INTERNATIONAL COOPERATION BETWEEN COMMUNICATIONS SATELLITE SYSTEMS: AN OVERVIEW OF CURRENT PRACTICES AND FUTURE PROSPECTS

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I. INTRODUCTION

It has been almost twenty years since Sputnik I was successfully launched and orbited.[1] Since then outer space activities have increased, bringing both tangible and intangible benefits to mankind. The communications satellite has provided highly visible benefits, having daily impact on the lives of many people located at virtually every point on the globe. At the same time, the proliferation of communications satellites has also brought about the necessity for extensive international cooperation and coordination in their deployment and use.[2]

At the time of the Sputnik I launch in October 1957, standards had not yet been developed for the allocation of portions of the radio frequency spectrum for space services, and guidelines had not yet been conceived to obviate potential interference between space systems. Although experts undoubtedly appreciated the finite nature of the then available portions of the spectrum, there were not very many pundits prognosticating numerous systems with their potential for harmful interference. The various exercises underway under the aegis of the United Nations related in general to international cooperation in space endeavors with specific efforts to allocate portions of the spectrum to the space and earth-space radio services first occuring in 1959 at the Administrative Radio Conference held in Geneva, Switzerland.[3] Prior to that time, the astronautical services were not officially defined, either on a national governmental basis or internationally. This created an erratic situation. Sometimes coordination and clearance took place in accordance with concepts of international norms of behavior

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[1]Space Technology Laboratories, Space Log 2 (Herrick ed. 1960); New York Times, Oct. 5, 1957, at 1, Col. 8.

[2]For a discussion of telecommunications development and their impact, see Charyk, Satellite Communications, in The Impact of Space Science on Mankind 25-26 (Greve, *et al* eds. 1976); Clarke, The Coming of the Space Age (1967); Dunlap, Communications in Space (1970); International Telecommunication Union, From Semaphore to Satellite (1965); Rosenberg, The Impact of Space Communications, in The Impact of Space Science on Mankind, *supra*, at 57-66.

[3]See Section II. *A. infra*.

and self interest. On other occasions, however, it did not take place resulting in either the threat or reality of interference for certain space programs.[4]

More than just time has passed. The radio frequency spectrum is a scarce resource and the geosynchronous orbit, while rather large in its circumscribed arc, cannot be utilized inefficiently. This is due to the fact that the communications satellite has been employed in geosynchronous orbit at a remarkable rate and by a strikingly large number of nations and organizations. Undoubtedly, more and more nations and organizations have come to perceive the enormous benefits offered by these satellites and have the capability, either themselves or as made available by others, to develop, construct, establish and operate communications satellite systems. Facilitating this proliferation of satellite systems is the policy of the United States Government pursuant to which launch services are provided to other nations on a cost-attractive basis, as well as the development of launch capabilities by other Governments.[5] Among the existing or proposed satellite telecommunications systems of several nations and organizations are: the global communications satellite system of the International Telecommunications Satellite Organization (INTELSAT); the various United States domestic systems, (the WESTAR, RCA and COMSTAR systems); in Canada, the TELESAT system; in Indonesia, the PALAPA domestic system; the STATSIONAR system of the Soviet Union; the proposed international maritime network; the U.S. Marisat program; the French/German Symphonie and Italian Sirio experimental satellite systems; and the proposed Brazilian and Colombian domestic systems.[6] Clearly, it is both desirable and necessary to effect coordination between and among these various systems to avoid interference and to achieve efficient use of

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[4]A. Haley, Space Law and Government 169 (1963).

[5]67 Dept. State Bull. 533-34 (1972); 65 Dept. State Bull. 624-27 (1971).

[6]For further information on these systems, see Bichara, The Symphonie Project, in Communications Satellite Systems: An Overview of the Technology (Gould & Lum eds. 1976); Brown, The International Telecommunications Satellite Organization and The U.S.S.R. Domestic Systems, in *id.*; Deane & Lipke, Maritime Satellite Communications, in *id.*; Gould, U.S. Domestic Communication Satellite Systems, in *id.*; Kawan, The Canadian Domestic System, in *id.*; COMSAT, Pocket Guide to the Global Satellite System 4-22 (1976); COMSAT, Annual Report to the President and the Congress 2-31 (1975); Symphonie in Africa, Air & Cosmos 27 (June 12, 1976); Franco-German Utilization:Symphonie Program, Air & Cosmos 40-41 (May 10, 1975); Use of Symphonie by Canada, France and Germany, Air & Cosmos 45 (March 15, 1975); COMSAT-ATT U.S. Domestic Satellite, Air and Cosmos 41 (Sept. 8, 1973); Brazilian Bid Accepted, Aviation Week and Space Technology 47 (July 12, 1976); Brazilian Telecommunications, Financial Times 26 (Sept. 23, 1975); Indonesian Satellite, Financial Times 6 (March 25, 1975); Russia Launches First Statsionar, Flight International 83 (Jan. 10, 1976); TELESAT Canada Launches Last Anik, Flight International 891 (May 29, 1975); Maritime Satellite Conference Decisions, Flight International 809 (May 29, 1975); Advanced RCA COMSAT to use New Delta, Flight International 808 (May 15, 1975); International Maritime Satellite Conference in London, Flight International 778 (May 8, 1975); Indonesia Orders COMSAT System, Flight International 345 (Feb. 27, 1975); Commercial Applications Satellites, Flight International 880-89 (Dec. 9, 1974); Satellite Survey, Flight International 203-05 (Feb. 8, 1973; Full Marisat Services in Atlantic, ITU Journal 641 (Oct. 1976); Indonesia First Domestic Satellite Launches, ITU Journal 660 (Sept. 1976); Toward Realization of International Maritime Satellite Systems, ITU Teleclippings 1-3 (Sept. 15, 1975); Communications Needs in Developing Countries, Telecommunications 50-51 (Sept. 1976).

international resources. This has not been an easy task in the past and promises to be an even more complex one in the future.

It may be useful to review some of the procedures which have evolved thus far and to present a practical exposition of activities of two major international organizations concerned with these matters: The International Telecommunication Union (ITU), which is engaged in the establishment of appropriate guidelines and criteria for intersystem coordination as an international regulatory body; and the International Telecommunications Satellite Organization (INTELSAT), which has established and operates a single global satellite system with certain responsibilities relative to its own actions and those of its members regarding coordination.

While this article focuses exclusively on a particular facet of space activity and the relevant work of these two organizations, any discussion of international cooperation in outer space must at a minimum make reference to the extensive work of the United Nations. Neither the ITU nor INTELSAT could have functioned as effectively as they have with respect to intersystem coordination absent the foundation laid by the United Nations through its formulation of general principles to be followed in undertaking activities in outer space. The efforts of the United Nations in directing the attention of its members to the necessity for international cooperation has both preceded and paralleled the efforts expended by INTELSAT and the ITU. These efforts have been detailed elsewhere[7] and, thus, will not be reviewed again herein.

II. REVIEW OF THE ROLE OF THE ITU

A. *Purposes and Structure*

Throughout its history, the ITU has managed to evolve in response to developments in technology.[8] Pursuant to its most recent charter,[9] the ITU has several objectives: to maintain and extend international cooperation for the improvement and rational use of telecommunications of all kinds; to promote the development of technical facilities and their most efficient operation, with a view to improving the

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[7]*See, e.g.*, S. Lay and H. Taubenfeld, The Law Relating to the Activities of Man in Space 81-102 and Appendix E (1970); Abdel-Ghani, Special Report on United Nations Institutions Concerned With Space Activities, 13th Colloq. on the Law of Outer Space 39 (1970); Christol, General Report on Activities and Action of the United Nations Organizations in the Space Field, *id.*, at 11; Colino, The United Nations Organization and the Legal Problems of Outer Space: The United Nations, Its Specialized Agencies, and Communications Satellites, *id.*, at 234; Galloway, The Future of Space Law, 19th Colloq. on the Law of Outer Space 2 (1976).

[8]*See* Leive, International Telecommunications and International Law: The Regulation of the Radio Spectrum 29-80 (1970); International Telecommunication Union, *supra* note 2, at n.2.

[9]International Telecommunication Convention (Signed Malaga - Torremolinos, 1973), 23 U.S.T. 1527, T.I.A.S. No. 7935.

efficiency of telecommunications services, increasing their usefulness and, as far as possible, making them generally available to the public; and to harmonize the action of nations to attain these ends.[10] To implement these objectives the ITU is, *inter alia,* to effect the allocation of the radio frequency spectrum and registration of radio frequency assignments in order to avoid harmful interference between radio stations of different countries. It is also to coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio frequency spectrum. With a view to harmonizing the development of telecommunications facilities, notably those using space techniques, the ITU is to coordinate such efforts and to seek to take full advantage of the possibilities of such facilities.[11]

In order to discharge this mandate the ITU has evolved a structure which consists of a Plenipotentiary Conference (the supreme organ), Administrative Conferences, the Administrative Council and four permanent organs: the General Secretariat; the International Frequency Registration Board (IFRB); the International Radio Consultative Committee (CCIR); and, the International Telephone and Telegraph Consultative Committee (CCITT).[12] Of particular importance to intersystem coordination is the work undertaken by the IFRB and the Administrative Radio Conferences.

The IFRB is to effect an orderly recording of frequency assignments made by different countries in order to establish the date, purpose and technical characteristics of each of these assignments with a view to ensuring formal international recognition thereof. This process is to be undertaken in accordance with the procedures provided for in the Radio Regulations and in accordance with any decisions which may be taken by ITU Conferences.[13] Under the same conditions and for the same purposes, the IFRB is also to achieve an orderly recording of the positions assigned by countries to geostationary satellites. In addition, the IFRB is to furnish advice to its members, with a view to the operation of the maximum practicable number of radio channels in those portions of the spectrum where harmful interference may occur, and with a view to the equitable, effective and economical utilization of the geostationary satellite orbit.[14] The IFRB also performs any additional duties with respect to the assignment and utilization of frequencies and the utilization of the geostationary satellite orbit, in accordance with the procedures provided for in the Radio Regulations, and as may have been prescribed by a competent ITU Conference or by the Administrative Council with the consent of a

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[10] *Id.*, Chap. 1, Art. 4-1.

[11] *Id.*, Art. 4-2.

[12] *Id.*, Art. 5.

[13] *Id.*, Art. 10-3.

[14] *Id.*

majority of ITU members.[15] It is of course recognized that an important function of the IFRB is its maintenance of essential records in connection with the performance of its various duties.[16]

The ITU Administrative Conferences may be either world-wide or regional and are normally convened for the purpose of considering specific telecommunications questions.[17] As noted earlier,[18] an Ordinary Administrative Radio Conference of the ITU was convened in 1959 in order to revise the 1947 Radio Regulations and to consider the allocation of certain frequency bands to the space and earth-space services on a world-wide basis for research purposes. This conference adopted definitions of new terms such as "space service", "earth-space service", "space station" and "earth station", thus paving the way for the introduction of satellite telecommunications services in the future. More significantly, however, it provided for the convening of an Extraordinary Administrative Radio Conference (EARC) in 1963 for the purpose of considering and allocating frequency bands for the space radio communications service.[19] The Extraordinary Administrative Radio Conference of 1963 was a critical step forward toward the introduction of commercial communications satellites and indeed, the establishment of global commercial communications satellite services. The international agreement which was concluded by the EARC on November 8, 1963, modified the Radio Regulations by allocating frequency bands for the various space services either on a shared or exclusive basis. In particular, a total of 2800 MHz in band width was allocated for communications satellites. Specifically, 100 MHz of spectrum space was designated as being available exclusively for communications satellites and approximately an additional 2700 MHz was allocated to this service on a shared basis with terrestrial radio services. The EARC also established detailed procedures for the notification to the IFRB of frequencies used by communications satellites, as well as the characteristics of such frequencies which had to be submitted.[20] Space telecommunications were considered again and in greater depth by the 1971 World Administrative Radio Conference (WARC) convened specifically for this purpose. As a result of this Conference further progress was made in the development of rules for the use of outer space and the frequency spectrum. The 1971 WARC took several actions of significance to satellite communications and coordination of satellite systems. The frequency allocations were amended not only to provide new frequency bands for the

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[15] *Id.*

[16] *Id.*

[17] *Id.*, Art. 7.

[18] See text accompanying note 3 *supra*.

[19] International Telecommunication Union, First Report by the ITU on Telecommunications and the Peaceful Uses of Outer Space 4, 19-12 (1962).

[20] *See* ITU, Final Acts of the Extraordinary Administrative Radio Conference to Allocate Frequency Bands for Space Radiocommunication Purposes Annex 3, 6, and Recommendations Nos. 4-A, 5-A, & 10-A (1963).

fixed satellite service,[21] but also to provide some of these new frequency bands on a world-wide rather than a regional basis.[22] The Radio Regulations were also in conformity with the principle of protecting the geostationary satellite orbit and ensuring its more efficient utilization.[23] Finally, a new procedure for coordination of satellite systems was adopted which provided, *inter alia,* procedures for the advance publication of information on planned satellite systems, for coordination to be applied in appropriate cases, and for the notification of frequency assignments.[24]

Additional conferences of a similar nature have been planned. For example, the World Administrative Radio Conference of January 1977 was to endeavor to establish criteria and procedures providing for the use of bands which are shared between broadcast services and telecommunications services, *i.e.*, the 11.7-12.2 GHz band in regions 2 and 3; and, the 11.7-12.5 GHz band in region 1.[25] Another World Administrative Radio Conference is planned for 1979 to consider, among other things, coordination procedures, spectrum allocation, and sharing with other services of orbit and spectrum utilization.[26]

B. The ITU Coordination Procedures

As indicated above, coordination procedures are a major concern of the ITU, are reviewed from time-to-time, and will be reviewed again in 1979. The procedures presently governing the coordination of communication satellites are those set forth in Article 9A of the Radio Regulations. These procedures provide for the advance publication of information on planned systems and for coordination between space systems in appropriate cases. They have the ultimate objective of registration of an agreed upon use of frequencies in the Master Register. The purpose of these procedures

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[21]The 1971 WARC defined "fixed satellite services" as a radio communication service:

> between earth stations as specified fixed points when one or more satellites are used; in some cases this service includes satellite-to-satellite links, which may also be effected in the inter-satellite services; for connection between one or more earth stations at specified fixed points and satellites used for a service other than fixed satellite service (for example, the mobile-satellite service, broadcasting satellite service, etc.).

International Telecommunication Union, Radio Regulations, Art. 1-11, 23 U.S.T. 1527, T.I.A.S. No. 7935 (1973).

[22]ITU, Radio Regulations, Article 5-81-82, 86, 91-93, 95-96, 103-104, 108, 110, 113, 115-117.

[23]*Id.*, Art. 7-26-29.

[24]*Id.*, Art. 9A. For a discussion of these procedures, see section II. *B. infra*.

[25]*See, e.g.*, World Adminstrative Radio Conference for Planning of Broadcasting Satellite Service, ITU Journal 300-06 (April 1976). The three regions referred to are those defined in Article 5, paras. 126-132 of the Radio Regulations for the purpose of making frequency allocations.

[26]*See, e.g.*, Burgeoning Spectrum Needs Seen in Views on 1979 WARC, Telecommunications Report 38 (Feb. 1975).

is to ensure the availability of information on planned systems to all ITU Administrations at an early date and to permit an early identification of existing systems which may receive harmful interference from future planned systems. To this end, Article 9A requires publication through the IFRB of characteristics of the new systems (as described in Appendix 1B of the Radio Regulations) no more than five years before the anticipated date of implementation of the system.[27] If the calculation of the risk of interference, performed in accordance with Appendix 29 of the Radio Regulations, using those characteristics of the system given during the advanced publication phase, shows a potential interference exceeding 2% of the total noise in any particular link, then coordination is required with the Administration affected.[28] The actual coordination procedure consists of an exact calculation of interference using characteristics of the system provided in accordance with Appendix 1B of the Radio Regulations.[29] The coordination which has to take place before final notification is not to be conducted more than three years before the date of the implementation of the system.[30] As envisaged by the ITU, this process is intended to be flexible so that there can be voluntary relocation of existing space stations to accommodate new space stations of other ITU Administrations if, in the absence of such relocation, the new stations could not otherwise be accommodated.[31] Clearly, the provisions require a major, sustained good faith effort on the part of all Administrations engaged in the use of outer space and, in particular, on the part of those Administrations responsible for existing space stations. In the final analysis, however, true international cooperation is required since there must be mutual acceptability by the parties concerned if a relocation is to take place.

In brief, this outlines the salient features of the coordination process developed by the ITU, as the international regulatory authority in the field of telecommunications. Each and every nation which is a member of the ITU now numbering in excess of 140 countries, and which has adopted and approved the Radio Regulations is obliged to follow these procedures. Consequently, a very large number of countries are affected. In addition, other organizations adhere to the ITU Radio Regulations, and follow the work, findings and recommendations of the CCIR and CCITT. One such organization is INTELSAT.

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[27]International Telecommunication Union, Radio Regulations, Article 9A-1, 23 U.S.T. 1527, T.I.A.S. No. 7935 (1973).

[28]*Id.*, Art. 9A-4-5.

[29]*Id.*, App. 29-1-6.

[30]*Id.*, Art. 9A-13.

[31]*Id.*, Art. 9A-3.

III. INTELSAT AND ITS APPROACH TO COORDINATION

A. Relationship with the ITU

To become a member of the International Telecommunications Satellite Organization (INTELSAT) a nation must be a member of the ITU.[32] In addition, INTELSAT has decided voluntarily to give due consideration to the relevant recommendations and procedures of the CCITT and the CCIR.[33] INTELSAT coordination procedures specify, *inter alia,* that all information stipulated by the appropriate ITU and CCIR recommendations are to be made available to INTELSAT by its members who are planning separate systems. INTELSAT also participates on a working level, in ITU activities, has sent observers to various ITU events, including the 1971 WARC, and plans to participate in the 1979 WARC with the possibility of developing proposals for changes to the Radio Regulations.

B. What is INTELSAT?

INTELSAT is an organization established for the purpose of continuing and carrying forward on a definitive basis, the design, development, construction, establishment, operation and maintenance of the space segment of the global commercial telecommunications satellite system which was established in the 1960's under interim arrangements.[34] The organization currently has some 95 members and has placed successfully more than four generations of communications satellites into orbit for the purpose of providing telecommunications services to all areas, nations and peoples of the world. INTELSAT's constitution is to be found in two agreements: one concluded among governments, which is known as the Agreement for the Establishment of the International Telecommunications Satellite Organization and which sets forth the organizational framework; and the Operating Agreement which is concluded among Signatories who are either the Parties signing the Agreement or their designated

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[32]Agreement Relating to the International Telecommunications Satellite Organization (INTELSAT) Art. XIX (a) (ii), T.I.A.S.7532 (1973). There is also an Operating Agreement. Both of these Agreements are collectively referred to as the definitive arrangements which superseded the Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System, the Special Agreement, and the Supplementary Agreement on Arbitration, T.I.A.S. 5646. The interim arrangements entered into force on August 20, 1964; the definitive arrangements entered into force on February 12, 1973, and superseded the interim arrangements.

[33]Operating Agreement Relating to the International Telecommunications Satellite Organization Art. 13, T.I.A.S. 7532 (1973).

[34]*Id.*, Agreement, Article II (a). The space segment referred to is defined in Article I (h) as the telecommunications satellites, and the tracking, telemetry, command, control, monitoring and related facilities and equipment required to support the operation of these satellites.

telecommunications entities and which sets forth more detailed technical, operational and financial aspects of system operation.[35]

INTELSAT's prime objective is the provision on a commercial basis of the space segment required for international public telecommunications services of high quality and reliability to be available on a non-discriminatory basis to all areas of the world.[36] INTELSAT has been eminently successful in achieving this objective. At present, there are four INTELSAT satellites in orbit providing daily telecommunications services of a variety of types: two INTELSAT IV-A's over the Atlantic, and a single INTELSAT IV over each of the other two ocean regions - the Pacific and Indian. In addition, there are satellites over each ocean region serving as spares in orbit as a backup to the four operational satellites. Accessing these satellites at the end of 1976 were 157 operational earth station antennae at 126 earth stations located in 82 countries.

In addition to provision of space segment capacity to meet its primary objective, INTELSAT is authorized to provide capacity on the INTELSAT space segment for domestic public telecommunications services.[37] Indeed, provision of certain of these services is to be treated on the same basis as provision of international public telecommunications services.[38] At the end of 1976 there were a number of countries either utilizing or planning to utilize the INTELSAT system exclusively for domestic

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[35]Agreement Relating to the International Telecommunications Satellite Organization, T.I.A.S. 7532 (1973).

[36]*Id.*, Art. III (a). Article I (k) of the Agreement defines public telecommunications services as "fixed or mobile telecommunications services which can be provided by satellite and which are available for use by the public, such as telephone, telegraphy, telex, facsimile, data transmission, transmission of radio and television programs between approved earth stations having access to the INTELSAT space segment for further transmission to the public, and leased circuits for any of these purposes; but excluding those mobile services of a type not provided under the Interim Agreement and the Special Agreement prior to the opening for signature of this Agreement, which are provided through mobile stations operating directly to a satellite which is designed, in whole or in part, to provide services relating to the safety or flight control of aircraft or to aviation or maritime radio navigation."

[37]*Id.*, Art. III (b), (c).

[38]Article III (b) provides that the following are to be considered on the same basis as international public telecommunications services:

> (i) domestic public telecommunications services between areas not under the jurisdiction of the State concerned, or between areas separated by the high seas; and
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> (ii) domestic public telecommunications services between areas which are not linked by any terrestrial wide-band facilities and which are separated by natural barriers of such an exceptional nature that they impede the viable establishment of terrestrial wide-band facilities between such areas, provided that the Meeting of Signatories, having regard to advice tendered by the Board of Governors, has given the appropriate approval in advance.

public telecommunications.[39] INTELSAT may also provide international and domestic specialized telecommunications services[40] either by means of the INTELSAT space segment or by means of separate facilities established specifically for those purposes in accordance with relevant terms and conditions as set forth in the Agreement.[41]

INTELSAT's structure consists of four major organs: the Assembly of Parties; the Meeting of Signatories; the Board of Governors; and an Executive Organ responsible to the Board of Governors.[42] The Assembly of Parties is composed of representatives of all

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[39]Thirteen Signatories have utilized, do utilize, or plan to utilize the INTELSAT space segment for provision of domestic public telecommunications services. With the exception of some Article III (b) (i) services (*e.g.*, U.K. to Hong Kong) the majority of domestic public telecommunications services are pursuant to long term (*i.e.*, for period of 5 years) allotments. The long term allotment agreement may be either on a preemptible or a nonpreemptible basis. If on a preemptible basis (*i.e.*, subject to removal if necessary to accommodate a higher priority service), such leases are on spare capacity and are charged for at a reduced rate. Each allotment agreement may be for either a whole, or a half, or a quarter of a transponder. Signatories currently having such allotment arrangements and the nature of the allotment either actually in effect or approved are:

Algeria	1 transponder	(spare, preemptible)
Brazil	1 transponder	(nonpreemptible)
Chile	1/4 transponder	(spare, preemptible)
Colombia	1/4 transponder	(spare, preemptible)
France	1/2 transponder	(spare, preemptible)
Malaysia	1 transponder	(spare, preemptible)
Nigeria	3 transponders	(spare, preemptible)
Norway	1/2 transponder	(spare, preemptible)
Saudi Arabia	1/4 transponder	(spare, preemptible)
Spain	1/2 transponder	(nonpreemptible)
Sudan	1 transponder	(spare, preemptible)
Zaire	1 transponder	(spare, preemptible)

The U.S. at one time leased a transponder on a nonpreemptible basis for provision of continental U.S. to Hawaii traffic. Brazil has also been given approval for the lease of two transponders on a preemptible basis upon termination of its current lease arrangement.

[40]Article I (1) of the Agreement defines specialized telecommunications services as telecommunications services which can be provided by satellite, other than those defined in paragraph (k) [public telecommunications services] including, but not limited to, radio navigation services, broadcasting satellite services for reception by the general public, space research services, meteorological services and earth resources services.

[41]Agreement relating to the International Telecommunications Satellite Organization, Art. III (d), (e), and (f), T.I.A.S. 7532 (1973). These provisions specify that international and domestic specialized telecommunications services may be provided on the INTELSAT space segment if the provision of public telecommunications services is not unfavorably affected thereby and if the arrangements are otherwise acceptable from a technical and economic point of view. Such services may be provided on separate facilities on request and subject to appropriate terms and conditions. INTELSAT's Assembly of Parties must authorize any provision of specialized telecommunications services either on the INTELSAT space segment or on separate satellites established.

[42]*Id.*, Art. VI.

governments Party to the Agreement. It has certain powers and decision making responsibility with respect to general policy and, in particular, with respect to provisions involving coordination of separate systems.[43] It meets approximately every two years. The Meeting of Signatories convenes annually, much as a shareholders meeting, to consider matters of interest to the telecommunications entities involved in utilizing the system.[44] The Board of Governors is an organ primarily concerned with management and operational responsibility, *e.g.*, it is responsible for the design, development, construction, establishment, operation and maintenance of the INTELSAT space segment. In terms of decision-making responsibilities, it is the most active and significant organ of INTELSAT. With respect to intersystem coordination, the Board has responsibility for making findings or tendering advice with respect to possible conflict with the INTELSAT space segment by systems separate from the INTELSAT space segment facilities which are expected to be established, acquired or utilized by Parties, Signatories, or other entities within the jurisdiction of Parties.[45] The day to day

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[43]*Id.*, Art. VII. Among the functions of the Assembly are: to formulate its views or make recommendations to other INTELSAT organs in the exercise of its power of considering general policy and long term objectives; to decide upon questions concerning formal relationships with States and international organizations; and to act upon amendments to the Agreement. Its specific responsibility in the area of intersystem coordination is to express in the form of recommendations, its findings regarding the technical and economic compatibility of satellites separate from the INTELSAT space segment for public international telecommunications services and technical compatibility of satellites separate from the INTELSAT space segment for specialized telecommunications services.

[44]*Id.*, Art. VIII. Among the functions of the Meeting of Signatories are: to consider annual reports on INTELSAT's activities and future programs and express its views thereon; to act on amendments to the Operating Agreement; to determine annually the minimum investment share for representation on the Board of Governors; to authorize increases in the capital ceiling. It has no role to play in intersystem coordination.

[45]*Id.*, Art. X. The Board is allocated numerous specific policy making and operational functions such as: adoption of policies, plans and programs for the design, development, construction, establishment, operation and maintenance of the INTELSAT space segment; adoption of financial policies and approval of budgets; adoption of terms and conditions for allotment of space segment capacity, approval of earth stations to access the space segment, and rates of charge. Specific responsibilities of the Board in connection with intersystem coordination are: expression of its findings in the form of recommendations with respect to the establishment of separate satellite systems for domestic public telecommunications services; tendering of advice to the Assembly of Parties with respect to the technical and economic compatibility of separate satellite systems for international public telecommunications services and with respect to technical compatibility of separate satellite systems for specialized telecommunications services; and establishment of general internal rules and adoption of decisions in each instance concerning notification to the ITU in accordance with its rules of procedure of the frequencies to be used for the INTELSAT space segment.

The Board meets approximately every two months, or six times a year, for a week at a time. Presently, the Board is composed of 25 Governors representing 73 Signatories. The Governors and respective Signatories they represent are as follows: Africa Group I (Ethiopia, Kenya, Tanzania, Uganda, Zambia); Africa Group II (Cameroon, Central African Republic, Gabon, Ivory Coast, Senegal, Zaire); Arab Group (Algeria, Arab Republic of Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Yemen); Argentina, Asia/Pacific Group (India, Malaysia, New Zealand, Singapore, Sri Lanka); Australia; Belgium/Netherlands/Luxembourg; Brazil/Portugal; Canada; Caribbean Group (Barbados, Dominican Republic, Haiti, Jamaica, Trinidad & Tobago); Colombia/Ecuador/Peru; France/Monaco; Germany; Greece/Switzerland/Austria/Liechtenstein; Israel; Italy/Vatican City; Japan; Republic of Korea/Pakistan/

management of the organization is undertaken by the Director General who is the chief executive of the organization and who is responsible for the performance of all management functions. Certain of these functions are performed in-house by the staff of the Executive Organ, and other functions are performed pursuant to a contract with an outside entity, known as the management services contractor.[46]

It is within this structure and in accordance with the functions allocated to the various INTELSAT organs that intersystem coordination takes place. INTELSAT Parties and Signatories have responsibilities with respect to both coordination of any separate systems in which they plan to participate with the INTELSAT system and coordination of the INTELSAT system itself in accordance with ITU requirements. These, of course, are in addition to the individual obligations of governments assumed by virtue of their membership in the ITU.

C. Rights and Obligations of INTELSAT Members

Determination of the rights and obligations of INTELSAT members with respect to satellite systems separate from INTELSAT was a major issue in negotiation of the

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Iran/Turkey; Mexico; Nordic Group (Denmark, Finland, Iceland, Norway, Sweden); Southeast Asia Group (Indonesia, Philippines, Thailand); Spain; United Kingdom/Ireland; United States; Venezuela/Chile/Bolivia.

[46] *Id.*, Art. XI and XII. Management arrangements for INTELSAT was one of the major issues in the negotiation of the definitive arrangements. For a discussion of the history of the negotiation of these provisions and major positions taken with respect thereto, see Colino, The INTELSAT Definitive Arrangements: Ushering in a New Era in Satellite Communications, European Broadcasting Union Monograph No. 9, at 45-50 (1973).

INTELSAT management arrangements as set forth in Articles XI and XII may be summarized as follows: An Executive Organ responsible to the Board was created and is in the process of acquiring increasing in-house management responsibilities during the period from entry into force until 6 years thereafter, *i.e.*, February 12, 1979. This Executive Organ was headed until December 31, 1976, by a Secretary General, appointed by and responsible to the Board. Management services of a technical and operational nature are provided by Comsat under a contract with INTELSAT in effect until February 1979. During this period, *i.e.*, until December 31, 1976, Comsat as management services contractor reported directly to the Board, and the Secretary General was not interposed between the Board and Comsat. However, he was to keep the Board fully and currently informed on the performance of Comsat under the contract, and to the extent practicable was to observe, but not participate in, major contract negotiations conducted by Comsat on behalf of INTELSAT.

After December 31, 1976, and hence, currently, there is a Director General, responsible to and acting in accordance with the policies and directives of the Board for all management services. The Director General was appointed by the Board and his appointment was confirmed by the Assembly of Parties at its Second Meeting in 1976. Until the expiration of its contract, Comsat continues to provide management services of a technical and operational nature and in its performance is responsible to the Director General rather than to the Board. After the expiraton of the management contract with Comsat, the Director General is to contract out to one or more competent entities, technical and operational functions to the maximum extent practicable with due regard to cost and consistent with competence, effectiveness, and efficiency. The permanent organizational structure of the Executive Organ was adopted by the Assembly, based upon a study conducted by the Board, at its Second Meeting in 1976. Permanent management arrangements are to be implemented not later than the sixth year after entry into force, or by February 12 1979.

INTELSAT definitive arrangements. Varying views were put forth on the nature of the obligations which governments and their designated telecommunications entities should undertake. These views ranged from total freedom to establish or participate in separate systems, to the requirement that all INTELSAT members utilize only the INTELSAT system for international services and, possibly, other services as well. One of the major concerns was the possibility of economic harm to the INTELSAT system if numerous separate systems were established by INTELSAT members. There was also concern that INTELSAT's objective of the establishment of a global system serving all areas of the world might be impaired by a proliferation of separate systems which would place increased demands on the scarce resources of the orbital arc and the radio frequency spectrum.

Numerous issues had to be considered and resolved before the rights and obligations of INTELSAT members were definitively set forth. A prime issue was the extent to which findings by INTELSAT with respect to potential interference, both technical and economic, should and could be considered binding on sovereign states, or their designated telecommunications entities. Another significant issue was whether INTELSAT should have reciprocal obligations to consult and coordinate with its members on additions to the INTELSAT system which might affect their planned or existing separate systems.[47] Further complicating the entire matter were the different approaches suggested with respect to the different types of services to be carried on the separate system (*i.e.*, with respect to international public telecommunications service, domestic public telecommunications services, specialized telecommunications services (either international or domestic), and separate systems contemplated for national security purposes).[48] There was also a question, essentially of a procedural nature, involving the possibility that INTELSAT might fail to act in an expeditious manner and hence have an impact upon plans of a member to establish a separate satellite system.[49]

These, and related issues, were successfully negotiated and resolved in what, judged by recent experience, appears to be a practical manner. There are, of course, various interpretations possible of the provisions of the INTELSAT Agreement causing questions to be raised. Nevertheless, most of the issues described above were resolved in a fairly straight forward fashion. Pertinent provisions of Article XIV of the Agreement provide:

> (c) To the extent that any Party or Signatory or person within the jurisdiction of a Party intends to establish, acquire, or utilize space segment facilities separate from the INTELSAT space segment facilities to meet its domestic public telecommunications services requirements, such Party or Signatory, prior to the establishment, acquisition or utilization of such facilities, shall consult the Board of Governors, which shall express, in the form of recommendations, its findings regarding the technical compatibility of such

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[47]*See* Colino, *supra* note 46, at 88-98.

[48]For definitions of public and specialized telecommunications services, see notes 36 & 40 *supra*.

[49]*See* Colino, *supra* note 46, at 99.

facilities and their operation with the use of the radio frequency spectrum and orbital space by the existing or planned INTELSAT space segment.

(d) To the extent that any Party or Signatory or person within the jurisdiction of a Party intends individually or jointly to establish, acquire or utilize space segment facilities separate from the INTELSAT space segment facilities to meet its international public telecommunications services requirements, such Party or Signatory, prior to the establishment, acquisition or utilization of such facilities, shall furnish all relevant information to and shall consult with the Assembly of Parties, through the Board of Governors, to ensure technical compatibility of such facilities and their operation with the use of the radio frequency spectrum and orbital space by the existing or planned INTELSAT space segment and to avoid significant economic harm to the global system of INTELSAT. Upon such consultation, the Assembly of Parties, taking into account the advice of the Board of Governors, shall express, in the form of recommendations, its findings regarding the considerations set out in this paragraph, and further regarding the assurance that the provision or utilization of such facilities shall not prejudice the establishment of direct telecommunication links through the INTELSAT space segment among all the participants.

(e) To the extent that any Party or Signatory or person within the jurisdiction of a party intends to establish, acquire or utilize space segment facilities separate from the INTELSAT space segment facilities to meet its specialized telecommunications services requirements, domestic or international, such Party or Signatory, prior to the establishment, acquisition or utilization of such facilities, shall furnish all relevant information to the Assembly of Parties, through the Board of Governors. The Assembly of Parties, taking into account the advice of the Board of Governors, shall express, in the form of recommendations, its findings regarding the technical compatibility of such facilities and their operation with the use of the radio frequency spectrum and orbital space by the existing or planned INTELSAT space segment.

(f) Recommendations by the Assembly of Parties or the Board of Governors pursuant to this Article shall be made within a period of six months from the date of commencing the procedures provided for in the foregoing paragraphs. An extraordinary meeting of the Assembly of Parties may be convened for this purpose.

(g) This Agreement shall not apply to the establishment, acquisition or utilization of space segment facilities separate from the INTELSAT space segment facilities solely for national security purposes.[50]

Within this article is the policy guidance necessary to permit effective coordination. How this policy was to be implemented and what procedures and specific guidelines would be required to achieve this were questions left to be answered by the organization itself, primarily the Board of Governors.

D. Implementation of and Adherence to the Provisions of Article XIV of the Agreement

The question of what tests should be developed to assess significant economic harm was considered rather early in the history of the Board of Governors. Obviously, the application of the significant economic harm test would be only within the context of

[50]Agreement relating to the International Telecommunications Satellite Organization, Art. XIV, T.I.A.S. 7532 (1973).

Article XIV (d) requiring coordination of satellites, separate from INTELSAT for the provision of international public telecommunications services. This was an important undertaking because INTELSAT's primary purpose is to provide international public telecommunications services and, hence, it could be harmed "significantly" only with respect to the provision of these services on a separate system. Procedures were adopted at the Fifth Meeting of the INTELSAT Board of Governors which occurred in October 1973.[51] These procedures provided the specific guidelines for ascertaining economic consequences to INTELSAT, (*e.g.*, for determining economic impact on projected INTELSAT space segment costs and utilization charges both with and without the services in question; and the impact on the magnitude of the investment shares of Signatories).[52] No criteria were developed, however, for ascertaining the degree of economic harm; this was left for future resolution. As matters have developed, there has been only one separate system requiring that type of coordination, namely the U.S. Marisat system.[53]

The thrust of all coordination, of course, is technical and operational compatibility required regardless of the type of service to be provided and hence required by Article XIV (c), (d), and (e) of the Agreement. At its Fifth and Sixth Meetings the INTELSAT Board of Governors developed procedures to be applied to such coordination.[54] Initially, these procedures were made equally applicable to experimental satellites but at its Seventh Meeting, in January 1974, the Board decided to exclude experimental satellites from the purview of these procedures.[55] INTELSAT coordination procedures require that all information stipulated by the appropriate ITU and CCIR recommendations should be furnished to the Director General of INTELSAT by Parties or Signatories planning separate satellite systems.[56] This information is intended to provide a reasonable basis upon which INTELSAT can ascertain the technical compatibility or incompatibility of proposed systems with the INTELSAT system. Adherence to this requirement would also permit INTELSAT to undertake necessary calculations, of the nature specified in Appendix 29 of the Radio Regulations, to determine whether or not

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[51]INTELSAT Board of Governors, Summary Record of the Fifth Meeting BG-5-3, para. 122, at 63 (October 1973).

[52]INTELSAT Board of Governors, Intersystem Coordination Procedures: Proposed Procedures for Implementation of Article XIV (d) Requirements Concerning Significant Economic Harm, BG-5-43 (October 1973). The investment shares of Signatories to the Operating Agreement are normally determined annually based upon recent use of the system. See Article 6 of the Operating Agreement.

[53]This system is discussed in part IV.*A. infra*.

[54]INTELSAT Board of Governors, Summary Record of the Fifth Meeting, BG-5-3, paras. 119-120, at 62-63 (October 1973); Summary Record of the Sixth Meeting, BG-6-3, para. 26, at 14 (December 1973).

[55]INTELSAT Board of Governors, Summary Record of the Seventh Meeting, BG-7-3, paras. 38-40, at 27-28 (January 1974).

[56]INTELSAT Board of Governors, INTELSAT Technical Coordination Procedures, BG-7-38 (February 1974).

harmful interference would result. The Director General, in conjunction with the appropriate advisory committees of INTELSAT, is to analyze the information and make recommendations with respect to the findings to be made on technical and operational compatibility. In particular, an effort will be made to determine the potential interference between systems taking into account both up path interference and down path interference to all earth stations operating with the INTELSAT system. These calculations are intended to be made in such a fashion as to take into account both existing and planned systems of INTELSAT.[57]

With respect to separate satellites for domestic public telecommunications services, the Board of Governors is to issue its findings as to technical compatibility and, if such findings are favorable, is to notify formally the appropriate government and/or private telecommunications officials. In the event findings are unfavorable to the Party or Signatory concerned, the Board would take steps to resolve the difficulties in an appropriate manner.[58] With respect to separate satellites for international public telecommunications services, and specialized telecommunications services whether international or domestic, the Board is to advise the Assembly of Parties as to the technical, and in the case of separate satellites for international public telecommunication services, economic compatibility of the proposed system in order to permit the Assembly to issue its findings in accordance with the provisions of the Agreement.[59] Although these procedures are not applicable to experimental satellites, the Board has indicated that it would expect, in the interest of all Parties and Signatories, that technical coordination for such systems would be undertaken on a voluntary basis in a manner similar to that applicable to satellites operating on a commercial basis. Of course, should such experimental satellites be utilized or intended for utilization at a later date on a commercial basis, then they would be subject fully to the requirements of Article XIV and the procedures established by the Board of Governors.[60] On a voluntary basis, thus far several experimental satellite systems have been coordinated with INTELSAT, including the European OTS, the Franco-German Symphonie, and the Italian Sirio networks.

Coordination of satellites providing specialized telecommunications services appeared to present problems of some magnitude at an early stage in the development of the INTELSAT organization under the definitive arrangements. In 1973 and 1974, it seemed likely that there could be a number of separate satellites planned to provide specialized telecommunications services which would fall within the definition of such services in Article I (1) of the Agreement. Consequently, the need might arise for many extraordinary meetings of the Assembly of Parties in order to comply with the

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[57] *Id.*, Attachment No. 2, at Section II.

[58] *Id.*, Attachment No. 2, at Section III.

[59] *Id.*, Attachment No. 2, at Section IV.

[60] INTELSAT Board of Governors, *supra* note 52.

requirements of Article XIV that findings be made within a six month period. In the light of experience, the concern has failed to materialize, and the Assembly has noted that in the application of Article XIV relating to such satellites no undue problems have yet arisen. The Assembly, however, is cognizant of potential difficulties and is keeping the matter under advisement for future consideration.[61]

Experience to date has indicated that the overwhelming majority of systems requiring coordination with the INTELSAT system have been separate satellite systems for domestic public telecommunications services. In fact, there has been only one system coordinated pursuant to Article XIV (d) (the U.S. Marisat system) and two systems coordinated pursuant to Article XIV (e).[62]

In spite of these procedures and efforts by INTELSAT members to comply with them, problems have been encountered in implementing the Article XIV provisions and related procedures. Interestingly enough, most of the problems have developed in connection with Article XIV (c) and technical and operational requirements, rather than with Article XIV (d), economic considerations.

IV. INTELSAT CASE STUDIES IN COORDINATION

There are numerous examples of INTELSAT coordination, basically of two types. First of all, INTELSAT complies with the applicable ITU Radio Regulations and coordinates its satellites pursuant thereto.[63] No serious difficulties have yet been

[61]INTELSAT Assembly of Parties, Summary Record of the Second Meeting, AP-2-3, para. 20, at 13 (September 1976). The Assembly of Parties was initially apprised of this potential problem at its First Meeting in February 1974, by the Board of Governors. At that time the Assembly decided to note that the application of Article XIV (e) relates to satellites falling within the definition in Article I (1), "specialized telecommunications services," so postulating that such satellites shall be intended to provide services of a telecommunications nature.

[62]The two separate systems coordinated pursuant to Article XIV (e) were a United States Geostationary Operational Environmental Satellite (GOES) and a Japanese geostationary meteorological satellite.

[63]INTELSAT procedures for coordination, notification and protection of the INTELSAT system in accordance with Article 9A of the ITU Radio Regulations provide for the Director General to prepare the necessary information for compliance with the relevant provisions of the ITU Radio Regulations regarding the existing and planned INTELSAT space segment. Upon the Director General's request, the Board of Governors is to authorize him to arrange for submission of the necessary information through the Notifying Administration to the IFRB and to the Administrations concerned in the name and on behalf of INTELSAT Administrations which consent, after having circulated the submission to all INTELSAT Administrations. These procedures define an Administration as defined in the ITU Convention, *i.e.*, any governmental department or services responsible for discharging the obligations undertaken in the ITU Convention and the Regulations. An INTELSAT Administration is defined as the Administration, as defined above, acting in the name and on behalf of a certain number of INTELSAT Administrations under the conditions adopted by INTELSAT. The Notifying Administration is to act only in the name and on behalf of those Administrations which have agreed that it should do so, in accordance with INTELSAT procedures. The Notifying Administration may decide not to include itself among the INTELSAT Administrations in whose name and on whose behalf it is acting.

encountered by INTELSAT in its dealings with various Administrations which might be affected by the location of INTELSAT satellites or the use of the radio frequency spectrum. INTELSAT also prepares comments and/or submits information with respect to existing and planned satellites which are not part of the INTELSAT system.[64] Secondly, INTELSAT members are obliged to coordinate both within INTELSAT and pursuant to ITU procedures with respect to their own planned systems apart from the INTELSAT system. To the extent that INTELSAT and ITU procedures overlap there are no problems; when the procedures differ or prove inadequate for one purpose or the other, then certain problems may arise of a type which are discussed further below.

ITU procedures have facilitated coordination between INTELSAT and non-INTELSAT members with respect to their communications satellite systems. One such example of this involves the STATSIONAR satellite system network of the U.S.S.R. This system engages the use of orbital arc positions in the Indian Ocean Region in proximity to the INTELSAT Indian Ocean satellites. In January 1976, in order to resolve potential problems, representatives of the U.S.S.R. and INTELSAT met to discuss comments made by INTELSAT in accordance with the Radio Regulations concerning the potential for interference between the STATSIONAR and INTELSAT networks. Comments have been submitted subsequent to the advanced publication of information regarding these networks as contained in IFRB circulars, and coordination is continuing in order to resolve any remaining concerns of either parties. A similar situation exists between satellites of the two systems located over the Atlantic Region. At a meeting held in November 1976, representatives of the U.S.S.R. and INTELSAT were able to reach agreement on the elimination of mutual interference between two specific closely-spaced satellites (one of each system), while agreeing to further studies aimed at establishing a basis for similar agreements relative to the remaining satellite in the U.S.S.R. system.[65]

As discussed elsewhere in this article,[66] no problems of an insuperable nature have developed as a consequence of this coordination. To the extent difficulties have emerged involving coordination, they have done so in connection with the implementation of Article XIV (c), coordination of separate satellite systems for domestic public telecommunications services.

Coordination of the Indonesian domestic satellite system, PALAPA, and the proposed Brazilian domestic system has proven to be somewhat complicated and has raised interesting issues. The questions which arose as a consequence of coordination of

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[64]In the case of non-INTELSAT satellite systems, the Director General is to prepare the necessary comments and/or information for transmission by the Notifying Administrations, as defined *supra* note 63, to the Administration (s) concerned and to the IFRB where appropriate. Such actions are undertaken pursuant to the conditions established by INTELSAT for obtaining the consent of INTELSAT Administrations.

[65]INTELSAT Board of Governors, Status Report on Intersystem Coordination, BG-22-60, at 2 (July 1976); *id.* Status Report on Intersystem Coordination, BG-25-27, at 4-7 (December 1976).

[66]See text accompanying notes 20 through 25 *supra*.

these systems have caused INTELSAT to continue to keep its coordination procedures under review and to act to develop more precise guidelines and criteria appropriate to INTELSAT's needs. The technical/operational aspects of the Indonesian coordination have underscored the necessity to provide appropriate responses to technical and operational questions. The Brazilian coordination posed some interesting and complex questions concerning the relationship between INTELSAT and ITU coordination procedures and the obligation of INTELSAT Parties and Signatories to comply with two separate coordination processes.

Set forth below are three case studies of intersystem coordination which illustrate certain of the issues and questions which have emerged over the past few years.

A. United States Marisat System

The United States through its Signatory apprised INTELSAT of its intention to establish a satellite system separate from the INTELSAT system for the purpose of providing certain maritime servies, *i.e.*, various public voice and record services between points on land and stations on ships at sea. The United States Signatory provided information to the Board of Governors in accordance with Article XIV (d) of the Agreement for its review and tendering of advice to the Assembly of Parties. Upon review, and with the assistance of technical and financial experts, the Board of Governors tendered the following advice to the Assembly of Parties at its First Meeting in February 1974:

1. No unacceptable interference will occur between the proposed U.S. Marisat satellite system and the INTELSAT system.

2. While the economic impact on INTELSAT of a proposed U.S. maritime system as described to INTELSAT could not be assessed with any precision absent any firm plans as to how, when and at what charge INTELSAT might itself provide maritime satellite services, no significant harm to the INTELSAT system need be expected.

3. Provision and utilization of such facilities will not prejudice the establishment of direct telecommunications links through the INTELSAT space segment among all participants.

4. The above advice is based upon the assumption that any significant extension of the system beyond 1979, or widening of its scope, would be the subject of a new submission and coordination under Article XIV (d).

The INTELSAT Assembly of Parties issued a finding consistent with this advice and requested the Board to make a further report on this matter to it at its Second Meeting. This additional report was requested because the economic impact could not be precisely assessed without having further information as to whether INTELSAT would or would not be providing such maritime satellite services in the same time frame. The Board of Governors implemented this request and advised the Assembly of Parties at its Second Meeting, in Nairobi, Kenya, in 1976, that the updated information on the originally

approved Atlantic and Pacific Ocean Region portions of the system showed that the system remained technically and economically compatible with the INTELSAT system through 1981. The Board also advised the Assembly that any material extension of these portions of the system beyond 1981, or widening of its scope, would require reconsideration. The Assembly issued a finding consistent with this advice.[67]

The United States Signatory also apprised the Board prior to the Second Meeting of the Assembly, and the Board in turn advised the Assembly, that a third Marisat satellite was planned for deployment over the Indian Ocean Region in the near future for commercial maritime communication satellite services. The United States Signatory supplied the necessary technical and economic information, which was reviewed by the Board of Governors. The Board tendered advice to the Assembly of Parties similar to that provided with respect to the Atlantic and Pacific Ocean Region portions of the network, namely that there was no unacceptable technical interference into the INTELSAT system, that, based upon present INTELSAT plans, there would not be any significant economic harm to INTELSAT through 1981, and that the same findings made previously with respect to the Atlantic and Pacific Oceans Regions should apply to the Indian Ocean situation.

In coordinating the United States Marisat system the problems encountered were minimal. This was perhaps due in large measure to the fact that INTELSAT had no definite plans to provide maritime services in any of its satellites during the same time period in which the Marisat system is to be operative. This situation became clearer during the interval between the First Meeting of the Assembly of Parties in 1974 and the Second Meeting in 1976 since during this time decisions were taken by the Board of Governors on the next generation of satellites to provide service through the early 1980's. Accordingly, it was not necessary for INTELSAT to address several other rather complex questions such as, for example, whether or not traffic which has never been carried on the INTELSAT system is a factor to be considered in determining whether significant economic harm occurs (should INTELSAT be interested in or capable of carrying such traffic at some time in the future), or whether only traffic which is currently on the INTELSAT system at the time of the valuation and which is subsequently removed from the INTELSAT system and placed on another separate system is to be taken into account in determining the degree of economic harm.

B. The Indonesian Domestic Satellite System - PALAPA

Indonesia undertook coordination of its planned domestic satellite system under both ITU and INTELSAT procedures. Based upon the information thereby available to INTELSAT and application of its coordination procedures, it appeared that the

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[67]INTELSAT Assembly of Parties, Report of the Board of Governors to the Assembly of Parties Pursuant to Article XIV (d) on a United States Maritime Satellite System, AP-1-5, at 1-2 (December 1973); *id.* Record of Decisions of the First Meeting, AP-1-3, para. 19, at 14-16 (February 1974); *id.* Report of the Board of Governors to the Second Assembly of Parties on the United States Maritime Satellite System, AP-2-11, at 2-3 (July 1976); *id.* Record of Decisions of the Second Meeting, AP-2-3, paras. 17-18, at 10-11 (September 1976).

PALAPA system might subject INTELSAT satellites to an unacceptable level of interference. As discussed elsewhere,[68] these procedures allow the international ITU procedures for international coordination (particularly Appendix 29 to the Radio Regulations) to be applied. The INTELSAT evaluation, as undertaken by the Director General (then Secretary General) and the management services contractor, revealed that the equivalent noise temperature at earth stations in the Indian Ocean INTELSAT network were increased by more than 2% due to emissions from the Indonesian satellite network and that accordingly more detailed coordination was required. Additional information was sought and provided by the Indonesian Signatory indicating that remedial action was required. One possible course of action was to impose constraints in the operation of both the INTELSAT and the Indonesian system to minimize the potential adverse effect; another possible course of action was to consider relocation of the Indonesian satellite.

In respect to INTELSAT's concerns, Indonesia informed the Board that its initial studies had indicated that there would be minimal interference pursuant to ITU procedures, but that more recent studies, undertaken in conjunction with INTELSAT and attuned to the more detailed characteristics of INTELSAT operation in the Indian Ocean Region, had shown greater potential for interference than had been ascertained previously. Consequently, Indonesia indicated its willingness to work with INTELSAT to achieve a mutually satisfactory conclusion. Indonesia noted, however, that it would be most reluctant to consider relocation of its satellite since this would impose severe constraints on its plans: a relocation would entail delay in the commencement of service, additional costs, and less efficient use of the geosynchronous arc.

For its part the Board was responsive to the Indonesian situation and determined that a relocation of the Indonesian satellite would not be necessary. The Board decided instead that the proposed location for the Indonesian satellite would be acceptable to INTELSAT subject to certain conditions, agreed to between INTELSAT and the Indonesian Signatory and set forth in a Memorandum of Understanding. This Memorandum of Understanding would then serve as a basis for notification to the IFRB that coordination had been effected.

As a result of this experience the Board deemed it appropriate to develop suitable INTELSAT separation criteria, consistent with international recommendations, to maximize efficient spectrum and orbit utilization and to assure adequate protection against harmful interference to the INTELSAT system. This was clearly prompted in part, as well, by problems expected to arise in coordination between INTELSAT and other satellites and by the view (held by some members of the Board) that the ITU procedures might not be adequate to meet all of INTELSAT's requirements. In addition, the Board deemed it necessary and desirable to undertake a general review of INTELSAT's coordination procedures and guidelines. This review is still in progress.

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[68]See text accompanying notes 20 through 25 *supra*.

Subsequent to the above considerations, the Board approved a Memorandum of Understanding between INTELSAT and Indonesia and expressed, in the form of a recommendation pursuant to Article XIV (c) of the Agreement, its finding that on the basis of adherence to the conditions set forth in the Memorandum of Understanding, no harmful interference into the INTELSAT system was to be expected from the Indonesian domestic system.[69]

C. The Brazilian Domestic Satellite System

In January 1976, Brazil formally commenced coordination of its proposed domestic public telecommunications satellite network with INTELSAT and submitted the technical information provided in the advance notification to the IFRB as well as additional technical information requested by INTELSAT. Based on this information and discussions between representatives of the Brazilian Signatory and INTELSAT, INTELSAT concluded that there was the potential for harmful interference into the INTELSAT system from the proposed Brazilian system. Brazil was of the view that no unacceptable interference would be caused and was reluctant to consider interference criteria which would be different from those which had been applied to coordination with Indonesia, given the characteristics of the Indonesian and the INTELSAT systems in the Indian Ocean Region. Discussions between INTELSAT and the Brazilian Signatory were continued and resulted in a proposal by INTELSAT that a Memorandum of Understanding be concluded between INTELSAT and Brazil which would endeavor to protect INTELSAT from unacceptable interference due to emissions from the Brazilian satellite system by setting forth specific operational constraints. The Brazilian Signatory, while not accepting the concept of a Memorandum of Understanding, agreed to all of the conditions, with one exception, which it suggested be modified. The provision to which Brazil objected was one requiring Brazil to undertake another coordination with INTELSAT pursuant to Article XIV (c) if it desired to change the location of any of its satellites, change the technical or operational characteristics of any such satellites or change any elements of the Memorandum of Understanding.

The Board did not sustain the Brazilian objection and instead decided to express in the form of a recommendation its finding that on the basis of adherence to the conditions set forth in the proposed Memorandum of Understanding, no unacceptable interference into the INTELSAT system would be expected from the Brazilian domestic satellite system. The Brazilian Signatory took note of the Board's decision without concurring. This nonconcurrence was the result of Brazil's reservations with respect to the appropriateness of some of the technical criteria utilized in evaluating the compatibility of the systems, the appropriateness of requesting more information than that required by ITU coordination procedures and the appropriateness of Brazil being required to inform and consult with INTELSAT on changes in the technical or operational characteristics of its system while INTELSAT did not have a reciprocal

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[69]INTELSAT Board of Governors, Summary Record of the Sixteenth Meeting, BG-16-3, paras. 171-173, at 145-147 (July 1975).

obligation.[70] Clearly, this latter point involved a question of interpretation of the INTELSAT Agreement since Brazil was in effect stating that INTELSAT should not have more rights or be in a position superior to that held by any one of its members.

Brazil considered certain of the questions which arose during its coordination process to be of sufficient importance to be addressed by INTELSAT's Assembly of Parties. Consequently, it informed the Assembly of Parties, at its Second Meeting, of its concerns. One point which Brazil thought should be addressed by the Assembly was the various interpretations of the application and implementation of Article XIV (c). Another point was the compatibility of the INTELSAT coordination process with the ITU process in order to avoid the existence of possibly conflicting processes. In this regard, it was noted that there are two different trends in the development and refinement of interference criteria: the Study Group of the CCIR of the ITU tended to relax the interference levels while INTELSAT tended to strengthen these figures. The consequence of these differences was the difficulty some members of both organizations had in reconciling two different positions.

In addition, the question was raised as to whether a Memorandum of Understanding was the appropriate method to register the acceptance of mutually agreed technical and nontechnical constraints pursuant to Article XIV (c). It was appropriate for the Assembly of Parties to consider this matter, in Brazil's view, because of the Assembly's function pursuant to Article VII (c) (ii) of the Agreement to "determine that measures should be taken to prevent the activities of INTELSAT from conflicting with any general multilateral convention which is consistent with this Agreement and which is adhered to by at least two thirds of the Parties."

After having considered the concerns of Brazil, the Assembly of Parties decided to note that the Board of Governors has applied a consultation process in the discharge of its responsibilities under Article XIV (c) and that the result of this consultation process, in the case of agreement, could very well facilitate the ITU process of coordination. The Assembly addressed directly the question of the method of recording coordination agreements and requested the Board of Governors to review the method by which it records a coordination agreement, keeping in mind the principles and procedures of the ITU Radio Regulations.[71] This matter is now under consideration by the INTELSAT Board of Governors.

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[70]INTELSAT Assembly of Parties, Considerations Concerning the Application by the Board of Governors of Article XIV (c) of the INTELSAT Agreement, AP-2-30 (September 1976).

[71]INTELSAT Assembly of Parties, Record of Decisons of the Second Meeting, AP-2-3, paras. 31-32, at 22 (September 1976).

V. IMPLICATIONS FOR THE FUTURE AND CONCLUSIONS TO BE DRAWN FROM THIS REVIEW OF INTERSYSTEM COORDINATION

A. Technical Considerations

As more satellite systems are established, the intersystem coordination process becomes more complex and the need to clarify and refine guidelines, procedures and criteria of such coordination becomes more apparent. It is quite clear that coordination may be more difficult in certain geographic areas than in others. For example, there are a greater number of INTELSAT satellites in the Atlantic Ocean Region than is the case in the other ocean regions. However, the other ocean regions are becoming more crowded not only as a consequence of INTELSAT operations, but also as a consequence of the introduction of other satellite systems as, for example, the U.S.S.R. STATSIONAR system. This increasingly complex situation calls for greater flexibility and understanding on the part of all parties concerned. In this connection, it is interesting to note that the Board of Governors in adopting the Memorandum of Understanding with Brazil had the following provision included:

> In the event that a satellite or satellites of a system other than that of INTELSAT or Brazil might cause significant interference to satellites in either the INTELSAT or Brazilian systems, Brazil and INTELSAT shall consult to determine in what respects, if any this Memorandum of Understanding should be amended.[72]

Effective coordination is dependent upon a number of factors, including the nature of the satellite system. Clearly, a system using small antennae with greater diffusion of radio signals in outer space requires larger spacing between the satellites of that system and other systems in order to achieve the desired protection ratios. The INTELSAT system utilizes very large antennae, and its satellites can be located much closer to one another than would be the case in another type of system. Effective coordination is also dependent upon the type of transmission techniques employed in the satellites. The Indonesian coordination process made it clear that it is necessary to establish criteria to protect certain types of transmissions utilized in the INTELSAT system. At present, there are no CCIR recommendations providing interference criteria for the protection of other than FDM/FM transmission modes.[73]

Finally, it is obvious that neither ITU nor existing INTELSAT procedures will be totally adequate for coordination in all instances. The ITU Radio Regulations do not specify substantive criteria to be employed in resolving problems and in achieving accommodations. Thus, it is necessary to develop such criteria in a dynamic environment

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[72]INTELSAT Board of Governors, Coordination with the Brazilian Domestic Satellite System Pursuant to Article XIV (c) of the INTELSAT Agreement,BG-22-30, at 11 (June 1976).

[73]Frequency Division Multiplex/Frequency Modulation. For a summary discussion of technical factors affecting coordination, see Jansky, Factors Affecting Orbit Utilization, in Communication Satellite Systems: An Overview of the Technology, *supra* note 6 at 103-07.

and on an evolutionary basis. This imposes on the parties directly concerned much of the burden for reaching agreement with respect to potential interference problems.

B. Specific Legal Considerations

1.INTELSAT

Clarifying provisions of the INTELSAT Agreement has proved not to be without difficulty and it is unlikely that a single interpretation will be agreed to by all members of INTELSAT. In light of the Brazilian experience, there are obviously different interpretations held with respect to Article XIV. The reciprocity issue is one outgrowth of such differing interpretations. A review of the history of the INTELSAT Agreements reveals that a provision requiring such reciprocity was considered but rejected prior to adoption of the text found in Article XIV.[74] Questions are also raised regarding the legal implications of INTELSAT's utilization of ITU procedures *in lieu* of its own. The situations for which the two processes have been developed are quite different, of course, since in INTELSAT's case the procedures have the objective of harmonizing the actions of the organization to the common benefit of all its members. Viewed from this perspective, the obligations of INTELSAT members are seen to be greater to the organizations which they have founded and in which they participate so extensively, rather than to themselves as individual sovereign states.

2. ITU

The ITU process proceeds in several stages, depending on whether or not coordination is necessary to avoid harmful interference. No formal rights of protection are conferred at the first stage. However, this is not intended to imply that the status of satellite networks under the Radio Regulations depends entirely on the process and results of mutual consultation. Satellite networks which are registered in the Master Register have certain rights to protection from harmful interference against networks which are not so registered. Nevertheless, since the adoption of the Radio Regulations at the 1971 Conference, there has been a great increase in the number of satellite systems being established or planned. This has complicated the coordination process in that at various times several satellite systems may be at different stages of coordination. Thus, the precise legal status of the registered satellite network cannot be finalized. It will depend in many instances on the actions taken (or not taken) during the preceding two steps, the existence and status of other particular satellite networks, the effects on other frequency assignments, and on the findings of the IFRB concerning the networks' compliance with various provisions of the Radio Regulations.[75] In any event, the ITU has

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[74]Resumed Plenipotentiary Conference on Definitive Arrangements for the International Telecommunications Satellite Consortium (April-May 1971), Amendment to Article XIV submitted by the Delegation of France, Doc. 200, para. 2, at 1, Summary Record, SR/50 (Final), at 8-9 (May 18, 1971).

[75]For a more detailed discussion of the legal ramification of ITU activities, *see, e.g.*, Jacobson, International Institutions for Telecommunications: The ITU's Role in The International Law of

no power to impose sanctions; it is the responsibility of the parties concerned, acting in good faith to cooperate. There are still, therefore, legal difficulties to be resolved in the future.

C. Potential Areas of Concern

Given INTELSAT's objective of a global system to serve all of its members, a potential area of concern to the organization, and hence, a stimulus to action, had to be to ensure the economic and technical viability of the INTELSAT system. This is a very real concern because of the emerging and growing demand for domestic telecommunications services by the most cost effective means. Satellites have been found by many countries to be the most desirable means to satisfy this demand. In addition, national and industrial development, technical development, and prestige contribute to a nations's desire to have a separate satellite system. Fortunately, INTELSAT has been sufficiently responsive to the needs of countries by offering many such services on the INTELSAT space segment and thereby offsetting some of the less tangible needs for separate domestic systems.

It is difficult, despite the remarkable progress which has been made by both INTELSAT and the ITU, to predict that adherence to cooperative forms of agreement will continue in the future. For countries to be expected to relinquish their rights to take unilateral action in order to cooperate to protect international endeavors is an anticipation which may not be justified. This is particularly the case since not every member of the ITU is a member of INTELSAT and since there are undoubtedly political considerations associated with certain countries' programs.

There are, of course, as indicated earlier,[76] very legitimate differences with respect to what is an appropriate level of coordination and what type of criteria are best employed to determine possible interference from one system into another. For one international organization to be limited by constraints which another organization deems to be appropriate, particularly when the purposes of the two organizations differ, is a concern which will not be readily resolved. Questions may also arise in those cases where the procedures of two organizations do not coincide but their membership does, as well as in those cases when there are differences between the two international organizations on what specific procedures are necessary and on what actions are therefore required of members of both organizations. Related questions are: what steps can an international organization take to achieve the objectives agreed to by its membership and how and when can one nation's goals and objectives be considered secondary to the benefit of the collective group of nations? Moreover, the situation may be further complicated by a country which is a member of both organizations, but for the achievement of its own objectives, political or otherwise, may prefer the procedures of

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Communications 51-68 (McWhinney ed. 1971); Leive, International Telecommunications and International Law: The Regulation of the Radio Spectrum 144-207 (1970).

[76]See text accompanying notes 20 through 25 *supra*.

one organization to another and may maintain, therefore, that the procedures of only one of the organizations legitimately be followed. With the expected creation of the organization known as INMARSAT (International Maritime Satellite Organization) the international organization jurisdictional question may become even more complicated and the rule making for intersystem coordination even more profuse. INMARSAT is expected to establish an international maritime satellite communication system and thus, will make use of some of the same international resources as described elsewhere in this article.[77] Even though each of the international organizations active in the use of satellites has described its own purpose and interests and has defined its own terms and processes, it is not always a model of consistency.

It would be inaccurate to conclude because of the increasing intricacies of intersystem coordination and the ever growing importance of achieving a more satisfactory way to effect such coordination that progress has not been achieved. Quite to the contrary, a great deal has been accomplished since 1957 to develop both more formalized frameworks for international cooperation and practical methods for achieving this cooperation. Both ITU and INTELSAT procedures for intersystem coordination are sure to be modified as conditions warrant. To the extent experience has demonstrated to INTELSAT that the existing procedures of INTELSAT and perhaps the ITU are not adequate for ascertaining the degree of harmful interference to be expected from planned satellite systems, it is quite likely that a review process will result in the formulation of new processes, guidelines and criteria which will be both technically adequate and generally acceptable. Undoubtedly, a great deal of flexibility and dynamism will be required in developing such processes, guidelines and criteria. The ITU initiated work in this area and has demonstrated such flexibility through its periodic revisions to procedures. In the years that lie immediately ahead the ITU is expected to take another look at its procedures and their impact on the coordination process. While there are no direct formal relationships at this time between INTELSAT and the ITU, INTELSAT certainly is cognizant of a great deal of work done under the aegis of the ITU. The views of INTELSAT member countries are made known in ITU fora and are surely taken into account; just as the results of ITU considerations are taken into account and followed as applicable in INTELSAT fora. INTELSAT, for example, has under active review a number of proposals for modifications to the ITU coordination process, which, if adopted by INTELSAT, will be forwarded by its Director General to ITU Administrations for their consideration in preparing their positions for the 1979 World Administrative Radio Conference. These proposals are essentially the principles upon which the coordination guidelines and separation criteria of INTELSAT are based. If

[77]Instruments for the establishment of the International Maritime Satellite Organization (INMARSAT) were adopted and opened for signature in September 1976. They consist of a Convention with an Annex entitled Procedures for the Settlement of Disputes and an Operating Agreement with an Annex entitled Investment Shares Prior to the First Determination on the Basis of Utilization. For background information on an international maritime system, see Maritime Satellites, Flight International 970-76 (April 10, 1976); Toward Realization of International Maritime Satellite Systems, ITU Teleclippings 1-3 (September 15, 1975); Maritime Satellite Conference Decisions, Flight International 890 (May 29, 1975); Commercial Applications Satellites, Flight International 889 (December 9, 1974).

eventually adopted by both INTELSAT and the ITU, another major step forward will have been taken in resolving a number of the difficulties which have arisen in the past in coordinating separate systems.[78]

This brief review of activities in the area of international coordination of communications satellite systems demonstrates that there is a responsiveness to the changing technical and operational challenges posed by the remarkable and rapid development of satellite communications. If the attitude underlying such responsiveness is continued, then surely the challenges posed to the limited frequency spectrum and orbital space will be met in the same cooperative manner, and in various stages of plannings, to avoid potential difficulties and, indeed, disasters. If this approach is successfully followed, then it may be expected that the close cooperation which has been evidenced in the past will be perpetuated in the future in the implementation of new coordination processes.

[78]The INTELSAT Board of Governors' Advisory Committee on Technical Matters report on this subject, in January 1977, described principles related to various aspects of the intersystem coordination process and criteria, for consideration in relation to CCIR preparatory activities, and eventually for consideration at the 1979 WARC. Of particular interest are two recommendations. The first concerns the adoption of single entry interference criteria which are scaled as a function of the orbital separation between the interfering networks. The second involved a recognition of the need to expand the investigation which is undertaken to determine the need for coordination, to include an evaluation of the interference of slow-swept carriers (Frequency Modulation/Television, FM/TV) into narrowband carrier sizes (*e.g.*, Single Channel Per Carrier, SCPC, and Single Channel Per Carrier Plus Code Modulation Multiplex Access Demand Assigned Equipment, SPADE).