRB publishes the information in its weekly circular[35] and examines the notice for conformity with: the ITU Convention; the Radio Regulations, including the Table of Allocations; and the coordination provisions.[36] If the coordination process was not successfully completed, the Board also examines the probability of harmful interference to previously recorded assignments.[37]

If the IFRB reaches a favorable finding, the frequency assignment, orbital position, and relevant operating and technical characteristics are recorded in the Master Register.[38] If the IFRB reaches an unfavorable finding, the assignment may be registered under certain limited circumstances, which ensure that harmful interference will not

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33. 1982 Radio Regulations, _supra_ note 1, art. 13, No. 1491. Notification is also required if the frequency concerned is capable of causing harmful interference (_id._ No. 1489) or if the frequency is to be used for international radiocommunication. _Id._ No. 1490.

34. _Id._ art. 13, No. 1496.

35. _Id._ art. 13, No. 1499.

36. _Id._ art. 13, Nos. 1502-1512.

37. _Id._ art. 13, No. 1506.

38. _Id._ art. 13, No. 1526.

be caused to previously registered assignments.[39] When an assignment is registered, the date of the notice is included in the Master Register. This date determines the rights of the assigned station. These rights, and the corresponding duties of administrations, will now be examined.

B. The Legal Nature of Vested Rights

When an administration has recorded an assignment of a geostationary orbital position and its associated radio frequencies in the Master Register, it has the right to use that assignment. This right to use is not tantamount to possessing title to property; it is not ownership.[40] This concept of use applies whether the registration was made on a "first-come, first-served" basis or in accordance with a plan.[41]

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39. Where the Board's findings were negative, an assignment may be recorded: (1) if the station has operated for four months, together with the station that was the basis for the unfavorable finding, without causing harmful interference (Id. art. 13, No. 1544); or (2) if the administration agrees to use the notified assignment on the basis of non-interference and to terminate interference immediately if it results. Id. art. 13, No. 1518.

40. See Leive, Regulating the Use of the Radio Spectrum, 5 Stanford J. Int'l L. 21, 35 (1970).

41. "No ITU plan ... has to-date, explicitly conveyed property rights, in orbit or spectrum." FCC, Second Notice of Inquiry, at 11, F.C.C. 82-214, 47 Fed. Reg. 24,223 (adopted May 13, 1982); see also R. Jakhu, The Legal Regime of the Geostationary Orbit, at 287-88 (1983) (Doctoral Dissertation on file at McGill Univ. Institute of Air and Space Law). Nevertheless, the right to sell or rent a geostationary orbital position allotted in a plan has been discussed in the literature. See Meckling, Management of the Frequency
(Cont. on next page)

This right to use a registered assignment is secured by the protection given to a registered assignment against harmful interference, but it has its limits. First, the use should be in accordance with the characteristics recorded in the Master Register. If an administration desires to change the characteristics of a registered assignment, the proper procedure to follow is the standard notification procedure set out for new assignments.[42] If the IFRB receives information that a station is not operating in accordance with its registered characteristics, it must consult the administration involved.[43] After consulting with the administration, the IFRB may cancel or modify the registered entry; however, they may only do so if the administration agrees.[44] Thus, the obligation to use an assignment in accordance with its registered characteristics is dependent upon the good faith of administrations.

The right to use a registered assignment also involves a duty to notify the IFRB if use is suspended for a period of 18

Spectrum, Wash. U. L. Q. 26 (1968); Wihlborg & Wijkman, Outer Space Resources in Efficient and Equitable Use: New Frontiers for Old Principles, XXIV The Journal of Law and Economics 23 (1981). Nothing in the BSS Plans explicitly prohibit such action. Because of technical requirements, however, it would be difficult to accomplish. No sales, rentals or other such arrangements have been initiated.

42. 1982 Radio Regulations, supra note 1, art. 13, No. 1548.

43. Id. No. 1574. The IFRB also has the duty to routinely contact administrations at least every two years to confirm that assignments are being used in accordance with recorded characteristics. Id. No. 1569.

44. Id. No. 1574.

months[45] or permanently discontinued.[46] If the Board is notified of a suspension in use or otherwise discovers such a suspension, and that suspension in use has existed for two years or more, a mark is made against the entry in the Master Register.[47] Thereafter, the assignment is not considered in the notification procedure for other assignments and is not entitled to protection against harmful interference from subsequently registered assignments.[48] Moreover, before the assignment can be brought back into use it must complete coordination and notification, and if successful, the new date on which the assignment is brought back into use is recorded

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45. Id. art. 13, No. 1570. A suspension in use of less than 18 months is not addressed by the Regulations. While use should be "regular" and without suspension of more than 18 months, it does not have to be continuous. Id. No. 1571. Theoretically, an administration could have more than one registered assignment per satellite and move the satellite from one orbital position to another, so long as any one assignment was not out of use for 18 months. The assignments would have to be identical, except for orbital position, for one satellite to meet the recorded characteristics of each assignment. While such a practice would not conserve the orbit/spectrum resource, it would add flexibility to a satellite telecommunication system. For example, at one time, INTELSAT moved a satellite from a recorded position over the Indian Ocean to a recorded position over the Atlantic because the demand for service was much greater and the satellite could be used more efficiently. See INTELSAT, Annual Report 21 (1978).

46. 1982 Radio Regulations, supra note 1, art. 13, No. 1573.

47. Id. art. 13, Nos. 1571 & 1572.

48. Id. art. 13, No. 1572.

in the Master Register.[49] When the Board is notified of the permanent discontinuance of a recorded assignment, the entry is deleted from the Register.[50]

Subject to the above rules regarding suspension and cancellation, the right to use an assignment recorded in the Master Register is not limited in time. Moreover, mere changes to the name of a station or its date of being brought into use do not require coordination and notification.[51] Therefore, an administration has a right to replace a satellite with one having the same basic technical characteristics. This right to replace an old satellite with a new one of the same type makes a registered assignment potentially perpetual. Consequently, the right to use has been referred to as "a right to perpetual use."[52]

There are three qualifications to the general rule that the right to use a registered assignment is perpetual. The first involves planned services. A plan may state a time limit for rights acquired pursuant to it. For example, the 1977 BSS Plan was designed for a period of fifteen years.[53] When it is revised, however, it is reasonable to conclude that

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49. Id. No. 1572 & 1513.

50. Id. No. 1573.

51. Id. art. 13, No. 1548.

52. Jakhu, supra note 41, at 289; and Jakhu, A Legal Analysis of the 1985 ITU Space Conference Report, Proc. 29th Colloq. on the L. of Outer Space 103, 105 (1986).

53. 1982 Radio Regulations, supra note 1, Appendix 30, art. 16. This Plan, however, will not automatically terminate (Cont. on next page)

assignments registered in accordance with the Plan will be provided some measure of continued protection. Therefore, while the rights acquired under allotment plans are not legally "perpetual," they may in fact continue for a very long time.

The second qualification to the right of perpetual use involves an experimental procedure initiated by Resolution No. 4 of the 1979 WARC.[54] This Resolution provides that a registered assignment of a geostationary orbital position and associated radio frequencies is considered discontinued when the period of operation shown on the assignment notice expires. Nevertheless, there are broad exceptions to this general proposition, which significantly mitigate its effect.[55] Moreover, the IFRB cannot cancel the assignment, it can only note in the Master Register that the assignment is not in conformity with Resolution 4.[56] Thus, even under this Resolution, if an administration desires to perpetuate a registered frequency/orbit assignment, it is able to do so.

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at the end of fifteen years; it remains in effect until revised by a competent WARC. Id.

54. Id. Res. No. 4.

55. For example, the period of operation can be extended as long as the characteristics of the assignment remain unchanged. Id. para. 1.2. This could be accomplished by replacing the original satellite with a new one having the same characteristics. Additionally, a new satellite with different technical characteristics but the same orbital location and frequency may be used as a replacement, so long as coordination and notification are successfully carried out and the probability of interference is not increased. Id. para. 1.3.

56. Id. Res. No. 4.

The final qualification to the right of perpetual use is contained in another Resolution of the 1979 WARC. Resolution No. 2 provides that registration of frequency assignments and their use "should not provide any permanent priority for any individual country or groups of countries ...."[57] While this statement sounds like a limit on the right of perpetual use, it is not enforced by any Radio Regulations and is only a statement of policy that administrations should "take into account."[58]

These qualifications to the "right to perpetual use"[59] do not significantly limit it. Nevertheless, although a theoretical right to perpetual use may exist in law, it has not existed in fact. Because technology has advanced so rapidly, the practice has been to replace one series or generation of satellites with a more advanced series possessing different characteristics, which requires coordination and notification.[60] Past practice, however, is no guarantee of future conduct.

C. Summary

The process of acquiring vested rights differs for allotment plans and assignments of allocated frequencies. In

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57. Id. Res. No. 2.

58. Id.

59. Jakhu, supra note 52.

60. An example of this practice is the successive series of INTELSAT satellites. See supra ch. 1, notes 48-56 and accompanying text.

the years before the Space WARC developing countries expressed dissatisfaction with the ITU's "first-come, first-served" regulatory regime. They focused on the bilateral nature of the coordination process and on the unequal bargaining power held by the parties to the negotiations. Although developing countries had little experience using the "first-come, first-served" regulatory regime, they had a perception that it was not an equitable rights vesting method. The potential abuse of the near absolute rights granted by that regime was disturbing to many developing countries.

The orbit/spectrum resource was not only being rapidly occupied, but occupied indefinitely and potentially perpetually. Therefore, developing countries advocated changing that regime to an allotment plan for the frequency bands being used for space services, primarily the FSS. The history of the development of the ITU regulatory regime at issue is chronicled in the next chapter along with the growing discontent of developing countries with that regime.

CHAPTER 4

PROLOGUE TO THE SPACE WARC

The Space WARC resulted, perhaps inevitably, from the substantial history of developments in international communication. This chapter summarizes the events that presaged the Space WARC by identifying the major accomplishments of prior telecommunications conferences and by noting the preparations undertaken by nations and organizations in advance of this latest conference. Knowledge of these past events will aid in understanding how the Space WARC shaped the future of space telecommunications.

A. The 1927 Washington Conference

The 1927 Washington Conference established many of the basic provisions for regulating international communications that exist today. At that Conference, radio stations were classified in various services according to their use; technical and operating standards were designed for these services; a table of frequency allocations was adopted, which allocated frequencies to the different services; and stations registered with the ITU were granted protection against harmful interference from later users. This *a posteriori* process of notifying and registering frequency assignments set the basis for the regulatory regime that would later apply to space telecommunications. This so-called "first-come first-served" rule would ultimately prompt the call for the space WARC.[1]

B. The 1947 Atlantic City Conferences

In 1947, two important ITU Conferences were held in Atlantic City, which made significant changes to the ITU's structure and Regulations. The Plenipotentiary Conference revised the ITU Convention. The Radio Conference, which had powers similar to a general WARC of today, revised the Radio Regulations. The many changes effected by these two conferences ushered in the "period of the modern ITU".[2]

The organizational structure of the ITU was changed to a form very similar to its current structure. In so doing, the IFRB was created, and the CCIR was made a continuing, as opposed to a periodically convened, body.[3] The ITU also became a specialized agency of the United Nations.

The IFRB was given duties very similar to those they currently perform. The original objective of the U.S. was for the IFRB to have "power to police the air", like an

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1. For an in-depth coverage of ITU history see G. Codding, The International Telecommunication Union: An experiment in International Cooperation (1952); D. Leive, International Telecommunications and International Law: The Regulation of the Radio Spectrum (1970); and R. White & H. White, The Law and Regulation of International Space Communications (1988).

2. G. Codding & A. Rutkowski, The International Telecommunication Union In A Changing World 29 (1982).

3. Id. at 23.

international FCC.[4] Due mainly to the refusal of nations to relinquish sovereign powers, however, the IFRB was established with little of the authority the U.S. had desired. Nevertheless, the establishment of the Board was one of the most significant steps taken by the 1947 Atlantic City Conference.

The Radio Conference made extensive changes to the International Table of Frequency Allocations. New services and additional portions of the radio frequency spectrum were added.[5] In accordance with prior practice, the allocations were made to services rather than countries. A new concept, however, was being considered.

One of the prime objectives of the U.S. for the conferences was the ultimate establishment of an "engineered spectrum" through the use of frequency allotment or assignment plans.[6] These "plans" would match requirements of ITU member countries with specific frequencies, as well as with technical and operating criteria based on sound engineering principles. The 1947 conferences were conducted and concluded with an expectation that plans for many frequency bands would be forthcoming in the following years.[7] As it turned out, the

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4. Leive, _supra_ note 1, at 55.

5. _Id_. at 25.

6. _Id_. at 56.

7. _Id_. at 56.

U.S. was unsuccessful in securing adequate support for the implementation of a planning approach.[8]

The Radio Conference established detailed provisions for the notification and registration of frequency assignments, similar to those presently existing.[9] It also established the principle of conformity. This principle requires conformity with the Convention and the Radio Regulations before a station may be recorded by the IFRB in the registration column of the Master Frequency Register.[10] Otherwise, the station would only be placed in the notification column.

The degree of protection to be accorded to stations recorded in the registration column of the Master Register was another important issue addressed at the 1947 Conferences. Some countries wanted a "right of priority" established in the Convention, based upon prior use and notification. The U.S. considered this would be inconsistent with the objective of a planned, engineered spectrum.[11] As a result of a compromise, the term "international recognition" was used in

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8. See infra notes 13-14 and accompanying text.

9. ITU, International Convention on Telecommunications, art. 11, 4 U.S.T. 570 (1947) [hereinafter cited as 1947 ITU Convention].

10. Id. art. 44.

11. Jakhu, The Evolution of the ITU's Regulatory Regime Governing Space Radiocommunication Services and the Geostationary Orbit, 8 Annals Air & Space L. 381, 394-95 (1983).

the Convention.[12] This phrase has been used in all subsequent ITU Conventions. Although a specific "right of priority" was not, and has never been granted in the ITU Convention, application of the Radio Regulations effectively grants such a right.

C. The 1959 WARC

In 1959, another general WARC was convened. One of the first questions it had to face was whether the goal of a planned spectrum could be realized. In the twelve years since the Atlantic City Conferences, no significant progress toward that objective had been made.[13] It quickly became obvious that a completely planned, engineered spectrum was unobtainable. Frequency demands made by ITU member nations greatly exceeded the supply of frequencies then usable, and no agreement could be reached on how to resolve the conflicting demands.[14] Therefore, this objective was abandoned.

The 1959 WARC made no significant changes to the regulatory regime established in 1947. Nevertheless, it was an important event for space telecommunications. For the first time, a "space service" was established by the Regulations, and frequencies were allocated for this service

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12. 1947 ITU Convention, supra note 9, art. 6.1(a).

13. Codding & Rutkowski, supra note 2, at 34.

14. Leive, supra note 1, at 68. An additional impediment was the opposition of the Soviet Union and its allies, who considered the planning approach an abridgement of their sovereignty. Codding & Rutkowski, supra note 2, at 31.

on a shared channel basis.[15] While these allocations were for space research purposes only, the launch of Sputnik in 1957 and subsequent satellite launches, demonstrated that demands on the radio spectrum would increase rapidly.[16] Therefore, a Recommendation was adopted to hold a conference in 1963 to allocate additional frequency bands for space purposes, if warranted by technological progress.[17]

D. The 1963 Space EARC

In 1963, an Extraordinary Administrative Radio Conference (EARC) was held "to decide on the allocation of frequency bands essential for the various categories of space radiocommunication."[18] This Conference was an important step in the evolution of satellite telecommunication services. The EARC defined new space services and allocated over 6,000 MHz to them on an exclusive or shared basis.[19]

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15. Jakhu, supra note 11, at 397.

16. DuCharme, Bowen & Irwin, The Genesis of the 1985/87 World administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, 7 Annals Air & Space L. 261, 264 (1982).

17. Id.

18. ITU, Radio Regulations, Res. No. 36 (Geneva, 1959).

19. White, supra note 1, at 121. Of these allocations, 2,800 MHz were for communication satellite services, with 2,700 MHz being on a shared basis with terrestrial radio services. See also Colino, International Cooperation Between Communications Satellite Systems: An Overview of Current Practices and Future Prospects, 5 J. Space L. 65, 69 (1977).

One of the principal issues raised at the EARC concerned the status to be given assignments made pursuant to the new allocations. In 1961, a Resolution of the U.N. General Assembly had asserted a belief that "communication by means of satellites should be available to the nations of the world as soon as practicable on a global and nondiscriminatory basis."[20] By 1963, concern already was mounting in developing countries that they would be denied access to satellite communication because the available frequencies would be monopolized through application of the "first-come, first-served" rule. Therefore, attempts were made to establish a new regulatory regime for space services based on worldwide plans.[21] Some developed countries, on the other hand, were concerned that if the usual notification and registration rules were not used for space services, or were used on an interim basis while plans were prepared, a sufficient foundation would not be established for proceeding

20. G.A. Res. No. 1721 (XVI) "International Co-operation in the Peaceful Uses of Outer Space" (Dec. 20, 1961).

21. Israel argued that the first-come first-served rule should be abandoned or modified for the space services, and the IFRB proposed that a future Conference be convened to establish worldwide plans for the space services. Leive, supra note 1, at 211. Algeria, Kuwait and the U.A.R. issued a joint statement calling for worldwide space service plans in order to implement U.N. Resolution 1721. DuCharme, Bowen & Irwin, supra note 16, at 265. Other countries shared these views.

with costly, long-term programs in the space services.[22] Ultimately, the views of the developed nations prevailed.[23] The Radio Regulations regarding notification and registration were retained for the space services. A new procedure of coordination was added due to the potential problems presented by shared frequency allocations.[24]

The views of the developing countries did find expression in a Recommendation that was based on U.N. Resolution 1721. Recommendation 10A recognized the rights of countries to an "equitable and rational use of frequency bands allocated for space communications" and recommended that use of radio frequencies for space telecommunications "be subject to international agreements based on principles of justice and equity permitting the use and sharing of allocated frequency bands in the mutual interest of all nations."[25] This Recommendation formally introduced the concept of "equitable access." Thus, while the 1963 EARC established the space

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22. Leive, supra note 1, at 212.

23. According to one author, the reason the developing countries' views were not accepted was because "they could not participate competently or extensively" in the preparations for the conference, and "did not have large enough delegations to keep pace with the deliberations and developments in the various committees and working groups" at the conference. Jakhu, supra note 11, at 400-01.

24. Leive, supra note 1, at 215.

25. ITU, Final Acts of the Extraordinary Administrative Radio Conference to Allocate Frequency Bands for Space Radiocommunication Purposes, Rec. 10A (Geneva, 1963).

services in the same regulatory regime as the other services, it initiated the movement toward demands for "equitable access" that ultimately resulted in the Space WARC.

E. The 1965 Plenipotentiary Conference

The 1965 Plenipotentiary Conference, held in Montreux, Switzerland, made no significant changes to the regulatory regime of space services. One result of the Conference is significant because it demonstrates the politics that were then emerging in the ITU, which often pitted the developed against the developing nations. This was the Conference's substantial reduction in the number of members on the IFRB. The developed countries wanted to abolish the Board and place its frequency registration functions within the General Secretariat. They believed its main tasks of establishing the Master Frequency Register and rules for frequency use had been met, and that eleven highly paid experts were not needed merely to manage the Register. The developing countries, however, had come to view the Board, with its impartiality and equitable representation of all regions, as their protector. In a compromise, the Board was retained, but its membership was reduced from eleven to five members.[26]

F. The 1971 WARC-ST

At the 1971 World Administrative Radio Conference for Space Telecommunications (WARC-ST), certain revisions were

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26. <u>See generally</u> Leive, <u>supra</u> note 1, at 73-80.

made to the Radio Regulations, but the basic scheme remained intact. Approximately 177 GHz of the radio frequency spectrum was allocated to space services, mostly on a shared basis with terrestrial services.[27] Additionally, the numerous space telecommunication services that exist today were identified in the regulations.[28] Previously, there had been a single service for space telecommunications. The Regulations regarding coordination and notification were revised,[29] and the procedure for advance publication was instituted.[30]

Two important Resolutions were adopted at this Conference. Resolution No. Spa 2-1 was a precursor to Article 33 (2) of the ITU Convention.[31] It declared for the first time that "the radio frequency spectrum and the geostationary satellite orbit are limited natural resources" which should be used "effectively and economically."[32] Other principles that were central to the issues at the Space WARC were included in this Resolution. First, it stated that all countries have

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27. DuCharme, Bowen & Irwin, supra note 16, at 266.

28. See ITU, Final Acts of the World Administrative Radio Conference for Space Telecommunications, Annex 1, Section IIA, at 39-45 (Geneva, 1971) [hereinafter cited as 1971 Final Acts].

29. Id. Annex 8, at 155-182.

30. Id. Annex 15, at 219-224.

31. ITU, International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 33, (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention].

32. 1971 Final Acts, supra note 28, Res. No. Spa 2-1.

"equal rights" to the use of frequencies and geostationary orbital slots for space telecommunication services.[33] Second, it resolved that states which had registered frequencies with the IFRB for use in space telecommunication services should not receive "any permanent priority ... [and] should take all practicable measures to realize the possibility of the use of new space systems by other countries ...."[34] This was a clear rejection of the "first-come, first-served" rule. Because it was a Resolution, however, and not a legally binding Regulation, it did not change the ITU legal regime of space telecommunications.

The other important Resolution involved the Broadcasting Satellite Service. Resolution Spa 2-2 called upon the Administrative Council to convene World or Regional Administrative Conferences to plan the frequency bands allocated to this service and its use of the geostationary orbit.[35] This Resolution led to the 1977 WARC-BS.

G. The 1973 Plenipotentiary Conference

The results of the 1973 Plenipotentiary Conference held at Malaga-Torremolinos, Spain, demonstrated the increased success developing countries were having in the ITU. The key provisions of WARC-ST Resolution 2-1 were incorporated as Article 33 (2) of the ITU Convention:

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33. _Id._

34. _Id._

35. _Id._ Resolution No. Spa 2-2, at 312.

> In using frequency bands for space radio services Members shall bear in mind that radio frequencies and the geostationary satellite orbit are <u>limited natural resources</u> and that they must be <u>used efficiently and economically</u> so that countries or groups of countries may have <u>equitable access</u> to both in conformity with the provisions of the Radio Regulations according to their needs and the technical facilities at their disposal. (emphasis added)[36]

The introduction of the concept of "equitable access" into a legally binding treaty was an important step toward the Space WARC.

To provide meaning to the principles of Article 33, the Article 10 responsibilities of the IFRB were expanded to include the geostationary orbit.[37] The new provisions of Articles 10 and 33 provided a new legal status to the geostationary orbit that was on a par with the radio frequency spectrum, and they provided a legal basis for the concept of the "orbit/spectrum resource."

In another move designed to promote the "equitable access" provisions of Article 33, the Conference set a schedule of Administrative Conferences for the next six years. The schedule included conferences to develop plans for the 12 GHz

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36. ITU, International Telecommunications Convention, art. 33 (2), T.I.A.S. No. 8572 (1973) [hereinafter cited as the 1973 ITU Convention].

37. The Board was given the additional duties of: (1) effecting a recording of "positions assigned by countries to geostationary satellites" under the same conditions and for the same purpose as they had been doing for frequency assignments; (2) furnishing advice to Members "with a view to the equitable, effective and economical use of the geostationary satellite orbit"; and (3) performing any additional duties concerned "with the utilization of the geostationary satellite orbit ...." <u>Id</u>. art. 10.3.

frequency bands, which had been allocated by WARC-ST to the fixed, mobile, and broadcast satellite services.[38]

The increased role and success of the developing nations at this Conference was one of its key aspects. Since World War II many newly independent nations had joined the ITU. For the most part they were developing countries. In an organization where each nation has one vote, and where the majority rules, the potential for increased power of the developing countries was apparent. This Conference saw the realization of that potential. As noted by the then ITU Secretary-General:

> For the first time in the history of the ITU the Conference's work was dominated by problems particular to [developing] countries from the day it opened until the close. These countries brought their full weight to bear on the Conference's work not only because of their numbers but also because of their united viewpoint on most of the basic problems dealt with and the pertinence and quality of the statements of many delegations.[39]

This Conference was only the beginning of the increased influence the developing nations would have in the ITU.

H. The 1977 WARC-BS

In 1977, for the first time, a space service was planned. The World Administrative Radio Conference for the planning of the Broadcasting Satellite Service (WARC-BS) was the Conference envisioned in Resolution Spa 2-2 of the 1971

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38. Mili, Plenipotentiary Conference, A Preliminary Assessment, 41 Telecommunications J. 2, 5 (1974) (editorial).

39. *Id.* at 2.

WARC.[40] The Conference established a plan for use of the 12 GHz band by the Broadcast Satellite Service (BSS) in Regions 1 and 3. Region 2, however, could not reach agreement on a plan and elected to postpone such action until 1983 when a RARC would be convened.[41]

The BSS is reserved for satellite systems designed primarily to transmit programs directly to homes for reception by small, inexpensive dish antennas.[42] Although there were no operational BSS systems in 1977, many nations were planning to establish them. Consequently, issues regarding broadcasting satellites, both technical and political, had been the subject of international discussion for many years.[43]

The adopted BSS Plan allotted orbital positions, frequencies, and service areas on a country-by-country

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40. See *supra* note 35 and accompanying text.

41. For a detailed discussion of the positions of key nations, and the events which led to the decision to postpone planning for Region 2, *see* DuCharme, Irwin & Zeitoun, *Direct Broadcasting by Satellite, the Development of the International Technical and Administrative Regulatory Regime*, 9 Annals Air & Space L. 267 (1984).

42. *See* discussion *supra* ch. 1, notes 26 and 27 and accompanying text; ITU, *Radio Regulations*, art. 1, no. 37 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations].

43. *See* C. Christol, The Modern International Law of Outer Space 605-720 (1982). Satellites in the BSS are often referred to as "direct broadcasting satellites" (DBS). *Id.*

basis.[44] Numerous factors were considered in the allotment process including country size, service areas, time zones, and language differences.[45] The Plan is extremely detailed and covers virtually all satellite characteristics that may affect transmission.[46] The Plan was designed to meet BSS requirements for the countries in Region 1 and 3 for a period of 15 years.[47]

The orbital arc included in the Plan is between 37 degrees West and 170 degrees East. In that arc, 34 orbital positions were designated, each separated by six degrees of arc. Many orbital positions were assigned more than once for use by geographically separated service areas, thus permitting frequency reuse. The frequencies included in the Plan are in the 12 GHz band. Only the downlink was planned since BSS feeder links had not yet been allocated. Most countries received frequencies for four or five television channels, but

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44. *See* ITU, Final Acts of the World Administration Radio Conference for the Planning of the Broadcasting-Satellite Service in Frequency Bands 11.7 - 12.2 GHz (in Regions 2 and 3) and 11.7 - 12.5 GHz (in Region 1) (Geneva, 1977), (now incorporated as Appendix 30, 1982 Radio Regulations, *supra* note 42).

45. Jakhu, *supra* note 11, at 359.

46. Specific areas of the Plan include: nominal orbital position; frequencies; antenna boresight geographical coordinates; antenna beamwidth; orientation of the ellipse; polarization; and effective power. 1982 Radio Regulations, *supra* note 42, Appendix 30, art. 11.

47. This Plan will remain in force, however, until revised by a competent Radio Conference. *Id.* art. 16.

large countries with greater demand received more.[48] When a station is brought into service, the country must notify the IFRB for the purpose of recording in the Master Register. All assignments made in accordance with the Plan, however, have the same status regardless of the date they are recorded.[49]

All countries in Regions 1 and 3 undertook to operate only in accordance with the Plan. No variations were permitted, even on a non-interference basis. Although a procedure for Plan modification was established, any modification requires approval of all administrations potentially affected by the proposal.[50] The inflexibility of this Plan has been its main criticism. Other than formal modification, no provision is made for the use of new technologies that might make certain areas of the Plan obsolete. Nevertheless, this first Plan for the space services was significant.[51]

I. The 1979 WARC

The 1979 WARC was the first general WARC to be held since 1959. The Conference was expected to "establish the basic framework for frequency allocations and radio regulations for

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48. For example, the USSR received 65 channels, and Australia 36. Id. art. 11.

49. Id. art. 5.2.2.

50. Id. art. 4.

51. Many saw it as "a successful exercise in the equitable international distribution of one segment of the orbit-spectrum resource." Weiss, Planning in the Fixed-Satellite Service 2 (paper presented at IEEE Antennas and Propagation Symposium, Seattle, June, 1979).

the development of radiocommunication over the next ten to twenty years."[52] It was therefore the focus of significant domestic and international attention. Preparations for this Conference began years in advance. The developed countries normally had been well prepared for such conferences; for this WARC, many developing countries were also well prepared. Regional seminars sponsored by the ITU were held in Africa, Asia and Latin America to help developing countries understand the complex technical reports that would form the basis for Conference decisions.[53] Shortly before the WARC, a large number of developing countries came together during a meeting of the Non-Aligned Movement to discuss their positions for the WARC. They issued a resolution calling for a future conference to plan the use of the geostationary orbit.[54] This was to remain their goal at the 1979 WARC.

Due to advance preparation, the 1979 WARC operated rather effectively in spite of the great number of complicated issues with which it was confronted. The Conference was attended by approximately 2,000 participants from over 142 countries and

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52. Kirby, CCIR and the WARC-79, 45 Telecommunications J. 468 (1978).

53. Arnopoulos, The International Politics of the Orbit Spectrum Issue, 7 Annals Air & Space L. 215, 228 (1982).

54. Rutkowski, Six Ad-Hoc Two: The Third World Speaks Its Mind, Satellite Communications 23 (March 1980).

by numerous observers.[55] It faced over 14,000 policy proposals; therefore, most work was handled by committees, each of which had sub-committees with various working groups.[56]

As expected, the WARC reached many important decisions. Technical and operating standards for radio services were revised to reflect new advances in technology, and the Table of Frequency Allocations was expanded from 275 GHz to 400 GHz.[57] This resulted in more than doubling the frequency allocations for the Fixed Satellite Service.[58] In so doing, various frequency band allocations were modified to reflect the increased use of satellite telecommunication.[59] In another important development, feeder links for the BSS were

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55. Arnopoulos, supra note 53, at 229.

56. Id.

57. Codding & Rutkowski, supra note 2, at 51. The frequencies from 275-400 GHz, however, have not been allocated. 1982 Radio Regulations, supra note 42, art. 8, at RR8-183.

58. INTELSAT, WARC' 79 doubles FSS spectrum, Vol. 1, No. 6 Intellink 1 (First Quarter, 1980).

59. Codding & Rutkowski, supra note 2, at 51. These modifications, however, resulted in more footnotes and reservations than had ever previously been made to the Table of Frequency Allocations. McPhail, Electronic Colonialism, The Future of International Broadcasting and Communication 165 (1981).

allocated. These feeder links would be planned at later conferences.[60]

All proposals involving the geostationary orbit were examined by an ad hoc working group known as "Six Ad-Hoc Two," which was formed by Committee Six on Regulatory Procedures.[61] The proposals relating to equitable access were aptly summarized by a participant:

> The developing countries generally sought the adoption of resolutions calling for a future planning conference. The developed countries responded with a variety of measures which reaffirmed the right of all countries to equitable access to the orbit, made the coordination process multilateral in nature, provided more ITU assistance, and established a fixed number of years after which a nation's granted rights would extinguish. The underlying essence of these differing approaches are a priori (i.e., granting future rights to each nation on the basis of agreed principles) versus a posteriori (i.e., granting rights on a case-by-case basis as a specific case arises).[62]

After several meetings, the developing nations remained united in their determination that a conference be convened to plan use of the geostationary orbit/spectrum resource. Ultimately, Six Ad-Hoc Two reached a compromise and agreed upon a Resolution that called for a planning conference, but

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60. For the Region 2 BSS feeder link plan, see infra note 80 and accompanying text. For Regions 1 & 3, see infra ch. 6, notes 103-105 and accompanying text.

61. Arnopoulos, supra note 53, at 230.

62. Rutkowski, supra note 54, at 23.

which specified that the conference could consider alternatives other than planning to meet the goal of "equitable access".[63]

The Resolution drafted by Six Ad-Hoc Two was passed by the WARC and incorporated into the Final Acts.[64] Resolution No. 3 noted the limited nature of the orbit/spectrum resource, the growing requirements being made on it, and the need for "equitable access" to, and "efficient and economical use" of the resource.[65] The Resolution then called for a two-session Administrative Conference "to guarantee in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to space services".[66] This guarantee was to be established by a plan or "other possible approaches."[67] The Space WARC is a direct result of this Resolution.

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63. *Id*. at 26.

64. Although originally entitled Resolution BP, it was later designated as Resolution No. 3. *See* 1982 Radio Regulations, *supra* note 42, Res. No. 3. Two other Resolutions of the 1979 WARC concerned the geostationary orbit. Resolution No. 2 repeated and replaced Resolution No. Spa 2-1 of the 1971 WARC-ST. *See supra* note 32 and accompanying text. Resolution No. 4 initiated an experimental procedure aimed at limiting the period of validity for an assignment. *See supra* ch. 3, notes 54-56 and accompanying text. In addition, Recommendation 700-1 repeated and replaced Recommendation No. Spa 10 of the 1963 EARC. *See supra* note 25 and accompanying text.

65. 1982 Radio Regulations, *supra* note 42, Res. No. 3.

66. *Id*.

67. *Id*. In the ITU, the terms "planned" or "plan" have always been associated with the concept of *a priori* planning, where certain frequencies (or orbital slots) are allotted to (Cont. on next page)

In general, the 1979 WARC was highly political and demonstrated not only the increasing dissatisfaction of the developing countries with the existing rights vesting mechanism for the orbit/spectrum resource, but also their increasing effectiveness at successfully asserting their positions.

J. The 1982 Plenipotentiary Conference

The ITU Plenipotentiary Conference met in Nairobi, Kenya, for six weeks in 1982. Over 1,000 delegates from 147 countries attended, as did observers from numerous international and regional organizations.68 The attempted expulsion of Israel from the Conference demonstrated the increased politicization of the ITU. While that motion was

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specific countries. Nevertheless, several developed countries indicated at the 1979 WARC that they considered the term, as used in Resolution No. 3, to have a much broader meaning. The U.S. Delegate issued a statement declaring that:

> The [U.S.] views the planning mandate of the next Space Conference as being very wide in scope, admitting of a broad range of possibilities ranging from detailed orbit/frequency assignment plans to more dynamic planning approaches that will provide access to the orbit/spectrum in an equitable manner as the real requirements of administrations arise.

ITU, World Administrative Radio Conference, Geneva, 1979, Doc. No. 846, at 6 (Nov. 26, 1979).

68. ITU, The ITU Plenipotentiary Conference Has Completed its Work, 49 Telecommunications J. 804 (1982).

narrowly defeated, it occupied a significant amount of Conference time and raised doubts in some countries about the future course of the ITU.[69]

After that issue was settled, the Conference made several significant changes to the Convention. The change with most significance to the Space WARC was the revision of Article 33. According to the 1973 ITU Convention, equitable access to the orbit/spectrum resource was to be available to countries "according to their needs and the technical facilities at their disposal."[70] The revised article deleted the quoted language and provided instead that equitable access should be determined "taking into account the special needs of the developing countries and the geographical situation of particular countries."[71] This was a very significant change in the concept of equitable access.

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69. During this debate, the U.S. issued a statement that if Israel were expelled the U.S. would leave the Conference, withhold financial payments and reassess its continued participation in the ITU. Long Range Goals in International Telecommunications and Information, an Outline for United States Policy, Committee on Commerce, Science, and Transportation, U.S. Senate, 98th Cong., 1st Sess. 39 (1983) (report of the National Telecommunications and Information Administration (NTIA)) [hereinafter cited as Long Range Goals]. It should be noted, however, that this was not the first time a country's exclusion from an ITU Conference was sought. Spain was excluded in 1947, as were Rhodesia, South Africa, and Portugal in 1973. Congress of the United States, Office of Technology Assessment, Radio Frequency Use and Management, Impacts from the World Administrative Radio Conference of 1979 49 (1982) [hereinafter cited as OTA Report].

70. 1973 ITU Convention, supra note 36, art. 33(2).

71. 1982 ITU Convention, supra note 42, art. 33(2). The significance of this change will be addressed infra in ch. 5.

A corresponding addition was made to Article 10 of the 1973 ITU Convention regarding the duties of the IFRB. This addition provided that when furnishing advice to members for their use of the orbit/spectrum resource, the IFRB should take into account "the needs of Members requiring assistance, the specific needs of developing countries, as well as the special geographical situation of particular countries."[72]

The Conference also placed a special emphasis on the improvement of telecommunication infrastructures in developing countries.[73] To this end, a phrase was added to the Convention Preamble recognizing "the growing importance of telecommunications for the preservation of peace and the social and economic development of all countries ...."[74] Additionally, the purposes of the ITU were amended to include the duty to "promote and to offer technical assistance to developing countries in the field of telecommunications ..."[75] and the duty to "foster international cooperation in the delivery of technical assistance to the developing countries and the creation, development and improvement of telecommunication equipment and networks in developing

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72. Id. art. 10.3(c).

73. Shortly before the Conference, the U.N. General Assembly had passed a Resolution for a "World Communications Year" dedicated to development of communications infrastructure, and recognizing "the fundamental importance of communications infrastructures as an essential element in the economic and social development of all countries." U.N. Doc. A/RES/36/40 (1982).

74. 1982 ITU Convention, supra note 42, Preamble.

75. Id. art. 4.1(1).

countries by every means at its disposal, including ... use of its own resources ...."[76]

One other change to the Convention also evidenced the increasing politicization of the ITU. Directors of the International Consultative Committees (CCIR and CCITT) had previously been elected by their technical peers at the Plenary Assembly of those bodies.[77] This procedure was changed so that the Directors would be elected in the more political atmosphere of the Plenipotentiary Conferences.[78]

K. The 1983 RARC-BS

As agreed during the 1977 WARC-BS, the nations in ITU Region 2 met in 1983 to formulate their plan for the BSS in the 12 GHz band. Delegations from 25 countries in North, South and Central America and the Caribbean reached agreement on a plan that allotted frequencies and orbital positions to individual countries and established detailed technical and operating criteria. The ability to devise this plan was greatly aided by the technological advances that had occurred since the 1977 WARC-BS and by extensive use of computer modeling techniques to test various proposals.[79] The plan allotted 48 orbital positions and 2,114 television channels

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76. *Id.* art. 4.2(c).

77. 1973 ITU Convention, *supra* note 36, art. 11.3(c).

78. 1982 ITU Convention, *supra* note 42, art. 11.3(c).

79. U.S. Dept. of State, Report of the United States Delegation to the ITU Region 2 Administrative Radio Conference (Cont. on next page)

among the individual countries. It also established technical operating parameters and regulatory procedures.

This plan is significantly different from the plan for Regions 1 and 3 in two important aspects. For the first time, uplinks were planned in addition to downlinks.[80] Additionally, in contrast to the rigidity of the 1977 plan, the 1983 plan is characterized by flexibility.

A procedure for plan modification, similar to that used in the 1977 plan, was incorporated in the 1983 plan.[81] In addition to formal modification, however, three areas of flexibility were built into the plan. First, a system that varies from the characteristics specified in the plan, but which would not adversely affect other administrations, may be established.[82] Second, a system that differs from the plan may be established on an "interim basis", even though it may

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on the Broadcasting Satellite Service, at 3 (1983) [hereinafter cited as U.S. RARC 83 Report].

80. Uplinks were planned in the 17 GHz band. Id. at 46.

81. ITU, Final Acts of the Regional Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in Region 2, art. 4 (Geneva, 1983) [hereinafter cited as Final Acts Region 2]. See also DuCharme, Irwin & Zeitoun, supra note 41.

82. Final Acts Region 2, supra note 81, arts. 3.2 & 5.2.2A. These systems would typically be low-power operations. See also Report of the Canadian Delegation to the Regional Broadcasting Satellite Conference (Region 2) Geneva, June 13-July 15, 1983, at 54-55 [hereinafter cited as Canada Region 2 Report].

adversely affect the assignments of other administrations.[83] Although agreement of affected administrations is required if increased interference could result, the procedure is simpler than that required for permanent plan modification.[84] Finally, some flexibility in orbital location was allowed. An administration that shares an orbital location may place its satellite anywhere within a 0.4 degree arc centered on the nominal orbital location.[85]

The flexibility of this plan was not brought about without difficulty. The procedures for interim systems were especially difficult to secure because several Latin American countries were suspicious of the motives of its proponents.[86] Ultimately, however, flexibility was established. The developing nations received their guaranteed access, and the developed countries were satisfied that their reasonable needs were met and that the plan contained a sufficient degree of flexibility. This plan, therefore, demonstrated an important fact - an _a priori_ plan could be designed with sufficient flexibility to allow for advances in technology.

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83. An interim system can operate for 12 years, with provision for a two year extension. Final Acts Region 2, _supra_ note 81, art. 3.2 & Res. Com. 6/5.

84. _See_ U.S. RARC 83 Report, _supra_ note 79, at 47.

85. Final Acts Region 2, _supra_ note 81, art. 3.3. Agreement of the other administrations that share the orbital location is necessary. _Id_.

86. _See_ Canada Region 2 Report, _supra_ note 82, at 11.

It must be emphasized, however, that there were many differences between the planning which occurred for the BSS and the subsequent FSS planning issues the Space WARC faced. The FSS is a much more complex service than is the BSS. The FSS handles various types of data for different end users, and it involves multiple bands with varying technologies. Moreover, when the BSS was planned, no operational systems existed, whereas the Space WARC's planning of the FSS followed the implementation of over 100 FSS systems.

L. Space WARC Preparations

Following the 1979 call for the Space WARC, many nations and organizations participated in preparatory efforts for the First Session. The extensive efforts of the ITU and the United States are examined in particular depth, but virtually every entity with an interest in satellite telecommunications devoted substantial time and resources to Space WARC preparation.

In the United Nations, this work was centered in COPUOS. The Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82) had made several recommendations for studies that were subsequently assigned to COPUOS.[87] Both its Legal Sub-Committee and its Scientific

87. See U.N., Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, U.N. Doc. No. A/CONF.101/10 (Vienna, Aug. 9-21, 1982). See also U.N. General Assembly Res. 37/90 and Res. 38/80 (1984).

and Technical Sub-Committee formed Working Groups for Space WARC matters.[88]

INTELSAT participated in ITU preparatory efforts,[89] and it also sought to directly influence its members by sending them a memorandum on Space WARC issues of concern to INTELSAT.[90] This memorandum included a statement that the Space WARC's key objective of equitable access "can be fulfilled, at least in part, by ensuring that INTELSAT continues to have available adequate orbit/spectrum resources, which would enable it to provide the satellite communications needs of its Members and Users."[91] INTELSAT sought the support of its members and users at the Space WARC so that

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88. *See* Rutkowski, *The World Administrative Radio Conference on Use of the Geostationary-Satellite Orbit: Airing The Views of U.S. Regulators and Users*, 24 Col. J. Transnat. L. 51, 57 (1985).

89. For example, INTELSAT provided inputs to the CCIR Conference Preparatory Meeting on "The INTELSAT System," on "The Nature and Extent of Congestion in the Geostationary Satellite Orbit," and on "Ways of Alleviating Orbit Congestion." *See* INTELSAT, Contributions to the Conference Preparatory Meeting (CPM), Doc. BG Temp. 58-115 (Feb. 29, 1984).

90. INTELSAT, WARC-ORB-85/88 Issues of Concern To INTELSAT, Ref. A/84-34 (Oct. 18, 1984)(attachment to memorandum from the Director General to all INTELSAT Signatories).

91. *Id.* at 1.

INTELSAT would "achieve the orbit/spectrum resources which are necessary to fulfill their satellite communications needs."[92]

Numerous other organizations were involved in Space WARC preparations. CITEL, the Inter-American Telecommunications Conference, is a body of the Organization of American States. Its technical committee prepared a report on Space WARC issues,[93] and it presented a resolution to the First Session advocating adoption of the Region 2 BSS Plan in the Radio Regulations.[94] Other organizations involved in WARC preparations included: NATO, INMARSAT, the International Maritime Organization, the International Civil Aviation Organization, and the World Meteorological Organization.[95]

As would be expected, the Space WARC preparations of the ITU itself were extensive and involved most of its organs. The General Secretariat organized major preparatory seminars

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92. Id. at 2. The memorandum also concluded that:

> The objective of the INTELSAT System Members and Users at the Conference should be to ensure the availability to their system, under any planning method agreed upon at the WARC, of the adequate orbit and spectrum resources which are necessary for the orderly growth and development of the INTELSAT System.

Id. at 3.

93. See Rutkowski, supra note 88, at 57.

94. See ITU, WARC-ORB-85, Doc. 84.

95. See FCC, First Report and Order, Gen. Doc. No. 80-741, F.C.C. 85-94, at 17 (March 1, 1985) [hereinafter cited as First Report and Order].

in Buenos Aires, Nairobi and Bangkok.[96] These seminars promoted exchanges and improved understanding of Space WARC issues, particularly for the smaller developing countries located near the seminars. The IFRB also made a significant contribution to Space WARC preparations.

The IFRB had been requested by the 1979 WARC to prepare a report on the application of the pertinent Radio Regulations and to include information regarding difficulties administrations may have had in gaining access to suitable orbit/spectrum resources.[97] This 84-page report described the existing ITU regulatory regime for communication satellites and indicated areas of the regime that might be improved.[98]

One of the report's most interesting sections was Annex F, which contained the replies of administrations to an IFRB Circular Letter requesting comments on difficulties they had experienced in applying the ITU regulatory procedures. Comments were received from 35 administrations, but only three (France, India and Mexico) indicated they had experienced difficulties, and only two others (Ecuador and Yugoslavia)

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96. Butler, The International Telecommunication Regulatory Framework For Satellite Communications, Proc. 28th Colloq. on L. of Outer Space 295, 296 (1985).

97. 1982 Radio Regulations, supra note 42, Res. No. 3.

98. ITU, Report of the IFRB to the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (1984) (appended to IFRB Circular Letter No. 600, Dec. 10, 1984, and attached to WARC-ORB/85, Doc. 4).

noted that they expected future problems.[99] It is not necessarily surprising that few developing countries commented on their dissatisfaction with the regulatory regime. Most developing countries had no direct experience with the regulatory procedures. Therefore, although they were generally unsatisfied with the nature of those procedures, they could not comment directly on their application.

Probably the most important ITU preparations for the Space WARC were conducted by the CCIR. The 1979 WARC had invited the CCIR to carry out studies and provide the First Session with "technical information concerning principles, criteria, and technical parameters including those required for planning space services."[100] These studies culminated with the CCIR Conference Preparatory Meeting (CPM) held from June 25 to July 20, 1984. The CPM was attended by 340 delegates from 61 countries and 33 organizations, and it compiled a report with extensive technical annexes.[101] The report covers every item specified in the First Session Agenda. It was used

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99. Id. at 74-84; and id. Add. 1, at 3.

100. 1982 Radio Regulations, supra note 42, Res. No. 3.

101. See ITU, Report of the CCIR Conference Preparatory Meeting (CPM), Joint Meeting, Study Groups 1, 2, 4, 5, 7, 8, 9, 10 and 11 Geneva, 25 June-20 July, 1984 (1984) [hereinafter cited as CPM Report]. For a report on this Meeting, see 12 J. Space L. 174 (1985).

extensively and referred to frequently at the First Session.[102]

In addition to international efforts, many nations also initiated Space WARC preparations of their own. The extensive preparations undertaken by the United States reflect the great concern held by developed countries for the potential results of the Conference. In 1980, the United States established a governmental interagency Space WARC preparatory committee designated Ad Hoc 178.[103] It met approximately monthly to prepare positions on Space WARC issues of interest to government users.

The United States Federal Communications Commission (FCC) also initiated proceedings in preparation for the Space WARC. It initiated these proceedings through a Notice of Inquiry in 1980.[104] After four Notices of Inquiry,[105] in 1985 the

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102. The CPM Report included a discussion of planning methods. Seven possible planning methods were described. Although the dual planning method adopted at the First Session was not one of these methods, some of the elements of the seven planning methods can be found in the Allotment Plan and Improved Procedures Planning. See Jasentuliyana, The Developing Countries and the Geostationary Orbit (paper presented at the 13th Annual Friedman Conference on the Global Telecommunications Revolution, Colum. Univ., March 29, 1985).

103. Ad Hoc 178 was established by the Commerce Department's National Telecommunications and Information Administration (NTIA) within its Interdepartmental Radio Advisory Committee (IRAC). See Rutkowski, supra note 88, at 55.

104. The Notice of Inquiry (NOI) invited public comment on the policies and proposals being developed for the Space WARC. See FCC, Notice of Inquiry, F.C.C. 80-697, 45 Fed. Reg. 85,126 (adopted Nov. 25, 1980). For a general discussion of U.S. preparations for WARC-ORB-85, see also Rutkowski, supra note 88.

105. See FCC, Second Notice of Inquiry, F.C.C. 82-214, 47
(Cont. on next page)

FCC published a Report and Order presenting the FCC's views and recommendations on the Space WARC to the United States Department of State.[106] In formulating its views, the FCC was aided by a public advisory committee that it had established in 1981.[107] This committee brought together experts on all the issues to be addressed at the Space WARC. It proved to be a successful and productive group, which was reconvened periodically throughout preparations for the First and Second Sessions of the Space WARC. Prior to the First Session, the Advisory Committee issued two reports.[108] Material contained in the first report was included in the United States' contributions to the CCIR Conference

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Fed. Reg. 24,223 (adopted May 13, 1982); FCC, Third Notice of Inquiry, F.C.C. 83-452, 48 Fed. Reg. 47,069 (adopted Oct. 8, 1983); and FCC, Fourth Notice of Inquiry, F.C.C. 84-194, 49 Fed. Reg. 21,419 (adopted May 10, 1984).

106. See First Report and Order, supra note 95. The FCC concluded that only the FSS bands between 3,700 and 7,075 MHz should be considered for planning. Id. at 4. The Report contained views on all of the major First Session issues.

107. See FCC, Memorandum Opinion and Order, F.C.C. 81-317, 46 Fed. Reg. 42,758 (1981).

108. See First Report of the Advisory Committee for the 1985 World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It (1983); and Second Report of the Advisory Committee for the 1985 World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It (1985).

Preparatory Meeting.[109] The second report was used by the FCC in preparing its Report and Order.[110]

M. Summary

The events leading to the Space WARC present an interesting history. We see the development of a detailed regulatory regime for space telecommunications. Moreover, we see a period of increasing dissatisfaction and increasing power on the part of developing countries; their first efforts to plan space services go back as far as 1963.

When the First Session of the Space WARC began in 1985, years of careful preparation had been invested. Sweeping revisions to the ITU regulatory regime for satellite telecommunications were a real potential. Developed countries were quite concerned that the results of the Space WARC would impair their existing and projected satellite communication networks. Developed countries were generally quite satisfied with the ITU regulatory regime. Many developing countries, on the other hand, were looking forward to significant changes to that regime and to realizing their goal of equitable access to the orbit/spectrum regime. Given these distinctly opposite views, a successful conference was anything but assured.

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109. See First Report and Order, supra note 95, at 9-10.

110. Id. at 10.

CHAPTER 5

THE SPACE WARC GOAL:

EQUITABLE ACCESS

The "essential objective" of the Space WARC was to "guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit and to the frequency bands allocated to the space services utilizing it ...."[1] The key term of this objective is "equitable access." This chapter examines the legal concept of equity and the concept of equitable access in the ITU as it relates to the Space WARC.

A. Legal Concepts of Equity

In the law, there are many concepts that involve equity. These include: equitable estoppel, equitable assignment, equitable conversion, equitable execution, and equitable recision. Indeed, there is an entire body of jurisprudence known as "equity." Notwithstanding its frequent use, the concept of equity is difficult to define. According to Black's Law Dictionary, equitable means "[j]ust, fair, and right, in consideration of the facts and circumstances of the individual case."[2] Precisely because equity depends upon the facts of each case, it remains an elusive concept.

1. ITU, World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, Administrative Council Resolution No. 895 (1983); see also ITU, WARC-ORB-85, Doc. 1.

2. Black's Law Dictionary 632 (Rev. 4th ed., 1968) (emphasis added).

Furthermore, it is a concept that differs in various countries according to their legal systems and their cultures.[3] Despite its elusiveness, it is generally agreed that equitable does not mean equal.[4]

References to equity in space law are relatively new phenomena, often related to demands by developing nations for a greater share of material resources.[5] This is particularly true of the Moon Treaty.[6] Unfortunately, the equitable sharing concept of the Moon Treaty will not be fully defined until, and if, an international regime is established to govern the exploitation of the moon's resources. That

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3. See Williams, The Exploitation and Use of Natural Resources In the New Law of the Sea and the Law of Outer Space, Proc. 29th Colloq. on the L. Outer Space 198, 202 (1986).

4. Id. See also Christol, National Claims for the Using/Sharing of the Orbit/Spectrum Resource, Proc. 25th Colloq. on the L. of Outer Space 295, 298 (1982); Gorove, Principles of Equity in International Space Law, Proc. 26th Colloq. on the L. of Outer Space 17, 18 (1983).

5. See Gorove, supra note 4; Doyle, Equitable Aspects of Access to and Use of the Geostationary Satellite Orbit (paper presented at IAF Congress, Brighton, U.K. 1987).

6. The Moon Treaty calls for the establishment of an international regime with several purposes. One of those purposes is "to provide an equitable sharing by all States Parties in the benefits derived from [moon] resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration." Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11 (7)(d) U.N. Doc. A/RES/34,68 (14 Dec. 1979).
Although this provision of the Moon Treaty sets out several factors relevant to a determination of equitability, it is not all-inclusive. By stating that certain factors get "special consideration," it implies that other factors are also relevant.

regime is to be established when "exploitation is about to become feasible."[7] If nations undertake to establish such a regime, they will be at the same conceptual stage that the Space WARC found itself when it had to determine specific rules and procedures to effect the nebulous concept of equitable access. The legal concept of equity is also reflected in several other international agreements involving space activities, but none provide a definition of the concept.[8]

B. Equitable Access in the ITU

The concept of equitable access was incorporated into the ITU Convention in 1973.[9] However, the term "equitable access" has never been defined in the Convention. A logical starting point for an examination of circumstances relevant to the Space WARC's objective of equitable access is the Resolution that called for the Space WARC.

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7. Id. art. 11 (5).

8. See Doyle, supra note 5.

9. International Telecommunications Convention, art. 33(2), October 25, 1973, T.I.A.S. No. 8572 [hereinafter cited as 1973 ITU Convention].

1. Equitable Access and Resolution No. 3

At the 1979 WARC, developing countries secured passage of Resolution No. 3.[10] In addition to calling for the Space WARC, Resolution No. 3 also addressed the issue of equitable access. It provided that "there is a need for equitable access to, and efficient and economical use of [the orbit/spectrum resource] by all countries as provided for in Article 33 of the [1973 ITU Convention] and Resolution 2 ...."[11] Two aspects of this provision are of paramount importance. First, while Resolution No. 3 recognized the need for equitable access, the goal was tempered by the requirement that such access be "efficient and economical."[12] Thus, these objectives were linked and were of equal importance. Second, Resolution No. 3 made reference to Article 33 of the 1973 ITU Convention[13] and to Resolution No. 2.[14] The objectives of equitable access and efficient and economical

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10. See discussion supra ch. 4, notes 63-67 and accompanying text.

11. ITU, Radio Regulations, Res. No. 3 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations].

12. Id.

13. 1973 ITU Convention, supra note 9.

14. 1982 Radio Regulations, supra note 11, Res. No. 2.

use were to be pursued "as provided for"[15] in those references. Both of those references, therefore, are relevant to an understanding of the principle of equitable access.

Article 33 of the 1973 ITU Convention provided that countries were to have equitable access to the orbit/spectrum resource "according to their needs and the technical facilities at their disposal."[16] This language implied that a country without a need for access to the orbit/spectrum resource or without the technical facilities to enable its use did not require equitable access. Article 33 could be interpreted to exclude countries without a present need and ability to use the orbit/spectrum resource from present considerations of equitable access. As in Resolution No. 3, Article 33 also provided that the orbit/spectrum resource "must be used efficiently and economically."[17] Thus, Article 33 both emphasized the present or near-term capability to use the orbit/spectrum resource and reaffirmed the link between equitable access and efficient and economical use.

Resolution No. 2, also referred to in Resolution No. 3, was adopted at the 1979 WARC.[18] Resolution No. 2, like Resolution No. 3 and Article 33, contained a provision

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15. *Id.* Res. No. 3.

16. 1973 ITU Convention, *supra* note 9, art. 33(2).

17. *Id.*

18. *See* 1982 Radio Regulations, *supra* note 11, Res. No. 2. This Resolution was originally adopted at the 1971 WARC for Space Telecommunications (WARC-ST). *See* ITU, Final Acts of the World Administrative Radio Conference for Space Telecommunications, Res. No. Spa 2-1 (Geneva, 1971).

regarding the efficient and economical use of the orbit/spectrum resource.[19] In addition, it acknowledged that "all countries have equal rights in the <u>use</u>"[20] of the orbit/spectrum resource and that such use "can start at various dates depending on the requirements and readiness of technical facilities of countries."[21] This statement could be interpreted to mean that the equal rights do not arise until a country is ready to use the orbit/spectrum resource. Such an interpretation is in accordance with Article 33 of the 1973 ITU Convention.[22] However, Resolution No. 2 also provided a new consideration relevant to the equitable access calculation.

In a provision apparently aimed at the "first-come, first-served" rule,[23] Resolution No. 2 concludes that prior registration of an orbit/spectrum assignment with the ITU "should not provide any permanent priority ... and should not create an obstacle to the establishment of space systems by other countries."[24] This provision, with its reference to permanent priority and obstacles, is future oriented. It indicates that future uses should be granted some

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19. 1982 Radio Regulations, <u>supra</u> note 11, Res. No. 2.

20. <u>Id</u>. (emphasis added).

21. <u>Id</u>.

22. <u>See</u> <u>supra</u> note 16 and accompanying text.

23. <u>See</u> discussion <u>supra</u> ch. 3, note 18 and accompanying text.

24. 1982 Radio Regulations, <u>supra</u> note 11, Res. No. 2.

consideration, at least to the extent that current uses should be made in such a manner so as not to "create an obstacle to"[25] later uses. Although not legally binding,[26] Resolution No. 2 is nonetheless material to the study of the meaning of equitable access. Its reference in Resolution No. 3 suggested for the first time that future needs and abilities were relevant to considerations of equitable access.

Having examined the components of Resolution No. 3, several conclusions may be drawn regarding the concept of equitable access _as of the time the Resolution was adopted_. First, circumstances relevant to equitable access must include considerations of efficiency and economy. In fact, economical and efficient use of the orbit/spectrum resource should be recognized as a separate objective of equal weight with the objective of equitable access.[27] Second, circumstances relevant to equitable access also include the present needs of countries for use of the orbit/spectrum resource as well as their technical facilities to enable that use.[28] Finally, there was an indication that future uses of the orbit/spectrum resource are also relevant to considerations of equitable

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25. _Id_.

26. _See supra_ ch. 2, note 19 and accompanying text. _See also_ Christol, _The International Telecommunication Union and the International Law of Outer Space_, Proc. 22d Colloq. on the L. of Outer Space 35, 42 (1977).

27. _See_ 1973 ITU Convention, _supra_ note 9, art. 33; and 1982 Radio Regulations, _supra_ note 11, Res. Nos. 2 & 3.

28. 1973 ITU Convention _supra_ note 9, art. 33.

access.[29] Though these conclusions are not definitive as to the meaning of equitable access, they lay the groundwork for an examination of subsequent events that are pertinent to a better understanding of this concept.

2. Equitable Access and the 1982 ITU Convention

The provision in Article 33 of the 1973 ITU Convention regarding needs and technical facilities was unpopular with developing countries who were concerned about their future access to the orbit/spectrum resource. At the 1982 Plenipotentiary Conference, those countries succeeded in amending Article 33 to provide instead that countries should have equitable access to the orbit/spectrum resource "taking into account (1) the special needs of the developing countries and (2) the geographical situation of particular countries."[30]

The proposal to amend Article 33 sparked considerable debate. Most developing countries supported deletion of the phrase "according to their needs and the technical facilities at their disposal"[31] because they believed it to be

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29. 1982 Radio Regulations, supra note 11, Res. No. 2.

30. International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 33(2) (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention].

31. 1973 ITU Convention, supra note 9, art. 33(2).

discriminatory.[32] The developed countries, on the other hand, were generally concerned that deletion of the phrase and substitution of language identifying the "special needs of the developing countries"[33] would "imply the introduction of a degree of inequality in favor of developing countries with regard to the use of frequencies in the space radio services."[34]

Thus, the threshold issue raised by the amendment to Article 33 is whether it created a priority favoring the developing countries. Several factors indicate that it did not. First, it appears that only equal treatment was sought by the nations supporting the change. For example, during the negotiation of the amendment to Article 33, a delegate from one of the countries that proposed the amendment stated that "[f]ar from instituting an inequality in favor of the developing countries, the text aimed at establishing a fair

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32. The delegate from Algeria stated that the "[r]emoval of any reference to needs or available technical facilities would improve, or, more importantly, create equal access ...." Plenipotentiary Conference, Nairobi 1982, Summary Record of the Tenth and Last Meeting of Committee 8, ITU Doc. No. 516, at 8 (Nairobi, 1983) [hereinafter cited as Nairobi Conf.]. The delegate from India agreed and asserted that "[c]ountries should have equal access ... without suffering penalties because they lacked technical facilities at any given time." Id. Not all developing countries, however, favored this change. The delegate of Brazil "considered that the reference to the needs of countries was justified." Id.

33. 1982 ITU Convention, supra note 30, art. 33(2).

34. Nairobi Conf., supra note 32, at 7 (statement of the delegate from the U.S.S.R.).

balance in the use of a limited resource ...."[35] Second, specification of the special needs of the developing countries does not necessarily mean that the needs of other countries cannot be taken into consideration. In fact, a 1982 United Nations report cited a need to establish criteria for equitable and efficient use of the geostationary orbit "based on the genuine needs ... identified by <u>each</u> country."[36] Finally, a legal priority favoring developing countries would contravene the Outer Space Treaty[37] which provides in relevant part that use of outer space must be "without discrimination of any kind, and on a basis of equality ...."[38] Legal, not actual, equality is required.[39] In determining equitable access, therefore, the special needs of

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35. <u>Id</u>. at 7 (statement of the delegate from Colombia). Statements of other delegates confirm that equal access, not preferential treatment, was the objective of the change to Article 33. <u>See supra</u> note 32.

36. <u>Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space</u>, at 71, U.N. Doc. No. A/CONF.101/10 (Vienna, Aug. 9-21, 1982) (emphasis added) [hereinafter cited as UNISPACE 82 Report].

37. <u>See</u> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967).

38. <u>Id</u>. art. I.

39. Von Kries, <u>The Legal Status of the Geostationary Orbit: Introductory Report</u>, Proc. 18th Colloq. on the L. of Outer Space 27, 29 (1975).

developing countries must be "tak[en] into account,"[40] but developing countries are not necessarily entitled to priority. The special needs of the developing countries have most relevance to the criteria of efficient and economical use of the orbit/spectrum resource.

Article 33 of the 1982 ITU Convention provides that use of the orbit/spectrum resource must be made "efficiently and economically ...."[41] Use of this resource in the manner most needed by the developing countries, however, may not constitute the most efficient and economical use.[42] Moreover, when they are ready to use the orbit/spectrum resource, developing nations may be unable to afford the advanced technologies that would provide the most efficient and economical use.[43] Finally, the needs of the developing countries for assured future access, if taken into account currently, may not lead to the most efficient and economical use. Therefore, the special needs of the developing countries

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40. 1982 ITU Convention, _supra_ note 30, art. 33(2).

41. _Id._

42. For a satellite telecommunication system to be practical for use in the rural areas characteristic of most developing countries, the earth stations must use small, inexpensive antennas. Use of such antennas, however, requires higher power satellites, and that in turn requires an increase in the minimum spacing between satellites. The end result of this wider spacing is a less efficient use of the geostationary orbit. _See_ Gorove, _supra_ note 4, at 19; and discussion _supra_ ch. 1, note 61 and accompanying text.

43. An FCC report acknowledged that "low technology service is an important concern of many developing countries." FCC, First Report and Order, Gen. Doc. No. 80-741, F.C.C. 85-94, at 26 (March 1, 1985).

are for current and future uses that are not the most efficient and economical.

The manner in which these special needs should be taken into account has been addressed by one author:

> In principle, the need for exploiting [the orbit/spectrum resource] to maximum advantage may not be questioned. But the criteria for judging efficiency should be determined in the context of the large gaps that divide the developing and the developed countries and the widely differing levels of socio-economic development among them .... It is well known that there are several technological means by which [efficiency] can be maximized. Most of them are, however, beyond the reach of a majority of developing countries ....[44]

Efficient and economical use of the orbit/spectrum resource, while still a general objective, can no longer be considered "an end in itself: it is only a means of ensuring all countries equitable access to this scarce resource."[45] Nor is efficiency a yardstick by which the special needs of the developing nations are to be measured. Rather, those needs, when taken into account, must be considered on an equal basis with the needs of developed countries even though they may not result in uses of the orbit/spectrum resource that are as efficient and economical.

The addition to the ITU Convention of the phrase "taking into account the special needs of the developing

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44. T. Srirangan, Equity In Orbit: Planned Use of a Unique Resource, at 6-7 (paper presented at 1984 Annual Conference of the IIC, West Berlin, Sept. 21-23, 1984).

45. UNISPACE 82 Report, *supra* note 36, at 70.

countries,"[46] therefore, does not grant a priority to developing countries for equitable access to the orbit/spectrum resource. Rather, it acknowledges that in any determination of equitable access, the needs of developing countries for particular uses of the orbit/spectrum resource, and for future uses, must be considered on the same basis as the uses made by developed countries notwithstanding the fact that less efficient and economical uses of the resource may result.

Another issue presented by the 1982 amendment to Article 33 pertains to the provision whereby equitable access should take into consideration "the geographical situation of particular countries."[47] This language was derived from proposals made by four equatorial countries at the 1982 ITU Conference.[48] The language of the original proposals was "taking into account the particular needs of the developing countries as well as those of the equatorial countries."[49] The last phrase was an attempt to secure support for the position of the equatorial countries taken in the Bogota

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46. 1982 ITU Convention, supra note 30, art. 33(2).

47. Id. Similar language was also contained in Resolution No. 3 of the 1979 WARC: "taking into account ... the special geographical situation of particular countries ...." 1982 Radio Regulations, supra note 11, Res. No. 3.

48. Nairobi Conf., supra note 32, Doc. Nos. 183 (Colombia); 184 (Ecuador); 189 (Gabon); and 178 (Indonesia).

49. Id.

Declaration.[50] The equatorial countries failed, however, to achieve specific recognition, and the language ultimately adopted reflects a compromise. It grants no legal preference to equatorial countries on account of their location on the equator; accordingly, it lends no support to the Bogota Declaration. Moreover, while the adopted provision favors no particular group of countries,[51] it may actually place equatorial countries at a disadvantage. In use of the geostationary orbit, geography generally favors equatorial countries, but it creates significant problems for nations with high latitudes.[52] Therefore, this provision should be interpreted to mean that if a country's use of the orbit/spectrum resource is affected by a geographical situation, then that situation should be taken into account in determining equitable access.[53] Such an interpretation comports with the plain meaning of the terms of the 1982 amendment and is appropriate given the physical limitations placed upon the use of the radio frequency spectrum by geographical conditions.

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50. See discussion infra ch. 11, note 40-50 and accompanying text.

51. At the 1982 Nairobi Conference, the U.S. delegate noted that "the reference to the geographical situation of particular countries was very broad and could apply to wide categories of countries." Nairobi Conf., supra note 32, at 7.

52. See discussion supra ch. 1, note 5.

53. At the Second Session of the Space WARC, many nations cited geographical factors such as rainfall and mountains in an effort to secure more favorable positions in the allotment plan. See infra ch. 8, notes 59-60 and accompanying text.

3. Other Circumstances Relevant to Equitable Access

A final issue regarding equitable access to the orbit/spectrum resource focuses on whether circumstances other than those specified in Resolution No. 3 and the ITU Convention may be considered, and if so, what other circumstances are relevant. Although the Convention specifies certain factors relevant to equitable access, it does not state that they are intended to be exclusive. Since equity generally requires that all relevant circumstances be taken into consideration,[54] circumstances other than those enumerated in the Convention should also be considered in determining the scope of the principle of equitable access.

One such relevant circumstance is ability to use the orbit/spectrum resource. Article 33 focuses on the use of the orbit/spectrum resource. Article 33(2) commences with the words "[i]n _using_ frequency bands for space radio services ...."[55] Since use cannot be made without ability, one author reasons that "ability must be at the disposal of a country which wishes to take advantage of its guaranteed access."[56] Nevertheless, ability must not be made a precondition to equitable access. To do so would constitute a

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54. _See supra_ note 2 and accompanying text.

55. 1982 ITU Convention, _supra_ note 30, art. 33(2) (emphasis added).

56. Gorove, _supra_ note 4, at 18. This does not mean, however, that later users should be penalized when ready to use the orbit/spectrum resource.

return to the past concept of equitable access, with its requirement of available technical facilities, and would thereby discount the future needs of the developing countries. Rather, ability should be viewed as relevant to equitable access only to the extent that it pertains to the time of use. A present guarantee to future access could constitute equitable access for a country that does not have the ability to presently use the orbit/spectrum resource.

Current use of the orbit/spectrum resource is another circumstance relevant to equitable access. The current users of the orbit/spectrum resource undertook that use, and the great expense underlying it, with an expectation of protection by the existing ITU regulatory regime.[57] The notions of fairness inherent in the concept of equity require that those users be accommodated in a guarantee of equitable access.

C. Summary

In summary, the 1982 amendment to Article 33 of the ITU Convention resulted in significant change in the concept of equitable access. Although considerations of efficiency and economy remain relevant to equitable access, those considerations must be viewed in light of the special needs of developing nations for current and future uses that may not be the most efficient and economical. Other relevant circumstances that need to be taken into account include: the

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57. For discussion of this regime and the protection it affords, see supra ch. 3.

geographical situation of particular countries, which affects their use of the orbit/spectrum resource; ability to use the resource; and the needs of current users.

While it is possible to identify factors relevant to considerations of equitable access, applying those factors to arrive at a method of providing equitable access is a more difficult task. There are conflicts and trade-offs inherent in these factors. It is very difficult to resolve concerns relating to present access to the orbit/spectrum resource with concerns relating to future access to the resource. Precisely because of these conflicts within the concept of equitable access it was difficult, and ultimately impossible, to formulate a single method for access to the orbit/spectrum resource that was equitable to all countries. Arriving at that conclusion, however, was a difficult process.

CHAPTER 6

THE SPACE WARC:

THE FIRST SESSION

Chapter 6 covers the First Session of the Space WARC, which was held between August 8 and September 15, 1985, in Geneva, and was attended by representatives from 112 nations. This chapter discusses the Conference structure, summarizes the work of the Conference, and analyzes why all of its objectives were not accomplished. This chapter then examines the key decisions of 1985 and identifies the primary issues that were left to be resolved in 1988.

A. Conference Structure

As an Administrative Conference of the ITU,[1] the main decision-making body of the First Session was the Plenary.[2] During its first meeting, the Plenary elected a Conference Chairman, Dr. Ilija Stojanovic (Yugoslavia), and established seven committees.[3]

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1. *See* discussion of Administrative Conferences *supra* ch. 2, notes 18-29 and accompanying text.

2. International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 77, (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention].

3. The following committees were established: (1) Steering Committee; (2) Credentials Committee; (3) Budget Control Committee; (4) Technical Parameters and Criteria Committee; (5) Committee on Planning Principles and Criteria, and (Cont. on next page)

The key committee was Committee 5, on Planning, which created two working groups. Working Group 5A had responsibility for making recommendations on decisions relevant to the services and bands to be planned and on the type of plan.[4] Working Group 5B had responsibility for associated regulatory and administrative procedures.[5] In addition, ad hoc groups on specific issues were established as needed.[6] All delegations had the right to participate in every committee and working group. Membership on ad hoc groups, however, was sometimes restricted because smaller groups were generally more effective at resolving time-sensitive issues.[7] Reports were forwarded from working groups to committees, and then to the Plenary where final

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Regulatory and Administrative Procedures; (6) Committee on Matters Relating to the Broadcasting Satellite Service in the 12 GHz Band; and (7) the Editorial Committee. ITU, WARC-ORB-85, Doc. 79.

4. *Id*. at 6.

5. *Id*.

6. *See*, *e.g.*, *infra* note 26-29 and accompanying text.

7. A delegate of Iraq inquired about the Chairman's authority to so restrict membership. The ITU Secretary-General replied that the Chairman "had authority to propose the list of members of the Ad Hoc Group" and that delegates "should allow the Chairman's initiative to produce results before commenting further." *See* ITU, WARC-ORB-85, Doc. 220, at 2.

decisions were taken and a report to the Space WARC Second Session was approved.[8]

B. Summary of the Work

The key agenda items of the 1985 session focused on planning of the geostationary orbit/spectrum resource. The four principal objectives were: (1) deciding which space services should be planned; (2) selecting which frequency bands should be planned; (3) establishing a planning method consisting of principles, technical parameters, and criteria for planning of the selected services and bands; and (4) with respect to services and bands not selected for planning, promulgating guidelines for regulatory procedures, as necessary.[9] As originally contemplated, the Space WARC was to make these decisions in the First Session and implement them in the Second Session.[10] Due to the failure of the First Session to resolve all of its objectives, however, the

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8. See ITU, Report to the Second Session of the Conference: World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (Geneva, 1985) [hereinafter cited as Report to the Second Session].

9. See ITU, World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, Administrative Council Resolution No. 895 (May, 1983) [hereinafter cited as Space WARC Agenda].

10. ITU, Radio Regulations, Res. No. 3 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations].

Second Session had to finalize decisions regarding the basic nature of the planning methods before it could address plan implementation.

The first objective of the First Session, selecting space services to plan, entailed relatively few problems. The focus of the Space WARC, indeed its _raison d'etre_, was the situation existing in the fixed satellite service (FSS).[11] Developing countries were concerned about their future access to the geostationary orbit/spectrum resource for their telecommunication satellites of the FSS, and about the conditions and requirements for such access.[12] One of the very few substantive decisions made in the first weeks of the Conference was that planning would involve only the FSS.[13] Thus, the first objective was achieved. The second and third objectives of selecting frequency bands to plan and establishing principles, technical parameters, and criteria for their planning, involved interrelated issues. Decisions on these matters were not to come as easily.

Planning issues were the subject of significant differences of opinion, and a wide variety of planning

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11. The FSS is the ITU classification for satellites providing point-to-point radiocommunication service. _Id._ art. 1, No. 22. _See_ discussion of the FSS _supra_ ch. 1, notes 20-22 and accompanying text.

12. _See_ discussion _supra_ ch. 5, notes 42-45 and accompanying text.

13. This decision should have been almost automatic, yet after two weeks of the session the decision to plan only the FSS was still on a "provisional" basis. _See_ ITU, WARC-ORB-85, Doc. 140, at 1.

approaches were proposed. In general, developing countries asserted that most, if not all, of the frequency bands allocated to the FSS[14] should be planned, and that the plan should be a long term, a priori plan partitioning the orbit/spectrum resource and allotting portions of it to all nations regardless of need or ability to use.[15] Developed countries were willing to enter into a compromise that would include the planning of certain "expansion bands"[16] through a flexible planning method, but they considered a priori planning of the "conventional"[17] C and Ku bands to be unacceptable.[18] This relationship between selection of bands to plan and selection of planning methods was emphasized repeatedly.

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14. For FSS frequency allocations see 1982 Radio Regulations, supra note 10, art. 8.

15. See, e.g., ITU, WARC-ORB-85, Doc. Nos. 17 (Senegal); 20 (Kenya); 75 (Algeria); and 87 (Iraq: "no approach other than a priori planning ... should be considered ....").

16. The term "expansion bands" refers to frequencies within the C and Ku bands that were newly allocated to the FSS during the 1979 WARC. In 1985, these bands were not in use by satellites of the FSS, but several satellite systems had Advanced Published for use of the expansion bands. See ITU, WARC-ORB-85, Doc. 275; and ITU, WARC-ORB-88, Doc. 19, at 22 and Annex 1.

17. The term "conventional bands" refers to the frequencies within C and Ku bands that had been allocated to the FSS prior to 1979. They are in heavy use in many sectors of the GSO.

18. See, e.g., ITU, WARC-ORB-85, Doc. Nos. 5 (U.S.); 12 (France); 18 (U.K.); and 39 (Japan). For a more in-depth discussion of the positions of various developing and developed countries at the First Session, see D. Demac, G. Codding, H. Hudson & R. Jakhu, Access to Orbit: After the 1985 ITU Space WARC (1986) (Report published by the IIC).

While the issues of bands to plan and planning methods were being debated during the first five weeks, progress was made in selecting planning principles. Eleven planning principles were identified.[19] Although this was an important accomplishment, the planning principles are only very general in nature.

Progress was also being made in certain other areas. Final Acts were adopted to incorporate into the Radio Regulations the results of the 1983 Regional Administrative Radio Conference on the Broadcasting Satellite Service.[20] Although unrelated to the central issues involving the FSS, this was an important agenda item in its own right.[21] Various technical matters were also progressing,[22] but policy issues critical to the equitable access goal were not fairing well.

The politically contentious issues of bands to plan and planning methods were not resolved until late in the First Session. The Plenary had assigned the initial task of selecting bands to plan and planning methods to Working Group

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19. For planning principles see ITU, WARC-ORB-85, Doc. 324 (Rev. 1), at 1-2.

20. ITU, Final Acts, WARC-ORB-85 (1985).

21. See Space WARC Agenda, supra note 9, at para. 6 A-3.

22. Committee 4 on Technical Parameters and Criteria made significant progress in their technical review of the situation prevailing in the bands allocated to space services. See ITU, WARC-ORB-85, Doc. 302. They were unable, however, to finalize decisions on establishment of technical parameters and criteria for planning due to the failure of Committee 5 to make progress on the underlying issues of bands to plan and the nature of the planning methods. Id.

5A. After approximately two weeks, Working Group 5A had made "provisional" recommendations that the C and Ku bands should be planned.[23] The limits of the frequencies to be planned within these bands, and the nature of the planning method itself, however, were not specified.[24] Many developing countries still wanted an a priori plan of all the FSS frequencies in these bands. Most developed countries were willing to plan only the expansion bands, and some were willing to plan only the expansion bands within the C band. Decisions on other frequency bands allocated to the FSS could not be reached on even a provisional basis. The Ka band and the 8/7 GHz band were still being hotly contested. Some developing countries wanted to plan these frequency bands, while most developed countries strongly opposed such planning.

In an effort to reach a compromise, the chairman of Working Group 5A, Mr. F. S. Pinhiero (Brazil), combined the two leading ideas before him. He proposed that planning be based on two distinct methods: an allotment plan with a specific bandwidth permitting each administration to satisfy its requirements for domestic service from an orbital position within a predetermined arc, and improved procedures satisfying requirements not addressed in the allotment plan.[25] The two methods would use different frequency bands. Although Mr. Pinhiero's proposal was favorably received by many countries,

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23. ITU, WARC-ORB-85, Doc. 140, at 1.

24. Id.

25. ITU, WARC-ORB-85, Doc. DT/70.

the deadlock in Working Group 5A was not broken. The success of the First Session appeared to be in jeopardy and the ramifications of a failed Conference were being discussed in the halls of the Conference center.

With less than two weeks remaining in the 1985 session, the Chairman of the Conference, Mr. Stojanovic, took action to break the deadlock. He announced the formation of an ad hoc group to seek a consensus solution.[26] This group consisted of several ITU officials and representatives from seventeen key countries. It met for several days while most other conference meetings were suspended. Suspending the Conference in this manner at such a late stage of the proceedings was a risky move since it could waste valuable days. The Chairman correctly recognized, however, that the problems would more likely be resolved by a small group of individuals than by continuing long hours of debate in a large committee.

The ad hoc group had some success and at least narrowed the remaining issues. The dual planning method approach of an allotment plan and improved procedures was accepted. Most members agreed that the expansion bands in the C band could be placed within the allotment plan.[27] Countries also agreed to "think over" inclusion of the Ku band expansion bands in

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26. ITU, WARC-ORB-85, Doc. 220, at 2. Mr. Stojanovic considered this action necessary because "some delegations were showing too little tolerance and willingness to compromise ...." Id.

27. ITU, WARC-ORB-85, Doc. DT/70 (Add. 1).

the allotment plan.[28] But the group was unable to reach a decision on other bands or on details of the two planning methods.[29]

Finally, on September 9th, the beginning of the last week of the session, the "showdown" on planning occurred. Some 59 delegations spoke in Committee 5 on this issue. Indonesia spoke early in favor of a compromise method of dual planning along the lines originally suggested by Mr. Pinhiero and sanctioned by the Chairman's ad hoc group.[30] Indonesia's emotional appeal for compromise appeared to have a significant effect on many other developing countries. Its position as a developing country with a deployed satellite system provided Indonesia with important credibility.

When the debate ended, it was clear that the majority of delegations favored the compromise encouraged by Indonesia. A decision to that effect was finally adopted.[31] This compromise involved two planning methods: an "Allotment Plan" to furnish all nations at least one allotment for national systems providing domestic services, and "Improved Procedures" for all other requirements.[32] The Allotment Plan was to

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28. Id.

29. Id.

30. ITU, WARC-ORB-85, Doc. 293, at 3.

31. Id. at 11.

32. ITU, WARC-ORB-85, Doc. 324 (Rev. 1), at 3.

apply to 800 MHz in the C and Ku expansion bands.[33] Improved Procedures planning was to apply to the FSS frequencies in the C and Ku conventional bands.[34] Although these two planning methods were identified, technical parameters and criteria, as well as regulatory procedures needed to implement and administer the plans, were not specified in detail.

Numerous reservations to the compromise dual planning methods were taken during the 1985 session. Twenty countries asserted reservations to the frequencies selected for the Allotment Plan.[35] Some of these countries considered that 800 MHz was too much, and others considered it was not enough.[36] However, even the countries supporting the compromise did so without complete information.[37] Until the technical parameters and criteria for the Allotment Plan and

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33. Id.

34. Id. The FSS frequencies in the Ka band were identified for possible planning by a future competent conference. Report to the Second Session, supra note 8, ch. 3, at 3.

35. ITU, WARC-ORB-85, Doc. 324 (Corr. 1), at 1.

36. For minutes of the Plenary discussions regarding this compromise see ITU, WARC-ORB-85, Doc. 293.

37. The Report of the U.S. Delegation concluded that "no delegation really understands what the allotment planning approach will look like in 1988, or what kind of procedures are needed." See U.S. Dept. of State, Report of the U. S. Delegation to the First Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It 51 (1986) [hereinafter cited as ORB-85 U.S. Delegation Report].

the Improved Procedures were defined, final decisions on the acceptability of the entire package simply could not be made intelligently.

The 1985 session, therefore, failed to complete its agenda. It selected the space service to plan and chose a set of planning principles. It also adopted certain decisions on bands to plan and planning methods. However, it did not settle the issues of frequencies to plan and planning methods, because the intrinsically related technical parameters and criteria for the plans were not established. In essence, the viability of the compromise "solution" depended upon the intersessional work and the Second Session to successfully elaborate upon and define the results of the First Session.

The most obvious reason for the lack of accomplishments at the 1985 session was that the session ran out of time. But that is not to say that sufficient time to accomplish the agenda items had not been scheduled by the ITU. The First Session was slated for five and one half weeks and actually ran over by a few days. This time could have been sufficient if the first four weeks of the session had yielded meaningful progress. That, however, had not occurred.

One must wonder why it took so long to reach the compromise of September 9th. The decisions were important and established the basis for all subsequent decisions; yet they were late in coming even though a general outline of what was ultimately accepted as the compromise solution had been proposed earlier in Working Group 5A.[38] In retrospect, it appears that certain developing countries held on too long to their quest to have all or most of the FSS bands included within an _a priori_ plan. Had these nations been willing to compromise earlier, more work on other issues could have been accomplished. Whether this unwillingness to compromise was the result of inflexible instructions that had been given delegates by their governments, the importance of the matters being discussed, recognition that there would be a Second Session to fall back on, a personal identification with specific results that certain delegates appeared to have,[39] or whether it was a consequence of poor judgement regarding realistic outcomes, is a matter of conjecture. Most likely, all of these factors played a part. Whatever the cause, unwillingness to compromise was a predominant characteristic of the First Session.

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38. This type of a compromise solution had been proposed in Working Group 5A on September 2d. _See supra_ note 25 and accompanying text. The Executive Director of the 1985 U.S. Space WARC Delegation, who participated in many off-the-record negotiating sessions, believes that a compromise of this nature could have been reached at least 10 days before September 9th. Telephone interview with Mr. Harold G. Kimball, U.S. National Telecommunications and Information Administration (Aug. 25, 1986). In fact, a proposal very similar to the compromise solution adopted had been discussed by key participants on August 31st. The delegates from Kenya and Algeria, two key leaders of the developing countries, rejected that proposal.

39. One delegate from Algeria, Mr. Bouhired, waged a particularly vocal campaign throughout the First Session for _a priori_ planning of _all_ the frequency bands allocated to the FSS. Mr. Bouhired had something to say on every issue at every session. If he sought to identify himself as a champion of the rights of developing countries he was successful. During the intersessional period he was hired by the ITU.

One other factor contributing to slow progress in 1985 was the repeated injection of extraneous legal/political issues. These issues were initially raised as proposed planning principles. Several equatorial countries asserted a claim to sovereignty over portions of the GSO arc above their territory.[40] This claim had been raised in many international conferences, but few anticipated that it would be a major issue at the Space WARC. Nevertheless, this issue was repeatedly raised along with numerous other alleged planning principles relating to, or derived from, the sovereignty claim.[41] The sovereignty related issues, first raised on August 13th,[42] were not resolved until September 13th.[43] They were discussed in a sub-group of Working Group 5A, in 5A itself, in Committee 5, in the Chairman's ad hoc group, and finally in the Plenary.

Additionally, the desire to reach a consensus was a factor that often resulted in delay. In spite of the politics present at the First Session, the quest for consensus was a striking factor. The developing countries had a majority of the vote, yet few votes on significant issues were taken, and then not until near the end of the session. The emphasis on consensus had its basis primarily in two factors. First,

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40. <u>See</u> discussion <u>infra</u> ch. 11, notes 30-40 and accompanying text.

41. <u>See</u> discussion <u>infra</u> ch. 11, notes 30-40 and accompanying text.

42. <u>See</u> ITU, WARC-ORB-85, Doc. 106 (Colombia).

43. <u>See</u> ITU, WARC-ORB-85, Doc. 353, at 5-9.

interference free communications have always depended to a great extent on cooperation among countries. This has been one of the primary reasons for the very existence of the ITU. Second, most developing countries realized that without the participation of the majority of developed countries, any plan selected would have been an illusion.

In short, the failure to successfully resolve all agenda items at the First Session can be attributed to numerous factors. The most important was the unwillingness of many countries to enter into a reasonable compromise solution until extremely late in the session. Also important, however, was the presence of extraneous orbital sovereignty-related issues that were not finally resolved until the last few days. Time is valuable and must be used efficiently at such conferences. The repeated discussion of extraneous issues was not an effective use of conference time.

One further aspect of the First Session that provoked interesting comments, but that made no substantive difference, was the lack of a quorum at the concluding Plenary sessions. The First Session had been scheduled to end on September 13, 1985. By the 17th Plenary meeting, on September 15th, many delegations had departed and a quorum no longer existed.[44] Thus, many of the decisions reflected in the Report to the Second Session were not formally adopted by a quorum.

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44. <u>See</u> ITU, WARC-ORB-85, Doc. 360, at 18.

The decisions of the First Session were set out in a Report to the Second Session[45] and in Final Acts.[46] A more detailed analysis of those decisions is now undertaken.

C. Specific Issues

1. Planning Principles

Eleven Planning Principles were identified at the First Session.[47] They were to apply to both planning methods.[48] Some were taken from preexisting authority. Resolutions 2 and 3 of the 1979 WARC formed the basis of several principles,[49] as did the Radio Regulations[50] and the ITU Convention.[51] Other principles are broadly worded and subject to varying

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45. Report to the Second Session, _supra_ note 8.

46. ITU, Final Acts, WARC-ORB-85 (1985).

47. _See_ Report to the Second Session, _supra_ note 8, at ch. 3. The Planning Principles are also listed in Doyle, _Regulating the Geostationary Orbit: ITU's WARC-ORB-85_, 15 J. Space Law 1, 12-14 (1987).

48. _See_ Report to the Second Session, _supra_ note 8, at ch. 3 (para. 3.3.2).

49. Principle 3.3.2(b) affirmed that administrations are not entitled to "permanent priority" in use of the orbit/spectrum resource. This Principle was taken from Resolution 2. Principle 3.2.4 provided that planning should "take into account the relevant technical aspects of the special geographic situation of particular countries." It was taken from Resolution 3. _See_ Report to the Second Session, _supra_ note 8, at ch. 3; and 1982 Radio Regulations _supra_ note 10, Res. 2 & 3.

50. Principle 3.2.2 sets out sharing criteria similar to those already incorporated in the Radio Regulations. _See_ 1982 Radio Regulations, _supra_ note 10, Nos. 413-436.

51. Principle 3.2.1 provides that the planning methods shall guarantee equitable access taking into account the "special (Cont. on next page)

interpretation. For example, although the plan should be capable of "accommodating advances in technology",[52] it should also "not prevent the use of technologies which are well proven and widely available."[53] Another planning principle provides that existing systems must be taken into account, but may be subjected to "some adjustment".[54] This principle is quite important because it established that no planning method may ignore existing systems. It did not, however, provide specifics on the degree of protection to be afforded to existing systems. This is characteristic of all the planning principles.

The Principle evoking the most controversy at the First Session concerned multi-administration systems.[55] INTELSAT had lobbied intensively both before and during the First

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needs of developing countries and the geographical situation of particular countries." Report to the Second Session, supra note 8, at ch. 3. This Principle comes from article 33 (2). See 1982 ITU Convention, supra note 2, art. 33 (2).

52. See Report to the Second Session, supra note 8, ch. 3 (para. 3.2.7).

53. Id.

54. Id. (para. 3.2.5).

55. This Principle provides that:
a) The planning method shall take into account the requirements of administrations using multi-administration systems created by intergovernmental agreement and used collectively without affecting the rights of administrations with respect to national systems.
b) The planning method shall take account of the specific characteristics of multi-administration systems in order to enable them to continue to meet the requirements of administrations for international services as well as, in many cases,
(Cont. on next page)

Session for a favored treatment of multi-administration systems.[56] Additionally, a group of 30 administrations pointed out the constraints on orbital locations that such systems must deal with,[57] and proposed that "special recognition" should be granted multi-administration systems with respect to orbital locations.[58] Proposals by individual administrations regarding the treatment of multi-administration systems ranged from opposition to any priority or preference, to support for special treatment.[59]

The Principle ultimately adopted resulted from various compromise proposals. It left two questions unanswered: whether it creates any priority for multi-administration systems over national systems, and whether it covers national systems being used internationally.[60] The first question is the easiest to answer. Nothing in the language of the Principle indicates that a priority or preference was

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> for national services.
>
> c) It is understood that these multi-administration systems include those having a safety-of-life aspect and feeder links in the FSS.

Report to the Second Session, supra note 8, ch. 3 at 2.

56. See supra ch. 2, note 87 and accompanying text; ITU, WARC-ORB-85, Doc. 83.

57. See discussion supra ch. 1, notes 43-44 and accompanying text.

58. See ITU, WARC-ORB-85, Doc. 166.

59. See ITU, WARC-ORB-85, Doc. DT/27 (compilation of proposals).

60. See Jakhu, A Legal Analysis of the 1985 ITU Space Conference Report, Proc. 29th Colloq. on the L. of Outer Space 103, 107 (1986).

intended. Indeed, it provides only that the requirements and specific characteristics of multi-administration systems shall be "taken into account."[61] Thus, the Principle grants no priority for multi-administration systems over national systems.

The second question, whether the Principle covers national systems being used internationally, is more difficult. The term "multi-administration system" could logically apply to a common user system owned by one nation and used by others, such as the Indonesian Palapa system.[62] While INTELSAT has defined "multi-administration systems" in a rather restrictive manner,[63] the Report to the Second Session contains no definition. This Principle also uses the term "national systems," but does not define it. The potential use of national systems for international service, in competition with INTELSAT, was a major issue of international telecommunications at the time of the First Session.[64] If national systems providing international service were to be excluded from the Planning Principle on multi-administration

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61. See supra note 55.

62. See supra ch. 2, notes 118-120 and accompanying text.

63. The INTELSAT definition of "multi-administration systems" includes only systems that are "owned and operated by global or regional organizations whose member states cooperatively share in telecommunications facilities and in joint decision-making." See Jakhu, supra note 60, at 107.

64. See Klass, Prospect of Competition Jolting INTELSAT Members, Aviation Week & Space Tech., June 25, 1984, at 171; Staple, The Assault on INTELSAT, NATION, Dec. 22, 1984, at 665.

systems, one would have expected the exclusion to be stated specifically.[65] Thus, it remains unclear whether national systems being used internationally were intended to be covered by the Planning Principle on multi-administration systems.[66]

In summary, the Planning Principles adopted at the first session were broad and somewhat ambiguous.[67] To an extent, they can be viewed as the First Session's rendition of factors relevant to equitable access to the orbit/spectrum resource. Since equitable access is a difficult concept to define, it is

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65. At the twelfth Plenary meeting, when this Planning Principle was discussed, Venezuela and Algeria indicated that they believed "national systems" as used in this Principle, meant "domestic systems." See ITU, WARC-ORB-85, Doc. 342, at 3. In fact, the minutes of this meeting indicate that Algeria stated such an understanding and "on that understanding" the issue was decided. Id. However, the recollection of this author, who attended the Plenary meeting, is that the decision was not as clear as indicated in the minutes. Several nations, including the United States, had spoken directly against the interpretation being advanced by Algeria. Since this meeting occurred late in the First Session, the minutes of this Plenary meeting were not approved by a subsequent Plenary, as is the normal practice. Therefore, their accuracy is questionable. Moreover, one other provision in the Report to the Second Session throws light on this issue. When the Report discusses the Allotment Plan, it states specifically that it is "limited to national systems providing domestic services." See Report to the Second Session, supra note 8, at ch. 3 (para. 3.3.4.1). This limitation indicates that the term "national systems," when used without qualification, may be interpreted more broadly than just those providing domestic services. See also ORB-85 U.S. Delegation Report, supra note 37, at 57.

66. The U.S. delegation to the First Session concluded that the Planning Principle on multi-administration systems did not exclude national systems providing international service. See ORB-85 U.S. Delegation Report, supra note 37, at 54-55. But see Jakhu, supra note 60, at 108.

67. For a further discussion of the Planning Principles see generally R. White & H. White, The Law and Regulation of International Space Communication 213-221 (1988).

not surprising that the Planning Principles selected were not more specific. At the Second Session, the Planning Principles played only a small part. They were sometimes cited to support one position or another; however, they were not incorporated into the planning methods in the Final Acts.[68]

2. The Allotment Plan

The Allotment Plan adopted at the First Session provides all ITU administrations with at least one allotment consisting of: an orbital position in a predetermined arc; a bandwidth of 800 MHz within the expansion bands selected; and a service area.[69] The concept of a predetermined arc was included to increase the flexibility of the Plan even though few delegations understood the concept and those that did probably had different understandings.

The Plan is for "national systems providing domestic services."[70] Thus, the service area would normally be limited to national territory. However, the procedures associated with the Plan were to allow "administrations with adjacent territories to combine all or part of their

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68. See ITU, Final Acts adopted by the Second Session of the World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing It (ORB-88) Geneva, 1988.

69. See Report to the Second Session, supra note 8, at ch. 3.

70. Id. (para. 3.3.4.1).

allotments" in order to establish a subregional service.[71]

The Allotment Plan protected existing systems. This protection was sought by various countries that had already started advance publication of satellites in the Allotment Plan bands.[72] Existing systems were defined as systems recorded in the Master Register; in coordination; or which had filed advance publication information with the IFRB before Aug. 8, 1985, when the First Session commenced.[73] Such systems were to be included in the Plan on an "equal basis" with planned allotments but could be subject to "some adjustments," depending upon their stage of development.[74] Although a definition of existing systems was adopted that set a cut-off date of August 8, 1985, no moratorium was placed on using the Radio Regulations for a system in the Allotment Plan bands. This lack of foresight caused some problems at the Second Session.[75]

The Allotment Plan also provided for additional requirements in the relevant frequency bands above those allotted. Additional requirements, however, could only be accommodated to the extent that they did not "introduce limitations to the bringing into use of an allotment in the

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71. _Id._ The accommodation of subregional systems was a significant issue at the Second Session.

72. _See_ ITU, WARC-ORB-85, Doc. 275; and ITU WARC-ORB-88, Doc. 19, at 22.

73. _Id._ (para. 3.3.4.9).

74. _Id._

75. _See infra_ ch. 8, notes 21-22 and accompanying text.

plan except if agreed by the administrations concerned."[76] Furthermore, if an allotment had already been converted into an assignment, an additional requirement could not cause it unacceptable interference.[77]

Procedures were called for to cover various areas. These included: allotment modification, conversion of an allotment into an assignment, and establishment of new allotments for new members of the ITU.[78] The Plan duration was a period "of at least ten years."[79] The technical parameters of the Plan were to be based upon generalized parameters applicable to all allotments.[80]

Because the compromise on planning methods was reached so late in the First Session, many issues were left unresolved. These included: setting the Allotment Plan's specific duration; choosing the general parameters upon which it would be based and the values for those parameters; establishing procedures for modifying allotments and for converting them into assignments; and determining the number of allotments that each country could have.[81] The major issue left unresolved, however, related to the basic nature of the Allotment Plan.

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76. *Id.* (para. 3.3.4.8).

77. *See id.*

78. *See id.* (para. 3.3.4.7).

79. *Id.* (para. 3.3.4.6).

80. *See id.* (para. 3.3.4.2).

81. *See id.* ch. 3, at 3-4.

According to the Report to the Second Session, "each allotment shall consist of an orbital position in a predetermined arc".[82] The prime issue remaining was the timing of the position assignment. Use of the term "predetermined" indicated that the arc had to be assigned when the plan was devised. It was not so clear, however, when the position within that arc had to be assigned.

Two different views on this matter were expressed at the 1985 session.[83] A number of developing countries argued that a fixed position should be assigned, along with the predetermined arc, when the plan is devised.[84] This would, in effect, make the Allotment Plan an *a priori* plan,[85] with a predetermined arc and a predetermined position. The assigned position, however, would clearly be the most important factor. It could be moved within the arc, but only with the permission of the nation having that assignment. On the other hand, several developed countries emphasized the flexibility that could be associated with a predetermined arc

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82. *Id.* at 4.

83. In one of the last Plenary meetings, the IFRB noted that there existed "some misunderstanding on the exact interpretation of the term predetermined arc." ITU, WARC-ORB-85, Doc. 358, at 7.

84. Algeria argued that if a position was not assigned along with the orbital arc, there would be "nothing tangible" about the guarantee of access. Author's notes of Committee 5, 6th meeting (Sept. 7, 1985). Committee 5A Chairman, Mr. Pinhiero, argued for a specified position that could be moved around within an arc. *Id.*

85. One commentator specifically referred to the Allotment Plan as an "*a priori*" plan. *See* ORB-88 A Pre-Conference Bulletin 3 (1987).

and asserted that the fixed position within a predetermined arc should be assigned only when a satellite system is to be implemented.[86] This difference of opinion concerning the timing of position assignment related back to the initial conflict regarding a priori plans, which separated developing from developed countries during most of the First Session.

3. Improved Procedures Planning

The other part of the dual planning method accepted at the First Session was planning by improved procedures. The principal characteristic of this method was to be the convening of periodic multilateral planning meetings (MPMs).[87] MPMs were to be the normal process for gaining access to the geostationary orbit in the conventional bands of the C and Ku bands.[88]

Associated with MPMs was the topic of burden-sharing criteria. Many administrations considered that the application of such criteria would ensure equitable access to the associated frequency bands. Burden-sharing criteria would use objective criteria to require networks with previously vested rights to make certain adjustments in order to

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86. The delegate from Spain argued that the allotment could be an arc with a position guaranteed when a requirement arose. Author's notes of Committee 5, 6th meeting (Sept. 7, 1985).

87. Report to the Second Session, supra note 8, ch. 3 (para. 3.3.5.1).

88. For specific frequencies, see id. (para. 3.3.1b).

accommodate a new network.[89] For example, a registered satellite might have to accept, as part of that registration, the obligation to move its orbital location up to a specified maximum distance during its life expectancy in order to accommodate a new satellite.

Few details about MPMs and burden-sharing were provided. In theory, all interested parties would be gathered at an MPM and they would make equitable adjustments, perhaps based on burden-sharing criteria, in order to accommodate new users of the orbit/spectrum resource. MPMs would end the unequal bargaining power that is a potential characteristic of bilateral negotiations conducted during Coordination under the "first come, first served" ITU regulatory regime.[90] Since the First Session provided little definition of the MPM concept, the nature of the MPMs and the status of their decisions were left to the Second Session.[91]

A frequency-related matter was also left to the Second Session. In the last few days of the First Session, several developing countries made efforts to expand the frequency bands subject to improved procedures. It was not until the last full day of the Conference that a move to include the 3.4

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89. <u>See</u> <u>id</u>. (para. 3.3.5.3c)

90. <u>See</u> discussion <u>supra</u> ch. 3, notes 75-78 and accompanying text.

91. Report to the Second Session, <u>supra</u> note 8 ch. 3, at 5.

to 3.7 GHz band was defeated.[92] On the same day, an effort to include the 30/20 GHz band resulted in a compromise leaving the decision on planning of this band to the Second Session.[93]

Recognizing that little work had been accomplished on Improved Procedures, the First Session urged administrations to consider during the intersessional period "the implications and possibilities of this approach ... and submit proposals to the Second Session."[94] The Report to the Second Session listed factors to be considered regarding MPMs. These included: the timing of meetings; the status of decisions taken; the financial implications; the scope and form of requirements and the stage at which they should be submitted; the participants in the meeting; the safeguarding of the interests of non-participants; and whether bilateral agreements reached in the period between meetings should be subject to ratification at the next meeting.[95] Many other important issues remained unresolved, such as the role of the IFRB in the MPMs and the nature and application of burden-sharing criteria. So many questions were left unanswered that, in the next to the last Plenary meeting, the

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92. ITU, WARC-ORB-85, Doc. 360, at 13.

93. The CCIR was asked to study the 20/30 GHz band and report to the Second Session regarding its possible planning "by a future competent conference." Report to the Second Session, _supra_ note 8, ch. 3 (para. 3.3.5.1); and ITU, WARC-ORB-85, Doc. 360, at 12-13.

94. _Id._ at 6.

95. _See id._

delegate of China declared that the Conference had not indicated "what kind of method is meant by improved procedures nor how it can guarantee equitable access to the commonly used frequency bands."[96]

4. Simplified Procedures

The First Session recognized that the existing Radio Regulations would remain in effect after the Second Session for the space services and bands not identified for planning. All administrations realized that those regulations are very complex.[97] Therefore, the Second Session was requested to simplify the Radio Regulations in certain areas.

Articles 11, 13, and 14 were singled out for particular attention. In regards to Article 11, the First Session suggested that Appendices 3 and 4 could be merged to avoid "duplication of information."[98] Several aspects of the coordination procedures were also identified for change. These included improving Appendix 29 to reduce the number of cases where coordination is required; and allowing coordination on the basis of satellite networks, as opposed to

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96. ITU, WARC-ORB-85, Doc. 360, at 11.

97. For a discussion of these Radio Regulations, see supra ch. 3.

98. See Report to the Second Session, supra note 8, at 73.

an assignment-to-assignment basis.[99] Changes suggested for Article 13 included improvements to the accuracy of the IFRB's records and provisions for further extensions to the notified date of bringing a system into use when that is required by exceptional circumstances.[100] In regards to Article 14, the First Session noted the general ambiguity of certain footnotes referring to it[101] and made several recommendations, including: reviewing and modifying Article 14 provisions involving assignments to stations in space services in such a way that they would be applicable to satellite networks; considering the question of modification to a network that had successfully completed the Article 14 procedure; and including a means by which "affected administrations" are identified.[102] Also called for were simplified handbooks on the Radio Regulations and distribution of up-to-date copies of the IFRB's Technical Standards and Rules of Procedure.[103]

5. Broadcasting Satellite Issues

Although the primary Agenda items of the First Session involved the FSS, several BSS issues were also on the Agenda.

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99. See id.

100. See id. at 74.

101. See id. at 75.

102. See id. at 75-76.

103. See id. at 77.

These issues were less politically charged than the FSS issues and progressed to satisfactory conclusion, although not without some difficulties.

Two main tasks relating to the BSS were given to the First Session. The first involved the Regions 1 and 3 BSS Plan.[104] The downlinks had been planned in 1977, but feeder links had not been allocated for the BSS until the 1979 WARC.[105] The First Session was to select the frequency bands for the feeder links, define their technical characteristics, and identify those bands for which sharing criteria between services needed to be developed.[106] This would set the stage for the establishment of the plan by the Second Session. The First Session accomplished all of these tasks.[107] Recommendations were also made for administrations to consider in preparing their feeder link

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104. *See* discussion *supra* ch. 4, notes 40-51 and accompanying text.

105. The Region 1 and 3 BSS downlink Plan was incorporated into the Radio Regulations as Appendix 30. *See* 1982 Radio Regulations, *supra* note 10, App. 30.

106. *See* Space WARC Agenda, *supra* note 9 (para. 3).

107. The frequency bands selected were: 17.3 - 18.1 GHz, and (for countries outside Europe and for Malta) 14.5 - 14.8 GHz. Report to the Second Session, *supra* note 8, at ch. 6 (para. 6.1.3). For the technical characteristics agreed upon, *see id.* (para. 6.2.2). Sharing criteria to be developed during the intersessional period are discussed *id.* (para. 6.3).

requirements, and guidelines were set out for the elaboration of the plan by the Second Session.[108]

The other primary Agenda item for the BSS involved the Region 2 BSS Plan. That plan, which covered both downlinks and feeder links, had been established in 1983, but needed to be incorporated into the Radio Regulations.[109] As the session opened, several European countries voiced objection to incorporating the plan due to alleged "technical incompatibilities."[110] Region 2 countries, however, persuaded those countries that the technical problems could be resolved, and they were. The Region 2 BSS Plan was incorporated into the Radio Regulations as a revised Appendix 30,[111] resulting in full recognition of the Plan by the administrations of Regions 1 and 3.

One aspect of the Region 2 BSS Plan, however, was not incorporated into the Radio Regulations. Resolution No. 2 of the 1983 RARC(BS), the Interim Systems Resolution, provided a flexible and streamlined method for implementing a BSS system that was significantly different from the Plan.[112] The First Session concluded that the long-term application of the

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108. See id. (para. 6.1.3).

109. See Space WARC Agenda, supra note 9 (para. 6).

110. See ORB-85 US Delegation Report, supra note 37, at 67-74.

111. Final Acts, supra note 46, App. 30; 1982 Radio Regulations, supra note 10, App. 30.

112. See U. S. Dept. of State, Report of the United States Delegation to the ITU Region 2 Administrative Radio Conference on the Broadcasting Satellite Service 47-48 (1983).

Interim Systems Resolution should be studied further. Thus, it was decided that the IFRB would apply this Resolution on a provisional basis, only for Region 2, and that the Second Session should make a definitive decision on the matter.[113]

Two other BSS related issues were discussed at the First Session. One involved satellite sound broadcasting systems for individual reception by portable and automobile receivers. The 1979 WARC had adopted Resolution 505, which encouraged administrations to carry out experiments on such systems within the 500 - 2,000 MHz band, and directed the CCIR to continue and expedite studies on the technical characteristics of satellite sound broadcasting systems.[114] The First Session was to consider this issue and make recommendations to the Second Session.[115] The First Session heard conflicting reports regarding the costs of satellite sound broadcasting versus the costs of equivalent terrestrial systems.[116] The most contentious issue, however, was the frequency of operation. Some administrations proposed looking outside the

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113. Final Acts, _supra_ note 46, Res. COM6/3. Other BSS Resolutions were adopted at the First Session. Res. COM6/2 related to the provisional application of the partial revision to the Radio Regulations prior to their entry into force; Res. COM6/4 related to the recording in the Master Register of the BSS assignments for Region 2. _Id_.

114. _See_ 1982 Radio Regulations, _supra_ note 10, Res. 505.

115. Space WARC Agenda, _supra_ note 9 (para. 4).

116. _See_ ORB-85 US Delegation Report, _supra_ note 37, at 31-32.

frequency range specified in Resolution No. 505. This was strongly opposed and a legal ruling on conference competency was requested.[117]

After further debate, the conference adopted a Recommendation concluding that satellite sound broadcasting is technically feasible but presents considerable sharing difficulties.[118] It invited administrations to continue studies "within, and also outside but near," the range of 500 - 2,000 MHz, and recommended that the Second Session should consider the results of the up-to-date studies and take an appropriate decision.[119]

The final BSS related issue involved High Definition Television (HDTV). Although not explicitly included in the First Session Agenda,[120] several administrations submitted proposals relating to the issue. The conference recognized that HDTV was rapidly progressing and that a world-wide frequency allocation to the BSS suitable for use by HDTV would be desirable.[121] In Recommendation PLEN/B, the session

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117. Id. at 33.

118. See Report to the Second Session, supra note 8, Rec. PLEN/C.

119. Id.

120. Space WARC Agenda, supra note 9.

121. See Report to the Second Session, supra note 8, Rec. PLEN/B.

asked the Administrative Council to place this issue on the Agenda of the Second Session.[122]

D. Summary

The results of the First Session were disappointing to many administrations. By failing to resolve all of its agenda items, a great deal of work was left for the intersessional period and for the Second Session. Notwithstanding its shortcomings, the First Session did manage to establish a framework that would lead to an acceptable outcome. In establishing this framework, the most politically contentious issues were substantially resolved. This left the Second Session free to concentrate on more technically oriented matters.

Also noteworthy was the success of the First Session in regards to the BSS issues. The work on feeder links for the BSS Plan in Regions 1 and 3 was fruitful, and the basis was set for the Second Session to establish this Plan. Furthermore, the BSS Plan for Region 2 and its feeder link Plan were incorporated into the Radio Regulations.

In evaluating the results of the First Session, it is important to consider that the developed and developing countries arrived at the Conference with very different goals and objectives. If no compromise had been reached, many observers would not have been surprised. Even as late as the fourth week of the Conference, the likelihood of a compromise

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122. Id.

result was doubtful. That any compromise was reached, therefore, must be considered a substantial accomplishment.

CHAPTER 7

INTERSESSIONAL ACTIVITIES

The lack of definitive results from the First Session of the Space WARC mandated that a tremendous amount of work would need to be accomplished before the Second Session convened in 1988. A productive intersessional period would be essential to a successful 1988 conference. This chapter reviews the most important aspects of the work accomplished during this period. Emphasis is placed on the activities of the ITU's IFRB and CCIR.

A. IFRB Activities

Given its responsibilities for frequency management and registration of geostationary satellite systems, it is not surprising that the IFRB was tasked with several duties critical to a successful intersessional period. Its principal assignments related to the Allotment Plan for the FSS. The First Session directed the IFRB to prepare the software required for the planning method, to conduct planning exercises, and to inform administrations of their progress by periodic reports and informational meetings.[1]

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1. *See* ITU, Report to the Second Session of the Conference: World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, ch. 8 (Geneva, 1985) [hereinafter cited as Report to the Second Session].

1. <u>IFRB Planning Assumptions</u>

The IFRB's responsibilities of developing software for the Allotment Plan and carrying out planning exercises with that software were greatly complicated by the lack of definition provided by the First Session. The Report to the Second Session framed the intersessional work of the IFRB.[2] It was, however, often confusing and even contradictory. For example, chapter 3 of the Report set out the planning approaches adopted by the First Session. It provided that each allotment in the Plan shall consist of a minimum bandwidth, a service area, and "<u>an</u> orbital position in a predetermined arc."[3] Another paragraph provided that the Plan shall permit each country to satisfy its requirements "from <u>at least one</u> orbital position, within a predetermined arc ...."[4] Neither of these provisions specified the timing of the position allotment. It could be long after the predetermined arc was allotted. Chapter 8 of the Report to the Second Session, however, provided that "[t]he planning exercise shall also examine the possibility of establishing orbital arcs associated with the orbital position ...."[5] This statement seemed to indicate that orbital positions should be predetermined, as opposed to orbital arcs. Thus, the directions to the IFRB were less than clear and concise.

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2. <u>Id</u>.

3. <u>Id</u>. ch. 3, at 4 (emphasis added).

4. <u>Id</u>. at 4 (emphasis added).

5. <u>Id</u>. ch. 8, at 1.

Due to this lack of direction, the IFRB had to make certain assumptions regarding the Allotment Plan in order to conduct the planning exercises.[6] These assumptions were set out in an IFRB report entitled the "ORB System."[7] In response to the comments submitted by administrations and information developed by the CCIR, the IFRB made several revisions to the ORB System during the intersessional period. These revisions included changes to the assumptions.

Of critical importance to the Board's planning exercises was the concept of a predetermined arc. The IFRB noted the opposing views that had been expressed at the First Session and recognized that it would need to limit the various predetermined arc concepts in order to conduct the planning exercises. In the first version of the ORB System, the Board adopted a very limited assumption regarding predetermined arcs. It provided that:

> each allotment will be characterized among others by an arc within the service arc which will be defined by a nominal orbital position and two limits in the form of +X, -Y degrees. The limits of the

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6. The IFRB concluded that:

> Despite the spirit of cooperation and goodwill demonstrated by all delegations [at the First Session] it was not possible to take a number of important decisions essential to the intersessional work of the IFRB. The lack of these decisions as well as some imprecision in the instructions to the Board made it necessary for the Board to define a set of working assumptions ....

ITU, IFRB ORB System, at vii (1986) [hereinafter cited as ORB System]. An updated version of this Report was presented as an attachment to a Conference document. See ITU, WARC-ORB-88, Doc. 19.

7. Id.

> arc are determined in such a way that any two entries in the Plan are compatible with one another, irrespective of the position of the space station within the predetermined arc.[8]

This assumption went through additional iterations before the final assumption on predetermined arcs was formulated.

The Board ultimately decided to consider three approaches to predetermined arcs. These approaches were:

> - an individual predetermined arc fully compatible with any other predetermined arc;
> - a predetermined arc common to a group of requirements which are nearly compatible, each common arc being fully compatible with any other common arc;
> - a predetermined arc compatible with a number of specific orbital positions but not compatible with another arc.[9]

Assumption No. 1 limited the concept of predetermined arcs to the above three approaches for the purposes of the IFRB planning exercises.[10]

Another important assumption made by the Board involved standardized and generalized parameters. There is a wide range of technical parameters that satellite systems can use. These parameters include values for satellite and earth station antenna characteristics, power levels, station keeping and antenna pointing accuracy of the satellite, as well as

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8. *Id.* at ch. 2, sect. 1 (original draft).

9. *Id.* at 12. For a description of these three approaches *see id.* at 12-15.

10. *Id.* at 16.

other performance related criteria.[11] In a planning process, the characteristics of the networks are assumed to be identical, except for the service area. This is done because without utilizing a set of parameters, a theoretical "typical satellite," the potential of harmful interference between networks cannot be evaluated. Standardized parameters are the set of technical parameters describing the typical communications satellite system that is envisioned when the plan is established.[12]

The values used for standardized parameters will greatly affect the results of the planning exercise. For example, by using the most exacting standards, the "high tech" solution, a large number of closely spaced satellites may be accommodated. By using less demanding standards, requiring less costly technology, wider spacing would be required and fewer satellites could be accommodated.[13]

Generalized parameters are also useful. It is highly unlikely that satellite networks implemented pursuant to a plan would use exactly the standardized parameters that the

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11. *See generally* ch. 1, Part B.

12. *See generally* Hauck, *Technical Parameters for Planning the Fixed Satellite Service* in "Digital Technology ... Spanning the Universe" 136 (IEEE Int'l Conference on Communications, Philadelphia, PA, June 12-15, 1988).

13. *See* discussion *supra* ch. 1, notes 58-70. A study conducted by a U.S. WARC preparatory group concluded that the use of advanced technology, rather than low performance equipment, could result in the accommodation of approximately four times as many satellites. *See* FCC, Second Report and Order, Gen. Doc. No. 80-741, F.C.C. 88-124, at 11 (March 30, 1988).

plan was based on. Generalized parameters are ranges of certain standardized parameters that can be used to implement allotments without the need to coordinate the assignments with other allotments. For example, one standard parameter could be an earth station antenna size of five meters. The associated generalized parameter might permit use (without requiring coordination) of antennas from four to six meters. The First Session had indicated that the plan "shall be prepared on the basis of generalized parameters applicable to all allotments."[14]

Standardized parameters can be converted to generalized parameters using mathematical formulae,[15] but not all of the standardized parameters must be converted to generalized parameters. A set of generalized parameters can be selected that "characterize only the interference-causing potential and interference susceptibility of the network."[16] The critical issue is the avoidance of interference between networks.

The use of generalized parameters, however, is not the only approach to planning. A carrier-to-interference ratio (C/I) can be used that takes into account the combined

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14. Report to the Second Session, _supra_ note 1, ch. 3 (para. 3.3.4.2). Six sets of generalized parameters were identified at the First Session. _Id._ at 57-62.

15. _Id._ at 22.

16. _Id._

interference causing potential of various parameters.[17] However, there are numerous types of carriers that each have different interference causing potential vis-a-vis other carriers. Moreover, a real satellite uses a mixture of carriers (e.g. TV, voice, narrow or wide-band data) each of which has different bandwidth and power transmission requirements, and each of which needs a different C/I value for protection. Thus, in selecting a C/I value, a theoretical "typical carrier" must be used.[18]

In Assumption No. 7, the IFRB decided on a planning method based upon "the generalized C/I approach along with appropriate standardized technical parameters."[19] This decision was based upon a CCIR recommendation.[20] The aggregate (i.e. considering interference from all other allotments, not just one) C/I target value selected by the Board for the planning exercises was 26 decibels. In other words, the 26 decibel value was a computer input (like the standardized parameters) and the software would attempt to move satellites around in the orbit until each satellite had an aggregate C/I of 26 decibels or more. Furthermore, a

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17. For a discussion of C/I ratios, see ORB System, supra note 6, at 40-49; and ITU, CCIR Report to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (WARC-ORB(2)) Part I, at 76-80 (Geneva, 1988) [hereinafter cited as CCIR Report].

18. See ORB System, supra note 6, at 42.

19. Id. at 20.

20. CCIR Report, supra note 17, at 22.

planning exercise would be considered successful only if the computer output provided every allotment with a C/I of at least 26 decibels.

Selection of a single C/I value was criticized by some administrations. In response to an IFRB Circular-letter requesting comments on the ORB System, the United States recommended that planning exercises be conducted with a range of C/I values from 20 to 26 decibels.[21] The Board indicated that if time permitted, it would conduct planning exercises with other values for C/I.[22] However, no such exercises were conducted.

In addition to its assumptions regarding predetermined arcs and standardized and generalized parameters, the IFRB had to make many other important assumptions in order to conduct planning exercises. Issues requiring assumptions included: bandwidth; service area; satellite antenna beamwidth; multiband networks; values for the standardized parameters; and treatment of existing systems.[23]

All of the decisions made by the IFRB relating to the planning exercises were important. Since it had neither the resources nor the time to run a large number of planning

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21. See FCC, WARC-ORB (2), Report of the Advisory Committee for the ITU World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (Space WARC Advisory Committee), at Annex B, (March 21, 1988) [hereinafter cited as Advisory Committee Report].

22. See ORB System, supra note 6, at 42.

23. For a discussion of the assumptions made by the IFRB, see id. at 16-29.

exercises with varying parameters, the assumptions and values used by the Board in the exercises that it did run had the potential of limiting choices that could be made at the Second Session.

2. Software Development

The IFRB was also charged with the weighty responsibility of developing the software that would be used for the planning exercises and would be used by the Second Session in preparing the final plan. For planning of the orbit/spectrum resource, two types of computer programs are generally useful. The first type is a synthesis program that generates a trial plan, including orbital positions, based upon the input requirements and technical parameters. The second type is an analysis program that takes the output of the synthesis program and performs a detailed examination of potential inter-satellite network interference. It is, in essence, a trouble-shooting program delineating where the output of the synthesis program must be revised to meet the planning objectives.

The program that the IFRB used was a synthesis program called ORBIT II. It was provided by Japan. ORBIT II determines an ordering of geostationary satellites while maintaining interference levels below specified parameters; it then determines an acceptable position for each satellite.[24] Although not an analysis program, ORBIT II could be used to some extent to assess satellite interference levels. Failure

24. Id. at 72.

to develop a dedicated analysis program to be used with ORBIT II contributed to the need to perform manual manipulation of draft plans at the Second Session.[25]

As a result of funding constraints, the IFRB had been limited to using ORBIT II, with no inclusion in the study of predetermined arcs except for those minimal results that might be obtainable using that program.[26] In an effort to expand their fiscally constrained capabilities, the IFRB invited administrations to provide other appropriate software for use in planning exercises.[27] In response, the United States provided the IFRB with a computer program that allowed the use of predetermined arcs in planning exercises.

This program, called NASARC,[28] was designed to identify predetermined arc segments that could be shared by groups of "compatible administrations," i.e. administrations that could be located within the same arc segment.[29] Each arc would be large enough to permit its associated group of compatible administrations to operate simultaneously at least one satellite each from within the predetermined arc without causing harmful interference to another allotment. NASARC was

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25. <u>See</u> <u>infra</u> ch. 8, notes 69-79 and accompanying text.

26. <u>See</u> ORB System, <u>supra</u> note 6, at 7.

27. <u>Id</u>. at 8.

28. NASARC stands for Numerical Arc Segmentation Algorithm for Radio Conferences. It was developed by NASA engineers.

29. For a more complete discussion of the NASARC program, <u>see</u> Smith, <u>Allotment Planning for Telecommunications Satellites</u>, 5 Space Communications and Broadcasting 359 (1987); and ORB System, <u>supra</u> note 6, at 74.

designed for use as a pre-processor program for ORBIT II. For each predetermined arc segment identified by NASARC, ORBIT II would identify an acceptable satellite location for each administration within the associated compatible group. Repeated runs of ORBIT II, in example scenarios, would identify a range of available orbit location options. Through use of NASARC, the Board would be able to examine the second type of predetermined arc concept that it intended to consider, the "common arc."[30] Unfortunately, the final version of NASARC was not provided to the IFRB until August 7, 1988, and it was not actually used in any planning exercises conducted by the Board.[31]

Additional computer programs were ultimately secured by the Board to help explore the two other predetermined arc concepts. One of these was produced as a result of a work study program arrangement between the IFRB and a University.[32] It identified individual predetermined arcs that were compatible with other predetermined arcs. This was the first type of predetermined arc concept the Board intended to consider.[33] The other was a sub-program added to ORBIT

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30. See supra note 9 and accompanying text.

31. See ORB System, supra note 6, at 74.

32. See id. at 73.

33. See supra note 9 and accompanying text.

II by the IFRB.[34] It identified predetermined arcs in which a space station could be located, but these arcs were not compatible with other arcs.[35] This was the final type of predetermined arc concept that the Board intended to consider.[36]

3. Planning Requirements

To conduct planning exercises, the IFRB needed to compile the Allotment Plan requirements of ITU administrations. In 1987, the Board requested all administrations to submit their requirements for one coverage per geographic area.[37] Submissions were received from 104 administrations.[38] Some indicated a requirement for more than one coverage per area based on operational constraints or the desire to provide a subregional system. Most of those administrations were asked to revise their requirements to conform to the intent of the First Session.[39] Administrations such as the Soviet Union and Canada, which needed more than one beam to provide one

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34. *See* ORB System, *supra* note 6, at 75.

35. *Id.*

36. *See* *supra* note 9 and accompanying text.

37. *See* IFRB Circular-Letter No. 682 (Feb. 25, 1987).

38. *See* ORB System, *supra* note 6, at 79.

39. *Id.*

coverage of their territory, were generally accommodated.[40] Many administrations submitted no requirements at all; the IFRB prepared the necessary data elements to include their areas in the planning exercises.[41]

The Board also had to include existing systems, as defined by the First Session, in the planning Exercises. The Board recognized that, as published, some of the existing systems would present significant problems regarding the accommodation of allotment requirements. The IFRB invited the concerned administrations to modify their existing systems to improve the planning situation, and that was done.[42] Nevertheless, the accommodation of existing systems along with the other allotment requirements remained a serious problem.

4. Planning Results

The first planning exercise conducted by the Board revealed that there were still significant problems involving the accommodation of both the existing systems and the allotment requirements in the same plan.[43] Even after administrations with existing systems provided further adjustments to their systems' technical parameters, planning exercises including both the allotments and the existing

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40. *Id.* at 80.

41. *Id.* at 79.

42. *Id.* at 111.

43. *See* ITU, WARC-ORB-88, Doc. 13, at 2.

systems provided extremely poor results.[44] Thus, the IFRB decided not to run additional planning exercises with existing systems included; further treatment of existing systems was left to the Second Session.[45]

When existing systems were deleted, the Board finally arrived at satisfactory results that provided all allotments with the target C/I of 26 decibels.[46] The Board then took the draft plan and ran limited additional exercises to compute predetermined arcs.[47]

5. Other IFRB Intersessional Tasks

The IFRB kept administrations informed of its intersessional activities through its ORB System Report, which was communicated to administrations by means of IFRB Circular-letters and through ORB Information Meetings. Three such meetings were held. The first meeting was held in May, 1986, the second in March 1987, and the final meeting in March, 1988.[48] These meetings were well attended and allowed administrations to directly comment on IFRB activities.

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44. Id.

45. Id.

46. Id. at 4; and discussion supra notes 20-21.

47. See ITU, WARC-ORB-88, Doc. 13, at 5.

48. See IFRB Circular-letter 738, Annex 1 (May 16, 1988). The General Secretariat also organized one regional seminar in Lome, Togo.

The IFRB also had important duties regarding the BSS feeder link plan for Regions 1 and 3. In this regard, the Board prepared computer software, collected the requirements submitted by administrations, conducted planning exercises, and reported their results to administrations.[49] Planning exercises were considerably more straightforward for the BSS plan than for the FSS plan because the First Session had defined the necessary technical parameters and their values.

Other tasks accomplished by the Board included describing certain computer programs that might be appropriate for use in Improved Procedures planning;[50] compiling its Rules of Procedure and distributing them to administrations;[51] and compiling an updated report on the accuracy of the IFRB's Master Register.[52]

B. CCIR Activities

The First Session listed 22 tasks for the CCIR to accomplish during the intersessional period.[53] In May, 1986, the Plenary Assembly of the CCIR adopted guidelines for the intersessional work and established a Joint Interim Working Party (JIWP) consisting of eight CCIR Study Groups to

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49. *See* ORB System, *supra* note 6, at ch. 5.

50. *Id.* at ch. 3.

51. *See* ITU, WARC-ORB-88, Doc. 18.

52. *See* ITU, WARC-ORB-88, Doc. 11.

53. *See* ITU, WARC-ORB-85, Doc. 360, Annex 1. *See also* Withers, *CCIR Current Work Programme*, in "ORB-88 A Pre-Conference Bulletin" 14 (Aug., 1987).

prepare a technical report for the Second Session.[54] In accordance with the CCIR guidelines, the relevant CCIR Study Groups formed Interim Working Parties and prepared reports based upon their studies.

The JIWP met December 7-18, 1987. It was attended by 192 delegates from 35 administrations and 18 organizations. The JIWP prepared an extensive three-part report based upon the inputs of Study Groups, administrations and other organizations.[55] Part I of the Report provides technical information relevant to the Second Session FSS Agenda items. It was designed to "assist the Second Session in deciding on planning and coordination procedures for the different frequency bands specified for allotment planning, for those subject to improved regulatory procedures, and for those not to be subject to planning ...."[56] Part II provides technical information relevant to BSS issues, including BSS feeder link planning, satellite sound broadcasting and satellite HDTV transmission.[57] The third part of the Report is an Executive Summary providing a 21-page overview of the work done on all of the intersessional tasks assigned to the

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54. ITU, CCIR Resolution 90: Recommendations and Reports of the CCIR, 1986, Volume XIV-1 (Geneva, 1986).

55. See CCIR Report, supra note 17.
An example of a contribution by an administration is the Report Annex on "A concept for the efficient and flexible use of the geostationary-satellite orbit in allotment planning," which was a contribution of the U.S. delegation to the JIWP. Id. Part I, at 81-85.

56. Id. Part I, at 1.

57. Id. Part II.

CCIR.[58] The Summary includes useful cross-references to its main report and to the First Session's Report to the Second Session.

The importance of the CCIR Report cannot be overemphasized. In addition to the important issues of generalized and standardized parameters, it also covered predetermined arcs, the accommodation of existing systems in the Allotment Plan, multi-administration systems, technical information pertaining to improved procedures, and all of the other areas that were important to Second Session issues. The Report was an Annex to a conference document,[59] and was repeatedly referred to at the Second Session. Due to the high quality and comprehensive nature of this Report, the Second Session did not deem it necessary to form a technical committee as was done in 1985.[60]

C. Activities of ITU Member Administrations and Other Organizations

Of all administrations, probably the most intensive efforts in preparation for the Second Session were undertaken by the United States. Organizationally, most of its efforts

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58. *Id.* Executive Summary.

59. ITU, WARC-ORB-88, Doc. 3.

60. *See supra* ch. 6, note 3.

were similar to those in preparation for the 1985 session.[61] Governmental preparations were centered in a group formed by the National Telecommunications and Information Administration (NTIA) that was designated as Ad Hoc 178.[62] This group coordinated Space WARC preparations for all interested government agencies. As part of their preparation in this group, NASA developed the NASARC software that the United States provided to the IFRB.[63]

The FCC was in charge of preparations for the United States private sector. It reinstated the public advisory committee that it had formed in preparation for the First Session.[64] This committee formed four working groups that studied the various issues and made recommendations to the FCC. Their findings are contained in a detailed report.[65] The FCC also issued a Fifth Notice of Inquiry that set forth preliminary views on each of the Second Session agenda items and requested public comments on them.[66] Finally, the FCC published a Report and Order, based on the comments received in response to its Notice of Inquiry as well as the input of

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61. See supra ch. 4, notes 103-110.

62. See FCC Fifth Notice of Inquiry, Gen. Doc. No. 80-741, F.C.C. 87-151 (adopted April 27, 1987). The NTIA is responsible for formulating Executive Branch telecommunications policies.

63. See supra note 27 and accompanying text.

64. See FCC, Memorandum Order and Opinion, Gen. Doc. No. 80-741, F.C.C. 85-533 (Oct. 8, 1985).

65. See Advisory Committee Report, supra note 21.

66. See Fifth Notice of Inquiry, supra note 61.

the civilian advisory group.[67] This Report contained recommendations for U. S. proposals to be presented at the Space WARC. The Report was sent to the United States Department of State where, in light of the Report and the recommendations of the NTIA, the final proposals of the United States were developed and forwarded to the ITU.

The preparatory efforts of the United States included bilateral discussions with 22 administrations and exemplify the efforts that were conducted by virtually every nation with interests in use of the orbit/spectrum resource.[68] Countries such as Canada, France, Australia and India all established formal groups to prepare positions and proposals for the Second Session, and they fully participated in ITU preparatory efforts.[69] Many smaller countries participated in preparatory efforts conducted by subregional organizations such as ASETA and the Caribbean Telecommunications Union.[70]

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67. *See* FCC, Second Report and Order, Gen. Doc. No. 80-741, F.C.C. 88-124 (adopted March 24, 1988).

68. *See* U.S. Dept. of State, Report of the United States Delegation to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (1989).

69. *See* *Reports From ITU Member States* in "ORB-88 A Pre-Conference Bulletin" at 17-19 (Aug., 1987).

70. *Id.* ASETA is the regional telecommunications association formed by the Andean countries. *Id.*

Regional organizations such as CITEL conducted more extensive preparatory efforts.[71]

International common user systems continued the active participation they had begun in preparation for the First Session. INTELSAT's Tenth Assembly of Parties requested its Director General to undertake a study program and to distribute the information developed to INTELSAT Signatories, users and other multi-administration systems.[72] INTELSAT formulated recommendations on all matters of concern to its system and conducted a study examining the incorporation of multi-administration systems in the Allotment Plan.[73] INTELSAT also participated in all ITU preparatory meetings.

A new forum that proved useful in coordinating Space WARC positions was the group of Satellite Organizations and their Notifying Administrations (SONA). This group included the United States, France, the United Kingdom, INTELSAT, INMARSAT and EUTELSAT.

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71. See U.S. Dept. of State, Report of the United States Delegation to the Fifth Inter-American Telecommunications Conference, Organization of American States, Lima, Peru, Aug. 10-14, 1987.

72. See INTELSAT, Third Progress Report on Studies for the Second Session of WARC-ORB-85/88, at 3, BG-74-23 (Oct. 21, 1987).

73. See INTELSAT, Incorporation of Multi-Administration Systems In An Allotment Planning Exercise, BG-71-14 (Jan. 23, 1987). This study reported that it was technically feasible to incorporate multi-administration systems in the Allotment Plan. Id.

D. Summary

In general, the intersessional activities were quite productive. The ITU, international organizations, and many administrations conducted extensive preparatory efforts. Those efforts were hampered, however, due to the lack of definitive results from the First Session. That lack of definition compelled the IFRB to make certain assumptions relating to the planning exercises. It also diminished the ability of organizations and administrations to focus their efforts on particular issues, since the issues themselves were not well-framed.

The failure of the First Session to define administrations' requirements for planning was particularly unfortunate for the intersessional period. The requirements used by the IFRB in its planning exercises were very different from those used at the Second Session. This greatly reduced the probative value of the Board's intersessional planning exercises.

Another constraint on the intersessional period was the financial limitations placed on the IFRB by the ITU Administrative Council. This had a particular effect on the IFRB's preparation of computer software for the planning exercises. The Board had limited resources to modify software provided to it by administrations. Therefore, any software offered to the Board had to be ready to run on the ITU computer system, and it had to be accompanied by technical experts to assist the Board with the software. The efforts of Japan and the United States in lending computer-related assistance to the IFRB are to be particularly commended.

Given the time and fiscal constraints that affected the intersessional period, the accomplishments made were noteworthy. Perhaps the most important function of the intersessional period, however, was to separate in time and memory the politically contentious First Session from the Second Session. For the Second Session to be successful, it would need to be quite different from the First Session.

CHAPTER 8

THE SECOND SESSION

The Second Session of the Space WARC was held in Geneva between August 29 and October 6, 1988. It was attended by representatives from 105 administrations and 14 international organizations.[1] In general, the Conference was quite successful. It completed the regulatory regime for the BSS and established a new regulatory regime for the FSS. Its success is attributable primarily to the substantial time and effort that had been invested in preparing for this Session by administrations, the ITU, and various organizations. The success of the Second Session, however, did not come without difficulties.

This chapter presents the key issues and structure of the Second Session. It then provides a broad overview of the work and accomplishments of the Conference. The details of the new regulatory regime for the FSS are examined in Chapter 9.

A. The Key Issues and the Structure of the Second Session

The Agenda adopted by the ITU Administrative Council set out the key issues for the Second Session.[2] The main tasks were to:

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1. *See* ITU, WARC-ORB-88, List of Participants (with supplements 1 - 6). For a list of international organizations, *see* ITU, WARC-ORB-88, Doc. 15.

2. The Agenda was adopted at the 41st session of the Administrative Council, held 16-17 June, 1986. *See* ITU, World Administrative Radio Conference on the Use of the (Cont. on next page)

- establish the Allotment Plan, including its technical standards, parameters and criteria, as well as associated regulatory procedures (Agenda items 1 & 3);
- establish the Improved Procedures (Agenda items 2 & 3);
- simplify the regulatory procedures for space services and bands not subject to planning (Agenda item 4);
- establish the feeder link plan for the BSS in Regions 1 and 3 and incorporate it into the Radio Regulations (Agenda item 6);
- consider the issues of satellite sound broadcasting and high definition television (Agenda items 9 & 11); and
- make appropriate recommendations regarding the 30/20 GHz band (Agenda item 14).[3]

The structure of the Second Session was adopted at the first Plenary meeting.[4] Once again, Dr. Ilija Stojanovic

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Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, Administrative Council Resolution No. 953 (June, 1986) [hereinafter cited as Agenda].

3. Id. Other Agenda items included: review and revise, as necessary, the definitions relating to space services (item 5); consider use of the band 10.7 - 11.7 GHz (earth-to-space) in Region 1 for all modes of FSS operation (item 7); consider possible correction of minor errors in Appendix 30 (item 8); review the long-term applicability of the interim systems Resolution (item 10); consider and revise as necessary the relevant Resolutions and Recommendations (item 13); consider revision of No. 480 of the Radio Regulations (item 15); make consequential amendments to the Radio Regulations necessitated by decisions of the Second Session (item 12); and evaluate the financial impact of its decisions upon the ITU budget (item 16). Id.

4. The following committees were established: (1) Steering Committee; (2) Credentials Committee; (3) Budget Control Committee; (4) Allotment Planning and Associated
(Cont. on next page)

(Yugoslavia) was elected Conference Chairman.[5] He had not been a particularly aggressive leader at the First Session, where his efforts, at times, appeared to be aimed at accommodating every administration. However, Dr. Stojanovic was known and respected by both developed and developing countries. His low-key leadership style was more suited to the Second Session, and his leadership contributed to the success of the Second Session.

The key committees were 4, 5, and 6. Committee 4 was to establish the Allotment Plan and procedures for the selected bands of the FSS. Committee 5 was to resolve various BSS related issues, including the BSS feeder link Plan for Regions 1 and 3. Committee 6 was to prepare the improved procedures as well as the simplified procedures for unplanned bands and services. A Technical Working Group of the Plenary was also established for various technical and miscellaneous matters, including the responsibility for making a recommendation regarding the 30/20 GHz band.[6] All decisions reached in the Committees had to be adopted by the Plenary before they could

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Procedures Committee; (5) Broadcasting Satellite Service (BSS) Matters and Associated Procedures Committee; (6) Regulatory Procedures (other than for Allotment Planning and BSS Feeder-Links) Committee; and (7) Editorial Committee. ITU, WARC-ORB-88, Doc. 114. For committee chairmanships, see ITU, WARC-ORB-88, Doc. 152. This structure was based on the draft structure outlined by the General Secretariat in July, 1988. See ITU, Circular-letter No. 224 (July 20, 1988).

5. See ITU, WARC-ORB-88, Doc. 112.

6. See ITU, WARC-ORB-88, Doc. 114, at 5.

be incorporated into the Final Acts as changes or additions to the Radio Regulations.[7]

B. The Work of the Conference

At the first Plenary meeting, the Secretary-General opened the Conference on a positive note. He asked the Conference to:

> endeavor to find a balanced solution that would, on the one hand, guarantee to every Member of the Union an orbital location and the associated radio frequency spectrum to meet its satellite communication requirements within a predetermined arc, while on the other, not hampering the development of technology aimed at improving spectrum use and the economic viability of satellite networks.[8]

The Conference Chairman also proclaimed his strong belief "that with a little help from all of us, we shall bring our task to a successful end."[9] On another favorable note, many administrations were quite relieved when the Colombian Minister of Communications indicated that his delegation would

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7. International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 77, No. 21 (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0) [hereinafter cited as 1982 ITU Convention].

8. ITU, WARC-ORB-88, Doc. 112, at 9.

9. Id. at 6.

not return to the matters relating to their claim of orbital sovereignty that had occupied so much time at the First Session.[10] The work of the Conference then commenced.

1. <u>Committee 4 (Agenda Item 1)</u>

Committee 4 had the most difficult and the most important responsibility of the Second Session -- establishing the Allotment Plan. The chairmanship of this committee was given to Mr. F. S. Pinhiero (Brazil). At the First Session, Mr. Pinhiero had chaired Working Group 5A, which had primary responsibility for planning. His efforts at the First Session helped to establish the compromise of a dual planning method. Since Mr. Pinhiero had filled what was probably the toughest position at the First Session, he was well qualified to chair Committee 4. His leadership proved to be often needed.

To carry out its critical assignment, Committee 4 formed three working groups. Working Group 4A was given responsibility to develop the technical standards, parameters, and criteria for the Plan; Working Group 4B was tasked to establish the Plan; and Working Group 4C was placed in charge of preparing the regulatory procedures.[11]

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10. <u>See</u> <u>id</u>. at 10-13; <u>see</u> <u>also</u> <u>supra</u> ch. 6, notes 40-43 and accompanying text.

11. <u>See</u> ITU, WARC-ORB-88, Doc. DT/5.

Committee 4 opened with a lengthy presentation by the IFRB detailing its intersessional work on allotment planning.[12] The assumptions it had used in planning exercises were summarized and remaining problem areas were highlighted. The main problems identified by the IFRB related to existing systems. The Board also outlined the time constraints on Committee 4.[13] Due to the amount of computer time required to generate a plan, the Board indicated that all of the basic decisions on the Allotment Plan would have to be taken by the second week of the Conference.

Given this severe time constraint, Committee 4 established a method to quickly resolve the most important matters relating to planning. Committee 4 itself took responsibility for determining matters regarding requirements, existing systems, subregional systems, predetermined arcs, and whether the Plan would be multiband or separate band. Working Group 4A immediately began to determine the technical characteristics and parameters for the Plan. An ad hoc group was established to handle the issues relating to existing systems. Working Groups B and C would not start their work until these fundamental decisions had been made.[14] With its organization set, and with sobering time constraints in mind, Committee 4 began its work.

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12. See ITU, WARC-ORB-88, Doc. 121, at 2-4. For a discussion of this work see supra ch. 7, notes 1-52 and accompanying text.

13. See ITU, WARC-ORB-88, Doc. 96.

14. See ITU, WARC-ORB-88, Doc. 121, at 5-6.

The first decision taken in Committee 4 was relatively straightforward. The First Session had selected a frequency range for the C band uplink, but had not finalized the selection of which 300 MHz within that range would be used.[15] Based upon a CCIR recommendation and the proposals of most administrations, the exact frequency range was selected.[16]

Another subject faced early in Committee 4 was to determine whether the Plan would be multiband, with one plan covering both the C and Ku band frequencies; or whether there would be separate plans for the C and Ku band frequencies. A separate band plan could have allotted administrations a different orbital position for each of the two bands. To implement such a plan would require use of two satellites instead of one, if both bands were to be used. For economic reasons, therefore, all administrations favored a multiband plan.[17]

Agreement on the topic of existing systems was considerably more difficult to reach. The First Session had concluded that existing systems would be included in the Plan

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15. See ITU, Report to the Second Session of the Conference: World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, ch. 3, at 3 (Geneva, 1988) [hereinafter cited as Report to the Second Session].

16. The C band uplink was fixed at 6,725 - 7,025 MHz. See ITU, WARC-ORB-88, Doc. 129.

17. See ITU, WARC-ORB-88, Doc. 130, at 2.

on an "equal basis" with the allotments.[18] However, during the intersessional period, the IFRB had been unable to run a successful planning exercise that included existing systems.[19] Thus, the method of accommodating existing systems needed to be resolved. Complicating this issue was the fact that a few of the existing systems that had been recognized at the First Session had subsequently made very significant modifications to their systems' characteristics.[20] A decision was required on whether the modified characteristics could be used for the Plan.

Furthermore, although the First Session had defined existing systems as those initiating advance publication before August 8, 1985,[21] no moratorium on advance publication of systems using the Allotment Plan bands had been established. Subsequent to the First Session, additional satellite networks in the Allotment Plan bands had initiated advance publication.[22] A decision was required on how to treat those so-called "new existing systems." The administrations that had followed the existing Radio Regulations during the intersessional period considered that their systems should be accommodated in the Plan.

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18. Report to the Second Session, _supra_ note 15, ch. 3, at 5.

19. _See supra_ ch. 7, notes 42-45 and accompanying text.

20. _See_ ITU, WARC-ORB-88, Doc. 129, at 4.

21. _See_ Report to the Second Session, _supra_ note 15, ch. 3, at 5.

22. ITU, WARC-ORB-88, Doc. 129, at 3.

To examine the complex issues involving existing systems, an ad hoc group was formed by Committee 4.[23] This group made limited progress. It decided that three existing systems that had modified their characteristics after the First Session should be considered as existing systems with the modified characteristics.[24] It also decided that the "new existing systems" did not qualify as existing systems as defined by the First Session; they would have to be accommodated through some other method.[25] Additionally, the ad hoc group analyzed IFRB planning exercises that had been run with the current characteristics of existing systems, and it concluded that the results were still not satisfactory.[26] Moreover, even though administrations with existing systems were making significant modifications to them to help the planning situation, the group considered that continued modification by itself was unlikely to result in a satisfactory solution.

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23. Group 4 ad hoc 1 had two tasks. First, to examine possible modifications to the characteristics of existing systems to see if the results of planning exercises could be improved. Second, to analyze the status to be given both to existing systems modified after August 8, 1985, and to new existing systems that initiated advance publication after that date. See ITU, WARC-ORB-88, Doc. 190, at 1.

24. See id. at 2.

25. A Resolution providing for the continued development of these systems under limited circumstances was later adopted. See infra note 103 and accompanying text.

26. See ITU, WARC-ORB-88, Docs. 190; 163, at 2; & 196, at 4.

Given the lack of significant progress made in the ad hoc group, the debate on how to accommodate existing systems continued in Committee 4. Administrations with existing systems generally asserted that those systems should be included in the Plan on an equal footing with allotments.[27] On the other hand, administrations without existing systems generally thought that they should be handled by temporary procedures.[28] In light of this disagreement and the inability to produce a satisfactory Plan that included existing systems, the Chairman of Committee 4, Mr. Pinhiero, sought a compromise.

The compromise proposed by Mr. Pinhiero called for an Allotment Plan of two parts. Part A would contain allotments, and Part B would contain existing systems. The Conference would attempt to resolve incompatibilities between Parts A and B, and interaction between the two parts would be governed by procedures.[29] This compromise was accepted in Committee 4, largely due to the leadership and persuasion exercised by Mr. Pinhiero. Several administrations, however, stressed that maximum compatibility between the two parts should be

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27. <u>See</u>, <u>e.g.</u>, ITU, WARC-ORB-88, Doc. 170, at 6-8 (statements of the United States, USSR, Luxembourg, Papua New Guinea, and Pakistan).

28. <u>See</u>, <u>e.g.</u>, <u>id</u>. (statements of France, Cameroon, and Indonesia).

29. <u>See</u> ITU, WARC-ORB-88, Doc. 220.

sought.[30] After discussion, the compromise proposal was adopted.[31]

Another issue requiring a decision in Committee 4 involved subregional systems. Developing countries recognized that in the foreseeable future few of them would be able to implement satellite communication systems of their own. Systems that were implemented would primarily be on a subregional basis. Therefore, the status of subregional systems in the Plan was very important to developing countries. The First Session had determined that such systems should not be included directly in the Plan, but rather, should be accommodated through the procedures associated with the Plan.[32] During the intersessional period, however, several administrations had submitted planning requirements based on subregional systems, and at the Second Session certain developing countries argued that these systems should be included in the Plan.[33] Most administrations favored upholding the decision of the First

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30. See ITU, WARC-ORB-88, Doc. 196, at 4-7.

31. See id. at 7.

32. See, Report to the Second Session, supra note 15, ch. 3, at 3.

33. See ITU, WARC-ORB-88, Doc. 130, at 7-8.

Session, and Committee 4 agreed to do so. Nevertheless, some administrations that favored including subregional systems in the Plan repeatedly returned to this issue.[34]

Committee 4 had several decisions to take regarding Plan requirements. One basic decision was whether the Plan would be based on a single method. The First Session had concluded that "a world-wide planning solution would be the most suitable, but the possibility of having different planning methods for different regions, frequency bands, or orbital arcs should not be excluded."[35]

In Committee 4, practically all administrations favored a single world-wide Plan using the same technical standards, parameters, and criteria, with a single coverage per country.[36] Canada, however, led a movement to secure additional flexibility for Region 2. Canada introduced a document demonstrating that, due to geographical factors, Region 2 had a greater orbital capacity than Regions 1

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34. This issue was raised again just a few days later in Committee 4 by African countries requesting that some consideration be given to setting aside orbital positions in the Plan for possible use by subregional systems. See ITU, WARC-ORB-88, Doc. 195, at 2. It was also raised several times in Working Group 4C.

35. Report to the Second Session, supra note 15, ch. 3, at 2.

36. For discussions of this issue, see ITU, WARC-ORB-88, Docs. 163, 164, & 170.

and 3.[37] Therefore, Canada asserted that Region 2 administrations should be able to receive more than one coverage per country in the Plan.[38] The factual premise for this proposal was correct; Region 2 does have more inherent flexibility than Regions 1 and 3 have. However, separate planning principles for Region 2 were not the most politically acceptable manner for reaching the desired result. Many believed that flexible procedures for the entire Plan could produce the same result. The flexibility would be more useful to Region 2 than to Regions 1 and 3, but the concept of a single world-wide Plan would be preserved.

Another factor weighing against the Canadian proposal was a lack of time. The IFRB had indicated that the computer processing time for a multiband planning exercise based upon one coverage per administration would be at least two weeks.[39] The Board had clearly stated that "the number of available options was therefore limited," and that if other requirements such as additional coverages were allowed, "the task would clearly exceed the time limits of the

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37. ITU, WARC-ORB-88, Doc. 153.

38. Canada argued that "the idea of making additional allotments in areas where there was no congestion was in keeping with the decisions of [the First Session] and the planning instructions given to the IFRB." ITU, WARC-ORB-88, Doc. 170, at 4.

39. See ITU, WARC-ORB-88, Doc. 163, at 3.

Conference."[40] With its discretion thus constrained, Committee 4 decided to produce a uniform world-wide Plan giving single coverage per country; any special provisions that might be developed for particular Regions would have to be implemented through procedures.[41]

Another requirements-related task was the updating of the data that administrations had previously submitted regarding their requirements for the Allotment Plan.[42] A deadline of September 8th was set for administrations to submit modifications to the information then on file.[43] Some administrations desired to submit special requirements, for example, a requirement for a specific orbital position based upon operational constraints.[44] A subsequent deadline for special requirements was established, but those special

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40. Id.

41. See ITU, WARC-ORB-88, Doc. 170, at 5. The Committee 4 Chairman indicated that after a Plan had been developed it would be reexamined to determine if improvements could be made for Region 2. Id. This was not accomplished because the Conference had insufficient time.

42. Administrations had submitted their allotment requirements in response to IFRB Circular-letters. See ITU, WARC-ORB-88, Doc. 195, at 2.

43. See ITU, WARC-ORB-88, Docs. 195, at 3; and 191, at 3.

44. See ITU, WARC-ORB-88, Doc. 195, at 3.

requirements were not to be taken into consideration until after the first draft Plan using basic requirements had been prepared.[45]

Committee 4 was also attempting to reach agreement on predetermined arcs. The IFRB had identified three different predetermined arc concepts[46] and one needed to be chosen. Japan introduced a proposal for a progressive reduction of individual overlapping predetermined arcs. According to this proposal, each satellite would be given a nominal orbital position and a predetermined arc within which the satellite could be repositioned. The extent of the predetermined arc would be reduced in three stages as the satellite progressed from predesign, to design, and finally to the operational stage.[47] The United States' proposal recommended the concept of common overlapping arcs that could be effected with its NASARC computer program.[48] Several other proposals were advanced, but most administrations favored either the Japanese or the United States approach. Since the NASARC program was not producing usable results on the IFRB

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45. *Id.* The subject of special requirements occupied much time in Working Groups A and B. *See infra* notes 54-57 and 60-66 and accompanying text.

46. *See supra* ch. 7, notes 8-10 and accompanying text.

47. For discussion of this proposal, *see* ITU, WARC-ORB-88, Docs. 53, at 6-7; and 130, at 2.

48. *See* discussion *supra* ch. 7, notes 27-31 and accompanying text; and ITU, WARC-ORB-88, Doc. 130, at 2-3.

computer,[49] it was decided to delay this decision, pending further efforts with NASARC, and further discussion on predetermined arcs was suspended.[50]

At this point in the Conference, the work of Committee 4 had progressed rather satisfactorily. Working Group 4A, examined below, had concluded its work of establishing the technical parameters to be used by the IFRB in the planning exercises. Committee 4 had selected the C band uplink and determined that the Plan would be a multiband Plan. It had reached a compromise on existing systems by dividing the Plan into two parts; Part A for allotments and Part B for existing systems. It had also established the basic nature of Part A as a uniform world-wide Plan, with single coverage per administration. Updated basic requirements for Part A had been obtained, and certain characteristics of existing systems had been modified in an attempt to improve the compatibility between Parts A and B. Although no agreement had been reached on the concept of a predetermined arc, Committee 4 was awaiting further word regarding the results of NASARC.

Committee 4 had reached the point where a planning exercise could be conducted to produce a draft Plan. These results had been accomplished in slightly over one week of the Conference. Administrations were therefore encouraged by the pace of the progress. At the traditional series of

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49. <u>See</u> ITU, WARC-ORB-88, Doc. 163, at 2.

50. <u>See</u> ITU, WARC-ORB-88, Doc. 130, at 5.

"receptions" given by many administrations in the first weeks of a conference, the mood was positive. Delegates consistently contrasted the politically contentious atmosphere present throughout the First Session, to the technical pragmatism that seemed to predominate at the Second Session. With this general optimism that a successful Plan would be forthcoming, the work of Committee 4 moved primarily to its working groups.

a. Selection of Technical Criteria for Planning

The selection of standardized technical parameters for Part A of the Plan was necessary before any planning exercises could be conducted at the Second Session. Working Group 4A had the responsibility of making recommendations for the values of those standardized parameters. In addition to the proposals of administrations, it had the benefit of the results from the IFRB intersessional planning exercises that had been based upon certain parameters,[51] and it also had the benefit of the CCIR studies that had been conducted regarding standardized parameters.[52]

In his first report to Committee 4, the Chairman of Working Group 4A presented a document outlining values for standardized parameters that had been "approved" by his

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51. See supra ch. 7, notes 11-23.

52. See ITU, CCIR Report to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (WARC-ORB(2)) (Geneva, 1988) [hereinafter cited as CCIR Report].

group.[53] While most of the technical parameters were accepted without controversy, several administrations considered that the document "incorrectly implied" that agreement had been reached on certain parameters.[54] The primary areas of contention involved the minimum elevation angles for various climatic zones[55] and special requirements based upon mountainous terrain.[56] After further debate, values for standardized parameters were established for use in the draft Plan. Special requirements, such as those relating to elevation angles, were to be revisited after results of the first draft Plan using basic requirements were known.[57] Moreover, if the draft Plan did not meet with approval, all of the values used would be subject to reconsideration.

As difficulties with the Allotment Plan were experienced, the technical criteria were revisited. Some administrations

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53. ITU, WARC-ORB-88, Doc. 167.

54. *See* ITU, WARC-ORB-88, Doc. 170, at 2.

55. Since rainfall affects satellite performance, the CCIR has performed numerous studies on this matter. Various climatic zones have been determined based on amount of rainfall, etc. Colombia led a group of countries in category "P" that asserted they should have a minimum elevation angle of 52 degrees rather than the 30 degrees provided in the report tendered by the Chairman of Working Group 4A. *See* ITU, WARC-ORB-88, Docs. 167; and 170, at 2.

56. Many administrations asserted a special requirement for a higher elevation angle based on their mountainous terrain. The CCIR had not done any studies on that subject, and no objective criteria regarding the effect of mountainous terrain on elevation angles were available. *See* ITU, WARC-ORB-88, Doc. 196, at 2-3.

57. *See* ITU, WARC-ORB-88, Doc. 196, at 2-3.

wanted the criteria to be based on more advanced technology in order to be able to accommodate more satellites. Other administrations, however, were concerned about the financial implications of a plan based upon advanced technologies. In general, reasonable compromises were reached on these issues. For example, on the 15th of September, a decision was made in Committee 4 to increase antenna pointing accuracy by decreasing the error tolerance from .2 to .1 degrees. This decision was made after a discussion of the cost implications.[58]

b. Establishment of the Allotment Plan

Working Group 4B had responsibility to develop the Allotment Plan. The basic objective was to prepare a Plan providing each allotment with an aggregate carrier-to-interference ratio (C/I) of not lower than 26 decibels.[59] This proved to be a very difficult goal.

Much of the discussion in Working Group 4B centered around the subject of special requirements. Requests for special requirements were made by administrations seeking a minimum elevation angle, a preferred orbital arc, or a fixed orbital

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58. Indonesia indicated that PALAPA uses an antenna pointing accuracy of .05. See Author's Notes of Committee 4 (Sept. 15, 1988).

59. See discussion of C/I values supra ch. 7, notes 17-21.

position for their allotment.[60] Working Group 4B established three categories of special requirements. The first encompassed requests based upon geographical conditions; rain zones, mountainous conditions, and high latitudes were recognized as conditions that could warrant special treatment in the Plan.[61] The second category involved requests based upon technical operating factors, such as the desire to have the allotment position coincide with the position of another satellite that the administration was operating or planned to operate.[62] The final category of special requirements included requests that administrations alleged would improve the Plan by reducing incompatibilities between Parts A and B.[63] Working Group 4A decided that it would first attempt

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60. See ITU, WARC-ORB-88, Doc. DT/43 (Rev.2).

61. Id. Technical problems resulting from rain and high latitudes had been considered previously within the ITU, but a constraint based on mountainous terrain was a new factor. As administrations recognized that they might secure more favorable elevation angles due to mountainous terrain, however, over 20 nations submitted special requirements based upon this factor. See ITU, WARC-ORB-88, Doc. DT/43 (Rev.2) & Add. This consideration was clearly being abused by countries. Even Spain made a special request for a minimum elevation angle of 30 degrees "in view of the mountainous nature of the Spanish terrain." ITU, WARC-ORB-88, Doc. 265.

62. ITU, WARC-ORB-88, Doc. DT/43 (Rev.2), at 2. Canada wanted an allotment in the Plan corresponding to its BSS allocation; Brazil wanted an allotment in the Plan corresponding to its current Brazilsat location. Author's notes of Working Group 4B (Sept. 7, 1988). Several other administrations made similar requests.

63. ITU, WARC-ORB-88, Doc. DT/43 (Rev.2), at 2.

to accommodate special geographic requirements.[64] Those requirements proved to be a great constraint on developing a satisfactory Plan.[65] In fact, the special requirements used in the Plan imposed so many constraints that the NASARC program of the United States could not produce a result that was better than the ORBIT II program being used by the IFRB.[66]

To prepare the Plan, Sub-Working Group 4B-1 was established. It consisted of experts from eleven administrations.[67] This group began working with the draft Plans produced by the IFRB. The first draft Plan[68] for Part A included basic requirements only. It resulted in five cases having a C/I less than the minimum objective of 26 decibels. Those five cases that could not be accommodated by the computer software were resolved through manual

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64. See ITU, WARC-ORB-88, Doc. 279.

65. Special requests for specific orbital positions were deleted after a decision was made to use a predetermined arc. Author's notes of Working Group 4B (Sept. 22, 1988). The chairman of Working Group 4B, Mr. N'Diongue (Senegal), failed to exert strong leadership in the area of special requirements. A more forceful chairman may have been able to convince administrations to withdraw requests for special requirements to help the overall Plan.

66. The U.S. notified the conference of this fact on Sept. 22, 1988. See ITU, WARC-ORB-88, Doc. 354, at 3. For a discussion regarding the effect these constraints had on NASARC, see U.S. Dept. of State, Report of the United States Delegation to the World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit and on the Planning of Space Services Utilizing It, at 22-23 (1989) [hereinafter cited as Report of the U.S. Delegation].

67. See ITU, WARC-ORB-88, Doc. 228.

68. See ITU, WARC-ORB-88, Doc. 242.

manipulation by the experts who repositioned and respaced allotments until the C/I target was met.[69]

Subsequently, a draft Plan of Part A incorporating requirements for special geographic conditions was prepared. Eleven administrations initially had a C/I of less than 26 decibels. After additional manual manipulation by the group of experts, all administrations were provided a C/I of at least 26 decibels.[70] However, potential incompatibilities with Part B had yet to be addressed. Moreover, when the new draft Plan was prepared, the resulting allotment positions for many administrations changed. Some changes, in the views of affected administrations, resulted in less favorable allotments due to a decrease in elevation angle, a position closer to the edge of their service arc, a position closer to an existing system, or a reduced C/I even though the 26 decibel objective had been met.[71] The concerns of those administrations were conveyed to Committee 4.[72] The Chairman of Committee 4 indicated that after the compatibility

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69. See ITU, WARC-ORB-88, Doc. 261, at 2.

70. See ITU, WARC-ORB-88, Doc. 307. One of the problems encountered by Sub-Working Group 4B-1 involved the long run times required for the generation of a draft Plan. Often these runs were made over weekends.

71. See ITU, WARC-ORB-88, Doc. 308, at 2-3.

72. See ITU, WARC-ORB-88, Doc. 308, at 2-3. Canada correctly pointed out that different draft Plans were bound to produce different results. Id. at 2.

of Parts A and B was examined, Group 4B-1 would endeavor to improve the allotments of administrations that were not satisfied.[73]

As work progressed, it became clear that compatibility of Parts A and B of the Plan would be difficult, if not impossible, to accomplish. Computer synthesis of Parts A and B did not provide a Plan where all allotments received at least 26 decibels, and some received less than 20 decibels. Therefore, manual manipulation of the computer synthesis of the two parts was pursued by Working Group 4B-1. Administrations were becoming concerned about the ability of the Conference to finalize a Plan.[74] During the final week of the Conference, a draft Plan was presented that incorporated the results of the manual manipulation that had been accomplished to reconcile parts A and B.[75] The accomplishments of the group of experts were considerable. Its diligent and tireless efforts led members of the United States' Delegation to nickname this group "the Wizards of WARC." This draft Plan provided all administrations with a

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73. See id. at 3.

74. On Sept. 30th, the Chairman of Committee 4 indicated that two possible courses of action were left. First, adopt Part A as it existed in the draft Plan that included special geographic conditions but did not take into account the existing systems, and accommodate the existing systems of Part B through procedures. Second, make changes to the technical parameters used to develop the Plan, such as reducing the target C/I ratio from 26 to 23 decibels. Both of these alternatives were rejected in favor of continued work by Group 4B-1. Jordan stated that a third Space WARC session might be required. See ITU, WARC-ORB-88, Doc. 428, at 5.

75. ITU, WARC-ORB-88, Doc. 453.

C/I of at least 20 decibels for their allotments,[76] but a few had less than the 26 decibel target.[77] When this draft Plan was considered in Committee 4, on October 3rd, many complaints were heard, and even some administrations that had a C/I greater than 26 decibels complained about their allotment positions.[78] Improvements were demanded even though the group of experts had indicated that no further significant improvements were possible in the time available.[79] The Conference was now in danger of ending without a completed Allotment Plan. Strong leadership was needed.

In the Plenary, the Conference Chairman recognized the reservations that had been expressed in Committee 4 and noted that it was too late to make additional computer runs. He requested affected administrations to negotiate with administrations causing interference on a case-by-case basis

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76. Canada actually had a C/I of less than 20 decibels, but it agreed to that level since the interference comes from its existing system. Author's notes of Committee 4 (Oct. 3, 1988).

77. See ITU, WARC-ORB-88, Doc. 473, at 3. Many existing systems also had a C/I less than 26 decibels. Id.

78. France considered it "unacceptable" that the 26 decibel target was no longer adhered to, and other countries that had a C/I greater than 26 decibels complained about their new allotment position because they considered it less favorable than that in a previous draft Plan. ITU, WARC-ORB-88, Doc. 466, at 3. Spain "flatly rejected" the Plan. Id.

79. See ITU, WARC-ORB-88, Doc. 473, at 3.

with the help of two groups of experts.[80] Furthermore, while these meetings took place, he kept the issue of the Plan off the Plenary agenda. This proved to be an important tactic since the Plenary was very busy drafting the Plan procedures. Had more time been spent in the Plenary debating the Plan itself, the Conference may have ended on a different note.

The off-the-record meetings to resolve difficulties with the Allotment Plan were partially successful. Some administrations modified technical parameters (such as improving antenna characteristics) in order to improve the situation. Although several administrations did not receive a C/I of 26 decibels, a general acceptance of the Plan was secured due largely to the efforts of the Conference Chairman. There was considerable pressure on the small number of administrations with a C/I of less than 26 decibels to acquiesce in the Plan. Two factors contributed to this pressure. First, the time constraints were obvious. Second the vast majority of administrations had acceptable allotments.

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80. Author's notes of Ninth Plenary Meeting (Oct. 3, 1988). The two groups of experts were led by Dr. Robert Bowen of Canada and Dr. Edward Miller of the U.S. These discussions have been referred to as "the first multilateral planning meeting." Report of the U.S. Delegation, _supra_ note 66, at 21.

On the last day of the Conference, the Plan was adopted.[81] The Chairman also secured passage of a Resolution calling for further cooperation among administrations after the Conference in an effort to improve the allotments in Part A of the Plan.[82] Very few formal Reservations regarding the Allotment Plan were asserted.[83] Considerable diffi-ulties had been overcome to achieve this Plan. Similar problems were present in preparation of the procedures to be associated with the Plan.

c. Establishment of Allotment Plan Procedures

Working Group 4C had responsibility for developing the regulatory procedures associated with the Plan. During the first weeks of the Conference it formed ad hoc groups to draft procedures on combining allotments into subregional systems, on Plan modifications, and on additional users.[84] Its task of developing procedures to define the interaction between Parts A and B of the Plan was greatly complicated since the ability of the Plan to accommodate both allotments

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81. Parts A and B of the Allotment Plan are incorporated in Appendix 30B of the Radio Regulations. See ITU Final Acts Adopted by the Second Session of the World Administrative Radio Conference on the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It (ORB-88) App. 30B, art. L. (Geneva, 1988) [hereinafter cited as Final Acts].

82. See id. Res. PL1.

83. See ITU, WARC-ORB-88, Doc. 448. Countries with a C/I less than 26 decibels generally reserved their rights to "take all necessary measures to ... ensure an aggregate C/I ratio over 26 dB." Id. at 28 (San Marino).

84. See ITU, WARC-ORB-88, Doc. 261.

and existing systems was not known until late in the Conference. As the extent of the incompatibilities between Parts A and B was recognized, many developing countries argued that Part A should be given a priority over Part B. Such a priority was eventually prevented, but not without much debate.

In spite of the serious issues being discussed in Working Group 4C, a general perception existed that procedures were fairing reasonably well. On September 20th, the Chairman of Working Group 4C reported that it was "proceeding satisfactorily with its tasks."[85] Less than a week later, however, progress on regulatory procedures reached a point of turmoil.

The Chairman of Working Group 4C, Mr. DuCharme (Canada), had suspended 4C meetings and formed a small team to integrate and simplify the various procedures that had been undergoing drafting. The product of this group, Document 359, was provided to Committee 4 on September 27th.[86] Although it had the support of the IFRB, it spawned a great controversy. It was attacked as not reflecting the agreements that had been made in Working Group 4C.[87] Some considered it "death for subregional systems" and others opined that the entire

85. ITU, WARC-ORB-88, Doc. 270, at 2.

86. ITU, WARC-ORB-88, Doc. 359; see also ITU, WARC-ORB-88, Doc. 363 (minutes of Committee 4).

87. Indonesia, Mexico, and China specifically stated that Document 359 differed from decisions taken in the Working Group. Author's notes of the 13th Meeting of Committee 4 (Cont. on next page)

document should be placed in square brackets to show that nothing in it had been previously adopted.[88]

After more than six hours of debate in Committee 4, primarily attacking Document 359, Chairman Pinhiero adjourned the meeting. Many concerns had been expressed by administrations. One of the main concerns involved the need to coordinate allotments during implementation. Many administrations had believed that if they were going to implement an allotment that was in accordance with the Plan that no coordination would be needed. That was the main reason for having a plan. But Document 359 outlined a coordination procedure for such situations and the IFRB confirmed that allotments being implemented in accordance with the Plan might still cause unacceptable interference with adjacent allotments that were also in conformity with the Plan. The Board explained that this could happen if the two

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(Sept. 27, 1988). Document 359 was also attacked in the Plenary on Sept. 29. China opined that the Document "had brought confusion in its wake since it contained a number of new concepts ... time had thus been wasted and progress hampered ...." ITU, WARC-ORB-88, Doc. 418, at 2. Kenya stated the Document "did not correspond to what had been agreed by the majority of Delegations ...." Id. at 3. France interjected that "Delegations had been somewhat disconcerted by Document 359 and had felt that time had been perhaps wasted ...." Id. at 4. On the other hand, the U.S. declared that "Document 359 could still serve as a basis on which to develop the requisite procedures." ITU, WARC-ORB-88, Doc. 386, at 3.

88. Id. See also ITU, WARC-ORB-88, Docs. 363 & 364.

allotments were using carriers with different densities.[89] Recognition of this factor so late in the Conference was extremely disconcerting to administrations that had expected to be able to implement their allotments without any coordination. In view of the expressed sentiments, Chairman Pinhiero appointed a drafting group to explore several alternatives to resolve the coordination issue.

Despite the strong words against Document 359, the Chairman of Committee 4 insisted on proceeding with a section-by-section analysis of it while the drafting group he formed sought to rewrite some of its procedures. While Mr. DuCharme had made a tactical error in preparing Document 359 outside of his Working Group, his procedure is to be faulted more than the substance of the Document. Document 359 ultimately formed the basis for many of the procedures that were adopted.

Hereafter, decisions on procedures were taken in Committee 4 or in the Plenary, since the Conference was in its last week. The primary areas of disagreement involved: subregional systems, existing systems, additional uses, and conversion of allotments to assignments.

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89. High density carriers, such as television, can cause interference with lower density carriers. A CCIR study of that problem was not yet complete. See ITU, WARC-ORB-88, Doc. 411, at 2. For discussion of this issue in Committee 4, see ITU, WARC-ORB-88, Doc. 364, at 7-9.

Committee 4 had previously decided that subregional systems would be accommodated through procedures.[90] Finalizing those procedures was not an easy task. Most developing countries wanted assurance that they would be able to implement subregional systems, but some also wanted to protect their national allotments at the same time. After much debate, it was decided that national allotments would be "suspended" during the life of the subregional system unless they could be used in ways that did not affect allotments in the Plan or assignments made in accordance with the Plan's procedures.[91]

The issue of existing systems had also been controversial since the beginning of the Conference.[92] The permissible length of operation for existing systems and their interaction with Part A of the Plan were the key procedural issues. Again there was much discussion. A compromise on the length of operation finally was reached. Since the life of the Plan is to be a minimum of 20 years, it was determined that existing systems could have a maximum life of 20 years from the date of entry into force of the Plan.[93] Regarding the interaction of existing systems with allotments, a compromise was adopted

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90. See supra notes 32-34 and accompanying text.

91. See Final Acts, supra note 81, App. 30B, art. L, sect. II (para. 202).

92. See supra notes 23-31 and accompanying text.

93. See Final Acts, supra note 81, App. 30B, art. N. Some administrations had attempted to limit the life of existing systems to a much shorter period. Papua New Guinea pointed (Cont. on next page)

providing that existing systems "shall ... take all technically and operationally possible measures to remove incompatibilities ... in order to accommodate the requirements of an administration seeking to" implement its allotment.[94]

The question of additional uses lingered until the final days of the Conference. Developed countries generally wanted such uses for systems that might not be in conformity with the Plan and for requirements they might have in addition to their allotment. Developing countries suspected that additional uses would restrict their flexibility in implementing allotments. A small drafting group was able to work out a compromise urging administrations to use other bands, but permitting additional uses with significant restrictions.[95]

The issue of converting allotments into assignments without the need for coordination was also resolved in the final days of the Conference. A last minute addition of a technical Annex to the Plan resolved this concern to some extent. Administrations whose allotments are in

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out that existing systems are real systems that must have an economically viable period, including the life of the earth stations. Its Pacstar system had an economic plan based on a 20-year life. The U.K. also persuasively argued that limitations on real systems should not be based upon "a paper Plan that may never be put into operation." Author's notes of Working Group 4C (Sept. 19, 1988).

94. Final Acts, supra note 81, App. 30B, art. L (para. 108a). Although some administrations had argued for a provision that would force a resolution of incompatibilities through specific burden-sharing criteria, the Chairman persuasively argued that good faith had to be assumed or no results would be possible.

95. See id. sect. III.

compliance with Part A should not have to initiate coordination if their frequency assignments are ordered according to the accepted macrosegmentation method.[96]

Another issue that needed to be finalized involved the use of predetermined arcs. This issue had been discussed in Committee 4.[97] The constraints placed upon the Plan by special requirements had precluded the use of NASARC and its common overlapping predetermined arc concept.[98] Thus, Committee 4 had focused on the concept of a progressive reduction of the predetermined arc.[99] This approach, which uses a "nominal" orbital position and a predetermined arc that is reduced as the system advances toward operation, was adopted by the Plenary.[100] The predetermined arc procedures add flexibility to the Plan and should assist in resolving difficulties that may arise as the Plan is implemented.

The procedures ultimately adopted by the Plenary are quite complicated, and their adoption was accompanied by some confusion because many were drafted in the last days of the

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96. See Final Acts, supra note 81, App. 30B, Annex 3B. The "macrosegmentation concept" provides that an administration shall not be required to coordinate if, in addition to meeting other constraints, it orders the frequency assignments so that the upper 60 percent of each band is used for high density carriers and the lower 40 percent for low-density carriers. Id.

97. See discussion supra notes 46-50 and accompanying text.

98. See supra note 66 and accompanying text.

99. See ITU, WARC-ORB-88, Doc. 364.

100. See Final Acts, supra note 81, App. 30B, art. J, & Annex 5.

Conference and often at a very late hour.[101] Chairman Stojanovic frequently resorted to the use of small drafting groups to resolve issues during coffee breaks. While procedures were being debated and redrafted, one had to question whether they were fully understood. Some procedures had not even been considered at the Working Group or Committee level. These procedures are examined further in the next chapter.

d. Resolutions

Two Resolutions were adopted to address the use of Allotment Plan bands by systems that are not in Parts A or B. Once the Allotment Plan enters into force, use of those bands will be governed by the Plan. One Resolution clarifies that in the period between the end of the Conference and the entry

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101. For example, decisions on the predetermined arc were not finalized until the last two days of the Plenary. On Oct. 3rd, Canada introduced a new document regarding application of the predetermined arc concept. It noted that the concept "has not been precisely defined" and offered as Annex 5 a method of applying the concept that had been developed earlier in 4C ad hoc 4. ITU, WARC-ORB-88, Doc. 461. On the afternoon of Oct. 4th, Denmark made a proposal that after 20 years from the effective date of the Plan the predetermined arc would be increased from plus or minus 10 degrees to plus or minus 20 degrees. This narrow issue was debated for over two hours in the Plenary. At one point a motion to close debate was made and voted down. After more debate the proposal was placed in "mental square brackets." Later in the Plenary it was adopted with some amendments. <u>See</u> Final Acts, <u>supra</u> note 81, art. J (para. 103); and Author's notes of the 10th Plenary Meeting (Oct. 4, 1988).

into force of the Plan, administrations may not use the provisions of Article 11 to attempt to establish a satellite network in the planned bands.[102]

The other Resolution addressed the issue of "new existing systems" that had been raised in Committee 4.[103] It lists the administrations, and their systems, that had initiated advance publication between August 8, 1985 and October 5, 1988, and permits those systems to continue to develop under two limited circumstances.[104] First, each administration may consider one system to be a conversion of its national allotment in Part A of the Plan; it would have to meet the technical criteria applicable to Part A allotments. Second,

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102. See Final Acts, supra note 81, Res. COM4/2.

103. See supra note 25 and accompanying text.

104. See Final Acts, supra note 81, Res. COM4/1. Selection of the date of Oct. 5, 1988, was quite interesting. Earlier in the Conference Spain had unsuccessfully requested a specific position for its allotment in the Plan. On Oct. 4, 1988, Spain began advance publication of a system using that specific position. Then, on Oct. 5th, it moved to change the date in this Resolution from Aug. 29, 1988 (the opening day of the Conference), to Oct. 6, 1988 (the closing date), so that the system it had just filed for would be included. Its proposal was voted down, but Spain wanted another vote. However, the Convention provides that a proposal may not be voted on again in the Plenary until "at least one day after the vote has been taken." 1982 ITU Convention, supra note 7, art. 77, No. 577. Since a full day was not left, most thought the proposal was dead. In a move that must be admired for its ingenuity, Spain modified the proposal by changing the day from the 6th to the 5th. It then made a passionate plea about Spain's need for this system for the Olympic games it is scheduled to host and called for another vote. Obviously Spain had done much lobbying in the halls. Its proposal was accepted and the Spanish system is included in Resolution COM 4/1. Perhaps other administrations admired the perseverance and "chutzpah" of the Spanish delegation more than the merits of its proposal.

the system may proceed under the additional uses provision of the Plan. Thus, significant constraints were placed upon the "new existing systems," but possibilities for their continued development were left open.

2. <u>Committee 5</u>

Committee 5 had responsibility for a variety of Agenda items related to the BSS. To formulate a BSS feeder link Plan for Regions 1 and 3, it established Working Group 5A. This Group then formed two Sub-Working Groups; 5A-1 was to establish the requirements and prepare the Plan, and 5A-2 was to determine the technical parameters to be used in the development of the Plan.[105] Working Group 5B was given responsibility to deal with six other items listed in the terms of reference for Committee 5.[106] It also established two Sub-Working Groups; 5B-1 was to handle procedural issues including the procedures to be associated with the Plan, and 5B-2 was to resolve the matters of HDTV and BSS sound.[107] Within Committee 5, numerous ad hoc working groups were established to handle special issues as they arose. In

105. *See* ITU, WARC-ORB-88, Doc. 151.

106. *See* ITU, WARC-ORB-88, Docs. 114 & 145.

107. ITU, WARC-ORB-88, Doc. 186, at 2.

general, the work of Committee 5 progressed smoothly and the Committee met its scheduled completion date of September 29th.[108]

a. Establishment of the Feeder Link Plan (Agenda Item 6)

Within Committee 5, priority was given to establishing the feeder link plan. At the first meeting of Committee 5, the IFRB reported on its relevant intersessional activities and introduced the planning exercises it had carried out.[109] The Board outlined issues requiring decisions before additional planning exercises could take place.[110] The CCIR also introduced the report of its relevant intersessional work.[111]

During the first week of the conference, work progressed rapidly. Feeder link requirements needed updating and administrations were given until September 5th to do so.[112] Technical parameters to be used for a planning exercise were agreed upon.[113] Additionally, an ad hoc working group was established within Working Group 5A to examine the accuracy of requirements submitted, to identify incompatibilities in the Plan, and to contact administrations in order to find

108. ITU, WARC-ORB-88, Docs. 115 & 403.

109. ITU, WARC-ORB-88, Doc. 131, at 2.

110. Id. at 3.

111. Id. at 5.

112. ITU, WARC-ORB-88, Doc. 128.

113. ITU, WARC-ORB-88, Doc. 179.

solutions.[114] The results of the first feeder link planning exercise were available on the 8th of September,[115] and the ad hoc group began analyzing it in order to suggest modifications for improvement.

Work on the feeder link Plan continued to progress on schedule. On September 14th, the first draft Plan was published.[116] The ad hoc group analyzed the draft and worked out further improvements. On September 22d, the Chairman of Working Group 5A was able to report that "[m]ost of the problems relating to the feeder link Plan had been identified and resolved."[117] When the final meeting of Committee 5 was held on September 29th, the BSS feeder link Plan was approved.[118] The Plenary subsequently adopted the Plan for incorporation into Article 9A of Appendix 30A of the Radio Regulations.[119] The technical parameters and other criteria selected for the Plan are quite similar to those contained in the Region 2 BSS feeder link Plan.[120]

Work on the regulatory procedures to be associated with the feeder link Plan also progressed efficiently in Working

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114. ITU, WARC-ORB-88, Doc. 182.

115. ITU, WARC-ORB-88, Doc. 211 (Rev. 1).

116. ITU, WARC-ORB-88, Doc. 260.

117. ITU, WARC-ORB-88, Doc. 325, at 2.

118. ITU, WARC-ORB-88, Doc. 403, at 2.

119. _See_ Final Acts, _supra_ note 81, Appendix 30A, art. 9A.

120. _See_ Report of the U.S. Delegation, _supra_ note 66, at 30.

Group 5B. During discussion in an ad hoc group established to prepare the procedures, various issues were raised. These included: the need to coordinate feeder link earth stations with systems in other services that existed before the feeder link planning began; the ability to employ the concept of orbital clustering, which was used in the Region 2 BSS Plan, in order to resolve incompatibilities in the Regions 1 and 3 Plan; and the time limit for implementing modifications to the feeder link Plan.[121] All of these issues were successfully resolved. On September 27th, a draft of the regulatory procedures was published.[122] With a few changes, this document was approved by Committee 5 on September 29th.[123] The procedures for the BSS feeder link Plan for Regions 1 and 3 were adopted by the Plenary for incorporation into Appendix 30A of the Radio Regulations, which already included the procedures for the Region 1 feeder link Plan. The matters covered by the procedures include: execution of the Plans; modifications to the Plans; and coordination, notification, examination and recording in the Master International Frequency Register of assignments.[124]

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121. The major issues discussed in this ad hoc group are summarized in the Report of the U.S. Delegation, id. at 30-32.

122. See ITU, WARC-ORB-88, Doc. 368.

123. See ITU, WARC-ORB-88, Doc. 402, at 2-3.

124. See Final Acts, supra note 81, Appendix 30A, arts. 1-7.

b. Revisions to Minor Errors in Appendix 30 (Agenda Item 8)

Appendix 30 of the Radio Regulations contains the BSS Plan for Regions 1 and 3 that was incorporated into the Regulations at the 1979 WARC, as well as the Plan for Region 2 that was incorporated at the First Session of the Space WARC. Agenda item 8 directed the Second Session to consider possible corrections to minor errors in the revisions of Appendix 30 that were made at the First Session. These corrections were to be made "without impact on either Plan."[125]

As directed by the Administrative Council, during the intersessional period the IFRB had reviewed Appendix 30 and communicated the results of its study to administrations for their comment.[126] The IFRB noted that apart from correcting errors, the actual revision of Appendix 30 did not appear to be included in the Conference Agenda.[127]

Working Group 5B discovered that several administrations, led by Argentina, contested the competence of the Conference to make _any_ corrections to Appendix 30.[128] The ITU Legal Advisor pointed out that while the revision of Appendix 30 was not within the competence of the Conference, the Conference

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125. Agenda, _supra_ note 2, at 5.

126. _See_ ITU, WARC-ORB-88, Doc. 9 (containing IFRB Circular-letter _No._ 719 and the responses from administrations).

127. _Id_. Annex to IFRB Circular-letter No. 719, at para. 1.3.

128. _See_ ITU, WARC-ORB-88, Doc. 135 (Argentina).

was competent to correct minor errors.[129] Nevertheless, certain suggested corrections potentially impacted the substance of Appendix 30 and Working Group 5B proceeded in a cautious manner.

Sub-Working Group 5B-1 was instructed to study the issues and to seek a solution that would not involve actual amendment of Appendix 30.[130] The group successfully resolved these issues in three ways. Some issues were clarified simply by making comments on the IFRB´s Rules of Procedure.[131] In other cases, however, it was deemed necessary to make corrections to Appendix 30. A one page list of such corrections was approved by Committee 5 in the form of a "List of Errata for Appendix 30."[132] This list was adopted in the Plenary and attached to the Final Acts.[133] Finally, updates to country/geographical area symbols used in Appendix 30 were accomplished through a Resolution instructing the Secretary-General to make such corrections when publishing updated versions of the Radio Regulations.[134] Thus, the revision of minor errors in Appendix 30 was accomplished through a variety of methods.

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129. See ITU, WARC-ORB-88, Doc. 402, at 4.

130. See ITU, WARC-ORB-88, Doc. 233.

131. See ITU, WARC-ORB-88, Doc. DT/60.

132. See ITU, WARC-ORB-88, Doc. 374.

133. See Final Acts, supra note 81, Addendum at 97.

134. See id. Res. COM5/4.

c. Interim Systems Procedures (Agenda Item 10)

Resolution No. 2 of the 1983 RARC-BS provided a means for interim systems to be implemented even though they did not conform to the Region 2 BSS Plan. Affected administrations had to agree to the implementation, but the procedure was much simpler than that required for actual Plan modification.[135] The Second Session was to take a definitive decision on the long-term applicability of this Resolution. By 1988, some administrations in Regions 1 and 3 had recognized the benefits of a procedure allowing the early introduction of BSS systems having characteristics different from those appearing in the BSS Plan. Thus, there was support at the Second Session for the permanent incorporation of Resolution No. 2 into the Radio Regulations for Regions 1 and 3 as well as for Region 2.[136]

Two issues regarding Resolution No. 2 were raised. First, whether it should be continued for Region 2. Second, whether the Conference was competent to adopt a similar provision for Regions 1 and 3. Working Group 5B elected to suspend discussion of the second issue while Sub-Working Group 5B-1 took action on the first.[137]

No administration voiced objections in principle to the inclusion of Resolution No. 2 in the Radio Regulations for

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135. See discussion supra ch. 4, notes 83-84 and accompanying text.

136. See ITU, WARC-ORB-88, Doc. 162. The Soviet Union, in particular, desired the adoption for all three Regions of an interim systems procedure similar to Resolution No. 2. See ITU WARC-ORB-88, Doc. 7, at 6.

137. See ITU, WARC-ORB-88, Doc. 173, at 2.

Region 2.[138] Sub-Working Group 5B-1 was able to make good progress on an appropriate Resolution. Certain clarifications to Resolution No. 2 were made and the potential effects of Region 2 interim systems on the Regions 1 and 3 BSS Plan were discussed. On September 26th. Committee 5 was able to approve Resolution 42 continuing the interim systems procedure for Region 2.[139] This Resolution was adopted by the Plenary and included in the Final Acts.[140]

The desire of certain administrations to have similar provisions made applicable to Regions 1 and 3 did not fare as well. This issue caused "considerable difficulties" in Sub-Working Group 5B-1.[141] Ultimately, it was concluded that the Conference was not competent to extend the interim systems provisions to Regions 1 and 3 since the Agenda only contemplated applicability to Region 2. A drafting group was established to prepare a text that would call for a future conference to examine the possibility of extending the interim systems provisions to Regions 1 and 3.[142] This text[143]

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138. See ITU, WARC-ORB-88, Doc. 186, at 2.

139. See ITU, WARC-ORB-88, Doc. 356, at 2.

140. See Final Acts, supra note 81, Res. 42 (Rev. Orb-88).

141. ITU, WARC-ORB-88, Doc. 356, at 2.

142. See ITU, WARC-ORB-88, Doc. 325, at 4.

143. ITU, WARC-ORB-88, Doc. 369.

was approved by Committee 5[144] and, with some minor modifications, it was adopted by the Plenary as Resolution COM5/5.[145] This Resolution called for a future conference to consider the possible application of interim systems provisions in Regions 1 and 3. It also reiterated that, until such a conference was convened, administrations in Regions 1 and 3 wishing to bring into use interim systems could apply the applicable Plan modification provisions already contained in Appendix 30 or 30A.[146] Unfortunately, those provisions are not nearly as simple and flexible as are the interim systems provisions for Region 2. Thus, the administrations in Regions 1 and 3 that sought the adoption of interim system provisions for their Regions were unsuccessful. Moreover, the conference called for in Resolution COM5/5 may not be held for many years.

d. Satellite Sound Broadcasting (Agenda Item 9)

The Second Session was charged with taking appropriate decisions relating to satellite sound broadcasting systems. A CCIR presentation to Committee 5 outlined the relevant CCIR intersessional studies.[147] Those studies established that it was feasible to provide a satellite sound broadcasting service

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144. See ITU, WARC-ORB-88, Doc. 387, at 4.

145. Final Acts, supra note 81, Res. COM5/5.

146. Id.

147. For a review of these studies, see CCIR Report, supra note 52, ch. 6.

to vehicles and portable receivers using current technology. Difficulties existed, however, in the area of band sharing with other services. Thus, "the allocation of a suitable frequency band ... remained the fundamental problem."[148]

In Working Group 5B, the initial discussion of this issue centered around a proposal submitted by 15 European administrations.[149] This proposal called for a future conference to allocate frequencies within the range 500 - 3,000 MHz. Questions were initially raised about that frequency range since Resolution 505[150] only referred to the range 500 - 2,000 MHz.[151] However, Recommendation No. 2 of the First Session referenced a frequency "within, and also outside but near" the range 500 - 2,000 MHz.[152] Since decisions on this item were to be taken "in accordance with Recommendation No. 2 of the First Session,"[153] the frequency range could be larger than 500 - 2,000 MHz.

Although there was some opposition to the concept of an allocation for satellite sound broadcasting, even the administrations supporting allocation recognized that further

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148. ITU, WARC-ORB-88, Doc. 162, at 4.

149. ITU, WARC-ORB-88, Doc. 40.

150. ITU, Radio Regulations, Res. No. 505 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations].

151. See ITU, WARC-ORB-88, Doc. 186, at 3.

152. See Report to the Second Session, supra note 15, Rec. PLEN/C; and discussion supra ch. 6, notes 114-119.

153. Agenda, supra note 2, at 5.

studies of the sharing problems were required. Therefore, it was agreed that the CCIR should continue studies based upon clear instructions regarding frequency band limits and sharing issues. Sub-Working Group 5B-2 was tasked to draft a suitable Resolution.[154] The Resolution finally adopted calls for a future conference to consider allocation of a band or bands within the frequency range 500 - 3,000 MHz for BSS (sound).[155] It also invites the CCIR to pursue specific studies and resolves that provisions should be developed to protect existing services that may be affected by a BSS (sound) allocation.[156]

One other issue remained to be concluded in the satellite sound broadcasting area. Several administrations wanted to conduct sound broadcasting experiments, and India desired to do so outside the 500 - 2,000 MHz range identified in Recommendation 505 for such experiments.[157] Several possible approaches to this matter were examined by

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154. See ITU, WARC-ORB-88, Doc. 213, at 3.

155. Final Acts, supra note 81, Res. COM5/1.

156. Id. This provision was added due to concerns expressed by several Latin American countries and the USSR about their existing or planned services. See Report of the U.S. Delegation, supra note 66, at 33.

157. India requested a new footnote in Article 8 for BSS sound experiments using 1517-1521 MHz. ITU, WARC-ORB-88, Doc. 41, at 5.

Sub-Working Group 5B-2.[158] A drafting group was formed to attempt to prepare a Resolution that would accommodate India's objective. Strong objection to this approach was led by the United Kingdom.[159] India finally withdrew its proposal on this matter on the understanding that Recommendation 505 would be retained unchanged. This was accomplished by the Plenary, which retained Recommendation 505.[160] Thus, administrations are still encouraged to carry out experiments for BSS (sound) within the 500 - 2,000 MHz frequency range.[161]

e. High Definition Television (Agenda Item 11)

The discussion of HDTV in Committee 5 began with a presentation by the CCIR on its intersessional studies.[162] The CCIR was able to conclude that HDTV broadcasting should provide a picture for reception in homes with a quality close to that of the studio signal. To allow for the introduction of HDTV, the CCIR suggested a world-wide BSS allocation of about 500 MHz, preferably not above 23 GHz.[163] Initial discussion indicated most administrations were amenable to a future conference that would make such an allocation. The

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158. See ITU, WARC-ORB-88, Doc. 387, at 3.

159. See ITU, WARC-ORB-88, Doc. 402, at 6.

160. See Final Acts, supra note 81, Addendum, at 96.

161. See 1982 Radio Regulations, supra note 150, Rec. No. 505.

162. See ITU, WARC-ORB-88, Doc. 186, at 4-5.

163. Id. at 5.

primary area of contention was whether the Second Session should specify the frequency bands to be considered for the allocation.[164]

Discussions in Sub-Working Group 5B-2 centered on a document introduced by 21 CEPT administrations.[165] Various frequency ranges for an HDTV allocation were proposed, and it was generally agreed that the outer limits of the range would be between 11.7 and 23 GHz. Discussions led to a compromise Resolution that was accepted by Committee 5 and adopted in the Plenary with few alterations.

Resolution COM 5/3 calls for a future conference to deal with HDTV frequency allocation matters.[166] Although other frequency bands are not ruled out, it resolves that the frequency range of 12.7 - 23 GHz should "be considered for the choice of an appropriate band ...."[167] The future conference should select the band for HDTV and also an associated HDTV feeder link band, both preferably on a world-wide basis. The Resolution also invites the CCIR to conduct specified studies.[168]

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164. CEPT countries wanted the Second Session to recommend specific bands for consideration by the HDTV allocation conference, as did Australia. See id. at 5.

165. ITU, WARC-ORB-88, Doc. 4ـ.

166. Final Acts, supra note 81, Res. COM5/3.

167. Id.

168. Id.

f. Revision of Radio Regulation No. 480 (Agenda Item 15)

Radio Regulation No. 480 provided that, in Region 2, use of the 1,605 - 1,705 KHz band by terrestrial broadcasting service stations "shall be subject to a plan to be established by a regional administrative radio conference."[169] The contemplated conference was held in 1988; it established a plan as directed, and forwarded a Recommendation to the Second Session of the Space WARC for an appropriate modification to Regulation No. 480.[170] The Agenda of the Second Session called for such a modification.[171] This issue entailed few problems and, except for a few editorial changes, Regulation No. 480 was modified as recommended by the Region 2 conference.[172]

g. Resolutions and Recommendations (Agenda Item 13)

Committee 5 was also responsible for revising as necessary and taking other appropriate action on Resolutions and Recommendations relevant to the BSS. Seven new Resolutions were adopted.[173] The most significant of these have been mentioned above. Committee 5 also retained five Resolutions,

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169. 1982 Radio Regulations, supra note 150, No. 480.

170. See ITU, WARC-ORB-88, Doc. 14.

171. See Agenda, supra note 2, at 5.

172. See Final Acts, supra note 81, at 2.

173. See id. Res. Nos. COM5/1, COM5/3, COM5/4, COM5/5, COM5/6, COM5/7, & COM5/8.

modified two, and suppressed twelve.[174] Finally, seven existing Recommendations were retained.[175]

3. Committee 6

Committee 6 established three working groups. Working Group 6A was made responsible to formulate the Improved Procedures; Working Group 6B was tasked to simplify the regulatory procedures pertaining to the unplanned bands and services; and Working Group 6C was charged to resolve the remaining general issues relating to regulatory procedures.[176]

a. Improved Procedures (Agenda Item 2)

Working Group 6A had responsibility to establish the improved regulatory procedures for the FSS in the bands selected at the First Session[177] and to make any necessary consequential amendments to the Radio Regulations.[178] The "principal characteristic of this method" was to be the convening of periodic multilateral planning meetings

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174. See ITU, WARC-ORB-88, Doc. DT/93; and Final Acts, supra note 81, Addendum, at 96.

175. See Final Acts, supra note 81, Addendum, at 96.

176. See ITU, WARC-ORB-88, Doc. DT/7.

177. See Report to the Second Session, supra note 15, ch. 3 (para. 3.3.1b).

178. See ITU, WARC-ORB-88, Doc. 138 (Rev.1).

(MPMs).[179] The conference opened with administrations expressing a wide range of views on the form and purpose of MPMs. This was not surprising since the First Session had provided so little guidance.[180] Some administrations concluded that there should be no MPMs at all.[181] They were concerned that MPMs would impose financial burdens and result in administrative delays.[182] Other administrations supported informal MPMs, on an as-needed basis, that would function as an adjunct to Article 11 coordination.[183] On the other extreme, some administrations favored formal, regularly scheduled MPMs.[184] In between these positions were a variety of proposals.[185]

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179. See Report to the Second Session, supra note 15, ch. 3, at 5.

180. See discussion supra ch. 6, note 91.

181. See, e.g., ITU, WARC-ORB-88, Doc. 66 (Algeria).

182. See ITU, WARC-ORB-88, Doc. 137, at 2-3.

183. See, e.g., ITU, WARC-ORB-88, Docs. 12 (U.S.), 88 (Venezuela), and 74 (New Zealand). Senegal questioned any approach based on mere changes to Article 11. Its delegate stated "why look at Article 11? MPMs are to be outside of Article 11. We are looking at improved procedures, not simplified procedures." Author's notes of the third Meeting of Working Group 6A (Sept. 14, 1988). The chairman indicated that administrations had made proposals based on Article 11 and they must be addressed. Id.

184. See, e.g., ITU, WARC-ORB-88, Docs. 120 (Colombia), 118 (China), 81 (Ivory Coast), 69 (Kenya), and 85 (Senegal).

185. For example, Canada proposed the convening of MPMs on an as-needed basis but only to ensure the accommodation of the first two satellite systems of each administration. See ITU, WARC-ORB 88, Doc. 59, at 4-5.
The various MPM proposals were collected in a document by Working Group 6A. See ITU, WARC-ORB-88, Doc. DT/15.

The methodology used by Working Group 6A in its discussions on MPMs played an important part in the outcome. For purposes of discussion, the chairman identified two types of MPMs. Type "b1" was "a meeting of administrations which would be convened on request of an administration with the purpose of facilitating the coordination of new and proposed networks."[186] Type "b2" was "a formal meeting structure, convened on a regular basis with the ability to make binding decisions."[187] For each of these contrasting concepts, various aspects of MPMs were addressed. These included: legal and financial concerns, participation, venue, organization and conduct of meetings, and the relationship of MPMs to the Radio Regulations.[188]

The contrast between these two types of MPMs was made quite clear through this methodical approach. The differences relating to legal aspects provide a good example. A type b1 MPM could be implemented by the Second Session through appropriate changes to the Radio Regulations, and its decisions would have the status of coordination agreements under article 11.[189] On the other hand, a type b2 MPM would require changes in the ITU Convention that could not be implemented by the Second Session, and its decisions would

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186. ITU, WARC-ORB-88, Doc. 302, at 1.

187. _Id_.

188. _Id_.

189. _Id_.

have the status of binding international agreements.[190] Discussions in Working Group 6B moved quickly toward a type b1 MPM in order to avoid legal, financial, and other problems posed by type b2.

As the MPM concept moved toward type b1 on an "as required" basis, however, several administrations objected that the guidelines of the First Session were not being followed.[191] Those guidelines provided that MPMs would be the "principal characteristic" of improved procedures and "the normal process for gaining access to the [orbit/spectrum] resource."[192] The Soviet Delegate, however, reminded those administrations that the guidelines also provided that MPMs might not be periodic, but that they could be "convened when required."[193] He concluded that MPMs may be necessary, but that they should only be held when required.[194]

In subsequent meetings of Working Group 6A, agreement was reached to use a type b1 MPM[195] and that MPMs would be a method of Article 11 coordination. To accomplish this,

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190. Id. at 1. See also ITU, WARC-ORB-88, Doc. 165 (outlining legal aspects of MPMs).

191. Author's notes of the Second Meeting of Working Group 6A (Sept. 9, 1988).

192. See Report to the Second Session, supra note 15, ch. 3, at 5.

193. Id.

194. Author's notes of the Second Meeting of Working Group 6A (Sept. 9, 1988).

195. In Working Group 6A, the decision to use a type b1 MPM was made on Sept. 16th, with very little controversy. See (Cont. on next page)

Article 11 was slightly modified to authorize the use of MPMs in "exceptional" cases,[196] and a Resolution was adopted to define the MPM concept.[197] According to the Resolution, MPMs are to be a part of the mechanism to provide equitable access, and they should only be used when an administration encounters "major difficulty" in obtaining coordination.[198] An MPM may be called by any administration seeking coordination. However, administrations are under no obligation to participate. MPM results are considered as coordination agreements among the participants and do not prejudice the rights of nonparticipants.[199]

In the final analysis, Improved Procedures planning resulted in few changes to the ITU regulatory regime for the conventional bands of the FSS. The normal method of gaining access to those bands remains coordination under Article 11; MPMs were established only as a last resort. Some may therefore question whether the directives of the First Session were followed. Although the Report to the Second Session was

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Author's notes of the Fourth Meeting of Working Group 6A (Sept. 16, 1988).

196. See Final Acts, supra note 81, art. 11, MOD 1051, & ADD 1085C.

197. Id. Res. COM6/3.

198. Id.

199. Further details of the improved procedures are examined infra in Chapter 9.

not, of itself, legally binding on the Second Session,[200] the Agenda did mandate that the improved procedures were to be developed "according to the principles and methods established at the First Session."[201] Notwithstanding that mandate, the principles and methods relating to improved procedures were vague and even contradictory.[202] Moreover, the MPM concept had not been thought through at the First Session.[203] During the intersessional period many administrations, including both developed and developing countries, recognized that regularly scheduled formal MPMs would be expensive and could delay coordination.[204] Furthermore, the coordination of real systems often requires a series of meetings; coordination would therefore be difficult to accomplish at one

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200. See Jakhu, A Legal Analysis of the 1985 ITU Space Conference Report, Proc. 29th Colloq. on the L. of Outer Space 103, 106 (1986).

201. Agenda, supra note 2, at 4.

202. See discussion supra ch. 6, notes 90-96.

203. See id. One provision in the Report to the Second Session listed MPMs as a "possible" feature of improved procedures. Report to the Second Session, supra note 15, ch. 3, at 6. That statement evidences the uncertainty regarding MPMs that existed at the First Session.

204. The U.S. was one of the administrations that proposed MPMs at the First Session. After further study in light of the decisions reached at the First Session, the U.S. views on MPMs evolved to a different approach that simply acknowledged the possibility of multilateral meetings pursuant to the existing Radio Regulations. See ITU, WARC-ORB-88, Doc. 12, at 18-22. For a discussion on how this new approach evolved, see FCC, Fifth Notice of Inquiry, at 22-29, Gen. Doc. No. 80-741 (adopted April 27, 1987).

setting.[205] To maintain arguable compliance with the principles and methods established at the First Session, MPMs were retained. They were, however, given a lesser status than most observers at the First Session would have anticipated.

b. Simplified Procedures (Agenda Item 4)

Working Group 6B had responsibility to "review and revise, as necessary, the regulatory procedures pertaining to space services and frequency bands not to be subject to planning ... [and] to prepare such consequential amendments to the Radio Regulations as may be necessitated ...."[206] Due to the large number of proposals on various subjects,[207] several Sub-Working Groups and ad hoc groups were formed for specific issues. Work progressed smoothly through these groups, and with little controversy these technical matters were satisfactorily resolved. Many changes were made to Articles 11, 13, and 14 as well as to Appendices 3 and 4. The regulatory procedures in those areas of the Radio Regulations were simplified in ways that will benefit all users.

One category of changes was aimed at altering certain perceptions about the so called "first come, first served," regulatory regime. These proposals were initially discussed

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205. Mexico stated that "coordination can't be done in one meeting, it takes a series of meetings." Author's notes of the Second Meeting of Working Group 6B (Sept. 9, 1988).

206. ITU, WARC-ORB-88, Doc. 138 (Rev.1).

207. For a compilation of proposals, see ITU, WARC-ORB-88, Docs. DT/14 & DT/21.

in Sub-Working Group 6B-1 and generally provided that required actions could be undertaken on a multilateral basis as well as on a bilateral basis. Although the existing Radio Regulations did not preclude multilateral meetings, it was agreed to specifically acknowledge that potential. In the advanced publication stage, Radio Regulation No. 1051 was changed to specifically state that an administration having difficulties may "request other administrations, either bilaterally or multilaterally ... to help resolve the difficulties."[208] Specific steps that the IFRB may take, at the request of an administration, to help resolve difficulties, are also set out.[209] Previously, administrations could seek the assistance of the Board but efforts that the Board should take were not clear. Now the Board's duties and responsibilities are unambiguous.

In the coordination stage, similar changes were made. Radio Regulation No. 1085 was revised in several respects. One change provides that administrations may use bilateral or multilateral meetings to effect coordination.[210] Another change specifies that both the affected administration and the administration seeking coordination have responsibility to "make all possible <u>mutual</u> efforts to overcome [any]

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208. Final Acts, <u>supra</u> note 81, art. 11, MOD 1051.

209. The Board may evaluate levels of interference; define methods and criteria to be used, subject to agreement by the administrations concerned; and make arrangements to facilitate discussions. <u>Id</u>. ADD 1054A-1054D.

210. <u>Id</u>. ADD 1085B.

difficulties ...."[211] Finally, a new provision permits the IFRB to provide assistance at the request of an administration if a bilateral or multilateral meeting is required to achieve coordination.[212]

These changes were supported by both developing and developed countries because they clarified some of the previously perceived injustices of the Article 11 procedures. It is important to recognize that the multilateral meetings contemplated in these provisions are not the MPMs otherwise provided for in "exceptional circumstances."[213] These multilateral meetings could be requested by interested administrations at any stage of the regulatory process and are subject to no formal procedures, requirements, or rules.

Another category of changes that were made to the Radio Regulations provided increased flexibility in the time constraints placed upon bringing a network into use. The Regulations had provided that each satellite network normally would be brought into service within five years of commencing the advance publication procedures.[214] In "exceptional circumstances" the IFRB could extend that period for up to

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211. Id. ADD 1085A (emphasis added).

212. Id. ADD 1091A.

213. See discussion supra note 196 and accompanying text.

214. See 1982 Radio Regulations, supra note 150, No. 1042.

eighteen months.[215] Thus, the total period allowed to bring a network into service was six and one-half years from the start of advance publication. If the time limit was not met, the process had to be initiated once again.

Delegations recognized that those time constraints were no longer realistic. Satellite networks had become more complex, thereby increasing lead time and the time required for coordination. Moreover, launch vehicle failures and the resulting shortage of launch vehicles had greatly compounded the difficulties of securing a timely launch.[216] In light of these concerns, the period following advance publication during which a satellite network should be brought into service was lengthened from five to six years,[217] and the extension allowed was increased from eighteen months to three years and made mandatory upon the request of an administration.[218] Moreover, due to the immediate problems being experienced by administrations in getting satellites launched, a Resolution was adopted instructing the IFRB to apply the time extensions on a provisional basis pending the

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215. Id. No. 1550.

216. See discussions in Committee 6, ITU, WARC-ORB-88, Doc. 309, at 4. The IFRB provided a report to the conference outlining the existing situation regarding extension of the date of bringing an assignment into use due to launch failures. See ITU, WARC-ORB-88, Doc. 4.

217. See Final Acts, supra note 81, MOD 1042.

218. Id. MOD 1550.

effective date of the Final Acts.[219] Thus, all administrations now have a total period of nine years from the commencement of advance publication until a network must be brought into service.

Another simplification of the Radio Regulations involved the concept of network coordination and notification. Under Articles 11 and 13 of the current Radio Regulations, assignments involving geostationary satellites are handled on a frequency assignment basis for both the satellites and the earth stations communicating with them. Earth stations that were not associated with the original coordination action must be separately coordinated and notified. This entails additional expense and administrative burdens both for administrations and for the IFRB. Therefore, proposals were advanced to permit coordination and notification on the basis of typical earth stations with associated service areas.[220]

The concept of network coordination and notification was accepted after much debate. Basic principles were first adopted in Committee 6 and then Sub-Working Groups were formed to draft the various amendments to the Radio Regulations.[221] The resulting changes allow for coordination under Article 11 to be effected for a satellite network using information about the space station, "including its service area, and the parameters of one or more typical earth stations which may be

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219. Id. Res. COM6/4.

220. See, e.g., ITU, WARC-ORB-88, Doc. 12, at 25 (U.S.).

221. See ITU, WARC-ORB-88, Docs. 309, 284, 263, & 238.

located in all or part of the space station service area."[222] Individual earth stations within the service area of a satellite network do not require coordination if they have the parameters of the associated typical earth station or "if they would not cause or suffer interference of a level greater than the typical earth station."[223]

Article 13 was also changed to permit notification of a frequency assignment to a space station along with "one or more associated typical earth stations with the area in which they are intended to operate."[224] Individual notification of an earth station is required only under certain circumstances such as where the earth station will cause or suffer greater interference "than for any typical earth station coordinated ... for the relevant location."[225]

To complete the changeover to the network coordination and notification concept, many provisions of Articles 11 and 13 had to be realigned.[226] Appendices 3 and 4, which indicate technical information required for advance publication and coordination of networks, also required extensive

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222. Final Acts, _supra_ note 81, ADD 1060A.

223. _Id_. ADD 1066A.

224. _Id_. ADD 1493A.

225. _Id_. ADD 1094A, B, & C.

226. _See_, _e.g._, _id_. ADD 1058B.

revision.[227] The net effect of these changes is a simpler and more efficient method of coordination and notification, which provides equivalent protection against harmful interference.

Proposals to simplify article 14 were also introduced. The Article 14 procedures of the Radio Regulations are applied if a footnote to the Table of Frequency Allocations requires the agreement of an administration.[228] Some administrations had experienced difficulties in effecting the required agreements and made proposals to modify Article 14.[229] Those administrations met outside the Conference to draft a joint proposal.[230] An ad hoc working group was then established to review the proposed modifications to Article 14.[231] Some of the proposals potentially impacted terrestrial services and were considered beyond the competence of the Conference.[232] Ultimately, minor modifications were

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227. See id. Appendices 3 & 4. A decision was also made that Appendices 3 and 4 would not be combined. See ITU, WARC-ORB-88, Doc. 331.

228. See 1982 Radio Regulations, supra note 150, art. 14.

229. See, e.g., ITU, WARC-ORB-88, Doc. 12, at 26 (U.S.).

230. See ITU, WARC-ORB-88, Docs. 248, at 1; and 288.

231. See ITU, WARC-ORB-88, Doc. 361.

232. See Report of the U.S. Delegation, supra note 66, at 41.

made to Article 14,[233] and a Recommendation was adopted recognizing a need to review the provisions of Article 14 and calling for a future conference to make appropriate revisions.[234]

Another matter relating to simplified procedures was a Colombian proposal to prevent registration of a satellite network until coordination was effected.[235] The history of this proposal goes back to the First Session, where Colombia vociferously complained about a satellite that had been positioned above it in the geostationary orbit without successfully completing coordination with Colombia.[236] Colombia had frustrated successful coordination of that satellite on the basis of its equatorial sovereignty claims.[237] At the Second Session, Colombia introduced its proposal in Sub-Working Group 6B-1.[238] Recognizing the political nature of this proposal and the existence of "strong objections," Committee 6 referred it directly to the Plenary

233. See Final Acts, supra note 81, art. 14.

234. Id. Rec. COM6/C.

235. See ITU, WARC-ORB-88, Doc. 154, Add. 1 (Colombia).

236. See ITU, WARC-ORB-85, Doc. 263. Coordination was required because Colombia had previously registered a satellite in that area of the GSO. Even though the satellite had not yet been brought into use and was merely a "paper satellite," it was still entitled to protection under the Radio Regulations.

237. Id. at 7. For a discussion of the sovereignty claim, see infra ch. 11, notes 3-69 and accompanying text.

238. See ITU, WARC-ORB-88, Doc. 273.

in brackets.[239] In the Plenary, the Soviet delegate pointed out that the proposal was contrary to Article 13 of the Radio Regulations, which permits registration of a satellite system absent successful coordination where IFRB examination establishes that permissible interference levels will not be exceeded.[240] Moreover, the Soviet delegate indicated that the danger inherent in the proposal was that coordination could be refused on non-technical, even political, grounds.[241]

There was little support for the Colombian proposal, and in the final days of the Conference, under the threat of a vote with obvious results, Colombia settled for a "compromise" text. As adopted, this text provides simply that if an assignment is brought into use before the commencement of required coordination, that the advance operation does not afford any priority based upon the date of operation.[242] This provision has no effect upon the ability to register an assignment under Article 13.

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239. See ITU, WARC-ORB-88, Doc. 309, at 8.

240. See Author's notes of the Sixth Plenary Meeting (Sept. 29, 1988); ITU, WARC-ORB-88, Doc. 418, at 7. See also 1982 Radio Regulations, supra note 150, art. 13, No. 1506.

241. Author's notes of the Sixth Plenary Meeting (Sept. 29, 1988).

242. See Final Acts, supra note 81, ADD 1060AA.

c. General Issues (Agenda Items 5, 7, and 12)

Pursuant to Agenda item 5, the Second Session was to "review and revise, as necessary, the definitions relating to space services."[243] Committee 6 tasked Working Group 6C with that responsibility.[244] New definitions were added to the Radio Regulations for "Effective Boresight Area," "Effective Antenna Gain Contours," and "Steerable Satellite Beam."[245] Modifications were made to the definitions of "Deep Space," "Fixed Satellite Service," and "Feeder Link."[246]

Agenda item 7 involved the potential for bidirectional use of the 10.7 - 11.7 GHz band in Region 1. This issue was discussed within Committee 6 where opposition based upon potential interference problems was raised.[247] A decision was reached not to modify the allocation so as to permit bidirectional use and no changes were made to the Radio Regulations.

Agenda item 12 authorized the Second Session to make consequential amendments to the Radio Regulations that may be

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243. Agenda, _supra_ note 2, at 5.

244. For an excellent summary of the work of Working Group 6C, _see_ ITU, WARC-ORB-88, Doc. 415.

245. _See_ Final Acts, _supra_ note 81, ADD 168A, 168B, & 183.

246. _Id_. MOD 169, 22, & 109. The last two modifications provide the ability to use transportable earth stations in the FSS. However, stations may not be in motion while operating.

247. _See_ ITU, WARC-ORB-88, Doc. DT/22.

necessitated by decisions taken on other items. Committee 6 dealt with several proposals under this Agenda item that were designed to simplify the Radio Regulations. Proposals from Turkey and Malta led to minor modification of two provisions of the Radio Regulations by deletion of a reference to Malta.[248] A proposal of the United States to modify another Regulation was partially successful.[249]

Agenda item 13 called for appropriate action on relevant Resolutions and Recommendations. Those related to simplified procedures were addressed in Committee 6. Two issues were controversial. One Resolution proposed by 22 administrations was aimed at providing "special attention" to MSS feeder links operating in FSS bands.[250] Several administrations opposed this Resolution since relevant CCIR studies were ongoing.[251] After further discussion, this proposal was withdrawn and

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248. See Final Acts, supra note 81, MOD 858 & 863.

249. Regulation No. 839 was modified to correct typographical errors and misstatements of practice. Id. MOD 839. More substantive changes that had an effect on terrestrial services, however, were withdrawn due to opposition based on Conference competency. A proposal advanced by Canada was also withdrawn for similar reasons. That proposal would have modified Radio Regulation 863 to permit use of FSS feeder links for the BSS to be used for other purposes. See ITU, WARC-ORB-88, Doc. 404, at 3.

250. CEPT countries have historically sought priority for MSS feeder links operating in the FSS bands on behalf of INMARSAT. See Report of the U.S. Delegation, supra note 66, at 44.

251. See ITU, WARC-ORB-88, Docs. 188, at 2; & 247, at 2-3.

administrations placed remarks in the record[252] expressing their concern that the Conference had taken no action in response to the request of the Mobile WARC.[253]

A United States' proposal for a Recommendation on multiband/multiservice satellites also ran into strong opposition. This proposal pointed to the increasing difficulties resulting from the different regulatory regimes that may apply to one satellite designed to use multiple bands of the same service, or multiple services. The proposed Recommendation provided that "when planning a satellite network administrations [should] avoid using, if possible, combinations of frequency bands, such that more than one regulatory procedure applies to the network."[254] If a satellite would be subject to more than one procedure, guidelines were provided in the Recommendation. Although administrations recognized the nature of the problem, many favored a somewhat less stringent Recommendation. A compromise version of this Recommendation resulted from discussions within Committee 6. The adopted Recommendation provides that administrations should cooperate to overcome the

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252. See ITU, WARC-ORB-88, Doc. 404, at 3.

253. The WARC for Mobile Services was held at Geneva in 1987. The Secretary-General forwarded a copy of the Mobile WARC Recommendation to the Second Session. See ITU, WARC-ORB-88, Doc. 6 (Rev.1).

254. ITU, WARC-ORB-88, Doc. 77, at 2.

problems raised by multiband/multiservice satellites, and that, if necessary, a future conference should review the process for bringing such satellites into use.[255]

A Resolution calling for improved accuracy of the Master International Frequency Register was prepared in Committee 6 and was later approved by the Plenary.[256] It urges administrations to observe the time limits set for cancellation of assignments and to cooperate with the IFRB in giving notification of assignments that are not in use or are suspended.

One other Recommendation was the result of a Japanese proposal regarding the monitoring of emissions from satellites. The adopted Recommendation notes that monitoring of emissions could help the IFRB ensure the accuracy of the Master Register and result in more efficient and economical use of the orbit/spectrum resource. With that objective, it encourages administrations to participate in CCIR studies on the possible development of guidelines concerning space monitoring facilities.[257]

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255. *See* Final Acts, *supra* note 81, Rec. COM6/D.

256. *See id.* Res. COM6/1. This Resolution was based on Resolution No. 2 from the First Session and Resolution No. 9 from the 1979 WARC. *See* ITU, WARC-ORB-88, Doc. 188, at 1.

257. *See* Final Acts, *supra* note 81, Rec. COM6/B.

4. The Working Group of the Plenary (Technical and Miscellaneous Matters)

The Working Group of the Plenary had responsibility for a variety of technical issues.[258] One of its more important tasks involved the potential planning of the 30/20 GHz band. The First Session had asked the CCIR to study this band and to report to the Second Session "with the view of taking a decision on the future planning of these bands by a future competent conference."[259] During the intersessional period, the CCIR conducted studies; it then reported to the Second Session that until it had much more technical information available "it would be extremely unwise for the 30/20 GHz bands to be subject to planning ...."[260] The Working Group of the Plenary easily concluded that these bands should not be included in any planning method, but should continue to be treated under Articles 11 and 13 of the Radio Regulations. That decision was reported to the Plenary along with a draft Resolution.[261] The Plenary concurred with the decision and adopted a Resolution declaring that these bands are not

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258. For the terms of reference of this group, see ITU, WARC-ORB-88, Doc. 114, at 5.

259. Report to the Second Session, supra note 15, ch. 3, at 3. See also discussion supra ch. 6, note 93 and accompanying text.

260. CCIR Report, supra note 52, Exec. Summary, at 2.

261. See ITU, WARC-ORB-88, Docs. 206 & 207.

identified for planning at this time and inviting the CCIR to continue its studies.[262]

Another issue handled by the Working Group of the Plenary involved the threshold for determining whether Article 11 coordination was required. According to Appendix 29 of the Radio Regulations,[263] two networks had to coordinate if one of them under worst case conditions would theoretically experience an increase of equivalent noise temperature in excess of four percent due to emissions from the other network.[264] A CCIR report recognized that in many cases more detailed calculations revealed no harmful interference even though the four percent threshold had been exceeded.[265] An improvement was needed in that method for determining whether coordination was required in order to minimize the burdens of unnecessary coordinations. Several proposals to revise the four percent threshold value were presented at the Second Session.[266] The United States proposed an increase in the threshold to six percent.[267] France, on the other hand, proposed repealing the single threshold concept in favor of a table of thresholds covering different carrier

262. See Final Acts, supra note 81, Res. GT-PLEN/1.

263. See 1982 Radio Regulations, supra note 150, Appendix 29.

264. See CCIR Report, supra note 52, Exec. Summary, at 12.

265. Id.

266. See ITU, WARC-ORB-88, Doc. 204.

267. See ITU, WARC-ORB-88, Doc. 12, at 44.

types.[268] After lengthy discussion the Working Group agreed to raise the threshold value to six percent as recommended by the United States.[269] Appropriate amendments to Appendix 29 were prepared[270] and adopted by the Plenary.[271]

This Working Group also developed numerous technical revisions to Appendix 3 (covering the Articles 11 and 13 coordination and notification information), and to Appendix 4 (covering Article 11 advance publication information).[272] These revisions were adopted by the Plenary with minor changes.[273]

One other issue raised in the Working Group of the Plenary involved circular geosynchronous inclined orbits. The IFRB Rules of Procedure provide that a satellite is considered to be geostationary only if its inclination is not greater than five degrees.[274] The United States proposed that satellites in circular geosynchronous orbits having an inclination of up

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268. See ITU, WARC-ORB-88, Doc. 21.

269. See ITU, WARC-ORB-88, Doc. 204. France initially reserved its position on this decision and did not withdraw its reservation until late in the Conference.

270. See ITU, WARC-ORB-88, Doc. 205.

271. See Final Acts, supra note 81, Appendix 29.

272. See ITU, WARC-ORB-88, Doc. 329, and references cited therein. These revisions were sent to Committee 6 for their inclusion in Appendices 3 and 4 as rewritten. See supra note 227 and accompanying text.

273. See Final Acts, supra note 81, Appendices 3 & 4.

274. See ITU, WARC-ORB-88, Doc. 18, at 63.

to 15 degrees should be considered to be geostationary.[275] This proposal met with considerable opposition. The Working Group was able to draft a Resolution calling for CCIR studies on all technical aspects of inclined orbit operations.[276] It also drafted a related modification to Article 29.[277] These two documents were referred to Committee 6 where they incurred further difficulties. Consequently, no changes were made relating to this issue. The relevant documents were merely brought to the attention of the CCIR and the IFRB.[278]

C. Summary

The Second Session reached a successful conclusion and accomplished a tremendous amount of work. Most of the significant problems encountered involved the Allotment Plan. Those problems resulted in many late night Plenary meetings at the end of the Session. Additionally, the Session had to be

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275. *See* ITU, WARC-ORB-88, Doc. 56, at 33. The importance of this definition derives from the primary protection against interference given to geostationary satellites as opposed to non-geostationary satellites. *See* 1982 Radio Regulations, *supra* note 150, art. 29, No. 2613. Use of inclined orbits has been mentioned as a technique to increase the efficient use of the orbit/spectrum resource. *See supra* ch. 1, note 73 and accompanying text.

276. *See* ITU, WARC-ORB-88, Doc. 314.

277. *See* ITU, WARC-ORB-88, Doc. 294.

278. *See* ITU, WARC-ORB-88, Doc. 430, at 3.

extended by one day. Such an extension was not made without great reluctance because of the lack of a quorum that had resulted from an extension of the First Session.[279]

The Conference results establish a new regulatory regime for the FSS. The unplanned bands were simplified and improved. MPMs were established, but given much less emphasis than one would have anticipated after the First Session. The normal method for using the unplanned bands will remain the procedures of Articles 11 and 13 of the Radio Regulations. Those Articles, however, were amended in ways that eliminate much of the perceived unfairness of the "first-come, first-served" regulatory regime. Multilateral meetings to resolve difficulties are now specifically recognized, and a mutuality of obligation for resolving those difficulties is emphasized. Further improvements to the regulatory regime were made by providing for notification of assignments on a network basis with "typical earth stations," by lengthening time standards for bringing networks into use, and by increasing the coordination threshold from four to six percent. Administrations implementing satellite systems in the unplanned bands will benefit from these changes. Thus, the primary beneficiaries of these changes will be developed countries that are large users of the orbit/spectrum resource.

The Conference also established an Allotment Plan of two parts. Part A contains national allotments for all administrations, with special geographic considerations taken

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279. <u>See</u> <u>supra</u> ch. 6, note 44 and accompanying text.

into account. The guarantee of access is provided at a "nominal" orbital location that may be moved within an associated predetermined arc as assignments are implemented. Generalized parameters and associated Annexes will permit the implementation of most allotments without the need for coordination. Part B of the Plan contains existing systems. These systems have a status equal to that of the national allotments in Part A. Procedures associated with the Allotment Plan provide for the implementation of national allotments, existing systems, subregional systems, and additional uses. The Allotment Plan has a duration of at least 20 years. The Plan provides the guarantee of access to the orbit/spectrum resource that developing countries had long sought. The Plan and its associated procedures are examined in more detail in the following chapter.

Significant actions in relation to the BSS were also taken at the Second Session. A feeder link Plan for Regions 1 and 3 was established. This action finalized the planning of the BSS that was called for in 1971. The flexibility to create interim systems in Region 2 was also retained, and the extension of similar provisions to Regions 1 and 3 will be examined in the future. Satellite Sound Broadcasting and High Definition Television remain the subjects of CCIR studies, and Resolutions call for consideration of appropriate frequency allocations at future conferences.

One area that was not adequately addressed at the Conference is the problems that will be encountered by multiservice/multiband satellites. Many administrations may want to combine use of the Allotment Plan bands with unplanned bands of the FSS or the planned BSS bands. It is going to be difficult to do so with one satellite, given the differing legal regimes and the fixed BSS positions. This will result in less efficient use of the orbit/spectrum resource. Further review of this issue at a future conference is appropriate.

CHAPTER 9

THE NEW REGULATORY REGIME FOR THE FIXED SATELLITE SERVICE

The concerns of developing countries about the regulatory regime for the FSS prompted the call for the Space WARC.[1] That regime was reviewed previously in Chapter 3.[2] This chapter examines the new ITU regulatory regimes for the FSS and focuses on the key changes that were made to them during the WARC.

At the end of the First Session, it appeared that three different regulatory regimes for the FSS would emerge: the Allotment Plan; improved procedures planning; and simplified procedures for the unplanned bands.[3] As it turned out, only two basic regulatory regimes emerged. One is established in the Allotment Plan and procedures for specific frequency bands of the FSS. The other regulatory regime applies to the unplanned bands of the FSS. Certainly the most significant change to the previous regulatory regime for the FSS was the establishment of the Allotment Plan and procedures for certain

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1. See discussion supra ch. 4, notes 61-67 and accompanying text.

2. See supra ch. 3.

3. See Report to the Second Session of the Conference: World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, ch. 3 (Geneva, 1988) [hereinafter cited as Report to the Second Session].

specified bands. Before the Allotment Plan is examined, however, the regulatory regime for the other FSS frequency bands is explored.

A. The Regulatory Regime for the Unplanned FSS Bands

The regulatory regime for the unplanned FSS bands is basically the previous regime simplified in several respects and containing a separate procedure that applies to certain frequency bands in "exceptional cases."[4] The fundamental regulatory scheme of advance publication, coordination, notification, and registration was retained.[5] Specific changes that served to simplify this regime were highlighted in chapter 8.[6] The following discussion sets out the primary aspects of the new regulatory regime as amended.

1. Article 11

An administration desiring to establish a new satellite network initiates the regulatory procedure by sending the IFRB the advance publication information specified in Appendix

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4. ITU, Final Acts Adopted by the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (ORB-88), art. 11, ADD 1085C (Geneva, 1988) [hereinafter cited as Final Acts]. Since the separate procedure is only to be used in exceptional cases, this study does not consider it to be a separate regulatory regime.

5. See discussion of this scheme supra ch. 3, notes 20-39 and accompanying text.

6. See supra ch. 8 notes 206-242 and accompanying text.

4.[7] This information may be sent not earlier than six years and preferably not later than two years before the expected date of bringing the network into service.[8] On receipt of the complete information, the Board publishes it in its weekly circular.[9] After the information is published by the IFRB, any administration believing that one of its existing or planned satellite networks might be adversely affected has four months to send comments to the concerned administration (with a copy to the Board) "on the particulars of the interference to its ... systems."[10] When comments are received, any of the involved administrations may request

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7. See Final Acts, supra note 4, Appendix 4. That information includes: general characteristics about the satellite network, such as the expected date of bringing into use, visible arc, service arc, and planned orbital location (id. sect. B); characteristics of the network in the earth-to-space direction, such as the service area, frequency range, power, satellite receiving antenna characteristics, noise temperature, necessary bandwidth, and modulation characteristics (id. sect. C. Appendix 4 was modified at the Second Session to provide for steerable beam antennas); characteristics of the network in the space-to-earth direction, such as the frequency, power, characteristics of the satellite transmitting antenna, modulation, necessary bandwidth, and characteristics of receiving earth stations (id. sect. D); and, if available, supplementary information such as the type of carriers to be used. Id. sect. G.

8. Id. MOD 1042.

9. Id. art. 11, MOD 1044. Publication occurs within three months. Id. If the information is incomplete, the Board will seek clarification and additional information. Id. Advance publication information may be amended, but modifications that significantly change the character of the network may require recommencing the procedure. Id. MOD 1043.

10. Id. MOD 1047. The quoted language was added by the Second Session to clarify that comments must relate to interference. Comments on non-technical matters, such as political positions, are irrelevant to the regulatory process.

IFRB assistance in determining the potential for interference.[11]

A procedure for the resolution of disputes is set out in the Radio Regulations. Both the administration sending comments and the administration receiving comments are to endeavor to resolve the difficulties.[12] When problems are encountered, the administration responsible for the planned network should first attempt to satisfy its requirements without considering adjustments to networks of other administrations.[13] If no such means can be found, other administrations may be requested to mutually help resolve the difficulties.[14] This can be done bilaterally, multilaterally, or "in exceptional circumstances through the convening of multilateral meetings <u>similar</u> <u>to</u>" the MPMs provided for in the coordination stage.[15] If the administration responsible for the planned network requests

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11. <u>Id</u>. ADD 1047A & 1047B. This determination is made using Appendix 29. <u>Id</u>. If no comments are received from an administration, it may be assumed that the administration has no objections to the planned satellite network. <u>Id</u>. MOD 1047.

12. <u>Id</u>. MOD 1049. The modification to No. 1049 clarifies that the duty to resolve difficulties rests on both administrations. <u>See</u> <u>id</u>.; and ITU, <u>Radio Regulations</u>, art. 11, No. 1049 (1982) (ITU Doc. No. ISBN 92-61-01221-3) [hereinafter cited as 1982 Radio Regulations].

13. <u>Id</u>. MOD 1051.

14. <u>Id</u>.

15. <u>Id</u>. (emphasis supplied). The previous Radio Regulations had not specifically provided that contacts with other administrations could be on a multilateral basis. <u>See</u> 1982 Radio Regulations, <u>supra</u> note 12, art. 11, No. 1051. MPMs are discussed <u>infra</u> notes 42-56 and accompanying text. (Cont. on next page)

another administration to do so, that administration must explore all means of accommodating the planned network, which includes relocation of its own satellite as well as changing the operating and technical characteristics of its network.[16] If unresolved difficulties remain, all concerned administrations must then examine the possibility of making mutually acceptable adjustments.[17] During their attempts to resolve difficulties, administrations may seek the assistance of the IFRB.[18]

After advance publication information is sent to the IFRB the administration has a potential period of nine years to complete coordination and submit the required notification data or else the advance publication is cancelled.[19] When it sends advance publication information to the IFRB, an

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The emphasized language clearly indicates that multilateral meetings held at the advance publication stage are not MPMs within the meaning of Res. COM6/3. Although they could be similar to MPMs, their precise nature would be subject to the discretion of the participants.

16. <u>See</u> 1982 Radio Regulations, <u>supra</u> note 12, art. 11, No. 1052.

17. <u>See</u> Final Acts, <u>supra</u> note 4, art. 11, MOD 1053.

18. The Board's responsibilities in such situations were set out in greater detail by the Second Session. <u>See id.</u> ADD 1054A - ADD 1054D. Administrations that have sent advance publication information to the Board must also keep the Board appraised of comments received and the progress made in resolving difficulties. <u>Id.</u> MOD 1056. The IFRB publishes such information in a special section of its weekly circular. <u>Id.</u>

19. <u>See id.</u> ADD 1056A and citations contained therein. This provision was added at the Second Session in an effort to improve the accuracy of the IFRB's records. Some administrations asserted that the cancellation should occur
(Cont. on next page)

administration may also communicate coordination information, or notification information where coordination is not required.[20]

Coordination is a process that is similar to advance publication. It must be accomplished, with limited exceptions, before an administration can notify for registration, or bring into use, a frequency assignment to a satellite or to an earth station that is to communicate with a satellite.[21] In general, coordination is to be accomplished with other administrations that might be affected by the planned system.[22] However, coordination is not required if the potentially affected administration will not experience an increase in interference exceeding the threshold value defined

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only with the agreement of the concerned administration. That condition was not accepted, so the IFRB is only required to inform the administration concerned before the cancellation.

20. See id. ADD 1058A - 1058D. Such coordination or notification information shall be considered as having been received by the Board not earlier than six months after receipt of the advance publication information. Id. ADD 1058E.

21. See id. MOD 1069. Coordination is also required for frequency assignments to an earth station in relation to terrestrial stations and for frequency assignments to a terrestrial station for transmission in relation to an earth station. See 1982 Radio Regulations, supra note 12, art. 11, sects. III & IV. Only a few changes were made to those regulatory provisions. See Final Acts, supra note 4, art. 11, sects. III & IV.

22. See 1982 Radio Regulations, supra note 12, sect. II. Generally, coordination is required with another network of the same service that is operating in the same band in conformity with the ITU Convention and Radio Regulations, and that is already registered, in coordination, or notified without coordination where coordination is not required. See id.

in Appendix 29.[23] Nor is coordination required to notify or bring into use a typical earth station operating within the service area of a satellite.[24]

When an administration seeking to establish a satellite network requests coordination with another administration, it must send that administration the information specified in Appendix 3, including the characteristics of one or more typical earth stations and the respective service areas.[25] A copy is also to be provided to the IFRB.[26] When the Board receives the coordination information it examines it for conformity with various requirements[27] and then informs all administrations of the identity of the satellite network and

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23. See Final Acts, supra note 4, art. 11, MOD 1067. Appendix 29 established a method for determining if coordination is required between geostationary satellite networks sharing the same frequency bands. 1982 Radio Regulations, supra note 12, Appendix 29. The threshold value was changed at the Second Session from 4 to 6 percent. See supra ch. 8, note 269 and accompanying text. This change should result in fewer required coordinations.

24. Coordination is required in certain circumstances. See Final Acts, supra note 4, art. 11, ADD 1066A & MOD 1067. The issue of typical earth stations and coordination on a network basis is discussed supra ch. 8, notes 220-223 and accompanying text. For other exceptions to the requirement to coordinate see Final Acts, supra note 4, art. 11, sect. II; and 1982 Radio Regulations, supra note 12, art. 11, sect. II.

25. Final Acts, supra note 4, Appendix 3. This information is similar to the information required by Appendix 4 in advance publication (see supra note 7 and accompanying text), but it is considerably more detailed since more specifics about the planned satellite network should be known at this stage.

26. See Final Acts, supra note 4, MOD 1074.

27. See id. MOD 1076.

the date it received the information.[28] If an administration that has not been included in coordination believes that it should have been included, it may request to be brought into the procedure by sending its request to the administration planning the new network.[29]

Administrations receiving requests for coordination are to examine the information and notify the requesting administration of its decision within four months.[30] If it does not agree to coordinate, it must send the requesting administration the technical details that form the basis for its disagreement along with suggestions.[31] The administrations then resolve the difficulties through bilateral or multilateral meetings.[32] Both the affected administration as well as the administration seeking coordination are to make all possible mutual efforts to resolve the difficulties in a manner that is acceptable to

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28. This date is the date that the new satellite system shall be taken into account for coordination with subsequent systems seeking coordination. Id. If the information is incomplete, the Board requests clarification and any information not provided. See id. ADD 1078A.

29. See 1982 Radio Regulations, supra note 12, art. 11, No. 1080.

30. See Final Acts, supra note 4, art. 11, MOD 1084.

31. Id.

32. Id. ADD 1085B. The inclusion of multilateral meetings was added at the Second Session.

both parties.[33] This provision was added by the Second Session to emphasize that the coordination of new systems is a shared responsibility. The administration that has a recorded system should not simply refuse to make adjustments that could accommodate a new system. This shared responsibility is further defined in the provision for multilateral planning meetings (MPMs).[34] MPMs, however, are only available for the FSS in certain specified bands.[35] When applicable, an administration seeking coordination may initiate action to convene an MPM.[36] The MPM process is analyzed infra.[37] The results of coordination are to be sent to the Board along with any consequential modifications to the characteristics of the satellite networks involved in the coordination.[38]

If difficulties in effecting coordination are incurred, the administration seeking coordination may request assistance from the IFRB.[39] The IFRB shall then endeavor to effect coordination and, where necessary, it shall assess the

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33. Id. ADD 1085A.

34. See id. art. 11, ADD 1085C.

35. These bands are the bands identified at the First Session for Improved Procedures Planning. They are: 3,700 - 4,200 MHz; 5,850 - 6,425 MHz; 10.95 - 11.20 GHz; 11.45 - 11.70 GHz; 11.70 - 12.20 GHz (in Region 2); 12.50 - 12.75 GHz (in Regions 1 & 3); and 14.00 - 14.50 GHz. Id. Res. COM6/3.

36. Id. art. 11, ADD 1085D.

37. See infra notes 42-56 and accompanying text.

38. See Final Acts, supra note 4, ADD 1087A.

39. See 1982 Radio Regulations, supra note 12, art. 11, Nos. 1088 - 1094; and Final Acts, supra note 4, art. 11, ADD 10911, MOD 1093, & MOD 1094.

interference and inform the administrations of its results.[40] If an administration fails to make a timely reply to the IFRB's communications, it is deemed that the administration with which coordination was sought will not object to interference from, nor cause interference to, the assignment for which coordination was sought.[41]

2. Article 11 and the new MPM process

The MPM concept was added to the Radio Regulations at the Second Session. Several changes were made directly to Article 11, but most of the MPM provisions are contained in Resolution COM6/3, which was incorporated by reference into the Radio Regulations.[42] MPMs are a part of the coordination process for the FSS for the specified bands.[43] Multilateral coordination may take the form of an MPM "in exceptional cases."[44] While there is no definition in the Radio Regulations of the term "exceptional cases,"[45] Resolution COM6/3 provides some guidance. It states that an MPM "would be appropriate when an administration finds it has a major

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40. See 1982 Radio Regulations, supra note 12, art. 11, Nos. 1095 - 1099.

41. See Final Acts, supra note 4, MOD 1101 - MOD 1103.

42. See id. ADD 1085 C, & Res. COM6/3.

43. See supra note 35 and accompanying text.

44. Final Acts, supra note 4, ADD 1085C.

45. A proposal to amend this provision to read "in some circumstances" was defeated at the Second Session. See ITU, WARC-ORB-88, Doc. 405, at 2.

difficulty in obtaining coordination."[46] Therefore, "exceptional cases" could include any situation where bilateral coordination has been attempted and, after a reasonable time period, major difficulties remain.

MPMs are to be held "in accordance with resolves 1 to 7 of Resolution COM6/3 ...."[47] Pursuant to these provisions, an administration may propose an MPM, but other concerned administrations are not required to attend.[48] However, administrations that do not participate remain subject to the pertinent provisions of Article 11.[49] An administration that wants to attend, but is unable to, may delegate another administration to represent it, and representatives of multi-administration systems may participate at MPMs.[50] Results of MPMs have the status of coordination agreements among the participants; they do not prejudice the rights of non-participants.[51] No specific rules for the conduct of MPMs are specified. Just as in bilateral coordination, the

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46. Final Acts, supra note 4, Res. COM6/3.

47. Id. ADD 1085C.

48. See id. Res. COM6/3. However, all affected administrations are urged to "make every effort to participate in the [MPM]." Id.

49. Id.

50. Id.

51. Id. The results are to be conveyed to the IFRB. Id., and id. ADD 1087B & ADD 1087C.

nature of the proceedings are left to the parties involved.[52]

Perhaps the most important aspect of MPMs is not what they are, but what they are not. MPMs are not a guaranteed method to resolve coordination disputes. The Resolution recognizes that coordination "could, in some cases, necessitate appropriate burden sharing ...."[53] But no burden-sharing criteria are set out for participants to apply. Although participants are urged to "make every effort for the success of the" MPM,[54] affected administrations are not even required to participate.

Given the lack of any enforcement mechanisms in the MPM process, its effectiveness is uncertain. Nevertheless, when questioning the efficacy of MPMs, one must begin with the recognition that in the vast majority of cases, the normal bilateral coordination of Article 11 has been very effective.[55] Administrations generally act in good faith when participating in coordination activities, and coordination normally results in an outcome that is satisfactory to the administrations concerned. If there are

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52. MPMs may be held at any place agreed by the participants, and the costs are to be borne by the participants as they decide. The permanent organs of the ITU may be called upon for technical advice. *See id*. Res. COM6/3.

53. *Id*.

54. *Id*.

55. *See* discussion *supra* ch. 4, notes 98-99 and accompanying text; and *supra* ch. 3, note 19 and accompanying text.

cases where an administration is acting unreasonably, however, an MPM may serve as a vehicle to encourage more meaningful discussion. Therefore, MPMs should be viewed merely as an adjunct to an otherwise successful process of international negotiation. That is what they were intended to be, and more should not be expected of them. The Administrative Council will be monitoring the progress of MPMs; if difficulties arise, the MPM process may find itself back on the agenda of an Administrative Conference.[56]

3. Article 13

Notification to the IFRB of an assignment is required if the assignment is capable of causing harmful interference to any service of another administration, or if it is to be used for international communication, or if international recognition and protection against harmful interference is desired.[57] In general, any satellite communication network will require notification. The notice to the IFRB is to contain the information prescribed in Appendix 3; it may be submitted not earlier than three years, and not later than three months before the assignment is to be brought into

56. See Final Acts, supra note 4, Res. COM6/3.

57. See 1982 Radio Regulations, supra note 12, art. 13, No. 1488.

use.[58] The major change to Article 13 made at the Second Session permits the notification of one or more typical earth stations and associated service areas.[59] Notification of individual earth stations is no longer required except in certain limited circumstances.[60]

On receipt of a complete notice, the IFRB publishes the information in its weekly circular and then examines the notice.[61] This examination focuses on the assignment's conformity with the ITU Convention and Radio Regulations including its conformity with the coordination provisions.[62] If the Board reaches a favorable finding, the assignment is recorded in the Master Register.[63] If the coordination process was not successfully completed, the notifying administration can request the Board to attempt to effect coordination.[64] Moreover, if coordination has not been successfully completed the Board may assesses the probability

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58. *Id.* No. 1496.

59. *See* Final Acts, *supra* note 4, ADD 1493A; MOD 1494; & ADD 1494A - ADD 1494C. *See also* discussion of typical earth stations *supra* ch. 8, notes 220-223 and accompanying text.

60. *See id.*

61. *See* 1982 Radio Regulations, *supra* note 12, art. 13, Nos. 1499 & 1502.

62. *Id.* Nos. 1502 - 1512.

63. *Id.* No. 1526.

64. If the Board is successful the notice is registered. *See id.* Nos. 1528 & 1526.

of harmful interference[65] and register the assignment under limited circumstances that ensure harmful interference will not be caused to a previously registered assignment.[66]

When an assignment is registered by the Board, the date of the notice is included and that date establishes the rights of the assignment. The notified date of bringing the assignment into use will be extended for up to three years at the request of the notifying administration.[67] The right of an administration to replace a satellite with one having the same basic characteristics was unaffected by the Second Session;[68] a notified assignment can still be extended indefinitely so long as the basic characteristics remain unchanged.[69]

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65. Id. Nos. 1506 - 1513.

66. An assignment may be recorded when: the Board determines that the assignment that has blocked successful coordination has not been in operation for two years (id. No. 1513); or the station seeking registration has operated for four months together with the station that was the basis for the unfavorable finding without causing harmful interference to that station (id. No. 1544, and Final Acts, supra note 4, art. 11, MOD 1556); or the administration agrees to use the notified assignment on a non-interference basis and to terminate interference immediately if it results. Id. art. 11, MOD 1518).

67. See Final Acts, supra note 4, art. 11, MOD 1550. See also discussion supra ch. 8, notes 214-219 and accompanying text.

68. See discussion supra ch. 3, notes 51-52 and accompanying text.

69. See Final Acts, supra note 4, Res. No. 4.

B. The Allotment Plan

The Allotment Plan is a complicated combination of eleven articles and six technical annexes. These provisions are examined in the order in which they appear in the Final Acts, however, there is much interaction between them.[70]

1. Objective of the Provisions and Associated Plan (Article R)

The stated objective of the Plan is "to guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit in the frequency bands of the fixed-satellite service covered by" the Plan.[71] This language was adopted from the Resolution that originally called for the Space WARC.[72] Having adopted a Plan with this objective, the Conference thereby indicated its agreement that the Plan would be capable of providing equitable access as stated.

This Article also provides that the procedures associated with the Plan "shall in no way prevent the implementation of

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70. See id. Addendum, Appendix 30B. The citations contained herein are to the designations appearing in the Final Acts as provided the last day of the Second Session. When the Plan appears in the published version of the Final Acts, the numbering of provisions in Appendix 30B will be reaccomplished by the Secretariat on the basis of the numbering in Appendices 30(Orb-85) and 30A. The Allotment Plan will be incorporated into Appendix 30B of the Radio Regulations.

71. Id. art. R.

72. See 1982 Radio Regulations, supra note 12, Res. No. 3.

assignments in conformity with Part A of the Plan."[73] This reiterates the position advanced by developing countries that other uses of the Plan bands, such as by existing systems and additional uses, as well as by subregional systems, must not prevent the implementation of national allotments. In the future, therefore, should another use conflict with the implementation of an allotment, that other use would bear a responsibility to help accommodate the allotment.

2. Definitions (Article F)

Several important definitions are set out in Article F.[74] The "Conference" is defined as both sessions of the Space WARC.[75] The "Plan" consists of both Parts A and B.[76] An "Allotment" is defined to include: "a nominal orbital position; a bandwidth for 800 MHz (up-link and down-link) in the frequency bands listed in Article G ... ; a service area for national coverage; generalized parameters as defined in Annex 1 ... ; [and] a predetermined arc (PDA)."[77]

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73. *See* Final Acts, *supra* note 4, Addendum, Appendix 30B, art. R.

74. *Id.* art. F.

75. *See id.*

76. *See id.*

77. *Id.*

Important definitions were also adopted for the terms "existing system,"[78] and "subregional system."[79] The most difficult definition to arrive at was that for "additional uses."[80] Three categories of additional uses are recognized. One involves a requirement to use all or part of a national allotment that was suspended as a result of the

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78. An existing system is defined as a satellite system in the applicable frequency bands that is recorded in the Master International Frequency Register; or is in the process of coordination; or for which advance publication information was received by the IFRB before August 8, 1985; and that, in all cases, is listed in Part B of the Plan. See id. This definition was taken from the Report to the Second Session; the requirement to be listed in Part B was added to insure there was no question about what systems qualified as existing systems. See Report to the Second Session, supra note 3, ch. 3 (para. 3.3.4.9).

79. A subregional system is defined as "a satellite system created by agreement among neighboring countries Members of the ITU or their authorized telecommunications operating agencies, and intended to provide domestic or subregional services within the geographical areas of the countries concerned." Final Acts, supra note 4, Addendum, Appendix 30B, art. F. The term "adjacent territories" was used in the First Session in regards to subregional systems. See Report to the Second Session, supra note 3, ch. 3 (para. 3.3.4.1). However, at the Second Session several administrations pointed out that adjacent territories might not include islands in close proximity to each other or countries that were near each other but did not share a common border. See ITU, WARC-ORB-88, Doc. 428, at 9-10. The more general term "neighboring countries" was adopted to encompass such situations. A subregional system must be intended to provide domestic or subregional services, but the provision of limited international services is not necessarily ruled out by this definition.

80. See discussion supra ch. 8, note 95 and accompanying text.

formation of a subregional system.[81] Another involves the establishment of a subregional system pursuant to the additional uses provisions rather than through the procedures specifically designed for subregional systems.[82]

The final category of additional uses was the most controversial. It is for a use by an administration having a requirement "whose characteristics differ from those used in the preparation of Part A of the Plan ...."[83] This was the category of use that most concerned developing countries at the Second Session. Those countries succeeded in placing stringent restrictions on such potential uses. An additional use of this type is limited to "national coverage, taking into account technical constraints, of the administration concerned, unless otherwise agreed."[84] Furthermore, an additional use of this type can be made only if the

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81. See Final Acts, supra note 4, Addendum, Appendix 30B, art. F (b). This provision contains a reference to paragraph 216 of Article L that is incorrect. The reference should be to paragraph 215. This error is a direct result of the hurried drafting of these procedures that was accomplished very late in the Conference in Plenary session.

82. See id. art. F (c).

83. Id. art. F(a).

84. Id. This language is inartfully drawn because it was the subject of a last minute compromise. See supra ch. 8, note 95 and accompanying text. The author participated in this drafting group. The technical constraints referred to relate to spillover into another country of a signal; this may occur because it is impossible to design a satellite antenna that will broadcast only to the intended coverage area. The limitation to national coverage of the administration concerned was aimed at the separate international systems being considered by some developed countries. The language "unless otherwise agreed" indicates that the coverage area may (Cont. on next page)

administration's allotment, or part of it, has already been converted into an assignment, or if the particular requirement cannot be satisfied through conversion of that allotment into an assignment.[85]

3. Frequency Bands and Execution of the Plan (Articles G and H)

The frequency bands that the Allotment Plan applies to are:

4,500 - 4,800 MHz (space-to-Earth);

6,725 - 7,025 MHz (Earth-to-space);

10.70 - 10.95 GHz (space-to-Earth);

11.20 - 11.45 GHz (space-to-Earth); and

12.75 - 13.25 GHz (Earth-to-space).[86]

Administrations must adopt characteristics consistent with the Plan and its procedures for their FSS stations operating in the above bands.[87]

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include another administration with the consent of that administration. This clause was not in the original proposal advanced by several developing countries. See ITU, WARC-ORB-88, Doc. 460. It was added by the drafting group as part of the overall compromise on additional uses.

85. See Final Acts, supra note 4, Addendum, Appendix 30B, art. F(a).

86. See id. art. G.

87. See id. art. H.

4. The Plan and the Associated List of Assignments (Article J)

Article J defines the predetermined arc (PDA) concept and the list of assignments to be associated with the Plan.[88] The PDA is a segment of the geostationary orbit about a nominal orbital position. The size of the PDA depends upon the stage of development. In the pre-design stage, the PDA is plus or minus ten degrees "about the nominal orbital position established at the Conference ...."[89] After the Plan has been in effect for 20 years, the size of this PDA is increased to plus or minus 20 degrees as long as other criteria can still be met.[90] In the design stage, the PDA is plus or minus five degrees "about the nominal orbital position as may be modified by the application" of the procedures.[91] In the operational stage, the PDA is zero.[92] A Table defines these three stages of development for Parts A and B of the Plan.[93]

Application of the PDA concept provides flexibility to the Plan. When the concept is applied to assist in the implementation of an assignment, an administration will not be considered to be affected if its nominal orbital position is

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88. *Id.* art. J.

89. *Id.* art. J (para. 103a).

90. *See id.*

91. *Id.*

92. *See id.*

93. *See id.*

moved within the associated PDA and the aggregate C/I is maintained at 26 decibels or more.[94] The PDA concept may be applied to provide an allotment to a new ITU Member, to help convert an allotment into an assignment, to accommodate a subregional system, to resolve incompatibilities with existing systems, or to resolve incompatibilities with assignments in the List; it cannot be applied to assist in the implementation of an additional use.[95]

A List of implemented assignments is also to be associated with the Plan. It will contain assignments from Part A allotments, assignments of existing systems from Part B, assignments resulting from the introduction of subregional systems, and assignments of additional uses.[96] This List is the only document associated with the Plan that will disclose exactly which networks have been converted to assignments.

5. Procedures for Implementation of the Plan and Regulation of the FSS in the Planned Bands (Article L)

The procedures for the implementation of assignments contained in the three sections of Article L are particularly

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94. *Id.* (para. 103c). *See also* discussion *infra* notes 169-170 and accompanying text.

95. *See* Final Acts, *supra* note 4, Addendum, Appendix 30B, art. J (para. 104).

96. *See id.* (para 105). When the Board enters an assignment to the List, it informs administrations in its weekly circular. *See id.* (para. 105bis).

complex.[97] Only their general nature and key provisions, as well as problem areas, are discussed. The attached flow charts graphically depict the sequence of events leading to the implementation of a satellite network pursuant to the Plan.[98] These visual aids should assist the understanding of the implementation procedures.

Section I of Article L encompasses procedures for the conversion of an allotment into an assignment. When an administration intends to convert all or part of its national allotment into an assignment, it sends the Board the information specified in Annex 2.[99] The procedures begin with an examination of this information by the Board[100] and end, if successful, with the assignment being recorded in the List of assignments by the Board and notified by the administration.[101] If the Board determines by its examination that the proposed assignment is not in conformity with the Plan, further procedures are set out for the administration to follow.

If the assignment is in conformity with Part A of the Plan and with the macrosegmentation concept of Annex 3B (which is

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97. *See id.* art. L.

98. *See* Appendix C.

99. *See* Final Acts, *supra* note 4, Addendum, Appendix 30B, art. L, sect. I (Para. 101).

100. *Id.* (paras. 102 & 103). The flow chart of this procedure is contained in Appendix C.

101. *Id.* (para. 105bis).

designed to ensure that carrier densities are compatible)[102] then the primary remaining issue is compatibility with an existing system in Part B. If an incompatibility is found, a specific procedure is outlined.[103] This procedure emphasizes the responsibility of an administration with an existing system to accommodate the administration seeking to implement its allotment. Both administrations, however, are to cooperate in reaching an equitable agreement that will take into account the stage of development of the involved systems. Moreover, although "a means must be found to convert the allotment into an assignment," that means must be "acceptable to both parties."[104]

The language used in this provision makes it clear that an administration with an existing system has a particularly strong obligation to accommodate an administration seeking to convert its national allotment to an assignment when that assignment is in accordance with the Plan. In such situations, it is likely that the existing system will be in a more advanced stage of development than the allotment seeking

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102. See discussion supra ch. 8, note 96 and accompanying text.

103. See Final Acts, supra note 4, Addendum, Appendix 30B, art. L, sect. I (Para. 108). This procedure also mentions an administration responsible for an additional use. See id. (para. 108a). However, no additional uses will be involved here since the only reference to para. 108 is contained in para. 106. That paragraph only refers to incompatibility with Part B, and Part B contains only existing systems; it contains no additional uses. See id. art. J (para. 101). Therefore, the words "or an additional use" should be deleted from para. 108a. See id. art. L, sect. I (para. 108a).

104. Id. (para. 108c).

to be converted. To accommodate the new assignment, the administration with the existing system may be asked to move the system's position in the geostationary orbit or to significantly alter its operating characteristics. On the other hand, the administration seeking to convert its allotment may find that it is called upon to use more advanced technologies for its network than are provided for in the Plan. In such a situation, the optimum result may include a cost-sharing arrangement to cover the additional expense of the more advanced technologies. Such action may be more acceptable, and less costly, to the party having the existing system than would a change to that system's characteristics. In this manner, the means found to convert the allotment may be acceptable to both parties. Once again, however, the ultimate resolution of such difficulties will depend upon the good faith of the parties.

If the allotment seeking conversion into an assignment is not in conformity with Part A of the Plan or with the macrosegmentation concept of Annex 3B, an additional procedure is set out in Section IA to facilitate that conversion. The administration seeking to convert its allotment may modify the characteristics of its proposed assignment or select an alternative orbital location, "preferably" within its PDA.[105] It is important to note that an administration seeking to convert its allotment to an assignment should first

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105. See id. sect. IA (Para. 202). The assistance of the IFRB in these actions may be requested. Id.

attempt to meet its requirements from the nominal orbital location listed in the Plan. However, if it cannot do so, it is not limited to a location within its PDA. The administration could seek a position anywhere within its service arc, which may be far from its PDA. If incompatibilities still remain, the PDA concept may be applied to other allotments.[106] If the PDA concept cannot be applied without affecting other administrations, then the agreement of those affected administrations may be sought.[107] If an agreement is reached, the assignment is recorded in the List and the administration may notify its assignment.[108] If an agreement is not reached, the notice is returned to the administration seeking to convert its allotment.[109] That administration would still have the option to recommence the procedures and modify its proposed assignment further or to implement an assignment that is in accordance with the Plan and with the macrosegmentation concept.

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106. See id. (para. 204); & Annex 5. The method of applying the PDA concept is discussed infra note 169.

107. See id. (para. 207). For definition of the term "affected," see supra note 94 and accompanying text.

108. See id. (para. 208). Depending on what changes were made to the network, a special symbol may be included in the List requiring the administration responsible for the assignment to "accommodate, if necessary, future conforming assignments ...." Id. (para. 209).

109. See id. (para. 210).

Section IB contains procedures for recording in the List the existing systems contained in Part B of the Plan.[110] Two important limitations on existing systems are found in this section. First, existing systems that are not brought into use within nine years of the date of entry into force of the Allotment Plan shall be cancelled by the Board.[111] Given the maximum 20-year lifetime for existing systems, this limitation is reasonable.[112] Thus, Section IB will not be used after that nine-year period. Second, when incompatibilities among existing systems listed in Part B are experienced the normal coordination provisions of Article 11 are to be used instead of procedures in the Plan.[113]

The procedures for having an existing system recorded in the List are somewhat similar to the procedures applicable to the conversion of an allotment into an assignment. The PDA concept may be used if it is not possible to resolve incompatibilities through the use of an alternative orbital location.[114] If use of the PDA concept does not remove all incompatibilities, administrations are to cooperate in reaching an equitable agreement to accommodate the existing

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110. *See* flow chart in Appendix C.

111. *See* Final Acts, *supra* note 4, Addendum, Appendix 30B, art. L, sect. IB (para. 303ter).

112. *See* *id*. art. N. Considering that existing systems are limited to 20 years from the effective date of the Plan, those that are going to be implemented should be implemented within nine years.

113. *See* *id*. (para. 301b)

114. *See* *id*. sect. IB (para. 305).

system.[115] The language used in calling for such an agreement, however, is not as forceful as that used when an allotment is being converted to an assignment.[116]

One aspect in the existing system procedures, that is not depicted in the flow chart, could be interpreted to give such systems a priority over all other systems in the Plan. An administration seeking to implement an allotment that is in conformity with the Plan, but that is not compatible with Part B, must attempt to resolve incompatibilities with the administration responsible for the existing system.[117] The converse, however, is not specifically required. One provision of the existing systems procedures states that an assignment for an existing system notified to the Board after August 29, 1988, "will be entered in the List if the notified characteristics are identical to those contained in Part B of the Plan."[118] This provision could be interpreted to give an existing system contained in Part B a right to be entered in the List as an assignment, regardless of its affect on other assignments or allotments, so long as the exact characteristics entered in Part B are used. Such an interpretation would accord existing systems in Part B a priority over other systems in the Plan.

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115. Id. (para. 310).

116. Compare id. (para. 310) with id. sect. I (para. 108).

117. See id. sect. I (paras. 106 and 108).

118. See id. sect. IB (para. 301bis).

Granting a priority for existing systems, however, was not intended by the Conference. When the issue of a priority between allotments and existing systems was raised, it was always raised by a developing country seeking priority for allotments. Developed countries successfully countered that argument by insisting on equality for existing systems, as recommended by the First Session.[119] Notwithstanding that no administrations sought priority for existing systems, the language is clear and unambiguous -- "assignments _will be_ entered in the list if the notified characteristics are identical to those contained in Part B of the Plan."[120] To resolve this dilemma, it is necessary to refer back to the objective of the Plan and remember that the procedures "shall in _no way_ prevent the implementation of assignments in conformity with Part A of the Plan."[121] With this mandate in mind, and considering that if implementation cannot be prevented, operations after implementation should also be protected, one must conclude that although an administration having an existing system has a right to implement its assignment in accordance with Part B, it does not have a right to disregard potential interference with an allotment in conformity with Part A that is already implemented. Therefore, an administration seeking implementation of an

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119. _See_ Report to Second Session, _supra_ note 3, ch. 3 (para 3.3.4.9).

120. _See_ Final Acts, _supra_ note 4, Addendum, Appendix 30B, art. L (para. 301bis)(emphasis added).

121. _Id._ art. R (emphasis added).

existing system should follow the procedures of Article L, Section IB, even if it is implementing an assignment with characteristics identical to those in Part B. Although such an obligation is not clearly set out, this interpretation is consistent with the Plan's objective. Fortunately, since existing systems must be implemented within nine years,[122] this problem is not permanently ingrained in the Plan.

Procedures for the introduction of subregional systems are set out in Section II of Article L.[123] The group of administrations seeking to establish such a system selects an orbital position, preferably from the national allotments involved.[124] One administration serves as the "notifying administration."[125] All or part of the national allotment used by the system is suspended for the period of operation unless its use will not affect allotments in the Plan or assignments that have been made.[126] When determining which administrations are affected by the

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122. See discussion supra note 111 and accompanying text.

123. See flow chart contained in Appendix C.

124. See Final Acts, supra note 4, Addendum, Appendix 30B, art. L, sect. II (para. 201).

125. Id.

126. See id. (para. 202).

subregional system, the national allotments of the system's members are not taken into account.[127]

After the notifying administration sends the appropriate information to the Board, the Board determines whether the proposed assignment affects allotments, assignments in the List, or other assignments that are in the process of being implemented.[128] If an allotment or assignment is affected, several actions, including application of the PDA concept, are specified.[129] The procedures also cover situations where an administration later withdraws from a subregional system[130] and where the system is terminated.[131]

One interesting aspect of the procedures for subregional systems is that the potential of interference with an existing system that is in Part B, but that has not initiated action for conversion to an assignment in the list, is not examined by the Board. This could be a serious lacuna for subregional systems seeking implementation in the near future.[132] On the one hand, ignoring such existing systems may make it easier to implement a subregional system. On the other hand,

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127. See id. (para. 204).

128. See id. (para. 206).

129. See id. (paras. 208 - 212).

130. See id. (para. 214 & 215).

131. See id. (para. 216).

132. Since existing systems must be brought into use within nine years from the effective date of the Allotment Plan or be cancelled (see supra note 111 and accompanying text), this problem will cease to exist at that time.

administrations seeking to implement a subregional system would probably want to know about an existing system that might be converted into an assignment in the future and that might cause it interference. Therefore, when a subregional system seeks implementation, the IFRB should examine that system's compatibility with Part B of the Plan, and such information should be provided to all interested administrations.

One other aspect regarding subregional system procedures bears mention. Subregional systems, allotments being converted to assignments, and existing systems may take advantage of the PDA concept in their effort to be implemented. If the PDA concept is successfully applied, however, the subsequent procedural step varies. For an existing system, and for an allotment, the IFRB subsequently uses Annex 4 to determine whether any administrations are affected.[133] A subregional system, however, is not subject to that analysis. It would appear that either this was an oversight or that the Annex 4 analysis is unnecessary after application of the PDA concept.[134] If it was an oversight, then a step should be added to the procedures for subregional

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133. See Final Acts, supra note 4, Addendum, Appendix 30B, art. L, sect. II (para. 305bis), and sect. IA (paras. 205 and 105bis).

134. It may not be necessary to use Annex 4 after successful application of the PDA concept because when the PDA concept is applied, the calculation of single-entry C/I is done by the method in Attachment 1 of Annex 4. See id. Annex 5 (para i.1). It is beyond the competence of this author to determine whether the interference calculations could be different in an (Cont. on next page)

systems that requires the Board to apply Annex 4 even after successful application of the PDA concept. If Annex 4 analysis is unnecessary, then the provision for the Board to apply it is redundant and it should be deleted from the procedures for allotments and existing systems.[135]

The concluding section of Article L provides supplementary provisions for additional uses. According to Section III, additional uses in the Allotment Plan bands are to be avoided if possible.[136] An administration that does seek an additional use within the Allotment Plan must specify a period of validity of no more than 15 years.[137] Furthermore, unless agreed to by the administrations affected, the use may not require any displacement of the orbital position of an allotment in Part A or of an assignment in the List, nor be incompatible with Part A allotments, the assignments in the List, or assignments that have initiated action pursuant to Article L.[138]

Having reviewed the three sections of Article L, it is apparent that Article L contains the most complex procedures of the Allotment Plan. Their complexity is due to the

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independent application of Annex 4 from that calculated during application of the PDA concept. This issue should be examined by the IFRB.

135. See id. sect. II (para. 305bis), and sect. IA (paras. 205 and 105bis).

136. See id. sect. III (para. 301).

137. See id. (para. 302).

138. See id. (para. 302).

nature of the task, which requires providing for the implementation of various types of systems operating under different constraints, as well as to the manner in which they were drafted and adopted extremely late in the Conference. In addition to the problems already mentioned, several minor errors exist in the text of Article L.[139] Moreover, the procedures sometimes fail to complete a course of action, thereby leaving one at a "dead end."

"Dead ends" can be found in almost every procedure. In Section II, for example, after the PDA concept has been successfully applied, the Board is to publish its results and await comments.[140] If no comments are received, the assignment is recorded in the List.[141] If comments are received, the Board "shall initiate the appropriate action to

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139. For example, the term usually used when the IFRB places an assignment in the List is "record." See, e.g., id. sect. I (para. 105bis); & IA (para. 206) ("record the assignment in the List"). This comports with the traditional duty of the Board in recording assignments in the Master Register. See 1982 Radio Regulations, supra note 12, art. 13, No. 1516. In two places in Article L, the term that is used is "enter" the assignment in the list. See Final Acts, supra note 4, Addendum, Appendix 30B, art. L, sect. IB (para. 301bis); & sect. III (para. 305). There is no basis to afford a different legal effect to an assignment that has been "entered" in the List from that given to an assignment that has been "recorded" in the List. Thus, the term "enter" should be changed to "record."

140. See Final Acts, supra note 4, Addendum, Appendix 30B, art L, sect. II (para. 212).

141. Id.

resolve the matter."[142] If the Board is unsuccessful, the notice is to be returned.[143] However, no action is specified for the Board to take if it is successful in resolving the matter. One possibility would be for the Board to record the assignment in the List. But if the Board's action resulted in a change in the technical characteristics of the assignment, then other action needs to be taken. The administration seeking the assignment may not need to start over again,[144] but at least a new publication should be made.[145] This same "dead end" is found in Section IB. Moreover, a similar "dead end" is found in Section IA for Allotments;[146] if application of the PDA concept is unsuccessful, no procedure specifies the appropriate course of action. These "dead ends" are marked by question marks in the attached flow charts.[147]

The presence of these "dead ends" in the procedures raises the question of what an administration should do when it reaches a procedural "dead end." Nothing in the procedures ever prevents an administration from starting over with modified system characteristics or a new orbital position after its notice has been returned. These "dead ends" could

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142. _Id_.

143. _Id_. (para. 213).

144. _See_ _id_. (para. 206).

145. _See_ _id_. (para. 211).

146. _See_ _id_. sect. IA.

147. _See_ Appendix C.

have been eliminated by a simple procedure directing the IFRB to return the notice to the administration concerned. Such directions are already contained in other parts of the procedures.[148] Therefore, when such "dead ends" are reached, the IFRB should interpret a lack of direction as requiring it to return the notice to the administration concerned. That administration then will have the option of trying procedures again with suitable modifications to its system.

6. Other Procedures and Parts A and B of the Plan

Article K provides a procedure to add an allotment to the Plan for a new member of the ITU. The Board is charged to find an appropriate orbital position and it may use the PDA concept if necessary.[149] Article M provides that once the relevant Article L procedure has been successfully completed the assignment is to be notified to the Board in accordance with Article 13 of the Radio Regulations.[150] Furthermore, the requirements under Article 11 for coordination with terrestrial services sharing these bands remain intact; the

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148. See, e.g., Final Acts, supra note 4, Addendum, Appendix 30B, art. L, sect. I (para. 104); sect. IA (para. 210); and sect. II (para. 213).

149. See id. art. K (para. 103).

150. See 1982 Radio Regulations, supra note 12, art. 13. When the Board receives a completed notice under Article 13, it associates a PDA of 0 degrees with the assignment. See Final Acts, supra note 4, Addendum, Appendix 30B, art. M (para. 102) & art. J, (para. 103a).

Allotment Plan only affects the FSS in the planned bands.[151] Article P contains the actual Plan. All of the allotments in Part A and their specific characteristics are listed, as are the existing systems contained in Part B.[152] In Article I the period of validity for the Allotment Plan is established as at least 20 years from the date of entry into force, but it will remain effective until revised by a competent conference.[153]

7. The Technical Annexes

Annex 1 contains the standardized parameters used in establishing the Allotment Plan as well as the equation for establishing the generalized parameters for each allotment that may be used when implementing an allotment.[154] Most of the standardized parameters were "a reasonable compromise between existing technology and the somewhat relaxed standards preferred by many developing countries concerned about the

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151. See 1982 Radio Regulations, supra note 12, art. 11, sects. III & IV; and Final Acts, supra note 4, Addendum, Appendix 30B, art. M. The Conference was not competent to make any changes to allotments to terrestrial services. See ITU, WARC-ORB-88, Doc. 1.

152. See Final Acts, supra note 4, Addendum, Appendix 30B, art. P. Generalized parameters are to be established for each system and entered into Part A of the Plan. See id. (footnote No. 3).

153. See id. art. I.

154. See id. Annex 1.

costs of implementing FSS networks."[155] Nevertheless, constraints were placed on the Plan by some of these parameters which decreased the Plan's flexibility. For example, the chairman of Working Group 4A had recommended a lower value for the C/I protection ratio.[156] A lower value would have increased compatibility between Parts A and B and would have increased the overall flexibility of the Plan. The value of 26 decibels was retained mainly because of the inertia it had developed as a result of being selected by the IFRB for its intersessional planning exercises.[157] Furthermore, the special requirements for extremely high elevation angles demanded by some administrations due to perceived problems with rain attenuation and mountainous terrain imposed significant constraints on the plan.[158]

The generalized parameters adopted were based on the report of the CCIR.[159] The method outlined in Annex 1 provides a method for computing the interference producing capability and interference sensitivity of a satellite

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155. U.S. Dept. of State, Report of the United States Delegation to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, at 17 (1989).

156. See id. at 18.

157. See supra ch. 7, notes 20-22 and accompanying text.

158. See discussion supra ch. 8, notes 55-56 and accompanying text.

159. See ITU, CCIR Report to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (Geneva, 1988).

network.[160] An envelope of generalized parameters for each allotment will be established and added to the Plan.[161] The ability to use generalized parameters within this envelope when implementing a network increases Plan flexibility.

Annex 2 lists the data to be furnished in notices relating to FSS stations in the planned bands that are entering the design stage.[162] This information is used by the Board to make the assessments called for in Article L regarding conformity with the Plan and whether allotments or assignments will be affected.[163] In this regard, the information supplied through Annex 2 is similar to the information supplied through Appendices 3 and 4 for advance publication and coordination under Article 11 of the Radio Regulations.[164]

Annex 3A provides criteria for determining when a proposed assignment is in conformity with the Plan.[165] It is used in conjunction with Annex 1.[166] Annex 3B sets forth the macrosegmentation concept that permits assignments to be implemented without coordination when they follow this

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160. _See_ Final Acts, _supra_ note 4, Addendum, Appendix 30B, Annex 1B.

161. _See_ _id_. art. P (footnote 3).

162. _See_ _id_. Annex 2.

163. _See_ _id_. art. L.

164. 1982 Radio Regulations, _supra_ note 12 , art. 11.

165. Final Acts, _supra_ note 4, Addendum, Appendix 30B, Annex 3A.

166. _Id_. Annex 1B.

concept.[167] Annex 4 and its Appendix provide a method of calculating single-entry and aggregate C/I ratios to determine whether an allotment or assignment should be considered to be affected by another administration's network.[168]

Annex 5 contains the very important provisions on how to apply the PDA concept outlined in Article J. It sets forth a two-part test to determine whether an administration is to be considered as being "affected" by another administration.[169] It then sets out the steps for application of the PDA concept. To accommodate a new assignment, systems in the predesign stage are moved within their PDAs to see if the C/I objectives can be obtained. If the objectives cannot be obtained by movement of systems in the predesign stage, repositioning of systems in the design stage may be used.[170]

Annex 6 provides a list of technical means that may be used to avoid incompatibilities between networks at their

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167. Id. Annex 3B; see also discussion supra ch. 8, note 96 and accompanying text.

168. Id. Annex 4.

169. The first part of the test examines the effect of the proposed assignment on the administration concerned. This is the single-entry C/I ratio. If it is less than or equal to 30 decibels the administration is considered to be affected. Even if this test is passed, however, the administration is considered to be affected if the aggregate C/I ratio falls below 26 decibels. See id. Annex 5 (para. 1.1).

170. For the precise steps in application of the PDA concept see id. (para. 1.2).

implementation stage.[171] In essence, these means involve the use of technologies currently available but more costly than the technologies used in the Plan. Such technologies could be used by an administration seeking to implement an assignment if other methods of implementation, such as application of the PDA concept, did not result in accommodation of the network. This list should not be considered to encompass all of the technologies that may assist in accommodating a new assignment. As technology advances, other means to do so will certainly become available.

C. Summary

Many changes to the regulatory regime for the FSS were effected at the Second Session. Although the Article 11 coordination procedures were improved and simplified, they are still quite complex. In all likelihood, coordination will remain an involved process conducted by engineers over a time period that is measured at least in months.

The new provisions regarding multilateral meetings and the responsibility for administrations to make mutual efforts to overcome difficulties should serve to remove certain apprehensions about the "first come, first served" regulatory regime. Modifications adopted to specify that coordination may be multilateral as well as bilateral declare what had previously been an unwritten and unused possibility. The

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171. *Id*. Annex 6.

bottom line of the previous regulatory regime, however, remains in effect. An administration that has a registered assignment still is protected from harmful interference for an indefinite period of time. That administration is under no specific obligation to move a satellite or to alter operating characteristics in order to accommodate a new satellite network. The legal nature of vested rights remains basically the same.[172] No burden-sharing criteria were adopted to force the joint resolution of difficulties incurred during coordination.

There are good reasons for the failure to adopt burden-sharing criteria. First, the adoption of such criteria would have been difficult, if not impossible, to accomplish. Every network is different. The coordination of networks is an intricate interaction of multiple technical characteristics that are different for each case. Adoption of criteria that could equitably be applied in all cases is not practical. Second, the existence of burden-sharing criteria could result in significant increases to the costs of satellite systems since such systems would have to take into account the possible application of those criteria during the life of the system. That system would either have to be designed to be able to comply with the application of burden-sharing criteria and still provide its planned service, or insurance would have to be purchased to cover losses that could be incurred as a

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172. See discussion supra ch. 3, notes 40-60 and accompanying text.

result of a decrease in service caused by compliance with burden-sharing requirements. Either option would result in increased costs. Finally, the current regulatory regime has functioned reasonably well and it has accommodated all satellite systems that have sought coordination. Therefore, the adoption of burden-sharing criteria that would be difficult to apply was not acceptable to many administrations.

For the planned bands of the FSS, the allotment Plan and procedures accomplish the objective of guaranteeing access to the geostationary orbit for national allotments. Perhaps the most notable feature of the Plan is its flexibility. This is not to say that it has sufficient flexibility, but it does have significantly more flexibility than either of the BSS Plans, particularly the Plan for Regions 1 and 3.

This increased flexibility is provided primarily through the use of generalized parameters and the PDA concept, both of which are operative at the implementation stage. The generalized parameters permit the use of a range of system specifications when the system is being implemented. So long as the allotment's technical parameters fall within its envelope of generalized parameters and the allotment is otherwise in accordance with the plan, no coordination is necessary. The PDA concept also provides flexibility in implementing allotments. Although the PDA concept of NASARC would have afforded greater flexibility and simplicity, the constraints placed on the Plan by special requests submitted by administrations precluded the use of NASARC. The adoption of any PDA concept, however, was significant because it established the plan as an allotment Plan, as opposed to an assignment Plan with fixed and rigid orbital locations.

Notwithstanding the flexibility of this Plan, its technological obsolescence is already foreseeable. The standardized parameters used to develop the Plan are based on 1980s technology. The technological advances of the last 20 years portend the potential advances of the next 20 years. Technological obsolescence, however, is an inherent danger of any planning approach. Ultimately, technology will advance so much that a new conference to update the Plan will be needed.

As the Plan is implemented, one problem that may arise is the management of the Plan by the IFRB. As a result of assignment implementation, many satellites may be placed in locations other than their nominal location and possibly even outside of their original PDAs. Additionally, as the PDA concept is applied, the nominal orbital location for many allotments may be moved within their PDAs in order to accommodate the implementation of assignments. The result of all these moves will require additional computer synthesis of the Plan, at least for the involved sector of the Orbit. At the Second Session, manual manipulation by a small group of highly skilled experts was also required. Thus, the IFRB may be called upon to perform such manual manipulation in the future. This will be a new task for the IFRB and one that it may not welcome.[173]

The issue of subregional systems was resolved in a satisfactory manner. Therefore, administrations should be able to effectively implement such systems. In fact, developing countries will probably implement more subregional systems than national allotments in the foreseeable future. As this is done, many national allotments will need to be suspended.

Perhaps the greatest failure of the Plan procedures is the restrictions they impose on additional uses. These restrictions are so extensive that it is extremely unlikely that additional uses will be realized in Region 1, which has densely packed orbital allotments, and the same situation may result in densely packed areas of the orbit in Region 3. Region 2, as pointed out by Canada at the Second Session, has a greater capacity than the other two Regions. Some additional uses will probably be implemented in Region 2. But it is regrettable that more flexibility was not allowed for additional uses. Should a future conference reconsider the substance of the Allotment Plan, the restrictions on additional uses should be one of the prime issues considered.

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173. In a meeting of Committee 4, late in the Conference, the Vice-Chairman of the IFRB stated that "the Plan was established manually and the Board would have no possibility of establishing another after the Conference." ITU, WARC-ORB-88, Doc. 364, at 6.

The administrative errors contained in the Plan procedures should be corrected at a future competent conference. Even with such corrections, the procedures will remain very complex. Given the procedures' complexity, it is very likely that problems will arise in addition to the ones already discussed. It is truly unfortunate that these procedures had to be drafted in the Plenary in the last few days of the Conference. The basic scheme is reasonable, but the details certainly could have been set out in a more understandable manner. It is almost certain that the IFRB will have to adopt interpretations of these procedures in order to apply them in a logical manner.[174]

In retrospect, one must conclude that a better Plan and procedures certainly could have been developed at the Conference. Had more time been available, many of the procedural defects would have been identified and resolved. As it was, however, delegations never had time to stand back and reflect on the procedures. Notwithstanding their problems, however, the Plan and procedures are workable. Moreover, they are much better than many would have anticipated at the end of the First Session.

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174. Rules of procedure may be adopted for internal use by the Board in the exercise of its functions. See 1982 Radio Regulations, supra note 12, art. 10. Administrations may challenge such rules when a disagreement arises. Id. Res. No. 35.

CHAPTER 10

SPACE LAW AND THE SPACE WARC

Satellites operating from the GSO are not only subject to international telecommunications law, they are also subject to international space law. Part A of this chapter examines the legal status of the geostationary orbit and fundamental principles of space law that apply to it. In Part B those principles are applied to use of the geostationary orbit by telecommunication satellites under the new ITU regulatory regimes.

A. The GSO and International Space Law

1. The Legal Status of the GSO

The applicability of international space law to the geostationary orbit depends on whether the orbit is in outer space. Although we all know that outer space is "out there," there is no universally accepted legal definition of outer space.[1] It is generally accepted that objects which orbit the earth are located in outer space, and there is growing

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1. Many views on the boundary between air space and outer space have been asserted. See Cheng, The Legal Regime of Airspace and Outer Space: The Boundary Problem. Functionalism versus Spatialism: The Major Premises, 5 Annals Air & Space L. 323 (1980); Qizhi, The Problem of Definition and Delimitation of Outer Space, 10 J. Space L. 157 (1982); C. Christol, The Modern International Law of Outer Space, 502-511 (1982).

As early as 1959, the U.N. recognized that the issue of the definition/delimitation of outer space required attention. It has been on the agenda of COPUOS since 1967. Christol, supra note 1, at 439. Nevertheless, no definition has been agreed upon.

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acceptance of the proposition that the boundary of outer space has been reached at least by the altitude of 100 Km above sea level.[2] Therefore, the geostationary orbit should be considered part of outer space; however, one challenge to this proposition has been asserted.

In 1976, a group of eight equatorial states meeting in Bogota, asserted sovereignty over areas of the geostationary orbit. This issue was raised at the First Session of the Space WARC and is discussed in detail in Chapter 11.[3] This small, but vocal, minority has not received support. Consequently, because it is generally accepted that the geostationary orbit is located in outer space, the fundamental principles of space law apply to the orbit.

2. Fundamental Principles of Space Law

A number of principles have been recognized as fundamental principles of international space law.[4] Three of these have particular relevance to the geostationary orbit and the Space WARC. These three principles are included in the Outer Space

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For an in-depth discussion on the legal status of the GSO, *see* R. Jakhu, The Legal Regime of the Geostationary Orbit (1983) (Doctoral Dissertation on file at the McGill Univ. Institute of Air & Space Law).

2. Christol, *supra* note 1, at 505; and Gorove, *The Geostationary Orbit: Issues of Law and Policy*, 73 *Am.* J. Int'l L. 444, 447 (1979).

3. *See infra* ch. 11, notes 5-72 and accompanying text.

4. *See* Space Activities and Emerging International Law, at ch. *V* (N. M. Matte ed. 1984) [hereinafter cited as Emerging Principles].

Treaty and are also recognized as general principles of international law, which are binding on all states.[5] They are: (1) the principle of freedom of use of outer space; (2) the non-appropriation principle; and (3) the common interest principle.

a. Freedom of Use

The 1967 Outer Space Treaty, in its first article, declares that outer space "shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law ...."[6] The terms "exploration and use" were not defined in

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5. See Jakhu, The Principle of Non-Appropriation of Outer Space and the Geostationary Orbit, Proc. 26th Colloq. on the L. of Outer Space 21, 22 (1983); Christol, The Jus Cogens Principle and International Space Law, Proc. 26th Colloq. on the L. of Outer Space 1 (1983); and Vlasic, The Space Treaty: A Preliminary Evaluation, 55 California L. Rev. 507 (1967).

6. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 art. 1 (entered into force Oct. 10, 1967) [hereinafter cited as Outer Space Treaty].

This was not the first occasion this principle was asserted. In 1961 the U.N. General Assembly stated that outer space was "free for exploration and use by all states ...." G.A. Res. No. 1721, (XVI) "Int'l Co-operation in the Peaceful Uses of Outer Space" (Dec. 20, 1961). In 1963, in Res. 1962, the U.N. General Assembly again declared outer space was "free for exploration and use by all states ...." G.A. Res. No. 1962 (XVIII) "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space," (Dec. 13, 1963). This Resolution was a precursor to the Outer Space Treaty. All nine principles declared in this Resolution were incorporated in that Treaty. For a more detailed discussion of the historical development of this principle and the other fundamental principles discussed in (Cont. on next page)

the Treaty.[7] The weight of authority considers them to be general terms that encompass all activities in outer space.[8] Although the activity of placing a satellite in the geostationary orbit for the purpose of telecommunications may not be "exploration," it clearly constitutes "use."

The Outer Space Treaty places a number of limitations on the freedom of use doctrine. Article I indicates two of those limitations. Use must be "without discrimination of any kind, and on a basis of equality ...."[9] Use must also be "in accordance with international law ...."[10]

Limitations on freedom of use also appear in other articles of the Treaty. The two other fundamental principles of space law, the non-appropriation and the common interests provisions constitute two of these limitations. They are

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this Section, see Emerging Principles, supra note 4; and Christol, supra note 1.

7. There has been some discussion in the literature regarding the distinctions between exploration and use. See Emerging Principles, supra note 4, at 269-274.

8. Id. at 273; and Christol, supra note 1, at 39-42.

9. Outer Space Treaty, supra note 6, art. 1. Legal, and not factual, equality is the objective of this provision. See Von Kries, The Legal Status of the Geostationary Orbit: Introductory Report, Proc. 18th Colloq. on the L. of Outer Space 27, 29 (1975).

10. Outer Space Treaty, supra note 6, art. 1. This limitation is also stated in Article III, which specifically includes the Charter of the United Nations as one aspect of international law. Id. art. III.

discussed separately.[11] Another important limitation is found in Article IX, which provides that, in the use of outer space, states "shall conduct all their activities ... with due regard to the corresponding interests of all other States ...."[12] Additionally, states must bear responsibility and liability for their use of outer space,[13] and they have certain limited duties of consultation, observation, and information.[14] One specific activity was absolutely prohibited: states undertook "not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction."[15]

The freedom of use principle is also subject to limitation by other international agreements. Such limits are found in the Registration Convention,[16] the Liability Convention,[17]

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11. See infra notes 23-39 and accompanying text.

12. Outer Space Treaty, supra note 6, art. IX.

13. See id. arts. VI & VII.

14. See id. arts. V, IX & XI.

15. Id. art. IV.

16. Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, T.I.A.S. 8480, 18 ILM 891 (entered into force Sept. 15, 1976). This Convention requires States to register space objects with the U.N. and to provide certain information on them.

17. Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. 2, T.I.A.S. 7762 (entered into force Oct. 9, 1973). This Convention elaborates international rules and procedures concerning liability for damage caused by space objects.

the Moon Treaty,[18] the Nuclear Test Ban Treaty,[19] as well as the ITU Radio Regulations.[20] Nations may also agree to limit their freedom of use on a bilateral basis. The Anti-ballistic Missile Treaty between the United States and the Soviet Union is one example.[21] Various other limitations on the general freedom of use of outer space have been a subject of discussion within COPUOS.[22]

In short, although the principle of freedom of use is broad, it has always been limited in certain respects and it is subject to continued limitation through international agreement.

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18. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 14, 1979, U.N. Doc. A/RES/34/68, 18 ILM 1434 (entered into force July 1985) (U.S. not a Party) [hereinafter cited as Moon Treaty]. This agreement sets certain limits on the scope of permissible activities on the Moon and other celestial bodies.

19. Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water, Aug. 5, 1963, 14 U.S.T. 1313, T.I.A.S. 5433, 480 U.N.T.S. 43 (entered into force Oct. 10, 1963). This treaty prohibits nuclear explosions in outer space.

20. The Table of Frequency Allocations is a limitation on use of outer space. Generally, frequencies for communication with space objects may only be used in accordance with the Table. ITU, Radio Regulations, art. 6, No. 340 (Geneva, 1982) (ITU Doc. No. ISBN 92-61-0122113) [hereinafter cited as 1982 Radio Regulations].

21. Treaty With the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems, May 26, 1972, 23 U.S.T. 3435, T.I.A.S. 7503 (entered into force Oct. 3, 1972). Among other things, this Treaty prohibits deployment of a space-based ballistic missile defense. Id. art. V.

22. The two most significant involve direct broadcast satellites and nuclear power sources used on spacecraft. See Christol, supra note 1, at chs. 12 & 14, respectively.

b. The Non-appropriation Principle

Article II of the Outer Space Treaty establishes that "[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."23 The non-appropriation principle was adopted to implement the freedom of use principle[24] because, quite simply, appropriation by a single state is inconsistent with freedom of use by all states. The non-appropriation principle also furthers the common interests provision, since appropriation of an area of outer space would normally benefit only the appropriating state.

Appropriation is generally considered to be the taking of property for exclusive use with a sense of permanence.[25] Appropriation of outer space, therefore, is "the exercise of exclusive control or exclusive use on a permanent basis" of outer space.[26] Failure to define other important terms, however, has given rise to some controversy.

"Outer space" is one important term the Treaty fails to define. Two issues have been raised concerning its meaning.

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23. Outer Space Treaty, supra note 6, art. II.

24. Christol, The Geostationary Orbital Position as a Natural Resource of the Space Environment, 26 Netherlands Institutional L.R. 5, 12 (1979).

25. Emerging Principles, supra note 4, at 276; Gorove, Interpreting Article II of the Outer Space Treaty, 37 Fordham L. Rev. 349, 352 (1969).

26. Emerging Principles, supra note 4, at 276.

One involves the spatial area included within the term "outer space." This is the definition/delimitation problem discussed previously in relation to the Bogota Declaration.[27] The other issue involves the subject matter of appropriation -- whether natural resources in outer space are included within the prohibition on appropriation of "outer space." One school of thought distinguishes between appropriation of areas of outer space and appropriation of resources. It asserts that the prohibition on appropriation is only applicable to areas. The space powers have supported this view. They consider the natural resources of outer space to be in the same legal category as resources of the high seas.[28] The weight of opinion supports this position.[29] Nevertheless, a minority

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27. *See supra* notes 1-3 and accompanying text.

28. *See generally* Emerging Principles, *supra* note 4, at 278-279.

29. Neither Article II nor any other part of the Outer Space Treaty contains a reference to "resources." Wassenbergh, *Speculation on the Law Governing Space Resources*, 5 Annals Air & Space L. 611, 616 (1980). Goedhuis has stated that "whereas under the terms of the Space Treaty the appropriation of areas of outer space is prohibited, the Treaty has *not* prohibited the appropriation of the natural resources of that space." Goedhuis, *Some Legal Aspects of the Use of Communication Satellites*, Proc. 27th Colloq. on the L. of Outer Space 53, 56 (1974). Goedhuis based his conclusion on a study of the Treaty negotiating history, which indicates both western and communist nations considered that freedom of exploration and use included freedom to take and use natural resources. This is analogous to the traditional freedom of the high seas, which prevents appropriation of the seas but permits use of its resources. Negotiation of another Treaty also supports this view. The Moon Treaty contains provisions for establishment of an international regime to manage the exploitation of moon resources. Moon Treaty, *supra* note 18, art. VII. During the Treaty negotiations, one contested issue (Cont. on next page)

position contends that the prohibition applies to resources as well as areas.[30]

The meaning of "national" appropriation has also been the subject of debate. This issue revolves around whether the Treaty prohibits only appropriation by nations, or whether it also covers appropriation by individuals, private associations, and international organizations. Although one author has argued that appropriation by an individual may not be prohibited,[31] others support the view that nations are responsible for the actions of their nationals that occur in outer space, and therefore appropriation by individuals is prohibited.[32] Similar considerations apply to appropriation by an international organization; nations bear responsibility for outer space activities conducted by an international

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was whether a moratorium, express or implied, should be placed on resource exploitation pending formation of the international regime. None of the opposing views expressed the position that Article II of the Outer Space Treaty already prohibited appropriation of the moon's resources. See Gorove, supra note 2, at 449 note 32; see also Gorove, supra note 25, at 350.

30. Christol has written in reference to Article II that "it was accepted that no claimant should be allowed to have exclusive control of the whole of the space environment or of its components, including its natural resources." Christol, supra note 1, at 46. Gorove recognizes that "the term 'outer space' could be interpreted to include natural resources as well." Gorove, Utilization of the Natural Resources of the Space Environment in the Light of the Concept of Common Heritage of Mankind, in "The Settlement of Disputes on the New Natural Resources," at 105 (1983) (emphasis added).

31. Gorove, supra note 25, at 351.

32. See Emerging Principles, supra note 4, at 279-81, and authorities cited therein.

organization in which they participate.[33] Furthermore, the only interpretation consistent with the Treaty's purposes of assuring freedom of use, and use in the common interests, is that the prohibition on appropriation applies to all entities.

c. The Common Interests and Common Heritage Principles

Article I of the Outer Space Treaty provides that use of outer space "shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[34] Although this provision is rather ambiguous, it is an integral part of the Treaty and is legally binding.[35]

A wide range of views have been expressed on the meaning of the common interests provision. On one extreme is the view that the provision constitutes only a declaration of intent. On the other extreme is the view that it establishes a

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33. Outer Space Treaty, _supra_ note 6, art. VI.

34. _Id_. art. I.

35. During the Treaty's negotiation in COPUOS, a decision was made to insert this provision in the body of the Treaty as opposed to the Preamble. _See_ Emerging Principles, _supra_ note 4, at 330, and authorities cited therein. Additionally, during the negotiations several delegations issued statements emphasizing the binding nature of this provision. Valters, _Perspectives In the Emerging Law of Satellite Communications_, 5 Stanford J. Int'l Studies 53, 57 (1970). _See also_ Christol, _supra_ note 1, at 42 ("There can be no doubt that by accepting these terms States became legally bound by them.").

requirement for states to share all benefits derived from the use of outer space with all other countries.[36] The latter view has received little support.

In general, this provision "has not been regarded as requiring states to share the benefits in any specific manner, but rather as expressing a desire that the activities be beneficial in a general sense."[37] Although there are no schemes to enforce a specific sharing of benefits, practically every nation has benefited in some manner from the exploration and use of space. These benefits include the inexpensive availability of weather and other remote sensing information from satellites, increased knowledge about the universe, as well as affordable access to telecommunication satellites. Further discussion regarding the common interests provision is

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36. See Emerging Principles, supra note 4, at 327, and authorities cited therein.

37. Gorove, supra note 2, at 448. The practice of states also confirms this interpretation. For example, states have not demanded a share of moon samples brought back to earth, access to transponders of communications satellites, or the other specific benefits that have already been received by the space powers. See also Gorove, Implications of International Space Law for Private Enterprise, 7 Annals Air & Space L. 319, 321 (1982). But see N. Matte, Aerospace Law: Telecommunications Satellites 78 (1982) ("there is a basic obligation that falls upon States carrying out space activities to be responsive to the interests of developing countries, and to provide for some method of distributing the benefits derived from such activities.").

sure to occur during the next several years as a result of the COPUOS Legal Sub-Committee adding this issue to their Agenda.[38]

The principle of the Common Heritage of Mankind[39] is not included within the Outer Space Treaty, but it is significant because of its close relationship to the common interests provision.[40] Two primary theories regarding the Common Heritage of Mankind have been advocated. One theory holds that the Common Heritage of Mankind establishes common ownership and that all countries are entitled to substantive property rights over the natural resources of an area that is the Common Heritage of Mankind.[41] In essence, this type of Common Heritage of Mankind regime would secure economic

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38. The following Agenda item was added at the March, 1988, meeting of the COPUOS Legal Sub-Committee:

> Consideration of the legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries.

Report of the Legal Sub-Committee On the Work of Its 27th Session (14-31 March, 1988), U.N. Doc. A/AC.105/411 (1988).

39. See, e.g., Dupuy, The Notion of the Common Heritage of Mankind Applied to the Seabed, 8 Annals Air & Space L. 347 (1983); Matte, Limited Aerospace Natural Resources and their Regulation, 7 Annals Air & Space L. 379 (1982); Williams, The Exploitation and Use of Natural Resources in the New Law of the Sea and the Law of Outer Space, Proc. 29th Colloq. on the L. of Outer Space 198 (1987).

40. For a discussion of the development of this concept see Cocca, The Advances In International Law Through The Law of Outer Space, 9 J. Space L. 13 (1981).

41. One oft quoted proponent of the Common Heritage of Mankind as it relates to the law of the sea has stated that:

> The common heritage of mankind is the common property of mankind. The commonness of the "common heritage" is a

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benefits for developing countries that may have cost them nothing. It is not surprising, therefore, that many of the proponents of this theory are from developing nations. The other theory regarding the Common Heritage of Mankind is quite different. It considers that the above theory is "foreign to existing international law and may even come into conflict with existing rules of international law."[42] Instead, it holds that the Common Heritage of Mankind is simply a continuation of the general concepts of res communis and the common interests clause of the Outer Space Treaty.[43]

Although legally undefined and subject to dispute, four general elements of the Common Heritage of Mankind have been identified. They are: (1) the area involved is not legally subject to appropriation; (2) all States share in its management; (3) all States share in the benefits derived; and (4) the area is dedicated exclusively to peaceful purposes.[44] The "distinctive characteristic" of the Common Heritage of Mankind is the establishment of an international regime to manage the exploitation and sharing of

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> commonness of ownership and benefit. The minerals are owned in common by your country and mine, and by all the rest as well .... If you touch the nodules at the bottom of the sea, you touch my property. If you take them away, you take away my property.

Pinto, statement, in Alternatives in Deepsea Mining 13 (S. Allen & J. Craven, ed. 1979).

42. Wassenbergh, supra note 29, at 621.

43. See Finch and Moore, The 1979 Moon Treaty Encourages Space Development, Proc. 23d Colloq. on the L. of Outer Space 13, 14 (1981).

44. See, Emerging Principles, supra note 4, at 338.

resources.[45] Such a regime is envisioned for the moon in the Moon Treaty, which declares that "[t]he moon and its natural resources are the common heritage of mankind"[46] and establishes an international regime to manage and ensure an "equitable sharing" of the benefits derived.[47]

Developing countries have frequently asserted that the Common Heritage of Mankind concept applies to all international common resources including those of the deep seabed, Antarctica, celestial bodies, the geostationary satellite orbit, and the radio frequency spectrum. Although both the definition of the Common Heritage of Mankind and its status in international law are debatable, the call for the Space WARC can be viewed as an effort to bring the geostationary orbit within the concept of the Common Heritage of Mankind.[48]

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45. Id.

46. Moon Treaty, supra note 18, art. 11.1.

47. Moon Treaty, supra note 18, art. 11.5-7.

48. See 1982 Radio Regulations, supra note 20, Res. 3. One author is of the opinion that "[e]very hallmark of the common heritage of mankind principle is now present in the geostationary satellite communications environment." Rothblatt, International Cooperation in Regulating 12 GHz Band Geostationary Satellite Communications: Technology, Geopolitics and the Common Heritage of Mankind, Proc. 23d Colloq. on the L. of Outer Space 189, 192 (1980). At the First Session of the Space WARC, the delegate from Colombia stated that the geostationary orbit was the "common heritage of all countries." See infra ch. 11, note 94. However, although use of the orbit/spectrum resource for telecommunications is internationally regulated, a large degree of freedom of use is still allowed so long as harmful frequency interference does not result. Moreover, all states
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In summary, the geostationary orbit is part of outer space and is subject to the fundamental principles of space law. These principles may be analyzed separately to study their nature. However, they operate as a system of general provisions, not individually. Moreover, they must be viewed in light of the purpose of the Outer Space Treaty. That purpose was not to regulate specific activity in outer space, but to establish general principles that could be further defined as activities required.[49] The treaties adopted subsequent to the Outer Space Treaty have begun to provide that definition.[50] As use of outer space demonstrates the necessity for further regulation of activities, it is anticipated that states will attempt to reach new agreements. In this light, the Space WARC can be seen as part of the evolution of the legal regime of outer space.

The post-Space WARC ITU regulatory regimes for space telecommunications and their compliance with the fundamental

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do not necessarily share directly in the benefits derived from use of the orbit/spectrum resource.

49. Christol, supra note 1, at 42. A U.S. delegate observed that "[t]he aim of the negotiators had not been to provide in detail for every contingency in the exploration and use of outer space but rather to establish a set of basic principles. That is why the provisions of the Treaty were purposefully broad." U.N., Official Records of the General Assembly, Eighteenth Session, First Committee, Summary Records of Meetings, 17 Sept. - 11 Dec. 1965, at 159-91 (1965).

50. Generally, subsequent agreements between the parties to a treaty may be taken into account when interpreting the former agreement. Vienna Convention on the Law of Treaties, U.N. Doc. A/CONF. 39/27, art. 31(3)(a), (May 23, 1969), 8 ILM 679 (1969).

principles of international space law summarized above are examined next.

B. Compliance of the Post-Space WARC ITU Regulatory Regimes with International Space Law

1. The Unplanned Bands and Space Services

The ITU regulatory regime for unplanned bands and services permits use of the orbit/spectrum resource for an indefinite period of time, which is potentially permanent.[51] Although certain aspects of the old ITU regulatory regime were significantly changed by the Space WARC, in the final analysis the new regime may still be referred to as a "first-come, first-served.."[52] regulatory system. Due to the physical nature of interference,[53] it could be argued that use of the orbit/spectrum resource is also exclusive for the frequencies used for unplanned bands and services. These aspects of permanence and exclusiveness raise the question of whether such use constitutes an appropriation of outer space.

The application of the non-appropriation principle to the geostationary orbit arose in the COPUOS Working Group on Direct Broadcast Satellites. The French delegate stated that

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51. *See supra* ch. 3 notes 51-52, and ch. 9 notes 68-69, and accompanying text.

52. *See* discussion *supra* ch. 9, note 172 and accompanying text.

53. *See supra* ch. 1, notes 38-40 and accompanying text.

"the very use of geostationary satellites can be regarded as an appropriation of the equatorial orbit which is a privileged portion of space."[54]

In response, the delegate of the U.S. stated:

> The negotiating history of the Treaty shows that the purpose of this provision (article II) was to prohibit a repetition of the race for the acquisition of national sovereignty over overseas territories .... The Treaty makes clear that no user of space may lay claim to, or seek to establish national sovereignty over outer space .... On the other hand, the use of space or a celestial body for activities that are peaceful in character and compatible with the provisions of the Outer Space Treaty is, by definition, entirely legitimate. Using a favorable orbit for a legitimate activity cannot reasonably be classified as a prohibited national appropriation in the sense of Article II ... using a favorable geostationary orbit is no more an "appropriation" or "*de facto* occupation" than using a particular favorable area of the lunar surface -- the Sea of Tranquility, for example -- for a manned landing.[55]

One authority agrees that the French position went too far; it would "prohibit each and every use of the orbit which [would] be contrary to the Treaty's provisions."[56] He also believes, however, that the U.S. statement did not go far enough; it did not address itself to the problem of continued and exclusive use that could amount to *de facto* appropriation. He concluded that the "practice of first-come, first-served is contrary to the principle of non-appropriation of outer space,

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54. U.N. Doc. A/AC.105/62 (1969), at 3-4.

55. U.S. Delegation to the Second Session of the Working Group on Direct Broadcasting Satellites, Statement by the U.S. representative, Herbert Reis, at the Working Group Meeting, July 31, 1969 (cited in Valters, *supra* note 35, at 66-67).

56. Jakhu, *supra* note 5, at 22.

and hence, should be changed."[57] He opined that every use would be legitimate so long as it did not "exclude others permanently from such use or impose undue restrictions."[58] Although he did not specify what he meant by "undue restrictions," his emphasis was on the duration of use.[59]

The fundamental question regarding this issue is whether the non-appropriation principle of Article II of the Outer Space Treaty applies to use of the geostationary orbit/spectrum resource.[60] If it does not apply, then the actual or potential duration of the use is legally irrelevant to the issue of appropriation. In the opinion of this author, the non-appropriation principle is not applicable to use of the orbit/spectrum resource. The framework for this conclusion examines three questions: (1) whether use of the geostationary orbit by a telecommunication satellite is an appropriation of an area of outer space even if the use is permanent; (2) whether outer space resources are included

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57. Id. at 21. Of course, this conclusion was stated before the Space WARC reached its decision to continue the same basic regulatory regime with some modifications.

58. Id. at 23 (emphasis added). See also Jakhu, Legal Aspects of The WARC, INTERMEDIA 14, 17 (May, 1985) ("acquiring the orbital position assignments under the "first-come, first-served" rule does indeed seem to be contrary to the principles of non-appropriation ....").

59. Valters also considers the key to be duration of use. He has stated that "the decisive criterion appears to be the permanence of the ... communications satellite in question." Valters, supra note 35, at 66.

60. It is use of the orbit/spectrum resource, not just the insertion of a satellite into orbit, which places limitations on use of the geostationary orbit by others. See supra ch. 1, notes 12-45 and accompanying text.

within the scope of the non-appropriation principle; and (3) assuming, arguendo, that outer space resources are included within the non-appropriation principle, whether the orbit/spectrum "resource," in particular, is included.

The first question focuses on an appropriation of an area of outer space. As discussed previously, appropriation of outer space is "the exercise of exclusive control or exclusive use on a permanent basis."[61] While use of a registered orbital location by a geostationary satellite may be potentially permanent, geostationary satellites do not occupy the same specific area of outer space for any significant period of time. They are small, and constantly in motion.[62] Although at any particular point in time a geostationary satellite does exclusively occupy a specific area of outer space equal to its volume, due to the satellite's motion that specific area is constantly changing. Occupation of that specific area, therefore, cannot be deemed appropriation of that area because its duration is very short; it is certainly not permanent, or even potentially permanent.[63]

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61. See supra note 26.

62. Most satellites have a diameter less than 25 meters. Physical Nature and Technical Attributes of the Geostationary Orbit at 7, U.N. Doc. A/AC.105/203 (1977). A satellite in the geostationary orbit is constantly moving because of the many forces acting upon it. See supra ch. 1, note 4 and accompanying text.

63. Large space structures that may occupy a specific area of space for a long period of time would present a different issue. One author, however, extends this argument even further; he asserts that satellites do not appropriate (Cont. on next page)

There is another issue that must be examined prior to concluding that geostationary telecommunication satellites do not appropriate an area of outer space. Over a period that _is_ potentially permanent, a geostationary satellite remains within a certain larger, but limited, area of outer space.[64] One could assert that this larger area is appropriated since the use exercised from that general area could exclude use by some other satellites.[65] But this assertion fails because yet other satellites can operate within that same area of outer space.[66] Consequently, although the permanency aspect of appropriation would arguably be established, the

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outer space by their presence because the volumes occupied by satellites are "really more a part of the space object than they are a part of space itself." Rothblatt, _State Jurisdiction and Control in Outer Space_, Proc. 26th Colloq. on the L. of Outer Space 135, 136 (1983). Under that rationale, even large space structures may not appropriate areas of outer space.

64. It is able to remain in this area because of its station keeping ability. _See supra_ ch. 1, note 4 and accompanying text.

65. Other satellites with similar characteristics may be excluded due to radio frequency interference. _See supra_ ch. 1, note 40 and accompanying text.

66. Satellites operate from the same orbital location by using different frequencies, or by serving separated geographical areas. _See id._ The Radio Regulations do not require coordination based on collision potential, only on frequency interference. _See_ Radio Regulations, _supra_ note 20, art. 11. It is not the practice of administrations to coordinate satellite location with each other if there are no frequency interference problems, even if they will share the same nominal orbital location. Although the potential of collision "is in the back of everybody's mind," it is considered remote enough not to warrant coordination. Interview with Mr. Gomaa E. Abutaleb, INTELSAT's Coordinator for ITU on Technical Matters, in Washington, D.C. (October 31, 1984). Consequently, no station-keeping activity is conducted (Cont. on next page)

exclusivity required for appropriation would not. Therefore, use of an orbital location by a geostationary satellite is not exclusive, so appropriation of an <u>area</u> of outer space is not established.

The next question under the appropriation issue is whether Article II applies to outer space resources. As discussed earlier, the weight of opinion holds that the non-appropriation principle is not applicable to resources of outer space.[67] If this position is accepted as correct, further analysis is unnecessary since the non-appropriation principle would not be applicable to the orbit/spectrum resource. In order to continue the analysis of this issue, therefore, it shall be assumed that the non-appropriation principle does apply to outer space resources.

If the non-appropriation principle applies to outer space resources, the question arises as to whether the orbit/spectrum resource is an outer space resource. According to the ITU Convention, radio frequencies and the geostationary satellite orbit are "natural resources."[68] The geostationary orbit is a specific, quantifiable area of outer space and could be considered to be an outer space

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for the specific purpose of separating satellites operating from the same nominal orbital location. <u>Id</u>.

67. <u>See</u> <u>supra</u> notes 28-29 and accompanying text.

68. International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 33(2) (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0).

resource.[69] By itself, however, it is only an area of outer space, and it has already been determined that use of the geostationary orbit by a telecommunication satellite does not appropriate an area of outer space.[70] Radio frequencies, on the other hand, would not appear to be outer space resources. While they may travel to the Earth from a telecommunication satellite in space, the signals originate on Earth and are merely relayed back. Moreover, just as frequencies used for communication with ships on the high seas and airplanes in the air are not considered to be sea and air space resources, frequencies used for space telecommunication should not be considered to be space resources.

It is therefore necessary to directly address the issue of whether the non-appropriation principle applies to the orbit/spectrum resource itself. That "resource" is unlike any other resource of outer space. It is not a tangible resource like minerals on the moon. Rather, it is an intangible factor over which possession is impossible. It is referred to as a "resource" to emphasize its factually limited aspect, not as a legal classification. It is only conceptually a "resource" because of the physical phenomenon of interference. If it

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69. One author points out,however, that "[i]t is questionable whether the orbit as such is a natural resource in itself. If it is, it is not a limited natural resource; use does not deplete the orbit as a resource." Wassenbergh, supra note 29, at 615.

70. See supra notes 66-67 and accompanying text.

were not for radio frequency interference, the "orbit/spectrum" combination would probably have never been conceived of as a "resource" since it would not be limited.

In addition to being an intangible concept, the orbit/spectrum "resource" has many characteristics that determine whether use of one particular portion of the "resource" is an exclusive use. The orbit/spectrum "resource" is not simply a combination of an orbital location and a particular portion of the radio frequency spectrum. Rather, it is a complicated collection of many interrelated factors that determine whether two or more satellites can operate from the same geostationary orbital location.[71]

Another distinctive quality of the orbit/spectrum resource that sets it apart from true resources is its unquantifiable nature. Limits of tangible resources may be unknown due to undiscovered sources but they are at least quantifiable. Even the geostationary orbit has a quantifiable area. The orbit/spectrum resource, on the other hand, cannot be quantified at any specific time. Its limits depend on technology, which may evolve indefinitely.[72]

A final consideration is the ordinary meaning of the term "outer space." Treaties should be interpreted in accordance

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71. Use of the C band by a geostationary satellite at location X, with a spot beam on city Y, for example, may only constitute an exclusive use of those same characteristics. Another satellite could use location X and serve city Y on another frequency, or use location X and the same frequency to serve city Z. See supra ch. 1, note 40 and accompanying text.

72. See supra ch. 1, notes 80-82 and accompanying text.

with the ordinary meaning of their terms.[73] One may reasonably assume that the term "outer space" includes tangible resources located in outer space. It would be going far beyond the ordinary meaning of that term, however, to read into it application to the orbit/spectrum "resource."

In conclusion, use of the geostationary orbit pursuant to the ITU regulatory regime for unplanned bands and services does not constitute an appropriation of outer space in violation of Article II of the Outer Space Treaty regardless of the duration of the use. A geostationary satellite does not appropriate an _area_ of outer space, and the non-appropriation principle is not applicable to appropriation of outer space resources. Moreover, even if that principle were deemed to apply to such resources, the orbit/spectrum resource is not a resource of outer space encompassed by that provision. This result, however, does not end the inquiry regarding the validity of use of the geostationary orbit pursuant to the ITU regulatory regime for unplanned bands and services. The other limitations on the freedom of use principle must be examined.

One of these limitations is the common interests provision.[74] Use of outer space is to be carried out "for

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73. Vienna Convention on the Law of Treaties, _supra_ note 50, art. 31.

74. _See_ discussion _supra_ notes 35-38 and accompanying text.

the benefit and in the interests of all countries ...."[75] One author determined that "there is no indication that the benefit must be either material or direct. An indirect benefit may be sufficient."[76] In practice, the benefits from space telecommunication have inured to the vast majority of the countries of the world. Any nation may establish an INTELSAT station for a modest cost and become part of a world-wide telecommunications network. For countries that have done so, the benefits from the use of the geostationary orbit have been direct. With these factors in mind, it has been concluded that the activities of space telecommunication are "generally beneficial to all countries ... [and] satisfy the requirement of the common interest clause."[77]

Article I of the Outer Space Treaty provides three other limitations on the freedom of use of outer space. Use must be in accordance with (1) international law, and allow for freedom of use by other states (2) "on a basis of equality" and (3) "without discrimination of any kind."[78] The ITU regulatory regime appears to satisfy the criteria regarding compliance with international law. The regime is not only in accordance with international law, it is a part of

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75. Outer Space Treaty, supra note 6, art. I.

76. Gorove, Freedom of Exploration and Use in The Outer Space Treaty: A Textual Analysis and Interpretation, Den. J. Int'l L. & Policy 93, 101 (1971).

77. Id.

78. See Outer Space Treaty, supra note 6, art. I.

international law.[79] In addition, the basic ITU regulatory regime for the unplanned bands and services was taken from the regime used for decades by the terrestrial services.[80] There have been no significant assertions that the terrestrial regime violated principles of international law. Therefore, the ITU regulatory regime for unplanned bands and services is in accordance with international law.

The current regime also appears to satisfy the equality requirement. All states are treated on an equal legal basis. Although the first user has priority, the regime does not designate the first user; it could theoretically be any state. As noted by one author:

> There seems to be no reason why the principle of free use of outer space by all states on a basis of equality should result in an obligation for any state to refrain from using certain orbital satellite positions in favor of another state. The principle of equal use only offers an equal <u>legal</u> chance to each state of being the first one to use this or that orbital position, it does not create actual equality among states ... it cannot empower a state to make use of its space rights.[81] (emphasis added)

Another author, however, has opined that if a number of states monopolized the geostationary orbit "such a situation

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79. One of the sources of international law is international agreements. <u>See</u> Brownlie, <u>Principles of Public International Law</u> at 12-14 (1979). The ITU Convention and the Radio Regulations, which establish the regulatory regime, are both international treaties. Mili, <u>International Jurisdiction in Telecommunication Affairs</u>, 40 Telecommunications J. 122, 181 & 287 (1973).

80. <u>See</u> <u>supra</u> ch. 4.

81. Von Kries, <u>supra</u> note 9, at 29.

might be contrary to the equality principle ...."[82] Even if this statement is legally correct, such a situation is unlikely to result. History indicates that technological advancement will forestall creation of a monopoly, although more advanced and more expensive technology may need to be employed. Nevertheless, the regulatory regime would still treat all countries equally; the basis for use would be the same for all states even though all states could not take equal advantage of the opportunity. In other words, legal equality would still exist, although factual equality may not. Such a situation might, however, present problems relating to discrimination.

A significant issue is presented by the regulatory regime vis a vis the non-discrimination clause. One author has concluded that this provision, when read together with the Preamble and other Article I provisions,

> implie[s] that the economic or scientific underdevelopment of states is not a reason for their freedom to be jeopardized by the more developed states. Similarly, if certain states are able, only at a later stage, to make use of outer space, their freedom shall not be circumscribed by those states fortunate enough to already possess the required technological capability.[83]

Under the ITU regulatory regime for unplanned bands and services, cost of access to the geostationary orbit may increase due to the more advanced technology that may be

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82. Haanappel, Article II of the Outer Space Treaty and the Status of the Geostationary Orbit, Proc. 21st Colloq. on the L. of Outer Space 28 (1978).

83. Jakhu, supra note 1, at 153.

required for later users. If so, one could argue that the latecomers have been discriminated against because of their "economic or scientific underdevelopment." Certainly their freedom of use will have been "circumscribed" by the prior use of other nations. Another way of looking at this situation, however, is that at the time they are ready to use the geostationary orbit, the latecomers would be on the same legal footing as everyone else. All states that seek access to the geostationary orbit are required to follow the same procedures and have the same technological constraints. Thus, one could argue that the regulatory regime is not discriminatory even though its effects may be.

In considering the issue of discrimination, a key factor that must be borne in mind is that the regulatory regime for the unplanned bands has been sanctioned by a new international treaty -- the Final Acts of the Space WARC.[84] In essence, the vast majority of all nations have put a stamp of approval on this regulatory regime; the non-discrimination clause must be interpreted in light of that approval. Given this interpretation, one is persuaded that the regulatory regime applicable to unplanned bands and services does not violate the non-discrimination provision of the Outer Space Treaty.

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84. ITU, Final Acts Adopted by the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (ORB-88) (Geneva, 1988) [hereinafter cited as Final Acts].

2. The Planned Bands and Space Services

The space services now have several plans. Two plans exist for the BSS downlinks,[85] and each of these has an associated plan for its feeder links.[86] The FSS Allotment Plan adopted at the Second Session contains both uplinks and downlinks. Although these plans have significant factual differences, their legal status may be resolved under the general category of planned bands and services.[87] This task is much easier than is the analysis required for the unplanned bands and services. In fact, no authorities have asserted that allotment plans violate the provisions of international space law.[88]

The first issue to be addressed involves the non-appropriation principle. These Plans allot orbit/spectrum

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85. The Plans for Regions 1 and 3 and for Region 2 are contained in the Radio Regulations. See 1982 Radio Regulations, supra note 20, Appendix 30.

86. The feeder link Plan for Region 2 is in the Radio Regulations. See id. Appendix 30A. The feeder link Plan for Regions 1 and 3 will be incorporated into the Radio Regulations as a result of the Second Session. See Final Acts, supra note 84, Appendix 30A.

87. All of these plans, except for the FSS Allotment Plan, specify specific orbital locations and associated frequencies. The Allotment Plan specifies only "nominal" locations, which may change. However, if the other plans are within the bounds of space law, then the Allotment Plan is as well.

88. Although Jakhu has opined that position assignments under the "first-come, first-served" rule violate the non-appropriation principle, he concludes that "orbital positions allotted through a plan do not amount to appropriation." Jakhu, supra note 58, at 17.

resources to individual countries. National appropriation of outer space does not occur, however, due to the same reasoning applicable to the regulatory regime for unplanned bands and services. The Plans do not appropriate an area of outer space. If anything, they appropriate a portion of the orbit/spectrum resource. While some resources may be covered by the non-appropriation principle, however, the orbit/spectrum resource is not one of them.[89]

The equality and discrimination provisions are also complied with. Although the BSS Plans allot varying quantities of the orbit/spectrum resource to different countries, that was not the result of discrimination or treatment in a legally unequal fashion. To the contrary, the Plans were based on each country's demonstrated needs.[90] Differences in allocations are the result of factual differences in the states' requirements. Moreover, Article IX of the Outer Space Treaty has also been followed. Participation in the planning conference evidences co-operation, mutual assistance, and regard for the

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89. See discussion supra note 71-73 and accompanying text.

90. See U.S. Dept. of State, Report of the United States Delegation to the ITU Region 2 Administrative Radio Conference on the Broadcasting Satellite Service, at 2-3 (1983); and Report of the Canadian Delegation to the Regional Broadcasting-Satellite Conference (Region 2), at 54-55 (1983).

corresponding interests of other States. Furthermore, the Plans must be viewed as being in accord with international law since they are international agreements.[91]

Finally, the common interests principle is not violated by these Plans. They were the result of efforts by countries to ensure their equitable access to the orbit/spectrum resource for their individual needs within the context of world-wide Plans. The Plans may be regarded as the results of an exercise undertaken to implement and give definition to the common interests principle. Thus, although these Plans place restrictions on the freedom of use of outer space, the restrictions were established pursuant to the common interests principle and do not violate principles of space law.

C. Summary

The geostationary satellite is located in outer space and uses of it are subject to international space law. The fundamental principles of freedom of use, non-appropriation, and use in the common interests are all relevant to use of the geostationary orbit/spectrum resource by telecommunication satellites. The new regulatory regimes applicable to that use comply with these principles of international space law. In fact, those regimes now form part of the body of international space law. As international agreements relating to the use of outer space, they are an important part of the evolution of

91. These Plans are integral parts of the Radio Regulations. *See* 1982 Radio Regulations, *supra* note 20, Appendices 30 & 30A.

the legal regime of outer space. They are, in essence, results of the very evolution in space law that was contemplated when the Outer Space Treaty was promulgated.[92]

92. *See* *supra* note 49 and accompanying text.

CHAPTER 11

SPACE LAW ISSUES RAISED AT THE SPACE WARC

This chapter examines the space law issues raised at the Space WARC. Part A addresses the claim to sovereignty over geostationary orbit areas asserted by various equatorial countries and other principles associated with that claim. Part B reviews proposals to establish a new legal regime for the geostationary orbit. Part C examines a proposition related to the peaceful use of outer space. Finally, Part D addresses the issue of space debris in the geostationary orbit. A significant amount of Conference time was consumed by these issues at the First Session. The Second Session, however, was more technically oriented and spent little time exploring these issues.

During the First Session, most space law issues were initially raised in Working Group 5A. Its responsibility for devising a planning method included the establishment of planning principles upon which the Plan would be based.[1] States advancing provisions relating to space law often characterized them as planning principles, although that characterization was criticized.[2]

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1. <u>See</u> ITU, WARC-ORB-85, Doc. 79, at 6.

2. Colombia, for example, characterized its orbital sovereignty claim and other space law related provisions as planning principles. ITU, WARC-ORB-85, Doc. 106 add. 2. The sub-working group appointed to analyze and organize all planning principles was unable to agree that such provisions (Cont. on next page)

A. The Sovereignty Claim and Associated Principles

The most significant issue of space law raised at the Space WARC was the claim to sovereignty over areas of the geostationary orbit asserted by several equatorial countries. International space law provides that outer space is not subject to national appropriation by any means, including claims of sovereignty.[3] One might expect that the geostationary orbit, at an altitude of about 36,000 Km, would be considered part of outer space and thus be subject to the law of outer space.[4] A previous challenge to this proposition, however, was reasserted at the Space WARC by several equatorial countries.

This challenge was initiated in 1976, when eight equatorial states meeting in Bogota, Colombia, issued a Declaration claiming sovereignty over areas of the geostationary orbit above their national territory.[5] The Bogota Declaration was premised on an assertion that the

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were planning principles. See infra note 21 and accompanying text.

3. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410 T.I.A.S. No. 6347, 610 U.N.T.S. 205, art. 2 (entered into force Oct. 10, 1967) [hereinafter cited as the Outer Space Treaty]. For discussion of the nonappropriation principle, see supra ch. 10, notes 23-33 and accompanying text.

4. For an overview of international space law and a discussion of its fundamental principles, see Space Activities and Emerging International Law (N. M. Matte ed. 1984) [hereinafter cited as Emerging Principles].

5. Declaration of the First Meeting of Equatorial Countries, signed in Bogota, Colombia, December 3, 1976, by (Cont. on next page)

geostationary orbit is not a part of outer space, because its existence depends exclusively on the earth's gravity.[6] In the years since this Declaration was issued, the equatorial states have received little, if any, support for their proposition that the geostationary orbit is not a part of outer space. The 1982 United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE) acknowledged that most nations considered the geostationary orbit to be a part of outer space.[7] Nations generally have viewed the Bogata Declaration primarily as a political act directed against the developed countries using the

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Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire [hereinafter cited as the Bogota Declaration]. For an English translation of this document, see Manual on Space Law 383-387 (N. Jasentuliyana & E. Lee ed. 1979).

6. In relevant part, the Bogota Declaration provides that:

> [The geostationary orbit] is a physical fact linked to the reality of our planet because its existence depends exclusively on its relation to gravitational phenomena generated by the earth, and that is why it must not be considered part of the outer space. Therefore, the segments of [GSO] are part of the territory over which Equatorial states exercise their national sovereignty. Id. at 383.

7. Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, U.N. Doc. A/CONF.101/10 at 35 (Vienna, Aug. 9-21, 1982) [hereinafter cited as UNISPACE 82].

geostationary orbit.[8] Its factual basis,[9] as well as its legal basis,[10] has been vigorously assailed..

Prior to the Space WARC, some equatorial states appeared to be moderating, if not abandoning, their earlier position.[11] At a 1983 ITU conference, the sovereignty claim was raised but not forcefully asserted.[12] Nevertheless, at the First Session several equatorial countries argued strongly for specific recognition of their claim to sovereignty over areas of the geostationary orbit above their territory and for other proposals associated with that claim.

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8. See Report of the Canadian Delegation to the Regional Broadcasting - Satellite Conference (Region 2), at 13 (Geneva, June 13 - July 15, 1983).

9. The Declaration asserts that the existence of the geostationary orbit is due exclusively to the earth's gravity and for that reason it is not a part of outer space. Bogota Declaration, supra note 5. Factually, that proposition is incorrect. It is well established that numerous forces act upon an object in the geostationary orbit, only one of which is the force of the earth's gravity. See Physical Nature and Technical Attributes of the Geostationary Orbit, U.N. Doc. A/AC.105/203, at 4-6 (1977). Moreover, the force that is provided by the earth's gravity is a result of the entire mass of the earth, not just that of the equatorial countries.

10. The geostationary orbit, as a part of outer space, is not subject to national appropriation by claims of sovereignty. Outer Space Treaty, supra note 3, art. II. See also Jakhu, The Legal Status of the Geostationary Orbit, 7 Annals Air & Space L. 333, 340 (1982).

11. Id. at 343-344.

12. At the 1983 ITU Regional Administrative Radio Conference, Colombia and Ecuador asserted their claim for the record, but it was "generally ignored by the other participants" and took only a few minutes of the Conference's time. U.S. Dept. of State, Report of the United States Delegation to the ITU Region 2 Administrative Radio Conference on the Broadcasting-Satellite Service 51 (1983).

Colombia, the leader of these equatorial countries, introduced a document summarizing its planning proposals for use of the geostationary orbit.[13] One proposal asserted that "equatorial states exercise sovereignty over the corresponding segments of the [geostationary orbit] and regard them as an integral part of their territories."[14] This language was taken almost verbatim from the Bogota Declaration.[15] Two other proposals that sought to bolster claims of sovereignty over the geostationary orbit were also advanced. One declared that equatorial countries have "rights of preservation" over the geostationary orbit arcs above their territory.[16] The other asserted that "prior authorization" is required before another state may place a space object in the geostationary orbit arc above an equatorial state.[17] Documents submitted by two other equatorial countries, Kenya

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13. ITU, WARC-ORB-85, Doc. 106 add. 2.

14. Id. at 3.

15. See Bogota Declaration, supra note 5.

16. ITU, WARC-ORB-85, Doc. 106 add. 2, at 3.

17. Id. In a Plenary session, Colombia made a vociferous statement relating to the sovereignty claim and the prior authorization principle. See ITU, WARC-ORB-85, Doc. 263. In a statement supposedly directed against breaches of the ITU Radio Regulations, a Colombian delegate, the Colombia Minister of Communications, chastised the United States for failing to comply with the ITU coordination requirements. Id. at 6. This alleged failure related to a U.S. satellite positioned above Colombia in the geostationary orbit. In response, Ambassador Dean Burch, the head of the United States delegation, pointed out that the United States had attempted to comply with the ITU coordination requirements. At that point, however:

The coordination process was broken off by a Colombian
(Cont. on next page)

and Ecuador, supported these proposals.[18] Notwithstanding this support, the proposals made little progress in Working Group 5A.

In order to structure the discussions regarding planning principles, the Chairman of Working Group 5A appointed a sub-working group to analyze and systematically organize the many proposals.[19] The group's report placed the various proposals within fourteen broad categories of planning principles.[20] The group was unable to agree, however, whether nine Colombian proposals were actually planning

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Ministry representative on the basis of Colombian equatorial sovereignty claims. The Colombian representative stated that it would be necessary to request the permission of Colombia to launch and operate a satellite in their sovereign airspace. We refused to request such permission because we, and nearly every other country in this room, have refused to recognize sovereign claims to the geostationary orbit. In view of the inability to achieve technical agreement, the United States proceeded to launch and operate the satellite in 1983.

Id. at 7. See also, ITU, WARC-ORB-85, Doc. 358, at 16-18.

18. See ITU, WARC-ORB-85, Docs. 63, and 215.

19. Many of the countries represented at the Space WARC submitted proposed planning principles. The chairman of Working Group 5A recognized that discussion of these proposals would be greatly facilitated if they were organized and categorized under various topics. The sub-working group charged with this responsibility was chaired by Mr. Ian Hutchings of New Zealand. See ITU, WARC-ORB-85, Docs. DT/48, and DT/48 add. 1.

20. The categories of planning principles were: Guarantee of access and equitability; Sharing with other services; Reservation of resources; Duration of the plan; Special Geographical situations; Provision for multi-administration networks; Accommodation of existing systems; Different planning solutions in different circumstances; Flexibility; Usage of allotments; Efficiency; Provisions for multi-service and multi-band networks; Sharing of inconveniences; and (Cont. on next page)

principles,[21] although they were denominated as such by Colombia.[22] These nine proposals were referenced in the report, but were not listed as planning principles.[23] Included in these nine proposals were those regarding orbital sovereignty and prior authorization.[24] The proposal regarding preservation of geostationary orbit arcs above equatorial countries was included in the report as a possible planning principle within the category "Reservation of Resources."[25]

The Report of the sub-working group formed the basis for discussion of planning principles within Working Group 5A. Although the proposals regarding orbital sovereignty and prior authorization were not specified as planning principles in the

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Others. ITU, WARC-ORB-85, Docs. DT/48, at 1-2, and DT/48 add. 1, at 1.

21. ITU, WARC-ORB-85 Doc. DT/48, at 1.

22. ITU, WARC-ORB-85 Doc. 106 add. 2, at 1.

23. ITU, WARC-ORB-85 Doc. DT/48, at 1.

24. Id. In a later meeting of Working Group 5A, Colombia inquired about the fate of their nine proposals, which the sub-working group had not reported as planning principles. However, no discussion of the proposals was entertained by the Chairman. Author's notes of Working Group 5A (Aug. 31, 1985) (No official minutes were prepared for meetings of working groups).

25. As reported by the sub-working group, this proposed principle provided that "equatorial states shall preserve the corresponding segments of the [geostationary orbit] superjacent to their territories for the opportune and appropriate utilization of the orbit by all states, particularly the developing countries." ITU, WARC-ORB-85, Doc. DT/48, at 5. This language was taken from the Kenyan proposal. ITU, WARC-ORB-85 Doc. 63, at 4. It was, however, very similar to the Colombian proposal regarding "rights of preservation." ITU, WARC-ORB-85 Doc. 106 add. 2, at 3.

report,[26] discussion in working Group 5A of the "preservation" principle was immediately broadened by Kenya to encompass the more general issue of orbital sovereignty.[27]

Two primary objections to the proposals relating to orbital sovereignty, prior authorization, and preservation were voiced. First, most participants at the First Session considered any proposals relating to orbital sovereignty to be legal issues and not true planning principles. Within Working Group 5A, the debate on this matter centered primarily on whether the Space WARC was an appropriate forum to address the substance of these proposals. Several delegations contended that the legal subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), and not the Space WARC, was the appropriate forum.[28] Colombia countered that the United Nations had previously indicated the ITU was an appropriate forum.[29] The United Kingdom delegation challenged this assertion,

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26. See supra notes 19-25 and accompanying text.

27. When the "preservation" proposal was raised in Working Group 5A, Kenya broadened the discussion by asserting that the geostationary orbit was not part of outer space, but a part of the territory of equatorial states. Author's notes of Working Group 5A (Aug. 27, 1985).

28. The United Kingdom, Federal Republic of Germany, Italy, United States and France stated that COPUOS was the appropriate forum. Id.

29. Id.

arguing that the United Nations had stated only that COPUOS should take no action which would "prejudice ... the role of the (ITU)."[30]

The second problem plaguing the sovereignty claim and its associated principles was that they were viewed as directly conflicting with the primary goal of the Conference[31]--guaranteed equitable access to the geostationary orbit for all countries. Any exercise of sovereignty, or of sovereign rights such as preservation and prior authorization, would have granted exclusive rights of control to equatorial countries. It was difficult to perceive how equitable access for all countries could be guaranteed by providing equatorial countries with control over segments of the geostationary orbit.[32] Although Colombia asserted that equatorial countries would exercise their rights in order to "preserve" the geostationary orbit,[33] exercise of those rights would have been unencumbered by any criteria.[34] Thus, equatorial countries could have "preserved" their geostationary orbit arcs by demanding monetary payment, political concessions, or other exactions, prior to granting permission for their use.

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30. Id. This statement of a delegate from the United Kingdom quoted a U.N. document setting the agenda for the COPUOS Legal Sub-Committee's twenty-fourth session. International Cooperation in the Peaceful Uses of Outer Space, U.N. Doc. A/39/713, at para. 4(c) (1984).

31. Author's notes of Working Group 5A (Aug. 27, 1985).

32. Id.

33. See ITU, WARC-ORB-85, Doc. 106 add. 2, at 3.

34. Id.

One delegation pointed out that accepting any of these proposals would indicate that some countries were "more equal than others."[35]

In light of these two strong objections, no consensus was reached in Working Group 5A regarding the sovereignty-related proposals. In fact, except for the equatorial countries, there was a general lack of support for any of these proposals.[36] Therefore, the preservation proposal was reported to Committee 5 in brackets, indicating that no consensus had been reached.[37] The sovereignty claim and the prior authorization proposal, however, were not even referenced in the reports of Working Group 5A to Committee 5.[38]

Before these matters were tabled for discussion in Committee 5, a significant decision regarding sovereignty claims was made in another group. The Chairman of the First Session, Dr. Ilija Stojanovic, had established a Chairman's Ad

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35. Author's notes of Working Group 5A (Aug. 27, 1985) (Statement of U.S. delegation).

36. The equatorial countries of Ecuador, Colombia and Kenya spoke in favor of the "preservation" proposal and orbital sovereignty in general. The sole non-equatorial state indicating some support was Somalia, which made a brief statement in support of Kenya. The following states spoke out against this proposal and any proposals based on orbital sovereignty: the United Kingdom, Federal Republic of Germany, Italy, United States, Japan, France and Sweden. Author's notes of Working Group 5A (Aug. 27, 1985).

37. See ITU, WARC-ORB-85, Doc. 214, at 1. This action was based on a recommendation by the chairman of Working Group 5A. Author's notes of Working Group 5A (Aug. 27, 1985).

38. ITU, WARC-ORB-85, Docs. 140 & 214.

Hoc Group to seek a consensus solution on the issue of planning.[39] He considered this action necessary because progress had been slow and willingness to compromise had often been lacking.[40] The Chairman's Ad Hoc Group succeeded in settling certain issues and in narrowing the differences on others.[41] Although the sovereignty issue was not resolved, the Group considered it to be a legal matter and their report indicated that the Plenary would decide whether the Space WARC was competent to address the issue substantively.[42] Due to the action taken by the Chairman's Ad Hoc Group, Committee 5 did not address the sovereignty claim. The "preservation" proposal remained in brackets, and was also sent to the Plenary without discussion.[43]

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39. See ITU, WARC-ORB-85, Doc. 220, at 2. The Chairman's Ad Hoc Group included the Conference Chairman and Vice-Chairman as well as delegates from certain key countries. Id. Colombia, notably, was selected for membership. Id. Informal discussions indicated that Colombia was placed on this group due to two factors. First, Colombia was perceived to be the leader of the equatorial countries with regard to sovereignty matters. Certainly, Colombia was the most vocal. Second, many participants recognized that matters relating to sovereignty claims had to be resolved so that more important issues could be addressed. Colombia's cooperation, or at least acquiescence, would help conclude this matter in minimum time.

40. Id. No firm decisions on bands to plan or on planning methods had been made after almost four weeks of the Conference. See supra ch. 6, note 26.

41. See ITU, WARC-ORB-85, Doc. DT/70 (Rev. 1), at 6-7.

42. Id. at 7.

43. ITU, WARC-ORB-85, Docs. 330, at 7, and 324 (Corr. 1), at 1.

The sovereignty claim and the "preservation" proposal were finally resolved in Plenary session late in the Conference. In accordance with the earlier action of the Chairman's Ad Hoc Group, the Plenary had to decide whether the Conference was competent to address the substance of the sovereignty-related claims.[44] The majority of the nations speaking on this matter opined that the Conference was not competent.[45] Only four equatorial countries spoke in favor of competence.[46] During the course of the debate, the Secretary-General of the ITU was called upon for a legal opinion on the competency issue. His opinion focused on the Conference Agenda and concluded that sovereignty-related issues were not encompassed within the Agenda and, therefore, the Conference was not competent to address them.[47]

Ultimately, the Conference Chairman pointed out that most states agreed with the Secretary-General.[48] He suggested that the Conference declare itself not competent to address the sovereignty-related claims of the equatorial countries, including the "preservation" proposal, and that this decision

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44. See supra note 42 and accompanying text.

45. ITU, WARC-ORB-85, Doc. 353, at 6-9. The following states spoke against competence: Papua New Guinea, Sweden, Italy, United Kingdom, Netherlands, USSR, Federal Republic of Germany, United States and Canada. Id.

46. Colombia, Ecuador, Indonesia and Kenya asserted that the Space WARC was competent to address the sovereignty claims. Id.

47. See ITU, WARC-ORB-85, Doc. 353, at 8.

48. Id. at 9.

be reported to the United Nations.[49] His suggestion was adopted without objection.[50] Thus, the First Session made no substantive decisions regarding the claims of orbital sovereignty and rights of preservation. Nevertheless, the failure of equatorial countries to secure backing for substantive discussion of their claims may be interpreted as a lack of support for those claims.

The Conference Chairman's suggestion to report the decision on competency to the United Nations resulted from an agreement made in the Chairman's Ad Hoc Group.[51] Since there are no minutes of this Group's meetings, the rationale for reporting this decision to the United Nations is not on record. The issues of the definition and delimitation of outer space and of the character and utilization of the geostationary orbit, however, were already on the agenda of the COPUOS legal subcommittee.[52] Therefore, the mere reporting of the decision on competency to the United Nations cannot be viewed as advancing the legal status of the sovereignty claim.

One proposal introduced jointly by Colombia and four other Andean region nations related to the sovereignty claim in an

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49. Id.

50. Id. The decision on competence applied only to the Space WARC and not to either the ITU in general or to other ITU Conferences. Id. at 6-9.

51. See ITU, WARC-ORB-85, Doc. DT/70 (Rev. 1), at 7.

52. See International Cooperation in the Peaceful Uses of Outer Space, supra note 30.

important, but indirect, manner.[53] It was presented directly to Committee 5 by Venezuela,[54] and provided that "[a]ny planning method must be based on the relevant procedures and rules and on appropriate technical, economic, and legal factors."[55] This proposal was based upon a similarly worded recommendation that had been adopted at the United Nation's 1982 UNISPACE Conference.[56]

In spite of its background, this proposal was not well-received in Committee 5. States opposing the proposal indicated that the UNISPACE Conference had a status quite different from that of the Space WARC.[57] Moreover, much of the proposal was simply unnecessary. The reference to procedures and rules was an obvious statement of fact. Any

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53. ITU, WARC-ORB-85, Doc. 206 (Bolivia, Colombia, Ecuador, Peru, Venezuela).

54. See ITU, WARC-ORB-85, Doc. 330, at 2. This proposal was supported in Committee 5 by Venezuela, Algeria, Colombia, Nigeria and Ecuador. Id. and Author's notes of Ninth Meeting of Committee 5 (Sept. 17, 1985) (Author's notes are more extensive than the ITU summary record on this point.)

55. ITU, WARC-ORB-85, Doc. 206.

56. ITU, WARC-ORB-85, Doc. 330, at 2. See also UNISPACE 82, supra note 7, at 71 ("[A]ny solution to the use of geostationary orbit should be both equitable and flexible and take into consideration the economic, technical, and legal aspects.").

57. ITU, WARC-ORB-85, Doc. 330, at 2. The UNISPACE Conference was convened by the United Nations to allow wider participation by states in outer space matters and to assess new developments, exchange information and examine the effectiveness of institutional and cooperative methods for realizing the benefits of space technology. UNISPACE 82, supra note 7, at 2. The Space WARC, on the other hand, was an administrative conference of the ITU. It had a specific objective related to the geostationary orbit and the space services using it.

plan would clearly have to be based on relevant procedures and rules, which the First Session was charged with establishing.[58] The proposal's reference to technical and economic factors was also innocuous, because Planning principles had already been adopted that provided for those elements.[59]

Use of the term "legal factors," however, was quite another matter. Many nations saw a connection between the term "legal factors" and the sovereignty claim. They asserted that such legal questions had been covered by the report of the Chairman's Ad Hoc Group which referred the sovereignty issue to Plenary for a decision on competence.[60] Although this link between the term "legal factors" and the sovereignty issue seemed clear to many countries, Ecuador argued that the term was not "directly linked" to claims of sovereignty that were "not necessarily" included in the proposal.[61] After this short debate, Algeria called for a vote on the

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58. See ITU, World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, para 2.3 (Administrative Council Resolution No. 895, May, 1983) ("establish the principles, technical parameters and criteria for the planning ....") [hereinafter cited as Space WARC Agenda].

59. See ITU, WARC-ORB-85, Doc. 214, at 2 ("Any planning method should ... be capable of accommodating advances in technology and ... not prevent the use of technologies which are well proven and widely accepted.").

60. ITU, WARC-ORB-85, Doc. 330, at 2. For information on the Chairman's Ad Hoc Group, see supra notes 39-42 and accompanying text.

61. Author's notes of Ninth Meeting of Committee 5 (Sept. 10, 1985).

proposal.[62] In the first vote taken in Committee 5 on any issue, the proposal was defeated by a tally of 16 countries in favor and 31 countries against, with many abstentions.[63] Few non-equatorial countries voted for this proposal.[64] In fact, most developing nations abstained.[65] On the other hand, most developed countries voted against the proposal.[66]

Significantly, the votes in favor did not constitute an endorsement of the sovereignty claim but, rather, merely an approval of the ambiguous term "legal factors," which had been previously used in the UNISPACE Report.[67] The votes against the proposal, however, should be viewed as a repudiation of the sovereignty claim since the only controversial aspect of the proposal was the potential link between "legal factors" and the sovereignty issue.[68] The defeat of this proposal takes on added importance because it was the first occasion in

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62. ITU, WARC-ORB-85, Doc. 330, at 2.

63. _Id_.

64. The Summary Record of this meeting of Committee 5 does not specify which countries voted or how they voted. _See id_. These observations are recorded in Author's notes of Ninth Meeting of Committee 5 (Sept. 10, 1985).

65. Author's notes of Ninth Meeting of Committee 5 (Sept. 10, 1985).

66. _Id_.

67. _See supra_ note 56.

68. _See supra_ notes 57-60 and accompanying text.

which the sovereignty claim, in either a direct or indirect manner, came to a vote in an international forum.[69]

At the Second Session delegates were spared a lengthy discussion of the orbital sovereignty issue.[70] At the opening Plenary session, the Minister of Communications of Columbia, Dr. Hernandez, gave a prepared statement covering various issues.[71] He confirmed the views that Columbia had previously asserted regarding the geostationary orbit and reiterated reservations expressed by Columbia on prior occasions. Dr. Hernandez stated that in light of the decision on competency made at the First Session, the sovereignty issue was "not a matter for discussion at the Second Session ...."[72] This short statement was a stark contrast to the extensive efforts made by Columbia on this issue in 1985. Obviously, the lack of success had made an impact.

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69. U.N. COPUOS operates on a consensus basis and does not take votes. See Emerging Principles, supra note 4, at 197. Other international fora, such as UNISPACE 82, generally operate in a similar manner.

70. During the intersessional period, the ITU Secretary-General's letter regarding Conference competency was forwarded to the U.N. At its 29th session, COPUOS noted the letter but took no action on it. Report of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. No. 20 (A/41/20) (June 26, 1986). The COPUOS Legal Sub-Committee noted the letter at its 27th session and discussed the general subject of the definition and delimitation of outer space which is still on its agenda. No specific action was taken. See Report of the Legal Sub-Committee on the Work of its Twenty-Seventh Session (14-31 March 1988), U.N. Doc. A/AC.105/411 (April 8, 1988).

71. ITU, WARC-ORB-88, Doc. 112, Annex 3.

72. Id. at 12.

B. Proposals to Create a New Legal Regime for the Geostationary Orbit

At the First Session, Colombia proposed several planning principles aimed at creating a new legal regime for the geostationary orbit. One proposal called for establishment of a "specific legal regime."[73] A legal regime for all of outer space is already provided by the Outer Space Treaty and other applicable space law treaties.[74] If, however, the geostationary orbit is not a part of outer space, as asserted in the Bogota Declaration,[75] then a new legal regime would be needed to govern those areas not subject to the sovereignty of an equatorial state, i.e., those areas of the geostationary orbit above the high seas. Thus, this proposal also had a relationship to the sovereignty claim.

Several of Colombia's other proposals for a new legal regime had their origin in the Outer Space Treaty,[76] although Colombia is not a party to that treaty.[77] Article I of the Outer Space Treaty provides that "the exploration and use of outer space ... shall be carried out for the benefit

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73. ITU, WARC-ORB-85, Doc. 106 add. 2, at 3.

74. Outer Space Treaty, supra note 3. For an overview of the treaties applicable to outer space, see Manual on Space Law, supra note 5; Emerging Principles, supra note 4.

75. See supra note 5 and accompanying text.

76. Outer Space Treaty, supra note 3.

77. See ITU, WARC-ORB-85, Doc. 106, at 7.

and in the interest of all countries ...."[78] One Colombian proposal was titled "Use for the Benefit of All Mankind."[79] It provided that "[t]he ultimate objective of activities in the geostationary orbit should be the same as outer space and related science and technology activities, namely, to improve the welfare of mankind as a whole."[80] Although worded poorly in the English text, the intent of this provision seemed to be that activities in the geostationary orbit should be for the benefit of mankind. Use of the phrase "the same as [in] outer space ..."[81] was an obvious attempt to distinguish the geostationary orbit from outer space, as is done in the Bogota Declaration.[82] Colombia also proposed several planning principles regarding responsibility and liability for activities in orbit.[83] These proposals were

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78. Outer Space Treaty, _supra_ note 3, art. I.

79. ITU, WARC-ORB-85, Doc. 106 add. 2, at 2.

80. _Id_.

81. _Id_.

82. _See_ _supra_ note 5.

83. a. Proposal CLM/106/45 provided that:

> Each State must be internationally responsible for its activities in the geostationary orbit, irrespective whether they are carried out by governmental bodies or nongovernmental entities. When States pool forces and operate through an international organization the responsibility will fall on the organization and its participating States.

ITU, WARC-ORB-85, Doc. 106 add. 2, at 4.

b. Proposal CLM/106/46 provided that:
(Cont. on next page)

derived from the Outer Space Treaty[84] and the Liability Convention, with some changes in wording.[85]

Finally, Colombia proposed a planning principle regarding the remote sensing of a country's territory and natural resources from the geostationary orbit.[86] Among other things, this principle called for establishment of an

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> When two or more States jointly launch a space object, "they shall be jointly or severally liable for any damage caused" (Article V of the Convention on International Liability for Damage Caused by Space objects). The international organizations will not be authorized to submit claims for damage caused to them; only a State Member of the organization having signed the above Convention may do so. Id.

c. Proposal CLM/106 47 provided that:

> The geostationary orbit should not be considered as an area for private enterprise without due authorization and continuous supervision on the part of the States concerned. Id.

84. Outer Space Treaty, supra note 3, arts. 6 & 7.

85. For example, the Colombian proposal uses the term "private enterprise." See supra note 83. The Outer Space Treaty, however, uses the term "non-governmental entities." Outer Space Treaty, supra note 3, art. 6.

86. CLM/106/44 provided that:

> The Conference should decide that the [orbit/spectrum resource] must be used by satellites which do not threaten the security of States, i.e. the steps and measures taken to protect their nationals not only from physical and direct attack but also any other activities such as exploration of their territories is to acquire knowledge benefiting exclusively the State using the exploratory artifacts or third States, to the detriment of the

(Cont. on next page)

international regime to "safeguard each State's sovereignty over its natural resources ...."[87] Although no similar provisions are contained in space law treaties, the issue of remote sensing of the earth from space was already on the COPUOS agenda.[88] Moreover, the issue of remote sensing is quite controversial[89] and could have consumed much Conference time if examined at the First Session.

In general, the proposed planning principles relating to a new legal regime for the geostationary orbit received little support at the First Session. The substance of most of these proposals was already set forth in the Outer Space

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> States observed. It is particularly important for the developing countries that an equitable international agreement should be concluded which safeguards each State's sovereignty over its natural resources, respecting the confidential nature of the information obtained by means of remote observation.

ITU, WARC-ORB-85, Doc. 106 add. 2, at 3-4.

87. Id.

88. See International Cooperation in the Peaceful Uses of Outer Space, supra note 30, at para. 3a.

89. One author has noted that:

> For over a decade, within and outside of the United Nations framework, those interested in developing a legal framework for the uses of space technology have been attempting to agree on the appropriate principles to govern the acquisition of information about the earth's surface by the use of sensors placed on orbiting spacecraft, i.e., by remote sensing.

Logsdon & Monk, Remote Sensing From Space: A Continuing Legal Policy Issue, 8 Annals Air & Space L. 409 (1983).

Treaty[90] and, therefore, already applicable to all outer space, including the geostationary orbit. The proposal for a "specific legal regime"[91] for the geostationary orbit was associated with the sovereignty claim, and the proposal regarding remote sensing[92] was a controversial issue already being addressed in COPUOS. Due to the above factors, none of these proposals were reported out of Working Group 5A;[93] neither was their substance discussed in Committee 5 or the Plenary.[94]

C. Exclusively Peaceful Purposes

The concept of the peaceful use of outer space is a well-established principle of space law. The Preamble to the Outer Space Treaty, in two separate paragraphs, refers to "the exploration and use of outer space for peaceful

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90. Outer Space Treaty, _supra_ note 3.

91. _Supra_ note 73.

92. _Supra_ note 86.

93. These proposals were among the nine that ran into difficulty in the sub-working group formed by Working Group 5A. _See supra_ notes 19-23 and accompanying text.

94. The proposal for a specific legal regime was briefly mentioned by a delegate of Colombia during the Plenary discussion of competence to address the sovereignty claim. _See supra_ notes 44-50 and accompanying text. He declared that the geostationary orbit was the common heritage of all countries, not just the technological powers, and that this was "one reason why a _sui generis_ legal system for the [geostationary orbit] orbit/spectrum resource must be discussed at the Conference." ITU, WARC-ORB-85, Doc. 353, at 6.

purposes."[95] The United States has recognized this principle in domestic legislation[96] and in official policy statements. Nevertheless, it was a matter of concern to many nations at the First Session when Colombia introduced a planning principle providing that "the [geostationary orbit] must be used _exclusively_ for peaceful purposes, and its planning must thus rule out any consideration contrary to those purposes."[97]

The Colombian proposal was notable for three reasons. First, the expression "peaceful purposes" has never been formally defined. Two interpretations have been advocated. A number of Socialist countries maintain that "peaceful purposes" means "nonmilitary."[98] This interpretation would prohibit any military use of space, including use by military weather, communication, and surveillance satellites.[99] Such an interpretation clearly does not reflect state practice of the space powers. Moreover, it implies the total demilitarization of space, which is only possible under a comprehensive disarmament treaty. Most Western nations, including the United States, assert that "peaceful purposes"

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95. _See_ Outer Space Treaty, _supra_ note 3.

96. _See_ National Aeronautics and Space Act of 1958, Sect. 102(a), 42 U.S.C. Sect. 2451 (1982) ("[A]ctivities in space should be devoted to peaceful purposes....").

97. _See_ ITU, WARC-ORB-85, Doc. 106 add. 2, at 3 (emphasis added).

98. Vlasic, _Disarmament Decade, Outer Space and International Law_, 26 McGill L.J. 135, 171 (1981).

99. _Id_.

means "nonaggressive" uses;[100] thus, the peaceful purposes principle permits all nonaggressive military activities in space other than those that are specifically prohibited. The question is not whether a particular space activity is military or nonmilitary, but whether it comports with the Outer Space Treaty, the U.N. Charter, and other provisions of international law prohibiting acts of aggression.

Another problem was posed by use of term "exclusively." The phrase "exclusively for peaceful purposes" is used in two treaties that associate this language with a legal regime prohibiting weapons tests of any type and certain specific military activities.[101] Inclusion of a principle with such

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100. Id. See also Smith, Legal Implications of a Space-Based Ballistic Missile Defense, 15 Cal. W. Int'l L.J. 52, 71-73 (1985).

101. This phrase is used in the Outer Space Treaty, which provides that:

> The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited.

Outer Space Treaty, supra note 3, art. 4.

A nearly identical provision is contained in the Moon Treaty. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 14, 1979, art. 2, U.N. Doc. A/RES/34/68, 18 ILM 1434 (entered into force July 14, 1985; (Cont. on next page) potential arms control connotations would have drawn the ITU into very sensitive political issues.

The final difficulty with the proposal was that if it were adopted, the ITU would have to insure that planning ruled out considerations contrary to the principle of use for exclusively peaceful purposes.[102] This would have involved the ITU in defining which proposed uses were peaceful. Such actions would be contrary to the ITU Convention, since the stated purposes of the ITU do not include arms control functions.[103] Moreover, the Convention generally avoids ITU involvement in military matters and specifically provides that members retain their freedom regarding military radio installations.[104]

In spite of the problems presented by the proposal on exclusively peaceful purposes, states opposing it were in a delicate situation. Any argument against this proposal had to be phrased quite carefully to avoid the implication that a state desired or intended to use the geostationary orbit for non-peaceful purposes. Such an implication could have been exploited for propaganda purposes in other, more political

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U.S. is not a party). See also Antarctic Treaty, Dec. 1, 1959, art. 1, U.S.T. 794, T.I.A.S. No. 4780, 40 U.N.T.S. 71 (entered into force June 23, 1961).

102. See supra note 97 and accompanying text.

103. ITU, International Telecommunication Convention, Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendations and Opinions, art. 4 (Nairobi, 1982) (ITU Doc. No. ISBN 92-61-01651-0).

104. Id. art. 38.

arenas. Given this sensitivity, the discussions on this proposal at the First Session were rather brief. Many nations elected to remain silent when the issue was raised.

In Working Group 5A the proposal regarding exclusively peaceful purposes was briefly considered for selection as a planning principle.[105] Senegal noted that no state should be against the peaceful use of the geostationary orbit.[106] Colombia asserted that peaceful use is a basic "*raison d'etre*" of the Outer Space Treaty.[107] Nevertheless, after the United Kingdom stated that this proposal should not be considered a planning principle, the Chairman of Working Group 5A was quick to suggest placing it in brackets.[108] His suggestion, in all likelihood, was premised upon an appreciation of the political sensitivity it presented. No objections to the Chairman's suggestion were advanced[109] and the proposal on exclusively peaceful purposes was reported to Committee 5 in brackets.[110]

Committee 5 handled this proposal with a similar approach. The Committee Chairman indicated that it was a "legal issue

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105. The sub-working group of Working Group 5A had listed this proposal in its report on planning principles under the category of "Others." ITU, WARC-ORB-85, Doc. DT/48 add. 1, at 4-5.

106. Author's notes of Working Group 5A (Aug. 29, 1985).

107. *Id.*

108. *Id.*

109. *Id.*

110. *See* ITU, WARC-ORB-85, Doc. 214, at 2.

and would best be dealt with in the Plenary."[111] Again, no objections were asserted,[112] and the proposal was reported to the Plenary in brackets.[113] In the Plenary, the peaceful purposes proposal retained its characterization as a legal issue and was combined with the issues surrounding the orbital sovereignty claim.[114] The Plenary decisions regarding the lack of competence of the Conference to address such issues of space law[115] encompassed this issue, and apart from one brief comment, it was never addressed separately in the Plenary.[116] Thus, the "exclusively peaceful purposes" proposal came to a quick and quiet end at the First Session. This issue was not raised at the Second Session.

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111. ITU, WARC-ORB-85, Doc. 330, at 7.

112. Id.

113. ITU, WARC-ORB-85 Doc. 324, at 4.

114. ITU, WARC-ORB-85, Doc. 353, at 6-9.

115. See supra notes 45-50 and accompanying text.

116. Kenya briefly commented on the peaceful purpose proposal. They could not understand "why any administration should consider the use of the [geostationary orbit] for peaceful purposes only, to be irrelevant to the work of the Conference." ITU, WARC-ORB-85, Doc. 353, at 8.

D. Space Debris

The issue of space debris has been a matter of concern for quite some time among space lawyers and engineers.[117] At the 1982 UNISPACE Conference, it was recognized as a problem "that is likely to become more serious in [the] future."[118] It is not surprising, then, that this issue was broached at the Space WARC.

At the First Session, four delegations introduced documents regarding space debris. In general terms, Algeria, Iraq, and Kenya called for the removal of satellites from the geostationary orbit at the end of their lifetimes.[119] The United Kingdom proposed that the Conference adopt a Recommendation urging states and other satellite operators "to ensure that at the end of their useful lives [satellites] will

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117. For a discussion of the issue of space debris, see generally, Olmstead, Orbital Debris Management: International Cooperation for Control of a Growing Safety Hazard, (paper presented at 34th Congress of the IAF, Oct. 1983); Gordon, Toward International Control of the Problem of Space Debris, Proc. 25th Colloq. on the L. of Outer Space, 1 (1982).

118. UNISPACE 82, supra note 7, at 70.

119. An Algerian proposal simply stated that satellites should be able "to leave the [geostationary orbit] as soon as they are no longer used." ITU, WARC-ORB-85, Doc. 75, at 4. Kenya proposed that "States and/or international organizations operating their space objects in the geostationary orbit shall take necessary action to remove nonoperational or unutilized space objects from the orbit." ITU, WARC-ORB-85, Doc. 20, at 5. Iraq expressed concern over the increasing probability of collision in the geostationary orbit and proposed that "the removal of dead satellites from the geostationary orbit must be made obligatory for all future satellite networks and hence proposes that the Conference should adopt an appropriate Resolution to this effect." ITU, WARC-ORB-85, Doc. 87, at 5.

present no residual sources of interference to other satellites in the orbit."[120] The United Kingdom's primary concern was interference due to space debris.[121]

Although the Space WARC adopted no Resolutions or Recommendations regarding space debris, it did urge the ITU to take further action. The Report to the Second Session called upon the ITU to study the issue during the intersessional period to increase understanding of the issue, identify the relevant factors, evaluate the risks, and recommend a solution.[122]

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120. ITU, WARC-ORB-85, Doc. 18, at 16.

121. Id. at 15.

122. The relevant section of the Report to the Second Session provides:

> In the geostationary-satellite orbit there is a risk of collision with active spacecraft and blockage of beams of operational satellites due to the presence of uncontrolled manmade objects. At present, the probability for such physical interference is very low, though the number of satellites is expected to increase over time. It is advisable, therefore, to urge the CCIR to develop, in the intersessional period, a better understanding of this physical interference process leading to:
>
> - an identification of the relevant factors of what is thought at present to be a theoretical problem.
>
> - an evaluation of the risks that this phenomenon could present in the future, and
>
> - a recommendation for a solution to the problem should the study results justify further action.

See ITU, Report to the Second Session of the
(Cont. on next page)

The Second Session of the Conference was also invited to "review the progress" of the studies.[123]

The decision to call for further studies instead of adopting a Resolution or Recommendation was based primarily on three factors. First, the delegates recognized that the risk of physical interference caused by space debris was "very low."[124] Second, requiring the removal of satellites from the geostationary orbit could entail significant economic costs by reducing the operational life of the satellites.[125] Third, after some discussion, most delegations realized that it was too soon to adopt any specific provisions because so many factors were unknown.[126]

Conference: World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, at 45 (Geneva, 1985).

123. Id.

124. Id.

125. The proposal of the United Kingdom recognized that:

> Increasingly, the lifetime of a space station is limited not by the performance of its electronic and electrical systems but by the quantity of propellant it can carry. If a mandatory commitment was to be imposed such that a minimum quantity of propellant had to be reserved for the purposes of removing a defunct satellite from the orbit this could significantly reduce the operational life of that satellite.

ITU, WARC-ORB-85, Doc. 18, at 15.

126. Telephone interview with Mr. Dean Olmstead, U.S. Department of State (Oct. 24, 1985). Mr. Olmstead was a U.S. delegate to the Space WARC and was in charge of the space debris issue for the U.S. delegation.

At the Second Session, the issue of space debris did not surface. The CCIR had conducted intersessional studies and concluded that although orbital debris is a potential problem, "there are economic problems associated with the removal of satellites before all the station-keeping fuel has been expended."[127] Therefore it recommended further studies to develop a sound satellite retirement strategy.[128] In light of this recommendation, the Administrative Counsel did not place the debris issue on the Second Session's Agenda.[129]

E. Summary

Several important issues of space law were raised at the Space WARC. The most significant of these was the sovereignty claim and its related principles. It is apparent that the vast majority of countries have no desire to address this issue, or any of its variants, at least within the framework of the ITU. Both the vote on the issue of "legal factors" for planning the geostationary orbit[130] and the decision that the Space WARC was not competent to address the sovereignty

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127. ITU, CCIR Report to the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (WARC ORB(2)) Part I, at 70 (1988).

128. Id.

129. See ITU, WARC-ORB-88, Doc. 1.

130. See supra note 63 and accompanying text.

claim[131] underscore the general lack of support for these concepts. Developed countries are strongly against the sovereignty claim. Although developing countries, for political reasons, generally do not speak out against the equatorial countries, they realize that they would also be adversely affected if the sovereignty claim was accepted.

The First Session demonstrated that Colombia, in particular, is not prepared to let the sovereignty claim be forgotten. Colombia is motivated by at least three factors. First, Colombia's claim to sovereignty over the geostationary orbit arc above its territory has become a domestic political issue. Second, although Colombia probably realizes that the sovereignty claim will never receive significant international support, it may believe that it will receive some concessions or compromises as a result of its forceful advocation of the claim. Finally, Colombia may perceive that it derives some political prestige from being the "spokesperson" for this issue. Nevertheless, Colombia tuned down its rhetoric on this issue at the Second Session. In all likelihood, this decision by the Colombian government resulted from two primary causes: Colombia lost badly on this issue at the First Session, and the decision of the First Session on Conference competency extended to the Second Session. Moreover, there was so much work to be accomplished at the Second Session that any attempt to raise this issue would surely have been greeted by even stronger opposition.

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131. <u>See</u> <u>supra</u> note 50 and accompanying text.

Two other significant issues of space law were raised at the First Session. The issue of exclusively peaceful purposes is a sensitive political/legal issue which does not belong in the ITU. It was recognized as such at the First Session, was treated accordingly, and was not readdressed at the Second Session. The issue of space debris, on the other hand, is a significant legal/engineering problem that will remain active. Thus, space lawyers, in conjunction with engineers and scientists, will eventually have to deal with this issue in a definitive manner. In this case, the ITU may be an appropriate forum and, depending on the result of additional studies, space debris may again become an issue at a future ITU Conference.

CHAPTER 12

FINAL ASSESSMENT, CONCLUSIONS, AND RECOMMENDATIONS

The Space WARC ended the planning processes for space services that began in the 1970s. As a result, the international regulation of satellite telecommunications has been significantly altered. The regulatory regimes that are now in place should remain in effect, with minor modifications, for the foreseeable future. The Space WARC was, therefore, an historic event in telecommunications.

This Conference saw the relatively successful resolution of very complex technical issues that were embedded in a highly political subject. The Space WARC was called for in 1979 as a result of a clamoring by developing countries that had begun years before. Moreover, this action was part of an overall movement by developing countries to seek access to, and benefits from, international common resources such as the mineral resources of the deep seabed and the Moon. That this movement extended to the geostationary orbit, the most commercially important area of outer space, is not surprising. This is particularly so given the overall importance of telecommunications to developing countries and the particular benefits that can be realized by the use of telecommunication satellites operating from the geostationary orbit. Moreover, the concerns of developing countries regarding their future access to the orbit/spectrum resource were understandable, and fairly perceived, in light of the increasingly intensive use being made of that resource by developed countries. Although developed countries contended that advancing technology provides a guarantee of future access, developing countries had a general distrust of solutions based on technology since advanced technologies are often not affordable for them.

Thus, when the Space WARC began in 1985, the positions of the developing and developed countries were quite divergent. Developing countries wanted a rigid a priori plan with fixed orbital positions for most of the FSS bands. Developed countries wanted no part of such a plan; they considered the existing regulatory regime to be adequate, and they firmly believed that technological advances would continue to allow access to the orbit/spectrum resource by all nations on acceptable conditions. No one should be surprised, therefore, that the First Session was turbulent and contentious.

Even though the First Session ended with a compromise establishing the basic outline for a new regulatory regime for the FSS, few administrations left with a positive opinion of the results, or, for that matter, with a firm understanding of the type of regulatory regime that they were in the process of establishing. Much work was left to the intersessional period and to the Second Session. Furthermore, even though an allotment plan was called for as part of the regulatory regime, the views on the type of plan remained split. Developing countries still desired a plan with fixed orbital positions; this was a concrete guarantee that they could readily comprehend. Developed countries, on the other hand, contemplated a flexible plan with an emphasis on predetermined arcs, as opposed to predetermined positions. The concept of multilateral planning meetings for other bands was even less clear.

The consequences of the First Session not having fulfilled all of its objectives are difficult to determine. Had the Session arrived at an earlier compromise and gone on to further define important aspects of the planning methods, the intersessional period may have been more productive. That does not necessarily mean, however, that the results of the Second Session would have been improved. For example, had the First Session provided further definition to the MPM concept, that definition would certainly have been very different from the MPM concept adopted during the Second Session. One could even argue that the lack of definition provided by the First Session was beneficial to the outcome; it allowed administrations to consider the course they had set at the First Session, to evaluate other options, and to make necessary modifications to their proposals.

The intersessional period was as productive as it could have been considering the lack of specific guidance that materialized from the First Session. The IFRB was faced with great responsibilities but it had few resources. It had only the shell of a plan to work with and only a general idea of the specific allotment requirements of administrations. Therefore, the Board had to make assumptions on the type of plan that would be developed at the Second Session. In most cases, those assumptions proved reasonable, and they were accepted at the Conference. Some assumptions, however, later placed constraints on the plan, but since they had developed inertia as a result of use by the IFRB, they were retained.

During the intersessional period, the Board also faced difficulties in regards to computer software. Financial limitations prevented the Board from developing software specifically designed for an FSS allotment plan. Therefore, it was up to administrations to provide assistance. The program ultimately adopted for the Plan was offered by Japan. It proved adequate, but only with time-consuming manual assistance by experts.

Notwithstanding these difficulties, the intersessional period was fruitful in many ways. It gave the IFRB and CCIR time to prepare valuable work products for the Second Session. It provided administrations with a period to contemplate the results of the First Session and consider how they desired to proceed from that point. It also gave administrations an opportunity to conduct their own preparations and to gather together in a less antagonistic atmosphere than that which predominated at the First Sesion to discuss basic issues that had to be resolved at the Second Session. Most importantly, it provided a much needed cooling-off period.

The Second Session commenced with a positive approach by all administrations. Significant problems were encountered, but they were resolved with much less acrimony than had prevailed at the First Session. The moderating influence of developing countries with satellite systems was helpful, and a willingness to compromise was evidenced by most administrations. The knowledge that no additional session was scheduled to resolve matters, if this session proved unsuccessful, mandated a buisness-like approach without resorting to extraneous political issues. Nevertheless, this did not preclude the need to extend the Conference by a day in order to complete matters related to the Allotment Plan. And even with that extension, the Plan's procedures suffer from the manner in which they were drafted very late in the Conference. Despite these difficulties, the Second Session was very successful.

The Second Session completed the planning of the BSS that was initiated in 1977. Plans for the BSS that cover both the FSS feeder links and the BSS downlinks are now in-place. All ITU administrations have an allotment with an orbital position. The issues of Satellite Sound Broadcasting and High Definition Television will remain open until, and if, future conferences allocate frequencies for such uses. Selecting frequencies from the very intensively used areas of the frequency spectrum is going to be a formidable task. The ongoing CCIR studies may help resolve some of the difficulties relating to the above issues.

One of the primary aspects of the BSS Plans that deserves action in the near future is the establishment of interim systems provisions in Regions 1 and 3. As BSS systems are implemented in those Regions, the lack of flexible procedures may cause difficulties. Use of interim system procedures in Region 2 will provide an interesting comparison.

The decisions made on the FSS reflect a reasonable compromise between maximum efficiency in use of the orbit/spectrum resource and access on terms that are affordable to developing countries. Equitable access was provided in a manner that satisfies the concerns of developed countries regarding present access to the orbit/spectrum resource, while at the same time guaranteeing future access to developing countries. Since no single method was able to address all of the criteria relevant to equitable access, two regulatory regimes emerged for the FSS.

The regulatory regime for the unplanned bands preserves the basic attributes of the former regulatory regime for the FSS. The normal method for gaining access to the unplanned bands remains the procedures of Articles 11 and 13 of the Radio Regulations. Since that regime retains its basic "first come, first served" nature, some may assert that its worst attributes were preserved. Most, however, including this author, recognize that this regime has functioned in a very satisfactory manner and that it did not require dramatic revision. This regime provides flexibility to implement systems with a wide range of characteristics, and it accords those systems the protection against harmful interference that is necessary for a system to be financially viable. Although potential for abuse exists in this regime, it is very difficult to develop any regulatory regime that would be perfect for all cases.

Acceptance of the merits of the regime for unplanned bands and services is evidenced by the relatively few changes made to it at the Second Session. Those changes, however, do serve to mitigate some of the perceived unfairness of its "first come, first served" nature. The use of multilateral meetings to effect coordination was specifically provided for, and a mutuality of obligation to resolve difficulties was emphasized. The changes made to simplify this regime, such as those for network coordination and notification, and the change in the value of the coordination threshold, are significant improvements. Although these improvements will primarily inure to the benefit of large users of the orbit/spectrum resource -- the developed countries -- acceptance of this regime by developing countries helps to establish its legitimacy.

It should no longer be asserted that the ITU regulatory regime for the unplanned bands and services violates principles of international space law. That regime once again, with some modifications, has been accepted in a multilateral forum attended by over 100 countries. It is part of an overall scheme of several different regulatory regimes that combine to provide guaranteed equitable access to the orbit/spectrum resource. These regimes affect the use of outer space by telecommunication satellites and are, therefore, an integral part of international space law.

One of the more interesting aspects of the new regulatory regime for use of the orbit/spectrum resource by unplanned bands and services is the diminished role that the MPMs were provided. The First Session envisioned MPMs as the normal method for gaining access to many conventional bands of the FSS. The concept of MPMs, however, was never defined. During the intersessional period, most administrations concluded that MPMs presented a risk of unnecessarily increasing both the costs of coordination and the time required to effect coordination. Moreover, developing countries had time to reflect on whether MPMs were actually required to guarantee their access to the orbit/spectrum resource, especially since the Allotment Plan was being designed to do just that. Consequently, MPMs were established for use only in "exceptional cases" where the normal procedures fail to resolve difficulties. Furthermore, participation at MPMs is not required and no burden-sharing criteria were developed. Therefore, MPMs will not have a major role in future access to the orbit/spectrum resource.

The Allotment Plan was the political focus of the Conference. This Plan establishes the guarantee of access to the orbit/spectrum resource that has been sought by developing countries since the early 1970s. The Plan is based upon sound technical parameters and should permit administrations to implement their allotments. It has flexibility built into it through provisions for the use of generalized parameters and for application of the predetermined arc concept.

It is interesting that the predetermined arc concept adopted by the Second Session is a compromise between the two extreme positions espoused at the First Session. On one extreme was a Plan having fixed positions that could only be moved with advance permission of the concerned administration. On the other extreme was a plan with predetermined arcs and no assignment of positions until the implementation stage. This is but one example of the many compromises that underlie the results of the Space WARC. It is difficult to assess exactly why developing countries were willing to consider flexible predetermined arc concepts at the Second Session when many were not willing to do so at the First Session. During the intersessional period, the United States and several other administrations pointed out the benefits that a flexible plan using a predetermined arc would provide. Apparently those efforts were fruitful and administrations saw the value of this concept.

The main areas of the Plan that will cause some difficulties in the future involve the procedures, but they are workable. The procedures will enable administrations to implement their allotments or to participate in subregional systems. Existing systems will also be implemented pursuant to the procedures. Nevertheless, the problems identified in this study warrant further action. Many of those procedural deficiencies can be resolved by the IFRB through its Rules of Procedure. The attached "Suggested Rules of Procedure for the

IFRB"[1] serve to remove some of the procedural "dead ends" that were not detected at the Conference. In an effort to promote the understanding of the procedures by administrations, the IFRB should also publish in a circular-letter flow charts similar to those attached.[2] Minor errors contained in the procedures should be corrected at a future WARC. A list of such errors and a suggested agenda item for a future WARC is attached.[3] The procedures are so complex, however, that the defects noted herein may only be examples of other defects that will need to be addressed. Therefore, the IFRB should examine the procedures and provide the results of its study to administrations for their comments. This method will aid the IFRB in developing additional Rules of Procedure that will be needed to effectively use the Plan's procedures.

The IFRB is also likely to experience difficulties as the Plan matures. In particular, as the concept of the PDA is applied to enable assignments to be implemented, the positions of national allotments will move within their predetermined arcs. At some point, these moves will require an additional computer synthesis of the Plan, at least for certain sectors of the geostationary orbit. At the Second Session this required manual manipulation by a small group of experts. This may be a difficult exercise for the IFRB. Therefore, the

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1. *See infra* Appendix E.
2. *See infra* Appendix C.
3. *See infra* Appendix F.

IFRB is encouraged to explore the possibility of improving the software, with the assistance of administrations, in an effort to secure better results from computer analysis of data relevant to the Plan.

One of the most important lacuna in the procedures is their failure to define the relationship between existing systems and allotments that are in conformity with the Plan. The procedure for the resolution of incompatibilities between such systems is somewhat ambiguous. Although the Plan declares that "a means must be found to convert the allotment into an assignment which is acceptable to both parties,"[4] that means is not specified. The cost-sharing method discussed previously may provide satisfactory solutions to such incompatibilities. Cost-sharing is certainly preferrable to burden-sharing criteria, which would be difficult to develop and problematical to apply. Cost-sharing, however, will have to be effected on a case-by-case basis. Such voluntary methods of resolving incompatibilities would be a reasonable compromise to the difficulties that may be experienced between existing systems and allotments being converted to assignments. It appears that even in application of the Allotment Plan, the good faith of administrations will play an important part in its success.

4. ITU, Final Acts Adopted by the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (ORB-88), Addendum, Annex 30B, art. L, para 108c (Geneva, 1988).

Another deficiency in the procedures is their restrictions on additional uses. Those restrictions are so extensive that it will be very difficult to implement such systems in many regions of the geostationary orbit. These restrictions go far beyond what was necessary to protect the national allotments.

One further consequence of the Space WARC was the reaffirmation of the ITU as one of the most successful international organizations. After the dissention displayed at the First Session, some had questioned whether the ITU could continue to function in its present form.[5] The relatively successful conclusion of the Second Session should remove any doubt. The ITU functioned extremely well as an organization. It provided the framework for almost 1,000 people from over 100 countries to work together on difficult technical subjects. The myriad of decisions taken were arrived at primarily by consensus; of the few votes held, none were on matters of substance. Although some administrations were more satisfied with the results than others were, relatively few substantive reservations were made. A process that had evolved over a period of decades enabled countries with widely divergent positions to come together, to discuss issues of tremendous importance to telecommunications and to the use of outer space, and to arrive at an acceptable "middle

5. One author concluded that "whether or not the ITU in its present form continues as a successful exercise in international cooperation may very well depend upon the results of WARC-ORB-88 and associated proceedings." R. White & H. White, The Law and Regulation of International Space Communication 227 (1988).

ground." Therefore, the Space WARC was not only an historic event for telecommunications, it was also an extremely successful exercise in international negotiations.

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APPENDIX A

EXTRACT OF THE FIRST SESSION AGENDA

Resolution No. 895 WORLD ADMINISTRATIVE RADIO CONFERENCE ON THE USE OF THE GEOSTATIONARY-SATELLITE ORBIT AND THE PLANNING OF SPACE SERVICES UTILIZING IT

The Administrative Council,

noting

a) that Resolution No. 3 of WARC-79 invited the Administrative Council to take the necessary steps to convene a world space administrative radio conference with the essential objective to guarantee in practice, for all countries, equitable access to the geostationary-satellite orbit and to the frequency bands allocated to the space services utilizing it and that this conference be held in two sessions;

...

* * *

decides:

1. that the First Session shall be convened in Geneva on 8 August 1985 for a duration of five and a half weeks,

2. that in order to meet the objectives of noting a) the First Session shall:

2.1 review the situation prevailing in the bands allocated to space services on the basis of:

- information communicated by administrations,

- a report to be prepared by the IFRB in accordance with Resolution No. 3 of WARC-79;

2.2 decide on the basis of proposals received from administrations, which space services and frequency bands should be planned;

2.3 establish the principles, technical parameters and criteria for the planning, including those for orbit and frequency assignments of the space services and frequency bands identified as per paragraph 2.2, taking into account the relevant technical aspects concerning the special geographical situation of particular countries; and provide guidelines for associated regulatory procedures;

2.4 establish, as necessary, guidelines for the regulatory procedures pertaining to space services and frequency bands which have not been identified in accordance with paragraph 2.2;

2.5 consider other possible approaches that could meet the objective of noting a);

2.6 identify those bands for which sharing criteria between services (space or terrestrial) need to be developed during the intersessional period for consideration at the second session.

3. In order to meet the objectives of Resolution No. 8 of the Plenipotentiary Conference, Nairobi, 1982, the First Session shall:

3.1 select from among the frequency bands listed in resolves 1 of Resolution No. 101 of WARC-79 those bands for which frequency plans should be established for feeder links;

3.2 define the most suitable technical characteristics for the feeder links to broadcasting satellites, taking into consideration the CCIR studies pursuant to Resolution No. 101 and Recommendation No. 101 of WARC-79 and, if appropriate, taking account of the requirements of the space operation service for broadcasting satellites;

3.3 identify those bands, selected in accordance with paragraph 3.1, for which sharing criteria between services (space or terrestrial) need to be developed during the intersessional period for consideration at the Second Session.

4. In order to meet the objectives of Resolution No. 505 of WARC-79, the First Session shall consider the question in the light of experience gained by administrations and the results of studies in the CCIR and make appropriate recommendations for the attention of the Second Session.

5. The First Session shall also:

5.1 specify the form in which the requirements of administrations, for the services and frequency bands indicated in item 2.2 above, should be submitted to the Union, and indicate the desirable date for this submission;

5.2 specify the preparatory actions required to be completed before the commencement of the Second Session of the Conference;

5.3 recommend a draft agenda for the Second Session of the Conference for consideration by the Administrative Council;

5.4 evaluate the financial impact of its decisions upon the budget of the Union in accordance with No. 627 and other pertinent provisions of the Nairobi Convention;

<u>decides further</u>

6. that in order to meet the objectives of <u>decides</u> 2.3 of Resolution No. 1 of the Plenipotentiary Conference, Nairobi, 1982, and Resolution No. 504 of WARC-79 the First Session shall:

6.1 consider the relevant decisions of the Regional Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in Region 2 and incorporate these decisions in the Radio Regulations, as appropriate, revising the Radio Regulations only for these purposes as necessary;

6.2 adopt appropriate final acts to achieve this objective;

<u>invites the CCIR</u> to complete the necessary studies for the First Session of the Conference in accordance with Resolution No. 3 of the WARC-79 so that they may be available to administrations approximately ten months prior to the opening of the Conference;

<u>invites the IFRB</u>

1. to prepare a report on the operation of the procedures of Articles 11 and 13 including information about difficulties which may be reported to the IFRB by administrations in gaining access to suitable orbital locations and frequencies, and to circulate this report to administrations, at least one year before the First Session of the Conference;

2. to carry out technical preparations for the Conference in accordance with the provisions of the Radio Regulations;

<u>invites the Secretary-General</u> to make the necessary arrangements for the convening of the First Session of the Conference.

EXTRACT OF THE SECOND SESSION AGENDA

Resolution No. 953 WORLD ADMINISTRATIVE RADIO CONFERENCE ON THE USE OF THE GEOSTATIONARY-SATELLITE ORBIT AND THE PLANNING OF SPACE SERVICES UTILIZING IT (SECOND SESSION - GENEVA, 1988)

The Administrative Council,

<u>considering</u>

...

e) that the Second Session will need to consider:

1. proposals from administrations;

2. the Report of the First Session;

3. preparatory work carried out in the intersessional period;

4. the relevant reports from the IFRB and the CCIR;

5. the requirements for the allotment Plan submitted by administrations;

6. the requirements for the feeder links for the BSS submitted by administrations in Regions 1 and 3;

...

* * *

<u>resolves</u>

that the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and on the Planning of Space Services Utilizing It (WARC ORB(2)) taking due account of the radiocommunication services not specifically addressed in its agenda, be convened in Geneva on Monday, 29 of August 1988 for a period of five weeks and three days, with the following agenda:

1. to establish the allotment Plan and the associated regulatory procedures, based on <u>considering</u> e) 1 to 5, for the fixed-satellite service in the bands:

- 4,500-4,800 MHz and 300 MHz to be selected in the band 6,425-7,075 MHz; and

- 10.70-10.95 GHz, 11.20-11.45 GHz and 12.75-13.25 GHz,

according to the principles and methods established at the First Session;

2. to establish the improved regulatory procedures, on the basis of <u>considering</u> e) 1 to 4, for the fixed-satellite service in the bands:

- 3,700-4,200 MHz
  5,850-6,425 MHz

- 10.95-11.20 GHz
  11.45-11.70 GHz
  11.70-12.20 GHz in Region 2[1]
  12.50-12.75 GHz in Regions 1 and 3[2]
  14.00-14.50 GHz

- 18.10-18.30 GHz[3]
  18.30-20.20 GHz
  27.00-30.00 GHz

according to the principles and methods established at the First Session;

3. to adopt appropriate technical standards, parameters and criteria, pertaining to the fixed-satellite service in the frequency bands specified in items 1 and 2;

4 to review and revise, as necessary, the regulatory procedures and appropriate technical standards, parameters and criteria pertaining to space services and frequency bands not to be subject to planning;

5. to review and revise, as necessary, the definitions relating to space services;

6. to establish the provisions and associated Plan for feeder links, in the bands 14.5-14.8 GHz (for countries outside Europe and for Malta) and 17.3-18.1 GHz, to stations in the broadcasting-satellite service in Regions 1 and 3 operating in accordance with Appendix 30 (ORB-85) to the Radio

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1. In these bands the improved procedures shall apply between networks of the FSS only.

2. *Id.*

3. *Id.*

Regulations, on the basis of the relevant material identified in considering e), and to incorporate these decisions in the Radio Regulations, revising the Radio Regulations, as well as related Resolutions and Recommendations, only for these purposes as necessary;

7. to consider, subject to the adoption of a suitable feeder-link assignment Plan for Region 1, the amendment of the relevant Articles of the Radio Regulations and associated Resolutions and Recommendations, if it is appropriate, to permit the use of the band 10.7-11.7 GHz (Earth-to-space) in Region 1 for all modes of fixed-satellite service operation, taking into account the frequency bands identified for planning in items 1 and 2 above;

8. to consider the possible correction of minor errors in the revision of Appendix 30 (ORB-85) on the basis of a list to be submitted by the IFRB after consultation with administrations. Such corrections shall be made without impact on either Plan, on the interactions between the two Plans, or on the balance of the provisions relating to the various services in different Regions;

9. in accordance with Recommendation No. 2 of the First Session, to consider the results of the various up-to-date studies and, in reviewing the situation prevailing at that time, take appropriate decisions concerning the various aspects of satellite sound-broadcasting systems as outlined in Resolution No. 505 of WARC-79;

10. to review the possibility of the long-term applicability of Resolution No.2 (SAT-R2), and to take a definitive decision on this matter;

11. in accordance with Recommendation No. 3 of the First Session of the Conference, and without prejudice to the present BSS allocation in the 22.5-23 GHz band in Regions 2 and 3, to consider the question of a suitable frequency band for the broadcasting-satellite service, preferably on a world-wide basis, to accommodate HDTV, including possible action as appropriate on the necessary changes to Article 8 at a later competent conference;

12. to make such consequential amendments in the Radio Regulations as may be necessitated by the decisions of the Second Session of the Conference;

13. to consider, revise as necessary, and take other appropriate action upon the relevant Resolutions and Recommendations;

14. to consider the report of the CCIR mentioned in "notes ..." below and the question of making appropriate recommendations;

15. to consider and, if appropriate, revise No. 480 of the Radio Regulations only to the extent necessary to ensure that implementation of broadcasting stations in Region 2 in the band 1,605-1,705 KHz is without prejudice to the regional broadcasting plan adopted at the Second Session of RARC BC-R2;

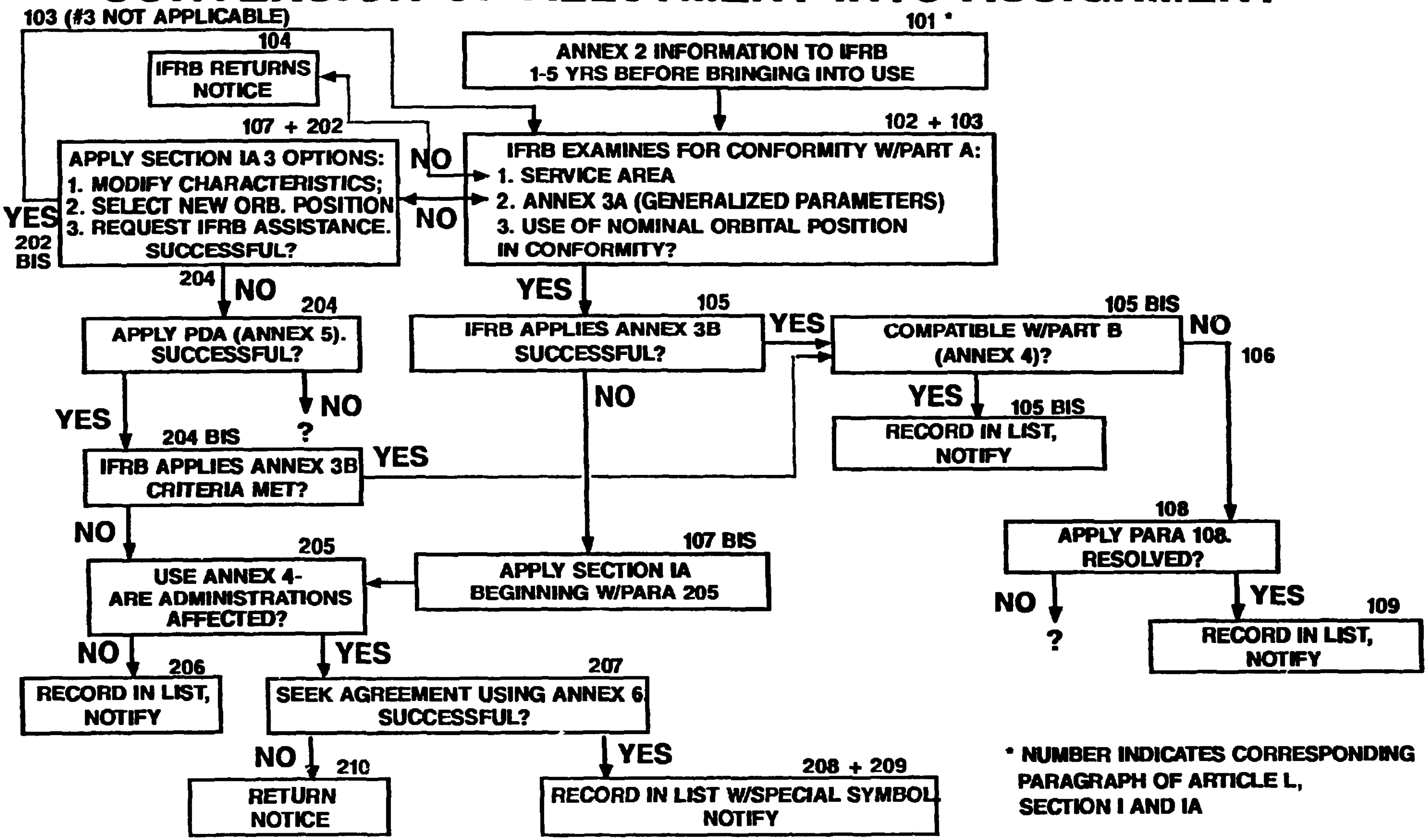
16. to evaluate the financial impact of its decisions upon the budget of the Union in accordance with No. 627 and other pertinent provisions of the Nairobi Convention;

notes that in Recommendation No. 1, footnote 2, the First Session of the Conference has requested the CCIR to study the technical characteristics of the fixed-satellite service in the bands 18.10-18.30 GHz, 18.30-20.20 GHz and 27.00-30.00GHz, and to report to the Second Session of the Conference with a view to taking a decision on the future planning of these bands by a future competent conference,

invites the IFRB and CCIR to ensure the timely completion of the preparation for the Conference,

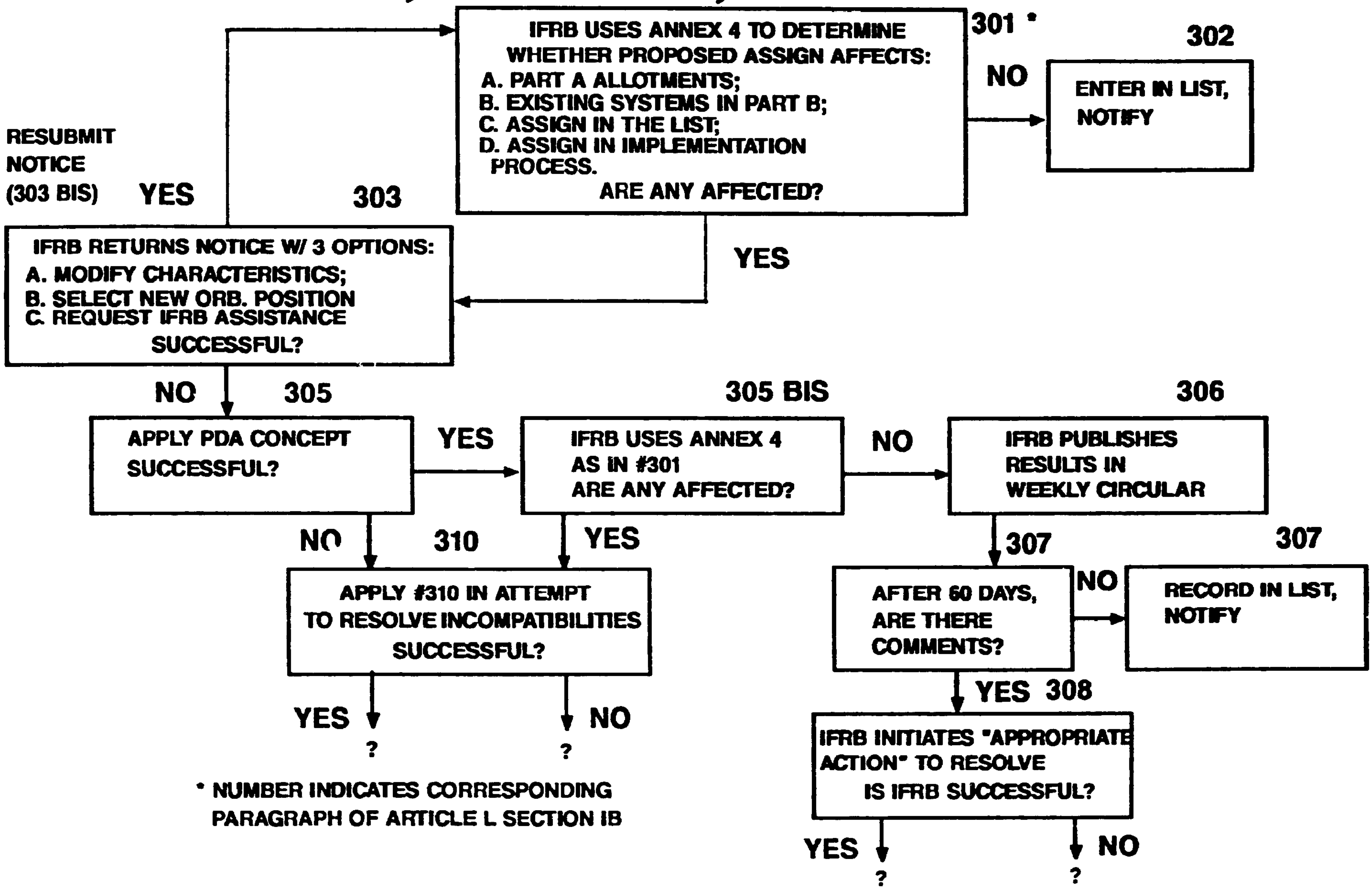
instructs the Secretary-General to make all necessary arrangements for the convening of this Conference.

ARTICLE L, SECTIONS I AND IA
CONVERSION OF ALLOTMENT INTO ASSIGNMENT



* NUMBER INDICATES CORRESPONDING PARAGRAPH OF ARTICLE L, SECTION I AND IA

ARTICLE L, SECTION IB, EXISTING SYSTEMS



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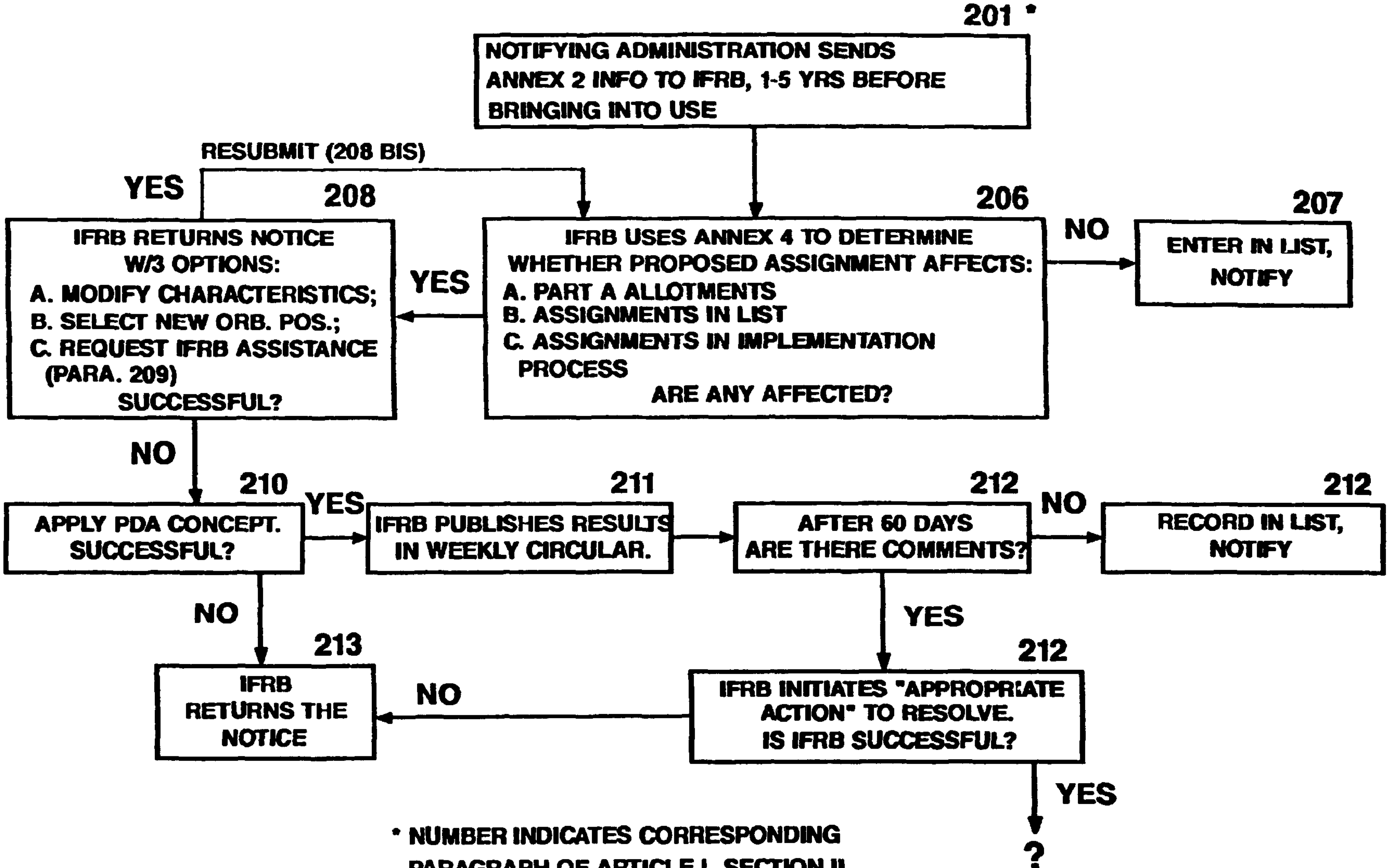
ARTICLE L, SECTION II -SUBREGIONAL SYSTEM



* NUMBER INDICATES CORRESPONDING PARAGRAPH OF ARTICLE L,SECTION II.

ARTICLE [L]

Procedures for Implementation of the Plan and Regulation of the Fixed-Satellite Service in the Planned Bands

Section I. Procedure for Conversion of an Allotment into an Assignment

101. When an administration intends to convert an allotment into an assignment employing all or part of its allotment in Part A of the Plan, it shall, not earlier than five years and not later than one year before the planned date of bringing the network into use, send to the IFRB the information specified in Annex 2.

102. Upon receipt of a complete notice of a frequency assignment related to that allotment, the Board shall examine it with respect to its conformity with Part A of the Plan.

103. A notice of an assignment is considered to be in conformity with Part A of the Plan if:

a) the service area is not greater than the service area in Part A of the Plan;

b) it meets the criteria of Annex 3A; and

c) the orbital position corresponds to the nominal orbital position in the Plan.

104. A notice shall be returned to the notifying administration whenever the service area is not within a geographical area for which the notifying administration is responsible.

105. When the Board finds that the proposed assignment is in conformity with paragraph 103, the Board shall apply the provisions of Annex 3B (Macrosegmentation Concept).

105bis When Annex 3B has been applied successfully and the Board has found that the proposed assignment is compatible with Part B of the Plan in accordance with Annex 4, the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article [M].

106. When the Board finds that the proposed assignment is in conformity with Part A of the Plan after examination using Annexes 3A and 3B but it is incompatible with Part B of the Plan, the provisions of paragraph 108 shall apply.

107. If a notice is not in conformity with Part A of the Plan, the provisions in Section IA shall apply.

107bis If under paragraph 105 after the application of Annex 3B coordination is required, then the provisions of Section IA beginning from paragraph 205 shall apply.

108. For the purpose of resolving the incompatibilities mentioned in paragraph 106:

a) an administration responsible for an existing system or an additional use shall, depending on the stage of development of its system, take all technically and operationally possible measures to remove incompatibilities at the pre-design, design and operational stages in order to accommodate the requirements of the administration seeking to convert its allotment into an assignment;

b) an administration whose allotment is being converted into an assignment shall assist in the resolution of incompatibilities;

c) both administrations, with the assistance of the Board if requested, shall cooperate in reaching an equitable agreement, taking into account the respective stages of development of their systems and recognizing that a means must be found to convert the allotment into an assignment which is acceptable to both parties.

109. After resolution of any incompatibilities through the application of paragraph 108, the Board shall then record the assignment in the List. The administration shall then notify the assignment in accordance with Article [M].

Section IA. Procedures for Conversion of an Allotment into an Assignment that is not in Conformity With Part A of the Plan or that Does not Comply with Annex 3B

201. The Board shall use this Section to determine if the proposed assignment affects:

a) the allotments in the Plan;

b) the assignments which appear in the List;

c) the assignments with respect to which the Board has previously received information in accordance with this Article.

202. If the proposed assignment is not in conformity with Annex 3A, the Board shall return the notice to the notifying administration indicating that it may take the following action:

a) modify the characteristics of its proposed assignment in order to ensure its compatibility; or

b) select an alternative orbital position, preferably within its PDA, or

c) request the assistance of the Board in either course of action.

202bis After the notice is returned to the administration following the application of paragraph 202, the administration may resubmit the notice and the Board shall apply again the provisions starting at paragraph 102, with the exception of paragraph 103 c) which is not applicable.

203. When the Board is requested to assist in the selection of an alternative orbital position for the proposed assignment, it shall endeavor to identify an orbital position which would ensure compatibility with the allotments in the Plan and the assignments in the List and shall communicate the results to the notifying administration.

204. If it is not possible to solve the problem mentioned in paragraph 202 after having considered the possibility of finding an alternative orbital position, the concept of PDA (Annex 5) shall be used by the notifying administration or by the Board, if its assistance is requested.

204bis When paragraph 204 has been applied successfully, the provisions of paragraph 105 of Section I shall be applied.

205. If the provisions of Annex 3B are not met, the Board shall then identify affected administrations having assignments in the List by using the criteria of Annex 4.

206. If no administrations are affected under paragraph 205, the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article [M].

207. If administrations are affected under paragraph 205, the administration responsible for the proposed assignment shall seek the agreement of the affected administrations using the techniques described in Annex 6.

208. When agreement is reached, the administration responsible shall advise the Board which shall modify the orbital position and PDA in the Plan, if necessary, and shall record the assignment in the List with a special symbol. The administration shall then notify the assignment in accordance with Article [M].

209. The special symbol referred to in paragraph 208 shall represent an undertaking by the administration responsible for the proposed assignment that it will accommodate, if necessary, future conforming assignments made under paragraph 105bis.

210. When no agreement is reached under paragraph 207, the notice shall be returned.

Section IB. Procedure for Recording in the List the Existing Systems Contained in Part B of the Plan

301. The Board shall use the method of Annex 4 to determine whether the proposed assignment affects:

a) the allotments in Part A;

b) the existing systems in Part B[1];

c) the assignments which appear in the List;

d) the assignments with respect to which the Board has previously received information in accordance with this Article.

301bis Assignments for networks contained in Part B of the Plan for which notices for recording in the Master Register were received by the Board prior to 29 August 1988 and recorded subsequently in the MIFR will be entered in the List. However, for notices received after 29 August 1988, the assignments will be entered in the List if the notified characteristics are identical to those contained in Part B of the Plan.

302. If, under paragraph 301, no allotments or assignments are affected, the Board shall publish the results of its calculations in a special section of the weekly circular and shall enter the proposed assignment in the List. The administration shall then notify the assignment in accordance with Article [M].

303. If, under paragraph 301, allotments or assignments are affected[2], the Board shall return the notice to the notifying administration indicating that it may take the following action:

a) modify the characteristics of its proposed assignment in order to ensure its compatibility; or

b) select an alternative orbital position and proceed in accordance with paragraph 301; or

c) request the assistance of the Board in either course of action.

303bis After the notice is returned to the administration following application of paragraph 301, the administration may resubmit the notice and the Board shall apply again paragraphs 301 to 303.

303ter For existing systems in Part B of the Plan the provisions of No. 1056A of the Radio Regulations shall be applied.

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1 Administrations with networks in Part B shall continue to apply the provisions of Section II of Article 11 with respect to other networks listed in Part B.

2 Incompatibility between assignments in Part B shall be disregarded whenever an agreement under the provisions of Section II of Article 11 was obtained.

304. When the Board is requested to assist in the selection of an alternative orbital position for the proposed assignment, it shall endeavour to identify an orbital position which would ensure compatibility with the allotments in the Plan and the assignments in the List and shall communicate the results to the notifying administration.

305. If it is not possible to solve the problem of incompatibility mentioned in paragraph 303 after having considered the possibility of finding an alternative orbital position, the concept of PDA shall be used (see paragraph 103 of Article [J]) by the notifying administration or by the Board, if its assistance is requested.

305bis If paragraph 305 has been successfully applied, the Board shall use the method of Annex 4 as in paragraph 301.

306. If paragraphs 305 and 305bis have been successfully applied, the Board shall publish the results of its calculations and the modified orbital positions in a special section of the weekly circular.

307. If, within sixty days of the weekly circular mentioned in paragraph 306 the Board receives no comments, it shall be deemed that there are no objections to the proposed relocations and the Board shall record the assignment in the List. The administration shall then notify the assignment in accordance with Article [M].

308. Comments under paragraph 307, if any, shall be limited to the case of an administration believing that the agreed protection criteria have not been met or to the case in which the administration envisages problems in recoordinating any satellite network under consideration. If such comments are received the Board shall initiate the appropriate action to resolve the problem.

309. In the event of an unsuccessful application of paragraphs 305 and 305bis, the provisions of paragraph 310 shall apply (with respect to incompatibilities with allotments and assignments derived from allotments).

310. If it is necessary for the purpose of resolving the incompatibilities mentioned in paragraph 305:

a) the administration responsible for an existing system shall, depending on the stage of development of its system, take all technically and operationally possible measures to remove incompatibilities;

b) an administration whose allotment or assignment is being affected shall assist in the resolution of incompatibilities;

c) both administrations, with the assistance of the Board if requested, shall cooperate in reaching an equitable agreement, taking into account the respective stages of development of their systems.

Section II. Procedure for the Introduction of a Subregional System

201. When a group of administrations intends to bring into use a subregional system it shall select one or more orbital positions for the system, preferably from the national allotments concerned, and send details of the assignment of the proposed network to the Board, not earlier than five years and not later than one year before the planned date of bringing into use. For this purpose, the administrations shall designate one among them to act on their behalf in the application of the provisions of this Appendix. The selected administration shall be known as the notifying administration.

202. All or part of the national allotments used by the subregional system shall be suspended for the period of operation of this subregional system unless it can be used in a way that does not affect allotments in the Plan or assignments made in accordance with the procedures associated with the Plan.

203. Suspended national allotments (see paragraph 202) shall continue to enjoy the same protection as that afforded to other allotments in the Plan which are not suspended, for use in the event of cessation of the subregional system.

204. When determining which administrations are affected by subregional systems, the mutual interference between the subregional system and its members' suspended national allotments shall not be taken into account for the period of the life of the subregional system.

205. In determining which administrations are affected, the interference caused by either the subregional system or the suspended allotments as specified in paragraph 202 shall be taken into account, but not both at the same time in view of their respective implementation schedules.

206. Upon receipt of a complete (Annex 2) notice relating to the proposed assignment, the Board shall use the method of Annex 4 to determine whether the proposed assignment affects:

a) the allotments in the Plan;

b) the assignments which appear in the List;

c) the assignments for which the Board has previously received complete information in accordance with this Article.

207. In the event of a favourable finding with regard to compatibility the Board shall enter the proposed assignment in the List. The administration shall then notify the assignment in accordance with Article [M].

208. In the event of an unfavourable finding with regard to compatibility, the Board shall return the notice to the notifying administration, indicating that it may take the following action:

a) modify the characteristics of its proposed assignment in order to ensure its compatibility; or

b) select an alternative orbital position and proceed in accordance with paragraph 201; or

c) request the assistance of the Board in either course of action.

208bis After the notice is returned to the administration following application of paragraph 206, the administration may resubmit the notice and the Board shall apply again paragraphs 206 to 208.

209. When the Board is requested to assist in the selection of an alternative orbital position for the proposed assignment, it shall endeavour to identify an orbital position which would ensure compatibility with the allotments in the Plan and the assignments in the List and shall communicate the results to the notifying administration.

210. If it is not possible to solve the problem of incompatibility mentioned in paragraph 208 after having considered the possibility of finding an alternative orbital position, the concept of PDA shall be used (see paragraph 103 of Article [J]) by the notifying administration or by the Board, if its assistance is requested.

211. In the event of a successful application of paragraph 210, the Board shall publish the result of its calculations and the modified orbital locations in a special section of the weekly circular.

212. If, within sixty days from the date of the weekly circular mentioned in paragraph 211, the Board receives no comments, it shall be deemed that there are no objections to the proposed solution and the proposed assignment shall be recorded in the List. The administration shall then notify the assignment in accordance with Article [M]. Comments, if any, shall be limited to the case of an administration believing that the agreed protection criteria have not been met. If it receives such comments, the Board shall initiate the appropriate action to resolve the matter.

213. In the event of an unsuccessful application of paragraphs 210, 211 and 212, the Board shall return the notice to the notifying administration.

214. If an administration withdraws from a subregional system, it shall inform the IFRB. The Board shall take account of this withdrawal when applying the provisions relating to the compatibility of new assignments.

215. If an administration which has withdrawn from a subregional system wishes to implement a national system, and is unable to satisfy the condition of paragraph 202 for the use of all or part of its allotment, it may proceed under the provisions of Section III of this Article relating to additional uses for the allotment or part of the allotment, as appropriate.

216. When a subregional system is terminated by the participating administrations, the notifying administration shall inform the Board as early as possible and the Board shall:

a) publish this information in a special section of its weekly circular;

b) cancel all frequency assignments in the List relating to that system;

c) modify Part A of the Plan to indicate that the corresponding national allotments are no longer suspended.

Section III. Supplementary Provisions Applicable to Additional Uses in the Planned Bands

301. These bands are used for the fixed-satellite service Allotment Plan and their use in accordance with this section should be avoided if possible. Administrations are urged to use other available bands.

302. An administration, or one acting on behalf of a group of administrations, may apply the procedure of this Section for an additional use as defined in Article [F], provided that the proposed assignments have a maximum period of validity of 15 years and will not, unless agreed to by the administrations affected, require any displacement of the orbital position of an allotment in Part A of the Plan or the orbital position of an assignment in the List, nor be incompatible with:

a) the allotments in the Plan;

b) the assignments in the List;

c) the assignments for which the Board has previously received information in accordance with this Article.

303. For this purpose it shall, not earlier than five years and not later than one year before the planned date of bringing the related assignment into use, send the information specified in Annex 2 to the IFRB.

304. Upon receipt of a complete notice, the Board shall examine it to ensure its compliance with paragraph 302 and in the event of non-compliance the notice shall be returned to the notifying administration.

305. If Board finds that the notice complies with the provisions of paragragh 302, it shall enter the assignment in the List and shall consider the information received as having been notified under Article [M]. The administration shall then notify the assignment in accordance with Article [M].

306. The provisions of this Section shall not be applied before one year after the date of entry into force of this Plan.

ARTICLE [K]

Procedure for the Addition of a New Allotment to the Plan for a New Member of the Union

101. The administration of a country which has joined the Union as a new Member shall obtain a national allotment in Part A of the Plan by the following procedure.

102. The administration shall submit its request for an allotment to the Board, with the following information:

a) the geographical coordinates of not more than 10 test points for determining the minimal ellipse to cover its national territory;

b) the height above sea level of each of its test points and the rain zone or zones;

c) any special requirement, other than a fixed orbital position, which is to be taken into account to the extent practicable.

103. Upon receipt of the complete information (Annex 2), the Board shall find an appropriate orbital position, if necessary using the PDA concept, and shall enter the national allotment of the new Member of the Union in Part A of the Plan.

104. For this purpose the Board shall consult, and if necessary seek the agreement of, any administrations that may be affected.

SUGGESTED RULES OF PROCEDURE FOR THE IFRB

The IFRB should consider adopting Rules of Procedure for the application of Appendix 30B along the following lines:

A. Where Article L, Section II, paragraph 212, is used and the IFRB resolves the matter, if any changes to the characteristics published under paragraph 212 are effected, another publication will be made in accordance with paragraph 212. If no such changes are effected, the IFRB shall record the assignment in the List and the administration will notify the assignment in accordance with Article M. See supra ch. 9, notes 140 - 145 and accompanying text.

B. Where Article L, Section IB, paragraph 308, is used and the IFRB resolves the matter, if any changes to the characteristics published under paragraph 306 are effected, another publication will be made in accordance with paragraph 306. If no such changes are effected, the IFRB shall record the assignment in the List and the administration will notify the assignment in accordance with Article M. See supra ch. 9, notes 145 - 146 and accompanying text.

C. The IFRB will apply the procedures of Article L, Section IB, for an Existing System even though that System may have characteristics identical to those contained in Part B of the Plan. See supra ch. 9, notes 117 - 122 and accompanying text.

D. When a notifying administration has initiated the procedures of Article L, Section II, for the establishment of a subregional system, during the application of Annex 4 pursuant to paragraph 206, the IFRB will examine the potential of interference to an Existing System in Part B and provide the results of its examination to the notifying administration for its information only. See supra ch. 9, note 132 and accompanying text.

E. Where the procedures of Article L do not specifically provide for a notice to be returned following unsuccessful action by the IFRB to assist an administration in implementing an assignment, the IFRB will return the notice to the notifying administration with guidance regarding future options. See supra ch.9, notes 146 - 148 and accompanying text.

NOTE: The IFRB should determine whether the analysis of Annex 4 is required subsequent to the application of the PDA concept and take appropriate action. See supra ch. 9, notes 133 - 135 and accompanying text.

MINOR ERRORS IN APPENDIX 30B AND SUGGESTED AGENDA ITEM

A. In Article F, Additional Use, paragraph (b), change "216" to "215." See supra ch. 9, note 81.

B. In Article L, Section I, paragraph 108 (a), delete "or an additional use." See supra ch. 9, note 103.

C. In Article L, Section IB, paragraphs 301bis and 302; and in Section III, paragraph 305, change "entered" to "recorded." See supra ch. 9, note 139.

The following topic should be added to the agenda of a future WARC:

noting: that during the preparation of Appendix 30B at the Second Session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It (WARC-ORB(2)), some minor errors were made;

* * *

resolves [the agenda will include]

x. consider the possible correction of minor errors in Appendix 30B (ORB-88) on the basis of a list to be submitted by the IFRB after consultation with administrations. Such corrections shall be made without substantive impact on the Plan and Procedures of Appendix 30B.