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Georgetown Space Law Group

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*by The Georgetown Space Law Group**

For the latter decades of the twentieth century the key phrase in international economics has become "information is power." Transmitting, receiving and collecting information has developed many passageways to power, and all nations of the world are to some extent concerned with the control of these passageways. Due to its special adaptation for communications satellites, the Geostationary Orbit (GSO) has become one of the most hotly disputed passageways.[1]

In 1946, Arthur C. Clarke first proposed that, by placing three satellites in GSO, the earth could be blanketed with a communications net-

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* The members of the Georgetown Space Law Group who co-authored this paper are: John M. Adams, Associate with Milbank, Tweed, Hadley & McCloy, Washington, D.C.; LL.M., Georgetown University; J.D., Northeastern University; B.A., Clark University. Brian Burdekin, Senior Advisor to the Deputy Prime Minister of Australia, Barrister and Solicitor of the Supreme Court of Victoria; LL.M., Georgetown University; LL.B., B.A., University of Melbourne. James E. Dunstan, Associate with Haley, Bader & Potts, Washington, D.C.; J.D., Georgetown University; B.A., Claremont Men's College. Andrew Grosso, Assistant U.S. Attorney, Middle District of Florida, U.S. Department of Justice; J.D., University of Notre Dame; M.S., B.S., Rensselaer Polytechnic Institute. Paul B. Larsen, Adjunct Professor of Law, Georgetown University, LL.B., University of Cincinnati; B.A., Wilmington College. Gregory J. McDonald, Associate with McGlinchey, Stafford, Mintz & Cellini, New Orleans, La.; J.D., Georgetown University; B.A., Lycoming College. Mark C. Van Ness, J.D., Georgetown University; B.A., University of Colorado.

The following people contributed to this paper: Michael D. Rizzuto, LL.M., Georgetown University; J.D., University of Vermont; B.A., Franklin & Marshall College. Eben H. Trevino, Jr., Capt., U.S.A.F.; LL.M., Georgetown University; B.A., Southwest Texas State University.

The views and ideas expressed in this article do not necessarily reflect those of any employer of any individual contributor, nor are all of these views and ideas adopted by each contributor. Comments concerning this article can be submitted to the Georgetown Space Law Group directly by writing to Paul B. Larsen, Georgetown University Law Center, 600 New Jersey Ave., N.W., Washington, D.C. 20001.

[1] The term "GSO" is here used to denote the phrases "geostationary orbit" and "geostationary orbits" interchangeably, with the meaning in a particular instance to be determined from the context. For a definition of GSO, see *infra* Section I.

work.[2] It was not long afterward, in 1963, that the first communications satellite was placed in the GSO.[3] Now, use of the GSO is in great demand due to the advantages of geostationary satellites over other communication systems.

One advantage a geostationary satellite has over other orbiting communications devices is that a groundstation need not have a complex mechanism for receiving or transmitting signals. To receive or send transmissions the antenna is permanently aimed at the position in the sky occupied by the satellite. Thus, a groundstation can be a simple, no-frills antenna, unencumbered by a sophisticated computer-driven tracking system. Consequently, Direct Broadcast Satellites (DBS) capable of reaching substantial portions of the globe are economically feasible.[4] The GSO is, in fact, the only orbit in which DBS can operate.

Other uses for geostationary satellites include: remote sensing of the earth's surface, either for military purposes or for natural resources management; navigational guidance, since targeting on just one geostationary satellite permits earth bound calculations of a position; solar energy platforms;[5] and manned spaced stations, including spacecraft terminals.[6]

For these reasons, the GSO is a unique and controversial natural resource. Technologically, it serves as a platform from which a single communications satellite can reach nearly one-half of the earth's surface. Legally, it is a driving force for the development of new regimes in both domestic and international law governing the use of new information technology. Politically, it is the focal point of conflict between the developed nations, which are the established communications powers, and the developing countries, which view the continued appropriation of this valuable and limited natural resource as a threat to their future development.

This article will provide an examination of these three topic areas, then describe the principal fora in which decisions concerning the GSO have taken place, including the International Telecommunications Union (ITU), the 1982 UNISPACE Conference, and the SPACE-WARC.[7] The

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[2] Clarke, *Extra-Terrestrial Relays: Can Rocket Stations Give World-Wide Radio Coverage?*, WIRELESS WORLD, Oct. 1945, at 305-08.

[3] This satellite was the Syncom 3. *See* THE WORLD IN SPACE, A SURVEY OF SPACE ACTIVITIES AND ISSUES 472 (R. Chipman ed. 1982) [hereinafter cited as THE WORLD IN SPACE].

[4] D. SMITH, SPACE STATIONS: INTERNATIONAL LAW AND POLICY 6 (1979).

[5] Berger, *International Law and Solar Energy and Solar Energy Satellites*, PROC. OF THE TWENTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 149 (1978).

[6] CaVault, *Unit Sets Goal of Manned Lunar Base*, 17 AVIATION WEEK & SPACE TECH. 21 (Nov. 29, 1982).

[7] SPACE-WARC, officially called the ITU World Administrative Radio Conference on the Use of the GSO and the Planning of the Space Services Utilizing It, will convene its first sesson in 1985 and its second session in 1988. The purpose of the session will be to provide

debate concerning the free flow of information versus national sovereignty will be reviewed, along with an examination of various regulatory methods of transborder data flow, possible mechanisms for the resolution of disputes occurring in space, and suggestions for preliminary governing regimes during the initial testing of these mechanisms. Finally, several proposals will be offered, among them the concept that, for political reasons, the GSO must be viewed as a limited global resource of which developing countries must be allocated an equitable share. Furthermore, for this allocation to be workable in the international arena, regimes governing transborder communications will have to take account of cultural and sovereignty concerns of nations which lack the Western World's heritage of freedom of expression.

I. GEOSTATIONARY ORBITS AND SATELLITES: BACKGROUND

Currently, two legal definitions of the term Geostationary Orbit are recognized, the first found in the International Telecomunications Union (ITU) Radio Regulations,[8] and the second in the Bogota Declaration.[9] The key difference is that the Bogota Declaration attempts to place emphasis on a particular region in space as constituting "the" GSO, whereas

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"equitable access to the GSO and to the frequency bands allocated to the space services utilizing it." SPACE-WARC, Rep. No. 895, *reprinted in In re* An Inquiry Relating to Preparation for an International Telecommunications Union World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It, Third Notice of Inquiry, General Docket No. 80-741 (Oct. 6; 1983) [hereinafter Notice of Inquiry]. *See also* FCC, First Report of the Advisory Committee for the ITU's World Administrative Conference on the use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing It.

[8] According to the ITU Radio Regulations, the following definitions apply. A geosynchronous satellite is "an earth satellite whose period of revolution is equal to the period of rotation of the Earth about its axis." A geostationary satellite is "a satellite, the circular orbit of which lies in the plane of the Earth's equator and which turns about the polar axis of the Earth in the same direction and with the same period as those of the Earth's rotation." ITU Radio Regulations, Revision, Nov. 8, 1963, ¶ 846(b), 15 U.S.T. 920, T.I.A.S. No. 5603. The orbit on which a satellite should be placed to be a geostationary satellite is called the "geostationary satellite orbit."

[9] The Bogota Declaration defined the geostationary orbit in a slightly different way. The geostationary orbit is:

> [A] circular orbit on the equatorial plane in which the period of sidereal revolution of the satellite is equal to the period of sidereal rotation of the earth and the satellite moves in the same direction of the earth's rotation. When a satellite describes the particular orbit it is said to be geostationary; such a satellite appears to be fixed on the zenith of a given point of the equator, whose longitude is by definition that of the satellite. The orbit is located at an approximate distance of 35,781 km over the earth's equator.

Bogota Declaration, Nov. 29-Dec. 3, 1976, ITU Satellite Broadcasting Conference, Geneva 1977, Doc. 81, Annex 4, at 16.

the ITU Regulations implicitly recognize that an orbit is the path a satellite transcribes as it revolves through space about another body and that an orbit is independent of particular regions the satellite passes through.[10]

Scientifically, the term "geostationary" is inaccurate. Various physical forces that affect a satellite or any other object in such an orbit will eventually cause that satellite to drift away from its intended geostationary position. These forces include the periodic tug of the moon as it circumscribes the earth; solar wind, which varies with the activity of the sun's surface; the density of the earth's residual atmosphere at the altitude of the satellite's orbit, also dependent upon the sun;[11] collisions with micrometeors; and, irregularities in the earth's gravitational field.[12] Continued corrections of the satellite's position are required if it is to remain geostationary. In practice, this means that any satellite meant to remain in a GSO for an extended period of time must possess a self-contained propulsion system to supply corrective thrusts as needed. When the fuel for this system is exhausted, the satellite will drift from its intended orbit.

Thus, no region exists in space which can properly be labeled "the" GSO. Rather, from a scientific standpoint, it is more accurate to say that certain ideal parameters exist which would enable an imaginary satellite to appear geostationary. Real satellites whose orbital parameters closely match the ideal ones for a sufficient period of time can be said to travel in a GSO.

Various natural and technological barriers exist which limit the capacity of the GSO as a communications network. Natural phenomena can disrupt communications between a geostationary satellite and a fixed earth receiving station. Drifting, the angular passage of a satellite across the disc of the sun, results in "solar outage," during which time communications are interrupted by solar interference. If an interruption of communications is not acceptable to the user, a second satellite has to be

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[10] The description given by the ITU appears somewhat closer to scientific fact.

[11] The early entry of the United States' Skylab in 1979, accompanied by its decay over the South Pacific (with sizable chunks falling over the Australian continent), is a dramatic example of the effect of this phenomenon. An increase in the activity of sunspots resulted in an increase in the solar wind encountered by the earth. This caused a heating of the upper atmosphere, and a corresponding increase in the atmospheric density in the orbital region occupied by Skylab. There was consequently greater orbital friction than NASA had expected, and a much shorter orbital life for Skylab than calculated.

Although the principle is the same, the magnitude of the effect of this atmospheric friction would be considerably less for satellites in geostationary orbits. This is because these orbits are approximately 22,300 miles above the earth, whereas Skylab was only 400 miles. Nonetheless the effect would be felt.

[12] Perek, *Physics, Uses and Regulations of the Geostationary Orbit, or Ex Facto Sequitor Lex*, PROC. OF THE TWENTIETH COLLIQUIUM ON THE LAW OF OUTER SPACE 403 (1978).

placed in orbit for use during the periods of outage.[13]

A second type of natural disruption is the result of interference with a satellite's power supply. Because most satellites use solar radiation for their energy source, any interruption of the sun's rays will affect a satellite's power supply during the interruption, thereby also disrupting communication transmissions.[14] Objects capable of coming between a satellite and the sun's disc are the earth, the moon and other satellites.

Collisions between satellites in the GSO are one type of technological problem. As the size and number of devices placed in the GSO increase and the amount of "space debris" continues to grow, the possibility of collision will also increase. Debris crossing a densely populated GSO may emerge as an unacceptable risk for expensive and highly critical satellites. The crowding problem will become especially critical in those portions of the GSO most advantageous to the positioning of communications satellites.[15]

Another type of technological barrier is the broadcast interference which may occur between transmitting satellites. This type of interference is a function of two factors: the physical distance between satellites and the similarity of their transmitting frequencies.[16]

Given these natural and technological limitations, the scramble for space in the GSO is and will be furious. Moreover, as new uses of and customers for the GSO appear, these limitations may become more pronounced, thereby providing fuel for potentially heated debates between user states. Therefore, the potential uses of the GSO are important factors in determining international regimes with which to regulate GSO usage under these technological and natural limitations.

II. Uses of the GSO

A. *Economics and the LDC's*

The emergence of the GSO as an international legal issue can best be understood against the background of increasing pressure from the lesser developed countries (LDC's) for what they perceive to be a more equitable share of the world's economic resources. This pressure emerged as a coherent and concerted campaign by the "Group of 77" (G77)[17] in the

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[13] *Id.* at 405.

[14] *Id.* at 405-06.

[15] *Id.* at 404.

[16] Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, 94 F.C.C.2d 129, 130 n.6 (1983) [hereinafter cited as Assignment of Orbital Locations].

[17] The Group of 77 was the title adopted by the loose-knit coalition of all developing countries. Originally 77 in number, the Group has now expanded to include almost 120 developing nations.

early 1970's. The G77's position embraced wide-ranging claims on issues as diverse as national sovereignty (e.g., the 200-mile maritime economic zones for coastal states), restructuring the international financial institutions established at Bretton Woods (including massive debt rescheduling), intellectual property (e.g., technology transfers to assist LDC industrialization) and recognition that the two great final frontiers, outer space and the high seas, were the "common heritage of mankind."[18] All these issues were subsumed in, and identified as, the search for a "New International Economic Order" (NIEO).

One consistent theme running through all NIEO debates was the exploitation of LDC's, initially by the great colonial powers and, more recently, by the industrialized West. Closely allied to this was the "reassertion" by all LDC's of the right to control their "natural resources," including the claim by a group of LDC's to ownership of the GSO.[19] Because this claim emerged from a decade in which the majority of the international community had agreed that "[o]uter space . . . shall be free for exploration and use of all states,"[20] it was viewed as a mere aberration contrary to international law by non-LDC's.[21] However, rather than being a mere aberration, this claim was symptomatic of a frustration which has great significance for the orderly evolution of international law. The reason for this backlash by the LDC's is simple: the LDC's perceive satellite technology as a valuable resource to assist development in the poorest countries. This assistance would come in the form of accelerated resource discovery, development and management (via remote sensing satellites). Furthermore, satellite technology would expand communications and educational programs via DBS, which would allow cost minimalization of information dissemination particularly in large countries such as India and Indonesia which have widely dispersed rural populations. Tropical LDC's also envision major long-term benefits from meteorological satellites for monsoon prediction and food stock management.

Stated specifically, the Bogota Declaration represented a political backlash against the industrialized nations' alleged usurpation of the GSO. Today, because these conflicting views threaten the efficiency of international communications networks, the concern of the LDC's that they not be preempted from participation in the use of the GSO because of their technological infancy is an issue that industrialized nations should quickly address. The stakes involved are high. For the LDC's, their future

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[18] International Telecommunications Convention, Oct. 25, 1973, art. 33, 28 U.S.T. 2497, T.I.A.S. No. 8572 [hereinafter cited as I.T.C.].

[19] The Bogota Declaration, *supra* note 9.

[20] Outer Space Treaty, Oct. 10, 1967, art. I, 18 U.S.T. 2410, T.I.A.S. No. 6347.

[21] Leister, *Third World Space Activities*, PROC. OF THE TWENTY-FIFTH COLLOQUIUM ON THE LAW OF OUTER SPACE 237 (1982).

development—even survival—is dependent on their sharing the benefits of the advanced technologies of the West. For the industrialized nations, a conflict with the LDC's over use of the GSO may produce ripple effects in other areas of "North-South" relations. There are few areas in which the costs of compromise will pay greater dividends than in the area of communications satellites and the efficient and cooperative utilization of the GSO.

B. The Strategic Factor: Military and Intelligence Satellites

The GSO is important not only as an aid to economic growth but also for strategic and intelligence purposes. The military use of the GSO cannot be overlooked when assessing the spacial and spectral demands placed on this resource. Unfortunately, because some satellites occupying the GSO are transmitting highly sensitive military and national security data, information concerning such satellites and their communication flow is highly restricted. Therefore, estimates as to the spacial and spectral demands these satellites place on the GSO is guesswork at best.

The military satellites currently in the GSO include early warning satellites (designed to spot the rocket plumes of ICBMs within one minute of liftoff)[22] and possibly anti-satellite satellites (ASATs).[23] The intelligence satellites currently placed in the GSO include photo reconnaissance, electronic intelligence and general surveillance models.[24] They include the most sophisticated and important monitoring and surveillance in the developed countries' "intelligence arsenals."[25]

Not only does the classified nature and extent of these satellites make it impossible to accurately estimate their burden on the GSO, but it is also impossible to discern distinctions between commercial and military satellites. The fact is that: "[T]ons of electronic surveillance equipment at this moment are inter-connected within our domestic and international common carrier telecommunications systems. Much more is under contract for installation."[26] Thus, satellites operated by COMSAT,[27] and its

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[22] J. BAMFORD, THE PUZZLE PALACE: A REPORT ON AMERICA'S MOST SECRET AGENCY 191 (1982).

[23] The Soviet Union already has ASAT capability, and the U.S. Defense Department's largest exploratory development progaram is aimed at developing laser weapons. Tyler, *Study Raps Laser Arms Funding Lag*, Washington Post, Mar. 27, 1983, at A1, col. 6; Boffey, *Pressures are Increasing for Arms Race in Space*, N.Y. Times, Oct. 18, 1982, at B9, col. 1. The proposed ASAT's will be "parked" in geosynchronous orbits. *See* Borad, *A Fatal Flaw in the Concept of Space Law*, 215 SCIENCE 1372 (Mar. 12, 1982).

[24] J. CANAN, WAR IN SPACE 102 (1982).

[25] For a description of the importance of these satellites, see *id.* at 101-13.

[26] J. BAMFORD, *supra* note 22, at 376.

[27] Communication Satellite Corporation.

international counterpart, INTELSAT,[28] form a significant, if "passive," intelligence gathering apparatus.[29]

Military and intelligence satellites in GSO present two factors of major significance. First, these satellites must be accounted for when analyzing physical congestion. There is no reason to suppose that their numbers will diminish. Second, and more importantly, the space powers (and to a lesser extent their allies) have a major security interest to protect in any negotiations concerning the future use of the GSO.

III. Scientific Answers to GSO Allocation

The uses and potential of the GSO are great; however, it is limited in size, to approximately 163,000 miles in length. Thus, with 300 devices placed in orbit, the spacing between them will be roughly 500 miles. More importantly for communications purposes, the angular separation is little more than 1° of arc. As the number of geostationary satellites increase, the separation will decrease, and congestion will result in radio interference between communications satellites. The interference is more acute because certain areas (bands) of the GSO are more useful than others—those being the bands over heavily populated regions of the earth. Thus, the actual angular separation for the majority of satellites will be less than a simple average.

Despite concerns of LDC's that, due to the GSO's inefficient use or domination by today's space powers, developing countries may never have the opportunity to share its benefits,[30] other commentators have suggested that continuing advances in technology will rapidly dissipate any such limitations of the GSO or perhaps even make its use obsolete.[31] One technological innovation, ground-based fiber optics, has been suggested as a complete substitute for communications satellites. Optical fibers are extremely thin strands of glass or plastic[32] with qualities which allow the transmission of light over long distances.[33] In practice, thousands of these strands are bundled together in a cable. As a transmission medium, optical fibers are superior to satellite radio communications, and the cost of the fibers themselves are so small that the major costs involved are those

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[28] INTELSAT stands for International Telecommunications Satellite Organization.

[29] J. Bamford, *supra* note 22, at 333.

[30] Ferrer, *The Use of the Geostationary Orbit*, Proc. of the Twentieth Colloquium on the Law of Outer Space 216 (1978).

[31] The World in Space, *supra* note 3, at 472, 479.

[32] Some types of optical fibers are on the order of several microns in diameter. *Bell Lab's Advances in Fiber Optics Discussed at OFC '82*, 5 Fiber Optics & Com. 2 (1982).

[33] A. Rutkowski, The Impact of New Technology on Satellite Radiocommunications (Nov. 10, 1982) (unpublished paper prepared for the FCC 1983 Space World Administrative Radio Conference Advisory Committee).

of right-of-way and laying the cable.[34] Such cables can readily serve as trunk lines between major communications centers.

Fiber optic cables do, however, suffer from limitations which satellites do not. Transoceanic trunk lines will remain expensive and provide service only between two terminus points. In contrast, one satellite can provide spread coverage over one-third of the earth's surface. A need for this type of broad coverage exists, for example, in those developing countries with rugged or discontiguous terrain or with widely distributed populations.[35] Moreover, this type of service could be more affordable than optic systems, since countries could share a satellite or perhaps lease portions of a satellite's broadcast time, spectrum or signal direction. Finally, optic cable suffers from the further limitation that, by its nature, it has a physical presence in the territories it traverses, thus inviting tariffs, regulations and other forms of government control. In the final outlook, rather than fiber optics replacing geostationary satellites, they will act instead to merely alleviate GSO crowding as a cost efficient method of connecting two points between which communication is regular and heavy.

Refinements of broadcast technology also promise to improve the efficiency of satellite telecommunications. Satellites which operate on different frequencies can be clustered, since only similar frequencies interfere with each other. Systematic allocation of alternate positions in the GSO will increase the space between satellites with similar frequencies, and so may also reduce interference.[36] Cross polarization of the signals of nearby satellites can be utilized, although this would require more sophisticated groundstations.[37] Suppression of sidelobes through improved antennae is also possible.[38] Major advances in the modulation of radio signals, or the manipulation of the signal to maximize spectral efficiency, are presently being achieved,[39] and they are approaching a theoretical limit of six-fold increase in information transmitted per unit bandwidth.[40]

Laser technology by satellite is one alternative to radio broadcasts which would effectively eliminate interference, thus reducing the spacing limitations of satellites. However, laser signals are extremely susceptible

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[34] *Id.*

[35] The benefits which would accrue to developing countries would best be illustrated from the example of the ATS-6 satellite, which would broadcast to the Indian sub-continent on frequency of 860 MHz with 3-meter parabolic antennae to about 5000 villages. *See* Andhyarujana, *Direct Satellite Telecommunications and Space Law*, PROC. OF THE TWENTIETH COLLOQUIM ON THE LAW OF OUTER SPACE 143 (1978).

[36] Perek, *supra* note 12, at 405.

[37] *Id.*

[38] *Id.*

[39] Rutkowski, *supra* note 33.

[40] Hill & Feher, *NLA 64-State QAM: A Power and Spectral Efficient Modulation Technique for Digital Radio*, 182 IEEE ICC 3B.2.1. (1982).

to adverse weather conditions. Furthermore, the reception and transmission of laser signals will require considerably more complex ground stations than radio signals require, defeating a major advantage of communications satellites.

Thus, despite these technological alternatives, demand and need will remain for GSO radio broadcasting in global communications systems, mainly because of its two advantages of flexibility and simplicity. Unfortunately, estimates place the number of active broadcast devices in the GSO by 1990 at 239.[41] If evenly spaced, this would mean a radial separation of about 1.5° of arc.[42] In the years beyond 1990, it can be expected that, because of spacing problems alone, some international allocation system will be necessary to preserve order in the global exploitation of the GSO.

IV. Allocation and Regulation through International Law

A. *The Conceptual Framework*

Customary international law acknowledges a state's sovereignty over airspace above its territory.[43] Arguably, this sovereignty would include the absolute right of a state to preclude transmission of radio, television or data flow information into their territory from abroad. However, another notion in international law is that individuals possess rights which are separate from those of states, and among those rights is that of the free flow of information. Many nations have argued that, like freedom from slavery and piracy, this right of information is of *jus cogens* character. Under the standards of the United Nations Treaty and the Universal Declaration of Human Rights, nations have thus called for the elimina-

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[41] Gehrig, *Geostationary Orbit—Technology and Law*, Proc. on the Nineteenth Colloquium on the Law of Outer Space 267, 270 (1977).

[42] This spacing will be uneven, however, as most of these satellites will be stationed above particular areas of the globe where the need for radio communication is greatest. Thus, the actual angular separation will be considerably less than 1.5°.

[43] L. Oppenheim, International Law 529 (Lauterpacht 8th ed. 1955). The principle of sovereignty over air space is included in the Chicago Convention on International Civil Aviation of 1955, which states:

> *Article 1*
>
> The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory.
>
> *Article 2*
>
> For the purpose of this Convention the territory of a State shall be deemed to be the land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such state.

Convention on International Civil Aviation, Dec. 7, 1944, 61 Stat. 1180, T.I.A.S. No. 1591, 15 U.N.T.S. 295.

tion of restrictions against the flow of information across borders.[44]

The focus of current international law in the area of satellite-to-earth communications attempts to strike a proper balance between sovereignty and the free flow of information. A rough classification finds nations aligned in one of three positions in this regard. Most of the Western industrialized democracies, for economic as well as political reasons, believe that "the best guarantee for freedom of expression and information is absence of interference by public authorities with the content of information . . . and with the free flow of information across borders."[45]

The communist countries by and large consider that the legitimacy of information depends on the purpose for which it is used. "Transborder information flows are permissible as long as they serve the cause of peace and do not violate the sovereignty of receiving nations."[46]

The developing nations occupy the third position within this dispute. They generally perceive themselves as being disadvantaged with respect to information and the utilization of new technologies, as they have historically been with other resources. They support open communications where this reflects an equitable distribution of resources.[47] Simultaneously, however, these nations are interested in controlling information and its concomitant technology for what they feel are vital cultural and security restrictions. These nations feel, to varying degrees, an urgent need for access to information, but also seek control over the broadcast content and over those who receive it.

B. The Current Patchwork of Regulation

Within this context there currently exists a multitude of regulatory regimes applicable to satellite-to-ground communications. Conceptually,

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[44] The Universal Declaration of Human Rights, G.A. Res. 217A, U.N. Doc. A/810 (1948).

[45] *See Europeans Tackle DBS Issues*, 5 TRANSNAT'L DATA REP. 234 (1982). Nonetheless, the United States, Great Britain and other free-flow oriented nations have not completely adopted the free-flow doctrine, but rather have implemented controls in the general area of information transfers.

Two provisions in the U.S. law give the government effective control over private international shortwave broadcasting. By statute, the FCC is empowered to assess the "adequacy of such efforts." The Smith-Mundt Act, 22 U.S.C. § 1462 (1976). By regulation, the FCC will only license private international shortwave broadcasters if the service will "promote international goodwill, understanding, and cooperation." 47 C.F.R. § 73.788(a) (1982). Also, any treaty obligation with respect to DBS activities would, even if it impinged on the first amendment rights of broadcasters, fall within the national security exception that arguably exists under the doctrine in Reid v. Covert, 354 U.S. 1 (1957), though the treaty itself cannot overrule Bill of Rights guarantees. *See* Price, *The First Amendment in Television Broadcasting by Satellite*, 23 U.C.L.A. L.R. 879 (1976).

[46] *Europeans Tackle DBS Issues*, *supra* note 45, at 254.

[47] *Id.*

they may be categorized as follows: national systems of various states; international bodies, with their standards and codes of conduct relating to technical matters and content; regional arrangements; and, international fora for consultation and dispute resolution on an ad hoc basis without international standards.[48]

1. National Systems

The effect of programming regulations at the national level can be seen in a comparison of the United States and the U.S.S.R. The United States is the most free-flow oriented nation of all states concerned with this issue. Yet, the United States' national system is based on the fact that the electromagnetic spectrum is limited and thus must be "rationed" (or regulated), despite the first amendment of the U.S. Constitution guaranteeing freedom of speech.[49] Analogously, in the area of satellite communications, the first amendment gives way as well. The United States retains strict control over international broadcasting via the maintenance of assigned frequencies and by requiring that international satellite communications take place through designated carriers.[50]

Pending any international agreement allocating slots, the United States, and to a lesser extent Canada, Mexico and some Central American countries, have already begun attempts to eliminate, or at least forestall, interference producing congestion between GSO satellites using the 4/6 GHz and 12/14 GHz bands.[51] The U.S. Federal Communications Commission (FCC) realizes the potential problems it faces in regulating the GSO when U.S. companies and other Western Hemisphere countries request more slots in the GSO than are available.

The FCC has been delegated the arduous task of allocating U.S. domestic satellites,[52] and, *a fortiori,* all GSO allocations in the Western Hemisphere. In 1981, the FCC adopted an interim plan to allocate slots on an essentially first-come, first-serve basis, while also beginning a rulemaking proceeding to evaluate the feasibility of reducing orbital separation and designing a more appropriate allocation method.[53]

The FCC's inquiry culminated in two *Memorandum Opinion and*

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[48] Price, *supra* note 45. Prof. Price also suggests that an international ban on any constraints whatsoever is an option for the international community. Inasmuch as the likely result of instituting such a ban would be the very stultification of communications the ban would seek to avoid, it is not discussed in any detail here. In the area of DBS, however, Prices' thoughts on content regulation in international broadcasting are still relevant.

[49] *Id.* at 68-70.

[50] Communications Satellite Act, 47 U.S.C. §§ 731-44 (1976 & Supp. V 1981).

[51] Assignment of Orbital Locations, 94 F.C.C.2d at 133 n.14.

[52] 47 U.S.C. § 721(c) (1976).

[53] Orbit Deployment Plan—Domestic Satellites, 84 F.C.C.2d 584 (1981).

Orders.[54] Acknowledging that the FCC may not be able to accommodate the desires of all entities wishing to position objects in the GSO,[55] the FCC settled on an approach designed merely to forestall congestion by requiring all GSO satellites utilizing the 12/14 GHz bands to be positioned at 2° angular separation, and GSO satellites utilizing the 4/6 GHz bands to be positioned within 2.5° as quickly as possible.[56]

The difficulty in immediately reducing the spacing of the "older" 4/6 GHz satellites is that there are 12 such satellites already situated in space, requiring physical repositioning. Of greater importance, however, is the burgeoning number of relatively uncomplex earth stations currently receiving signals from such satellites. Not only would all of these earth stations have to be reoriented, but many lack the complexity to eliminate co-channel interference caused by a 2° spaced neighboring satellite. For these reasons, the FCC took a lenient stand in implementing allocation regulations: "We have consistently held that the desires of an applicant for a particular orbital location do not limit our flexibility to assign orbital locations that best serve the public interest."[57] Instead, the FCC justified a slower reduction of spacing for the 4/6 GHz satellites because of "long leadtimes, high costs, and risks allocated with domestic satellites."[58]

The FCC must be commended on its attempt to deal with difficult technical problems, but its solution appears to be too little, too late. The repositioning itself is extremely complex.[59] But more importantly, the FCC did little to head off future problems by adopting a comprehensive allocation system which will ensure efficient and equitable allocation of the few remaining Western Hemisphere slots.

The FCC admitted that some allocation method was necessary,[60] but it stopped short of adopting either a comparative hearing or a lottery-type proceeding. Instead, the FCC will begin merely to stringently review applications for allocations and demand that companies seeking slots provide more information.[61] However, if this system does not work, the FCC indicated that it may proceed to a comparative hearing proceeding rather

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[54] Assignment of Orbital Locations, 94 F.C.C.2d 129 (1983); *In re* Filing of Applications for New Space Stations in the Domestic Fixed Satellite Service, 93 F.C.C.2d 1260 (1983) [hereinafter cited as Filing of Applications].

[55] Assignment of Orbital Locations, 94 F.C.C.2d at 130.

[56] Positioning 12/14 GHz satellites at 2° spacing will create few problems, since there are only three such satellites currently in the GSO (although a number more have been authorized and are nearly ready to launch). *Id.*

[57] *Id.*

[58] *Id.* at 131.

[59] *See id.* at 134-40 for an indication of just what the repositioning entails.

[60] Filing of Applications, 93 F.C.C.2d at 1261.

[61] *Id.* at 1261-67.

than a lottery.[62]

In light of the very few remaining slots over the United States, and the complexity of proposals filed with the FCC, it seems doubtful that this process will weed out all but the most poorly filed or speculative applications. The process certainly will not result in so few qualified applicants that the FCC can continue to allocate on a first-come, first-serve basis.

In comparison, little is known concerning the Soviets' approach to the physical allocation of the GSO. Regarding the content of GSO satellite transmissions, the Soviet system expressly limits speech to that which furthers socialist goals. The interaction of these two systems can be seen in the Helsinki accords, specifically in the bilateral approach towards the use of national systems for regulating information flow as found in "Basket III."[63] These accords have proven to be ineffectual in assuring free flow in the Soviet Union, thus demonstrating a problem inherent in using national systems to regulate communications, i.e., the manifold interpretations given by different states to the same concept.[64]

2. International Regulatory Bodies

The second regime, international standards and codes of conduct, continues to evolve out of negotiations.[65] The reasons for regulating communications from the geostationary orbit under such standards and codes are primarily threefold. First, international norms tend to protect smaller, less developed nations which lack the power to broadcast from space or to prevent the reception of such broadcasts. Second, given the disparate views reflected in national regulatory systems, international norms are a necessary means for reducing the conflict which is inevitable in an unregulated system. Third, since the GSO is a species of *res communes*,[66] the

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[62] *Id.* at 1263.

[63] Conference on Security and Cooperation in Europe: Final Act (Helsinki Accords), Aug. 1, 1975, *reprinted in* 14 I.L.M. 1292 (1975). In contrast to the first amendment presumption against prior restraint of communications, article 125 of the Soviet Constitution on freedom of speech, press and assembly is explicitly limited "in conformity with the interests of the working people, and in order to strengthen the socialist system." *See* H. BERMAN, JUSTICE IN THE U.S.S.R.: AN INTERPRETATION OF SOVIET LAW 378 (1963).

[64] *See, e.g.*, Declaration on the Inadmissibility of Intervention Into the Domestic Affairs of States, G.A. Res. 2131, 20 U.N. GAOR Supp. (No. 14) at 11, U.N. Doc. A/6014 (1966), *reprinted in* L. HENKIN, INTERNATIONAL LAW 920 (1980).

[65] Article 19 of the Universal Declaration of Human Rights states: "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers." The Universal Declaration of Human Rights, *supra* note 44, at 71.

[66] Outer Space Treaty, *supra* note 20. *See generally* Goedhuis, *Some Recent Trends in*

world community in toto, not merely the sending and receiving states, should also determine the manner in which the GSO is employed.[67]

a. The Role of the International Telecommunications Union (ITU)

The apportionment and use of the spectrum over which satellite communications are carried is governed in part by the International Telecommunications Convention (ITC) and annexed Radio Regulations.[68] Signals broadcast from groundstations to satellites located in GSO, signals relayed from one satellite to another (be they in GSO or not) and signals sent down to earth all fall within the regulatory jurisdiction of the ITU.[69] During the 1971 World Administrative Radio Conference, the ITU adopted several resolutions and regulations which affected satellite communications and the use of the GSO.[70]

i. Composition and Authority of the ITU

The ITU consists of: the Plenipotentiary and Administrative Conferences; the Administrative Council; the International Frequency Registration Board (hereinafter the IFRB), a body of five independent members which exists within the framework of the ITU; a general secretariat headed by the ITU Secretary-General; and two technical advisory groups, the International Consultative Committee on Radio (CCIR), and the International Consultative Committee on Telegraph and Telephone (CCITT).[71]

The ITU's "supreme organ" is the Plenipotentiary Conference.[72] Composed of delegations representing all member countries, each with one vote, it is responsible for revising the ITC and for establishing general policies and programs.[73] It differs from many conference of specialized U.N. agencies in two principal aspects: it meets relatively infre-

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the Interpretation and the Implementation of the Rule of International Space Law, 19 COLUM. J. TRANSNAT'L L. 213 (1981).

Article I of the Outer Space Treaty reads, in pertinent part:

> The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic development, and shall be the province of all mankind.

[67] Price, *supra* note 45, at 75-76.

[68] I.T.C, *supra* note 18. One-hundred fifty-seven states, including the United States, are parties.

[69] *Id.* at art. 33.

[70] *Id.*

[71] *Id.* at art. 5.

[72] *Id.* at art. 5.1.

[73] *Id.* at art. 6.2.

quently (about once every five years), and it undertakes at each such conference the laborious and time consuming task of revising the entire convention. The Administrative Council, which consists of 36 members of the Union elected by the Plenipotentiary Conference, directs the affairs of the ITU between the conferences.[74]

As opposed to the Plenipotentiary Conferences, the Administrative Conferences are far less grandiose in scale. Formed pursuant to article 7 of the ITC, the Administrative Conferences consist of world administrative conferences and the functionally more limited regional administrative conferences. They may consider only items specifically included in their agenda,[75] and they are normally convened to consider specific issues of telecommunications.[76]

The IFRB is charged with enforcing the ITC and its regulations.[77] This enforcement machinery, however, is limited. The Board cannot order stations off the air and cannot even refuse to record frequency assignments (claims to frequencies made by agencies for/as representatives of member governments) in the Master Register.[78] This lack of enforcement power does not mean that IFRB and ITC decisions are ignored; most ITU members find it in their own best interest to follow the IFRB's decisions.[79] Since the ITC, its Regulations and IFRB findings are essentially self-enforcing, publicizing the violations is essential. The Regulations provide for the regular publication of all IFRB actions.[80]

The regulations under which these ITU bodies work (the Convention and the Radio Regulations currently in force were enacted in 1973[81]) are the product of over 100 years of development, and can only be understood in the historical context of an increasingly congested radio spectrum. The ITC's genesis was the Telegraph Convention of 1865,[82] and the Radio Regulations trace their roots to the Berlin Final Protocol of 1903.[83] The ITU's spectrum management scheme was developed at the 1947 Atlantic City Conference in response to radio frequency congestion.[84] The Atlantic City Conference's objective was the ultimate establishment of an

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[74] *Id.* at art. 8.

[75] *Id.* at art. 7.2.

[76] *Id.* at art. 7.3(2).

[77] *Id.* at art 10.1.a.

[78] Radio Regulations, Dec. 21, 1959, art. 9, 12 U.S.T. 2498, T.I.A.S. No. 4893.

[79] U.S. OFFICE OF TECHNOLOGY, RADIOFREQUENCY USE AND MANAGEMENT: IMPACTS FROM THE WORLD ADMINISTRATIVE RADIO CONFERENCE OF 1979 (1982).

[80] Radio Regulations, *supra* note 78, at art. 10, § IV.

[81] I.T.C., *supra* note 18, at art. 13.

[82] International Telegraph Convention, May 17, 1865, 130 Parry's T.S. 198.

[83] Final Protocol for the Preliminary Conference, Aug. 13, 1903, 194 Parry's T.S. 46; *see* D. LEIVE, INTERNATIONAL TELECOMMUNICATIONS AND INTERNATIONAL LAW 29 (1970).

[84] D. LEIVE, *supra* note 83, at 56.

"engineered," or allocated, electromagnetic spectrum.[85] The IFRB was created and granted a range of powers, including the legal and technical examination of new notices and the issuance of findings. Protections for existing stations from harmful interference by others was recognized as a major right of an ITU member.[86] However, this protection was only to be accorded to those stations acting in conformity with the ITC and the Radio Regulations, thus providing the ITU with both the carrot and the stick to regulate radio broadcasts.

The second noteworthy feature of the Atlantic City Conference was the establishment of an elaborate procedure for the ratification and registry of frequency assignments. Each state was required to conform with the procedure if it wished to receive ITU protection against harmful interference.[87] Furthermore, when disputes over harmful interference arise between ITU members, article 15 of the Regulations provides procedural instructions for bilateral settlements by the parties to the dispute. A

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[85] *Id.*

[86] *Id.; see also* International Telecommunications Convention (Atlantic City Conference), Oct. 2, 1947, art. 44, 63 Stat. 1581, T.I.A.S. No. 1901.

[87] Article 10(2) of the 1973 Convention states:

> The essential duties of the International Frequency Regulation Board shall be: (a) to effect an assigment made by the different countries so as to establish, in accordance with the procedure provided for in the Radio Regulations . . . the date, purpose and technical characteristics of each of these assignments, with a view to ensuring formal international cognition thereof.

I.T.C., *supra* note 18, at art. 10(2).

The first step in the procedure leading toward the recording of new assignments in the Master Register takes place when an administration (a nation's government or specialized agency) formally notifies the IFRB that it has made a frequency assignment to a station under its jurisdiction. An administration cannot insist that the IFRB accept an incomplete notice. At this stage, therefore, the Regulations allow the Board to penalize an administration which refuses to furnish all the required information. This is almost the complete extent of the Board's enforcement powers.

Once the Board has received a complete notice, the particulars of the new assignment (claim) and the date of receipt of the notice by the IFRB are published in the Weekly Circular distributed to all administrations. Administrations thereafter have an opportunity to present comments or objections, either directly to the other administrations, or to the IFRB.

The IFRB examines such notices based on when they are received. The assigments are examined for conformity with the Convention and Regulations, and concerning the probability of harmful interference. The IFRB's findings must be based upon the probability of harmful interference to *notified assignments*, regardless of actual use. Radio Regulations, *supra* note 78; D. LEIVE, *supra* note 83, at 99. Regulation 515 provides that an assignment with an unfavorable finding with respect to harmful interference will be recorded in the Register only if the administration concerned verifies that the assigment has been in use for at least 60 days without either the administration or the Board having received any complaint of harmful interference. Regulation 516 provides a complex investigatory procedure to determine the extent to which an unfavorable finding which was legally correct corresponds to actual spectrum usage.

party may request the IFRB to conduct a study of the dispute and issue its finding and recommendations, but the Board will first determine whether the request is premature because of the party's's failure to use the article 15 bilateral settlement procedures.

ii. ITU Resolutions Concerning the Geostationary Orbit

The World Administrative Radio Conference (WARC) has adopted a number of resolutions affecting the ITU regulatory scheme. The 1971 WARC, WARC-ST, adopted Resolution SPA-1, which related to equal use of the frequency bands by all countries for space radio communications services, provided that "the registration with the ITU of frequency assignments for space radio communication services and their use *should not provide any permanent priority* for any individual country or groups."[88] This resolution specified that all countries had equal rights in the use of radio frequencies and of the GSO for radio services and that the radio frequency spectrum and the GSO were "limited natural resources."[89] This resolution was, however, non-binding.

WARC did make other—binding—changes in the requirement of the Radio Regulations:

> [An administration] which intends to establish satellite systems shall, prior to the coordination procedure, send to the International Frequency Registration Board not earlier than five years before the date of bringing into service each satellite network . . . the information listed . . . . Before an administration notifies the Board or brings into use any frequency assignment to a space station on a geostationary satellite . . . it shall effect coordination of the assignment with other administrations whose assignment in the same band . . . is recorded in the Master Register.[90]

The 1973 Plenipotentiary Conference amended the I.T.C. to further reflect the importance of space communications. Article 10(3)(b) was added, giving the Board the duty to "effect, in the same conditions and for the same purpose, an orderly recording of the positions assigned by countries to geostationary satellites."[91] Article 10(3)(c) was changed to include, as an IFRB duty, the furnishing of advice to members "with a view to the equitable, effective and economical use of the geostationary satellite orbit."[92] Article 4(c) was also modified, making it a goal of the ITU to "coordinate efforts with a view to harmonizing the development of tele-

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[88] World Administrative Radio Conference, July 17, 1971, Res. No. SPA 2-1, 23 U.S.T. 1820, T.I.A.S. No. 7435.

[89] *Id.*

[90] *Id.* at art. 9A.

[91] I.T.C., *supra* note 18, at art. 10(3)(b).

[92] *Id.* at art. 10(3)(c).

communications facilities, notably those using the space techniques, with a view to full advantage being taken of their possibilities."[93]

Although these changes are somewhat vague, their addition and a new article 33 reflects the attempt by developing countries to engraft the concept of the "common heritage of mankind"[94] onto the ITU's operating procedure. Article 33, entitled "Rational Use of the Radio Frequency Spectrum and of the Geostationary Satellite Orbit," states:

> 1. Members shall endeavor to limit the number of frequencies and the spectrum space used to a minimum . . . . 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*, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both . . . according to their needs and the technical facilities at their disposal.[95]

The importance of efficient use of the spectrum/orbit and the principle of equal rights of all countries found further expression in the Preamble of the Final Acts of the 1977 WARC for Planning of the Broadcasting-Satellite Service. The signatories acknowledged "the importance of making the best possible use of the [spectrum/orbit] . . . as well as the need for an orderly development of the services,"[96] and took into account "the equal rights of all countries, large and small."[97] The 1977 World Administrative Radio Conference on Broadcast Satellites (WARC) adopted a plan designating frequency assignments in certain spectrum bands and positions in the GSO for Region 1 (Europe, Africa, the USSR, and Mongolia) and Region 3 (Asia and the Pacific). Plans for a similar allocation scheme for Region 2 (the Americas) were at that time postponed, in return for two compromises: (1) an agreement by Region 2 members to an alternating area segmentation approach and (2) an agreement to hold a Regional Administrative Radio Conference not later than 1982 for the

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[93] *Id.* at art. 4(c)(2).

[94] Sarker, *International Telecommunication Convention and its Impact on Institutions*, PROC. OF THE SEVENTEENTH COLLOQUIUM OF THE LAW OF OUTER SPACE 82 (1975).

[95] I.T.C., *supra* note 18, at art. 33. A change in article 33 which is important for discussion of the GSO was adopted in 1982. Article 33 now provides that ITU must place special emphasis on meeting the deloping countries' needs and their geographical location. Notice of Inquiry, *supra* note 7, at 5. The implication is that such special treatment of the developing countries will be at the expense of the rest of the world.

[96] Final Acts of the World Broadcasting Satellite Administrative Radio Conference, 1977, preamble. *See also* Butler, *World Administrative Radio Conference for Planning Broadcasting Satellite Service*, 5 J. SPACE L. 93 (1977).

[97] *Id.*

purpose of adopting a detailed plan.[98] When the Region 2 Regional Conference was finally held in the summer of 1983, it likewise prepared *a priori* assignments in the GSO over the western hemisphere.[99] The 1979 WARC adopted Resolution No. 3 to "guarantee" all countries equitable access to the GSO and to its frequency bands.[100]

Thus, the concept of an "engineered spectrum" as first propounded in the Atlantic City Conference appears near fruition. The spectrum has already been allocated and the GSO are beginning to be allocated. Concurrently, the IFRB's jurisdiction has been expanded, and a greater emphasis has been placed on the world community's needs by requiring that the Board evaluate how "efficient" a proposed project is in relation to the scarcity of the resources.

Finally, the November 1982 meeting of the ITU in Nairobi confirmed the outlook for an increasingly assertive stance by the developing countries at forthcoming meetings of the ITU and WARC. The poorer countries not only adopted an increased budget for the ITU against the strong objections of the two superpowers, but they specified expenditures which were to be substantially redirected to provide technical assistance for LDC's.[101] According to the leader of the U.S. Delegation, the confrontation between the space powers and the LDC's would have been even more serious had it not been for an offer by the U.S. of private sector technical training for Third World technocrats and bureaucrats.[102] It is becoming clear that efforts of Western countries to keep "political" issues out of international technical fora will no longer be successful, particularly where LDC's believe they have basic interests at stake and see advantages to be gained by the introduction of such issues.

b. The UNISPACE Consensus on Communications Satellites in GSO

The explosive scientific and conceptual developments in the decade following the launch of Sputnik in 1957 prompted the United Nations to

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[98] *Id.*

[99] *See* Georgetown Space Law Group, *DBS Under FCC and International Regulation*, 37 VAND. L.J. 67, 103-04 (1984). The United States accepted the assignment plan despite reservations with it.

[100] Notice of Inquiry, *supra* note 7, at 5.

[101] This may create conflict with the stated U.S. Congressional intent of barring increased technical assistance from the budgets of specialized U.N. agencies.

[102] The United Nations General Assembly adopted in November 1982 a resolution stating basic principles governing use by states of satellites for international direct television broadcasting. The resolution states that DBS should be compatible with states' sovereign rights as well as their rights to receive and send information. Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, G.A. Res. 92, 37 U.N. GAOR Supp. (No. 51) at 98, U.N. Doc. A/37/51 (1982) [hereinafter cited as 1982 United Nations Resolution].

call the first U.N. Conference on the Exploration and Peaceful Uses of Outer Space in 1968.[103] That first Conference forecasted the establishment of routine operation of space communications systems. In the following fourteen years, cooperation between the ITU and the United Nations Committee for the Peaceful Uses of Outer Space (COPOUS) became imperative because of the great number of satellites annually launched.

In 1982, the time once again came to assess developments, encourage cooperation and emphasize the benefits of space technology to states which had not yet fully utilized the new resources. The Second United Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE)[104] was held at Vienna, Austria, in August of 1982. Ninety-three nations attended.

UNISPACE was held not just for the benefit of U.N. members and international organizations. Both governmental and non-governmental entities participated, as did many corporations which had space related products to market. A number of individuals, many of whom were leaders in space development, also participated. Certain sessions were even open to the public.

Among its accomplishments, the UNISPACE Conference developed criteria for regulating the use of various space technologies, including satellite communications. In the opinion of the delegates, countries should make choices based on the following factors:

> 1. the needs of the country;
> 2. that country's priorities;
> 3. the feasibility of meeting these needs and priorities through the use of space technology, giving due regard to the needs of other countries;
> 4. the country's financial resources, industrial infrastructure, and technological capabilities;
> 5. the availability of human, scientific, engineering, and management resources required for effective utilization of space technologies; and,
> 6. the recognition of the rights of other countries to use space technologies at a later date.[105]

The Conference specifically recognized the GSO as a limited natural resource of unique value for a multitude of space uses, with satellite communications being but one of these uses. It called for this resource to be

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[103] Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), Draft Report of the Conference, A/Conf. 101/10, at 6 (1982) [hereinafter cited as UNISPACE].

[104] *Id.* at 47.

[105] *Id.*

utilized in the most efficient manner possible. In this regard, the Conference took note that the ITU had formulated plans for the GSO and that the 1985 and 1988 ITU Conferences are scheduled to develop still further plans based on Resolution 3 of the 1979 WARC.[106]

In particular, the "explosive growth in the use of GSO, especially for communication satellites,"[107] was seen as an indication that space technology is being utilized productively.

> However, while GSO is occupied largely by developed countries' satellites and international systems,[108] there are countries which have not yet placed satellites in GSO; and increasing concerns have been expressed that these positions may not be available when they desire to use them, and that assignments in certain frequency bands (e.g. 4 or 6 GHz) may become more difficult to obtain in the future due to congestion.[109]

Thus, UNISPACE acknowledged these countries' concerns, observing that controls are being developed. It summed up its philosophy on the issue by saying, "[u]nnecessary congestion in GSO should be avoided taking into consideration the equal rights of all countries to GSO which is one of the most important international resources."[110]

Delegates examined the economic feasibility of alternate satellite communications systems, utilizing cost sharing and cooperation.[111] Although increasingly comprehensive and complex communications satellites are being planned and deployed by the developing nations,[112] the launching, operation, and maintenance of such heavy and complex devices is too costly for most states to undertake alone. UNISPACE noted the opportunity for increased international sharing of ground stations and satellites.[113]

Addressing the concern which some countries expressed about the crowding of the GSO,[114] UNISPACE noted that new technology is developing which will permit the distance between devices in GSO to be reduced. Paradoxically, however, more powerful and sophisticated satellites

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[106] *Id.* at 69.

[107] *Id.*

[108] *Id.* at 78.

[109] *Id.* at 69-70.

[110] *Id.* at 17.

[111] *Id.* at 16. For example, alternative systems could include use of large, high-powered spacecraft which would be fixed on-station in the GSO, making possible a technology inversion by which the complexity is shifted from the ground to the spacecraft. *Id.* The effect would be to have small antennae ground stations with large antennae communications satellites.

[112] Note, however, India's disappointing experience when a satellite became overloaded with technology and failed.

[113] UNISPACE, *supra* note 103, at 22.

[114] *Id.* at 16.

permit simpler ground stations, and the simpler ground stations require satellites to be spaced more widely in the GSO.[115] Thus, this alternative may create more problems. For example, the reduced costs of ground stations permit more people to receive DBS signals, creating a larger demand for such service and thereby greatly exacerbating the debate between countries diametrically opposed on the sovereignty/free flow issue.[116]

As an alternative, concentration of technology in large "space telephone exchanges" in GSO orbit has been proposed and is now feasible.[117] Such large platforms would receive, process and transmit signals via narrow beams using large antennas. Such exchanges could result in more efficient use of the GSO. However, UNISPACE expressed apprehension that single states might establish such platforms for themselves to the exclusion of, and in interference with, the needs of other less developed states.[118] UNISPACE encouraged a feasible alternative to such large platforms—the placement of satellites in clusters which are inter-connected electronically.[119]

UNISPACE expressed a need for an improved system of registration and coordination. All countries, it said, must be guaranteed "equitable access" to GSO and to the frequency bands assigned for space communication services.[120] The 1979 WARC resolved that prior registration of frequency assignments with the IFRB would not establish a permanent priority of positions and frequencies.[121] UNISPACE stated that such prior registration and use should not become barriers to the initiation of systems in space by other countries.[122]

Turning to the 1976 Bogota Declaration, UNISPACE declared its position that the GSO is subject to the Outer Space Treaty of 1967[123] and is therefore free for the use of all states.[124] In support of this, UNISPACE pointed to the ITU Convention, under which the radio frequency spectrum and the GSO must be used to provide equitable access in accordance with each countries' needs and available technology.[125]

In response to the "unnecessary" objects in the GSO, and the resulting danger to satellites legitimately in the orbit, UNISPACE recom-

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[115] *Id.*
[116] The cost has declined from $64,000 in 1965 to $9360 in 1981.
[117] UNISPACE, *supra* note 103, at 23.
[118] *Id.*
[119] *Id.*
[120] *Id.*
[121] *Id.*
[122] *Id.*
[123] *Id.* at 70
[124] *Id.*
[125] *Id.* at 70-71.

mended that owners of satellites be required to remove useless devices from the GSO, and that countries review constantly whether they actually need their satellites in GSO. UNISPACE called on the ITU to develop criteria for this purpose, as well as to promote efficient use of the GSO and the radio frequency spectrum.[126]

Finally, UNISPACE made a number of recommendations for the development and efficient use of the resources of outer space, including the GSO. It encouraged states to:

1. establish regional systems for self-regulation;
2. share data;
3. coordinate systems in order to avoid interference;
4. coordinate programs;
5. undertake joint planning;
6. provide opportunities and facilities for developing countries to utilize outer space;
7. provide education;
8. assist in establishing a space infrastructure; and,
9. develop space law regarding the technology of space and the peaceful application of such technology.[127]

UNISPACE expressed the hope that "a leading role in the promotion of more efficient use will no doubt be taken by countries with advanced space technology."[128] However, while concluding that "[t]he improvements in the utilization of GSO that would arise from the use of new technologies should permit all countries to have access to space technology at a level of sophistication appropriate to their needs and requirements,"[129] it asked that any planning should also consider the future needs of developing countries. Developing countries should not be forced into imprudent investments merely to secure their stake in the GSO or radio frequency spectrum.

c. UNESCO

On a somewhat broader scale, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) has dealt with GSO communications from the perspective of an information resources policy, founded largely on the conflict-avoidance justification.[130] UNESCO, however, suffers from an overly vague mandate to respect both the sover-

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[126] *Id.*

[127] *Id.* at 87.

[128] *Id.* at 70.

[129] *Id.*

[130] Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, Records of the General Conference, UNESCO 17th Sess., vol. 1, U.N. Doc. 17 C/ Res. 4.111 (1972), *reprinted in* U.N. Doc. A/AC.105/109 (1973).

eignty of states and the right of individuals to communicate.[131] Moreover, other more technology-specific regulations are the focus of discussions at fora concerned with transnational data flow, such as the United Nations Committee on Multinational Corporations, the Organization for Economic Cooperation and Development, and the International Bureau of Information, and thus preempt UNESCO discussions.

d. The Outer Space Treaty of 1967

The 1967 Outer Space Treaty applies to outer space as well as celestial bodies. Article I of the Treaty states:

> The exploration and use of outer space, including the moon and other celestial bodies, 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.
>
> Outer space, including the moon and other celestial bodies, 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, and there shall be free access to all areas of celestial bodies.
>
> There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and states shall facilitate and encourage international cooperation in such investigation.[132]

Placing an object in the GSO would clearly constitute a "use of outer space" and thus would be governed by article I.

The first clause of article I has not been interpreted to mean that all nations must receive specific benefits from each satellite in space, either monetarily or in services. Rather, it has been read to state only that space activities, and thus by implication geostationary satellites, must benefit all countries in a general sense.[133] The interpretation of the second clause is intended to prevent monopolization of space by one nation or a group of nations and to ensure that each state has an equal right to use outer space.[134]

In 1966, the U.S. Ambassador to the United Nations, Arthur Goldberg, said that article I was intended to make clear that "outer space and celestial bodies are open not just to the big powers or the first arrivals but shall be available to all, both now and in the future."[135] Other

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[131] *Id.*

[132] Outer Space Treaty, *supra* note 20.

[133] Gorove, *Freedom of Exploration and Use in the Outer Space Treaty*, 1 DEN. J. INT'L L. & POL'Y 93, 104 (1971).

[134] Gibbons, *Orbital Saturation: The Necessity for International Regulation of the Geosynchronous Orbit*, 9 CAL. W. INT'L L.J. 139, 148 (1979).

[135] Statement of Ambassador Arthur J. Goldberg before General Assembly Committee I (Political and Security), Dec. 17, 1966.

commentators have gone further, arguing that since article I was included in the body of the treaty and not in the preamble, it was the intent of the drafters that the "common interest" clause be a treaty obligation and not simply a general goal.[136]

A dispute has arisen over the meaning of article II as applied to the GSO. Article II states 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."[137] The United States has interpreted this to mean that as long as a use of the GSO is a legitimate use under the Treaty there is no appropriation.[138] The French have stated that the use of geostationary satellites can be regarded as an appropriation by occupation.[139]

The Treaty applies to parties if they are acting alone, with another state or states or in an international organization.[140] This provision can be interpreted to mean that the Treaty applies to any international organization of which a member state is a signatory to the Outer Space Treaty and that that organization's violations are imputed to be member states' violations. Individual states are, therefore, responsible to see that the international organizations to which they belong abide by the Treaty.

A major point of controversy in the application of the Treaty is to what physical space it can be applied. In 1976, a group of equatorial countries claimed sovereignty over the GSO. Part of the basis of their claim was a creative argument that the GSO was gravitationally unique from other possible orbits for satellites; hence, it was technically not part of outer space, and thus was not immune to sovereignty claims under the Outer Space Treaty.[141] Because the Outer Space Treaty contains no definition of outer space nor any formula to determine where outer space begins and airspace ends, customary international law is the only source for defining the applicable boundaries of the Treaty.[142] This customary law is itself based on, among other things, the widely accepted practices among and between nations. Herein lies a problem, however, since the only countries capable of establishing these practices are those who are able to venture into space. Thus, the actions of a few technologically advanced nations are establishing the norms and customs for the entire in-

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[136] Markoff, *International Space Agency Project, The Bogota Declaration, and the Common Interests Rule*, PROC. OF THE TWENTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 34 (1978).

[137] Outer Space Treaty, *supra* note 20.

[138] Rankin, *Utilization of the Geostationary Orbit—A Need for Orbital Allocation?*, 13 COLUM. J. TRANSNAT'L L. 98, 100 (1974); Gibbons, *supra* note 134.

[139] Rankin, *supra* note 138.

[140] Outer Space Treaty, *supra* note 20, at art. XIII.

[141] Bogota Declaration, *supra* note 9.

[142] I.C.J. CHARTER art. 38.

ternational community and by implication the application of the Outer Space Treaty.[143] Such a definition will surely be made in the best interests of the spacepowers (who stand to lose much in terms of economic, political and military powers) and therefore may overly limit other states' access to the GSO.

3. Regional Accords

Regional approaches to satellite broadcasting have proliferated.[144] They represent the confluence of naturally similar interests, and they not only provide a more manageable regulatory system in terms of size, but also permit "experiments" in the use of novel regulatory concepts. ARABSAT and the recent Council of Europe Declaration on the Freedom of Expression and Information represent two such attempts.[145] In these regimes, the basis for regulation is conflict minimalization, combined with the added similarity of interest that members of these consortia may be presumed to have.

One of the major contributions of these systems could be the eventual development, through conciliation and negotiation on an ad hoc basis, of some "common law" of broadcasting from GSO.[146] A framework for this type of regulation could be a mix of international standards with the concerns expressed in national systems. Essentially, a dynamic model of broadcast law would have the capacity to recognize the de facto lack of agreement over substantive regulation, yet nonetheless acknowledge that the international implications of the use of GSO requires accepted methods of dispute resolution. This approach may spur the continuing development of space technology in ways that the adoption of international standards alone would not.

4. Dispute Resolution

In highly technical and rapidly advancing fields, such as the development of outer space, and particularly the use of the GSO for communications purposes, mechanisms specifically designed to resolve disputes concerning these matters offer advantages over more general ones. Traditional methods used to resolve international conflicts have included negotiation, "good offices," mediation, conciliation, inquiry, arbitration

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[143] Gibbons, *supra* note 134.

[144] Price, *supra* note 45, at 82.

[145] *Europeans tackle DBS issues*, *supra* note 45, at 251. Each is a potential dispute resolution body. Such bodies and their procedural systems are dealt with more extensively below.

[146] Price, *supra* note 45, at 82.

and judicial settlement.[147]

a. Current Dispute Resolution Mechanisms Existing in Treaties Concerning Outer Space and Communications

Projection of some potential conflicts arising from the use of outer space is currently possible. For the purpose of this article, these disputes are separated into two broad categories.

Technical Conflicts are those which permit the involved parties to preserve their sovereign existence in a relatively undisturbed fashion. Controversies over money damages, for example, fall into this category. So do differing interpretations of mere technical rules found in international agreements. *Sovereign Conflicts* directly involve indicia of a nation's sovereignty, for example, control of or jurisdiction over places and things. Thus, the claim by one country that it has the right to prohibit signals from direct broadcast satellites of a second state from being transmitted into its territory can evolve into a conflict of this type.[148]

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[147] *Negotiation* takes the form of direct discussion between the disputing parties without third-party intervention. Implicitly, both parties seek through negotiation to voluntarily resolve the dispute.

Good offices can best be described as the friendly intervention by a third party whose designated function it is to bring the parties to a dispute together. If properly executed, this method requires the least amount of outside pressure in resolving the conflict.

Mediation can be differentiated from "good offices" in that the third party takes an active part in the discussion so as to act as a catalyst to dispute resolution.

An international institution may undertake *conciliation*, when it wishes a friendly settlement to occur, but without imposing any particular solution on the parties.

Inquiry is sometimes undertaken by an international institution in order to elicit facts and occasionally legal conclusions stemming from a conflict, thereby providing the parties with a seemingly independent and detached basis on which to resolve the dispute.

Judicial surroundings characterize the *arbitration* method of conflict resolution. States or disputing parties plead their case to judges of their own choice and, on the basis of respect for law and a voluntary acknowledgment of an incumbent duty to accept and carry out the award in good faith, accept the decision handed down.

Finally, the most structured and adversarial method is *judicial settlement*. Although the case is pleaded in much the same manner as in the arbitration setting, the tribunal is a pre-existing one, with a standing bench of judges, and as such is more detached from the controversy. 1 G. SCHWARZENBERGER, A MANUAL OF INTERNATIONAL LAW 241 (5th ed. 1967).

[148] States may not be the only parties to disputes over outer space. Corporate entitites, international institutions, and individuals may become involved as primary parties. *See* Dula, *Regulations of Private Commercial Space Activities*, 23 JURIMETRICS 156 (1983).

In the Convention of International Liability for Damages Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762 [hereinafter cited as Damages Convention], article VIII provides that a claim for damages incurred by an individual shall be brought by a state representing that individual. This state may either be the one where the damage occurred, the state of nationality, or the state in which the individual is a permanent resident. *Id.* at 2395. The damage claim is to be presented to the launching state. *Id.* at 2396 (art. IX).

Two treaties and two draft treaties concerning outer space issues currently exist. The two treaties in force utilize arbitration. However, the disputes they address fall only into the technical category. The two draft treaties encompass subjects which may potentially give rise to sovereign conflicts. The two draft treaties do not use arbitration as a resolution method.

i. The Technical Conflicts

The Convention on International Liability for Damages Caused by Space Objects (Damages Convention) provides a two-step process whereby claims for monetary damages can be resolved.[149] Articles IX and XIV suggest that settlement of a claim should be made through "diplomatic negotiations." If, however, settlement cannot be achieved through this method, articles XIV through XX provide for the establishment of a Claims Commission to conduct arbitration.

During the drafting of this treaty, disagreements arose over what power the Claims Commission should have in order to impose its decision upon parties.[150] A compromise was agreed upon[151] and the decision of the Commission is to be "final and binding *if the parties have so agreed*; otherwise, the Commission shall render a *final and recommendatory award,* which the parties shall consider in good faith."[152] The language used was carefully drafted so as to be ambiguous,[153] thus preserving the legality of dissenting action by a sovereign nation in the face of an adverse award by the Commission. Use of such language avoids de facto relinquishment of any freedom of choice by a state through its becoming a signatory of the Convention. Thus, in conflicts over the question of monetary damages, "technical conflicts," the Damages Convention was unable to establish a binding mechanism for dispute resolution.

The second pertinent treaty is the International telecommunications Convention (ITC).[154] Article 50 of the ITC provides for the resolution of "disputes or questions of interpretation or applications of provisions" of the Convention. This is to be done through "diplomatic channels," or other mechanisms "mutually agreed upon." However, should the parties not adopt these mechanisms, "any member party may submit the dispute

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For the purposes of this paper, only controversies between states will be discussed.

[149] Damages Convention, *supra* note 148, 24 U.S.T. at 2395-2400.

[150] *See* 1 N. JASENTULIYANA & R. LEE, MANUAL ON SPACE LAW 90 (1979).

[151] *Id.* at 137-42.

[152] Damages Convention, *supra* note 148, 24 U.S.T. at 2400 (art. XIX(2)) (emphasis added).

[153] 1 N. JASENTULIYANA & R. LEE, *supra* note 150, at 140.

[154] I.T.C., *supra* note 18.

to arbitration."[155] Article 81 declares that the decision of the arbitrator (or arbitration panel) should be "final and binding."[156]

This language seems to explicitly provide a mechanism which is binding upon member states in disputes affecting sovereignty. In practice, however, this arbitration procedure is used solely for resolution of disputes involving the technical rules. Political questions are, in practice, either left to negotiations between the parties themselves or to be addressed at meetings of the ITU. A prime example of this is the current dispute between RCA and the Cuban government. It seems that RCA's SATCOM IV may soon not be alone at 83° west latitude in the GSO. The Cuban government is currently planning to send a satellite to essentially the same position, using the same transmission frequencies.[157] Such a placement, according to RCA, would cause such co-channel interference that SATCOM would be rendered almost useless. RCA contacted the State Department and asked that it persuade the Cubans not to launch their satellite. It is anticipated that the countries' governments will address the problem diplomatically rather than one of them submitting the question to arbitration or using other international conflict resolution methods.

ii. Sovereign Conflicts

The Principles Governing Direct Satellite Broadcasting,[158] and the Principle Relating to Remote Sensing of Earth,[159] are draft treaties whose subject areas encompass sovereignty issues. Both contain clauses addressing conflict resolution which are similar. They provide that any dispute arising through the application of the respective treaties should be resolved via consultation between the parties. Failing this, resolution is to be sought through other "established procedures."[160] No arbitration provisions are included.

Thus, in none of the four treaties concerning outer space has arbitration been utilized as a method to resolve sovereign conflicts. As demonstrated in the Damages Convention, binding arbitration is in fact only

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[155] *Id.* at art. 50.

[156] *Id.* at art. 81.

[157] Monday Morning Memo, Oct. 3, 1983, at 3 (publication of National Radio Broadcasters Association).

[158] U.N. Doc. A/AC 105/218, Annex II (1978); 1 N. JASENTULIYANA & R. LEE, *supra* note 150, at 105. In a modified form, this draft treaty was adopted as a United Nations General Assembly Resolution. *See* 1982 United Nations Resolution, *supra* note 102.

[159] U.N. Doc. A/AC 105/218, *supra* note 158, at Annex III; 1 N. JASENTULIYANA & R. LEE, *supra* note 150, at 111.

[160] U.N. Doc. A/AC 105/218, *supra* note 158, at Annex III.

reluctantly resorted to even in the technical conflicts.[161]

b. Judicial Tribunals

The most traditional form of dispute resolution is the judicial tribunal. Although not referred to in any treaty or draft treaty concerning outer space, a discussion of this method is nonetheless provided because of its traditional importance. Two basic types of judicial tribunals exist, those which are national and those which are international.

With national tribunals, distinct difficulties arise for the international party. One is essentially procedural, involving questions such as jurisdiction and sovereignty. The outcome of these can be problematic in any politically sensitive case. Another difficulty centers about the substantive law to be applied. In some conflicts, merely the choice of forum, by itself, may be completely determinative of the litigation. As an example, this would be true for many issues concerning information flow. Such difficulties make national tribunals inappropriate for most international issues arising over the uses of outer space.

The second type of tribunal is the international one, best represented by the International Court of Justice (ICJ). Its statutes specify that it shall have jurisdiction only over those cases which are referred to it by the parties or where jurisdiction is specifically provided for in a treaty or other convention.[162] Thus, an act of political will on the part of a party-state is required to submit a case to the ICJ. Moreover, while one party may submit to the ICJ, the opposing party may choose not to recognize its competence in the particular case.[163] For these reasons, international judicial tribunals, like their national counterparts, are of questionable use in the resolution of disputes concerning outer space.

c. Suggestions for the Peaceful Resolution of Disputes Concerning Outer Space

From the foregoing analysis it may be gleaned that resolution of technical and other isolated issues could be accomplished through mandatory arbitration between states. However, broader issues affecting national sovereignty must be resolved by the parties themselves through the use of other mechanisms. Fortunately, because space activities have the ability to affect many countries on earth simultaneously, and implementation of complex technologies in outer space can impact on the sovereignty of nations as few other developments have in man's history, it is

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[161] Damages Convention, *supra* note 148 and accompanying text.

[162] I.C.J. CHARTER arts. 36, 37.

[163] *See generally* S. ROSENE, THE LAW AND PRACTICE OF THE INTERNATIONAL COURT 91 (1965).

in the interest of all states to resolve space conflicts. Therefore, alternate mechanisms of dispute resolution, as opposed to arbitration or judicial settlement, seem appropriate. Specifically, two traditional mechanisms, inquiry and conciliation, appear to be satisfactory alternatives given the existing conditions which limit the effectiveness of dispute settlement mechanisms.

Inquiry seems particularly appropriate because it is a fact-eliciting procedure. Space activity will be highly technical, thus fact determination should prove apt at defining issues and highlighting possible solutions. Conciliation calls for a neutral, third party to actively mediate a dispute. This third party can inject possible solutions into the resolution process, while avoiding many of the loss-of-face difficulties present in face-to-face negotiations. Additionally, it enables the neutral party to exert subtle pressure on the disputing parties in a context where such pressure may be accepted. Thus conciliation can offer many of arbitration's advantages in a situation where arbitration is otherwise inappropriate.

Legal, extra-national entities might be created in order to provide the neutral fora which are necessary for inquiry and conciliation.[164] Arbitration and judicial settlement, although by no means abandoned, should realistically be relegated for use only in technical conflicts.

It is hoped that the institutions proposed here can be established prior to the outbreak of any substantial international space conflict. Should they be successful in resolving initial disputes, they may acquire the precedential value needed to become the primary resort when future conflicts over outer space occur. As the development of the GSO is proceeding rapidly, inclusion of these mechanisms in future international agreements concerning the GSO would be a suitable testing ground for this proposal.

V. Future Projections and the SPACE-WARC

As the exploration of outer space has progressed, use of the GSO resource has been allocated on an essentially first-come, first-serve basis.[165]

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[164] Precedent exists for the use of conciliation in the U.N. Code of Conduct for Lines Conferences. "[T]he Code provides for settlement of disputes by one or more conciliators chosen from an international panel of conciliators . . . by the disputants to hear and settle their controversy." Larsen & Vetternick, *The UNCTAD Code of Conduct for Lines Conferences: Reservations, Reactions and U.S. Alternatives*, 13 Law & Pol'y Int'l Bus. 223, 241 (1981). The panel is to consist of "experts of high repute or experience in the field of law, economics of sea transport, or foreign trade and finance, as determined by the Contracting parties selecting them." 2 UNCTAD United Nations Conference of Plenipotentiaries on a Code of Conduct for Lines Conferences, art. 30(1), U.N. Doc. TD/Code/Add. 1 (1975).

[165] Gorove, *The Geostationary Orbit: Issues of Law and Policy*, 73 Am. J. Int'l L. 444, 455 (1979).

Those first to place satellites in orbit have gained priority rights over late-comers merely by their physical presence in the orbital slot, and it is already apparent that the most advantageous orbits are steadily becoming filled.[166] Because the technology involved is rapidly changing, what is not now clear is how many satellites can co-exist in GSO without interfering with each other.[167] Although short-falls in available space may be averted for many years by new technologies, the uncertainty of this problem has brought political uneasiness, as evidenced by the the Bogota Declaration.[168]

It cannot be assumed that claims by developing nations will disappear, nor that technological advances will forever keep abreast of the demand for orbital slots. Developing nations are heavily concerned with their own economic development and independence. Like all nations, they recognize the importance of communications in today's world.

The danger now faced is that actions of the developed nations, which ignore LDC demands without suggesting reasonable alternatives, will be interpreted as insensitivity to poorer nations and insincerity about principles of equity.[169] This may lead to a lack of respect for the rights of present users. Such a set of circumstances would breed conflict and may lead to chaos in communications. Although this conflict has not ripened, current U.S. policy determinations are a foreshadowing of possible conflict. On one hand, at the 1983 ITU Regional Conference the United States accepted as satisfactory in principle the plan for use of the geostationary orbit for direct broadcast satellites. Furthermore, the United States has agreed to participate in SPACE-WARC, which has as its mandate to guarantee equitable access to the geostationary satellite orbit and to the frequency bands. On the other hand, the United States has indicated it will only participate if alternative solutions to *a priori* planning are also considered. As indicated in the FCC Notice of Inquiry[170] the United States is opposed to further *a priori* allocation of geostationary orbital slots and frequencies, and has apparently based preparations for the conference on this principle. However, foreign countries and particularly de-

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[166] As stated, *infra*, one estimate suggests 239 active geostationary satellites will be in orbit by the year 1990. *Id.* at 446. This would certainly be a large number, leaving an average of less than 2° between each satellite.

[167] The distance required between satellites will depend on the function of each satellite and the radio frequencies available for use. The satellites are physically quite a distance apart even at 1° spacing, roughly 450 miles per degree [Distance = circumference/360 = 3.14159 x 2 x (22,300 + 3,500)/360 = 450.29 miles per degree].

[168] *See supra* Section I.

[169] "The exploration and use of outer space shall be carried out for the benefit and in the interests of all countries," and "shall be free for exploration and use for all states without discrimination of any kind." Outer Space Treaty, *supra* note 20, at art. I.

[170] Notice of Inquiry, *supra* note 7, at 4.

veloping countries in various United Nations fora have expressed strong demands for orderly sharing of the GSO resource. It is important that alternatives be considered to avoid such a scenario and hopefully to produce a system as equitable and efficient as possible.[171]

A seed presently exists for the resolution of conflicting claims to GSO. That seed is in the already discussed Outer Space Treaty of 1967. In article I it is agreed that the use of outer space shall be free and that its use shall be based on equality.[172] Furthermore, article II stipulates that outer space is not subject to appropriation by means of use, by claims of sovereignty or by any other means.[173] From these beginnings it seems possible to agree on the following:

> 1. The use of the GSO must be efficient. This requires that users must be informed about efficient utilization of the GSO, they must be willing to coordinate their activities with other states, and they must refrain from wasteful practices.
>
> 2. The concerns of the developing countries must be taken into account. This is true whether or not these concerns have a basis in reality, since the political basis which they do have can result in a considerable increase in North-South tension. Thus, the developing countries' concerns over the possible preemption from future use of the GSO must be resolved, and they must be resolved in an equitable manner.
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> 3. The military use of the GSO must be recognized as a fact and must be accounted for in international agreements.
>
> 4. Continued development and implementation of communications technology on a world-wide scale must be encouraged. This includes development of alternate ground based systems, such as integrated services digital networks utilizing fiber optic cables, and complex satellites possessing vastly increased capabilities.
>
> 5. International agreements resolving many of the present conflicts concerning satellite communications, such as the free flow of information question, should be reached speedily, particularly prior to the advent of international DBS services.
>
> 6. Mechanisms for international dispute resolution should be devised and institutionalized prior to the outbreak of political disputes in outer space. These conflict resolution mechanisms should include standing fora for inquiry and conciliation.

The widespread acceptance of the 1967 Outer Space Treaty by the international community demonstrates that the political will to peacefully regulate the use of outer space does exist. Progress made in COPUOS, the ITU and at recent WARC meetings shows that this is particularly the

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[171] Of course, equity and efficiency may be diametrically opposed in some instances, and there is no easy definition of equity in international relations.

[172] Outer Space Treaty, *supra* note 20, at art. I.

[173] *Id.* at art. II.

case with respect to the GSO, substantial difficulties notwithstanding. However, the particular fears of the LDC's, combined with a growing appearance that military use of the GSO by the space powers will work against the interests of the majority of the world's peoples,[174] calls for an immediate and imaginative response.

In attempting to regulate the use of the GSO equitably and efficiently, the international community can look to the work already undertaken to develop an agreement for the regulation of DBS. If nations could come to terms with the difficult issues inherent in DBS, one of the impediments to allocation and regulation of orbital slots would easily and logically be resolved.

The major difficulty in obtaining an acceptable international agreement on DBS is the question of broadcasts into national territories by other nations. Currently, almost all nations exercise some degree of control over material broadcast within their borders, and it is unrealistic to expect states to forego at least some degree of control over material broadcast via DBS. Negotiations beyond the 1982 UNGA Resolution on DBS should be pursued to find an acceptable compromise agreement between the competing principles of state sovereignty and free flow of information. The alternative can only be increased tension between all states.[175]

Additionally, other international conventions can contribute to the peaceful use of space technology. In 1978, France proposed a global satellite monitoring agency which would enable the United Nations to ascertain facts and communicate rapidly and reliably in times of crisis.[176] Neither the United States nor the U.S.S.R. supported this idea,[177] but a compelling argument can be made that the cooperative use of satellite communications technology is crucial in the nuclear age.

Finally, Recommendation 12 of the 1979 WARC called for a "World Administrative Radio Conference on the Use of Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It."[178] The 1982 Plenipotentiary Conference in Nairobi decided to convene the first session of this Conference, known as SPACE-WARC, on August 8, 1985, in Ge-

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[174] Washington Post, Nov. 7, 1982, at 18, col. 1.

[175] *Cooperation or Confrontation in Outer Space*, THIRTEENTH CONFERENCE ON THE U.N. OF THE NEXT DECADE 26 (1978).

[176] *See* Lay, *Space Law: A New Proposal*, 8 J. SPACE L. 41, 48 (1980).

[177] This idea surfaced again in 1980, in the U.N. Committee on Disarmament. *See* J. JOYCE, THE WAR MACHINE: THE CASE AGAINST THE ARMS RACE 201 (1980).

[178] Final Acts of the World Administrative Radio Conference, Geneva, 1979, rec. 12, *reprinted in* NAT'L TECH. INFO. SERVICE, DEP'T OF COMMERCE, II FINAL ACTS OF THE WORLD ADMINISTRATIVE RADIO CONFERENCE (1979); *see also* U.S. OFFICE OF TECHNOLOGY, *supra* note 79.

neva.[179] An agenda for the SPACE-WARC was adopted at the May 1983 meeting of the ITU Administrative Council which recognized that Resolution 3 of WARC '79 required the Council "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.[180] SPACE-WARC will consider and establish planning principles concerning the needs of particular countries for the use of the GSO and will establish regulatory guidelines for such use,[181] while at the same time recognizing that the changing need for services and technological gains will require a certain amount of flexibility in SPACE-WARC planning.

The impetus for the SPACE-WARC is the increasing use of the GSO. Countries wishing to use GSO satellite positions in certain areas (bands) have experienced difficulty in coordinating such new positions with countries which have previously placed satellites in nearby orbits. At WARC '79, some countries argued that the existing allocation system (based on coordination) was inadequate and inequitable and should be revised. Developing countries were particularly vociferous in advocating new regulations which would result in more efficient use of the GSO. To answer these concerns, the Council decided that the SPACE-WARC conference should first of all "review the situation prevailing in the bands allocated to space services on the basis of: information communicated by administrations [and] a report to be prepared by the IFRB in accordance with Resolution No. 3 of WARC-79."[182] The agenda for SPACE-WARC states that it shall "decide on the basis of proposals received from administrations, which space services and frequency bands should be planned."[183] While each conference is sovereign, the SPACE-WARC conference has indeed been given the task to engage in *a priori* planning of space services and frequency bands.

The United States has generally been content with the existing system, and it was therefore not among the countries advocating establishment of new regulations.[184] The United States fears that the current system for accomodation of satellite positions through ITU coordination may be replaced by an inflexible system.[185] However, the U.S. delegation to the 1979 WARC stated that, in a spirit of compromise, it could accept

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[179] Res. No. 895, *reprinted in* Notice of Inquiry, *supra* note 7, at app. B2. The second sessions of SPACE-WARC is scheduled for 1988. *Id.* at 3.

[180] *Id.* at B2.

[181] *Id.*

[182] *Id.*

[183] *Id.*

[184] *Id.* at 4.

[185] *Id.*

the recommendation to hold the SPACE-WARC, keeping in mind however the need for flexibility.[186]

To plan effectively for the Conference, the United States must therefore first evaluate the prevailing situation regarding the use of communications satellites in geostationary orbit; that is, whether the U.S. use of the geostationary orbit and its allocation of frequency bands is best served by the current and prevailing system of usage, or whether other systems are preferable. The FCC has decided that its study of the prevailing situation will include "all relevant information associated with the development and use of communication satellites in GSO, including anticipated consequences of current activities and programs."[187] The FCC analysis of the prevailing situation will consider at least the following six factors: (1) implementation of communication satellites, (2) demand of users for services, (3) developments in technology, (4) the networks which have evolved in telecommunications, (5) the internal institutions and (6) ITU's efficiency in coordinating use.[188]

First, in regards to the implementation of communication satellites, the FCC is confident that its policy of minimum government regulation is preferable. Despite contrary views[189] the FCC, until recently, was of the view that "the notion that most of the GSO is likely to become 'crowded' is a very unfortunate but widespread misperception with little basis in fact."[190]

Second, for realistic SPACE-WARC assessment it is critical that the user demand for services be established. Such demand is presently concentrated in a few countries, such as the United States, Western Europe and the U.S.S.R., and the FCC is of the view that the developing countries' demands for use of GSO will be increased only at "a moderate rate."[191] A study of the prevailing situation must ascertain credible projections of demand for services by users. Otherwise, without realistic assessment of user demand, the SPACE-WARC could by mistake assign slots and frequencies for uses which will never happen and thus waste this valuable resource.[192] The FCC encourages the ITU to consider "demand forecast models as analytical tools."[193]

The third factor, the expanding technology, is important not only in providing low-cost service but also in making this kind of service available to more people. In fact, the technology is expanding so rapidly that it

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[186] *Id.*
[187] *Id.* at 6.
[188] *Id.*
[189] *Id.*
[190] *Id.* at 7.
[191] *Id.* at 8.
[192] *Id.*
[193] *Id.*

is difficult to make accurate predictions as to what technology will be available in the future. The FCC has decided that any kind of technical restraints have an inhibiting effect and should be avoided as a matter of policy.[194] The FCC is "very concerned whether an international agreement might be effected which is potentially obligatory as a treaty instrument that could significantly complicate this matter and frustrate our domestic deregulatory goals, particularly in a field as rapidly evolving as satellite communication."[195] It concludes that "any international arrangements to which the United States is a party must not unduly hinder us from achieving our own national goals."[196] In addition, the FCC is of the view that a competitive environment is most favorable to development of technology and that the cost of new technology will be driven downwards by a pro-competitive environment. Ultimately the benefits of these developments in technology will become available to all countries which benefit from the freedom of technology to develop.[197]

In considering the fourth factor, networks which have evolved in telecommunications, the FCC points to the beneficial U.S. experience of GSO use by multiple private enterprises. In spite of the history in other countries of state monopolies in telecommunications networks, the FCC believes that the SPACE-WARC should consider that although other countries do not now follow the U.S. private enterprise approach "their domestic telecommunication networks and associated infrastructure will nonetheless undergo significant changes during the next two decades that cannot begin to be totally envisioned at this time."[198] Furthermore, the FCC expects the U.S. free enterprise networks to develop and expand rapidly "as to architecture, ownership and technology."[199]

Fifth, the FCC is of the view that developing countries will attach increasing importance to international institutions such as INTELSAT and INMARSAT to provide not only international services but also resources in order to obtain the advantages of new technology. This observation is motivated by the established need to pool domestic resources. Thus the FCC believes that it will be contrary to developing countries' interests to insist too rigidly on *a priori* assignments of the GSO because they will need flexibility for these institutions to develop.[200]

The sixth and final factor is the ITU's efficiency in coordinating GSO use. The United States believes the existing ITU system of advance pub-

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[194] Notice of Inquiry and Proposed Rulemaking, F.C.C. 83-67 (Mar. 18, 1983).

[195] Notice of Inquiry, *supra* note 7, at 9.

[196] *Id.*

[197] *Id.*

[198] *Id.* at 10.

[199] *Id.*

[200] *Id.*

lication of projected uses, subsequent coordination with and notification to other countries within ITU appear "to be satisfactory and cost effective."[201] The FCC Notice of Inquiry notes that this process "has allowed the kind of continuing flexibility that has allowed constant technical and operational adjustments to assure open entry. This is in many respects, equitable access in practice."[202] Thus the FCC is of the view that "it seems that detailed *a priori* plans applied to even the most amenable communication satellite service have yet to demonstrate in practice their usefulness in assuring equitable access."[203]

The policy of the FCC is clear. It believes that "*[a]ny* detailed *a priori* assignment plans for communication satellite services beyond those that already exist for the broadcasting-satellite service at 12 GHz and the associated feeder-link bands appear unacceptable to the United States."[204] Therefore, the FCC wants the SPACE-WARC conference to accept as a basic premise that "a wide range of planning options" must be considered. Otherwise, "there is no point in any further dialogue" because the FCC essentially believes that no further *a priori* plans are required or necessary. Essentially the FCC is of the view that the existing ITU system of coordination use is satisfactory.[205] Private U.S. industry interests support this view,[206] which is understandable because these interests are the primary beneficiaries of the FCC's policy.

Furthermore, the FCC Notice of Inquiry notes that ITU's activity in this area must be guided by ITU's basic objective which is solely "to avoid harmful interference."[207] Therefore, the FCC does not appear interested in any planned division of GSO resources merely because they may become scarce in the future. The FCC concludes:

> It seems patent that a detailed *a priori* assignment plan contained in a treaty instrument for any communication satellite service other than broadcasting-satellite is not feasible, or to the extent feasible, not desirable. This planning approach utilizes the most inflexible possible legal device, a multilateral treaty, accepts the demands for allotments without any scrutiny or controls, explicitly or implicitly freezes dozens of technical and operational characteristics of every communication satellite facility at some low common denominator, impairs the ability to later share a common facility, and suggests the conveyance of protection normally afforded an actual station.[208]

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[201] *Id.* at 11.
[202] *Id.*
[203] *Id.*
[204] *Id.* at 12.
[205] *Id.*
[206] *Id.* at 13.
[207] I.T.C., *supra* note 18, at art. 4.
[208] Notice of Inquiry, *supra* note 7, at 15.

Thus, the FCC is of the view that an *a priori* assignment plan would be contrary to U.S. communication policy,[209] and that such a plan would also impede international development of communications.[210] It states that "it is difficult to envision whose interests, whether developed or developing country, would be served by the further application of a rigid *a priori* assignment planning method" which would place constraints on technological development and would "defer the promise these facilities hold for many kinds of innovative, low-cost, universal information services in the future for all peoples."[211]

Is this geostationary orbit a scarce resource? While the amount of possible orbital slots will increase with improvements in technology, and although visions of orbital congestion must be tempered by the very real prospects of earth-based alternatives, in particular fiber optic cable, it is the current availability of the GSO as a means of world-wide communications which preoccupies nations. Although it is possible that nations overemphasize the value of this resource, until the GSO's potential value and limitations can be accurately assessed, and until alternative communications technology becomes a reality, countries will contine to envision the GSO as a scarce world resource worth contesting for. The use of this resource must, therefore, be carefully coordinated among nations so that the resource is used most efficiently, yet without depriving any one country of its equitable share. Because states have legitimate concerns over the future use of this resource, an important potential conflict exists.

The United States, through the FCC's recent Notice of Inquiry, expresses willingness to participate in good faith in the SPACE-WARC negotiations.[212] Those negotiations will include advance planning for the use of the geostationary orbit's frequency bands and space services. Although the FCC and the current administration have expressly rejected the concept of *a priori* planning, the FCC has also expressed willingness to participate in conference negotiations as long as all avenues will be explored.

Interestingly, the United States accepted at the 1983 ITU Regional Administrative Radio Conference (RARC) *a priori* planning for the use of the geostationary orbit by direct broadcast satellites (DBS).[213] In those negotiations the United States received sufficient orbital slots and frequencies to satisfy its needs. The outcome of the RARC is important not only because of its results, but also because of the breach with the past U.S. policy of automatically rejecting *a priori* planning or orbital slots and frequencies.

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[209] *Id.*
[210] *Id.*
[211] *Id.*
[212] *Supra* note 7.
[213] *Id.* at 4.

Unfortunately, the 1983 Notice of Inquiry fails to weigh the results of the 1983 RARC in terms of its precedential value. There is an important lesson to be learned from the 1983 RARC, because of its approach to conflict resolution brought an acceptable outcome for all countries involved. The Administration's concerns seem to rest on the implicit assumption that due to the scarcity of GSO slots in relation to DBS slots and frequencies and relative demands therefor, that *a priori* planning in allocating the GSO will not result in an acceptable outcome for the United States.

Although the United States is the most extensive user of the geostationary orbit, it has only one vote at international conferences such as the SPACE-WARC. On the other side are the clearly expressed views of the large majority of nations, notably at the 1982 UNISPACE Conference and at other U.N. and ITU meetings, that they want some *a priori* planning for the use of the geostationary orbit. Their legal arguments are based on article I of the 1967 Outer Space Treaty which states 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,"[214] and on article 33 of the ITU treaty which recognizes that "radio frequencies and the geostationary satellite orbit are limited national resources, that must be used efficiently and economically so that countries or groups of countries may have equitable access to both . . . according to their needs and technical facilities at their disposal."[215] Furthermore, the ITU agreed in 1982 to meet the special needs of the developing countries in "guaranteeing equitable access to the geostationary orbit and to the frequency bands."[216] Thus, the United States appears to be on a clear collision course over the use of the geostationary orbit.

With the exceptions of a few equatorial countries, it is generally accepted that the geostationary orbit is not a unilateral national resource, but an international resource. Therein lies the problem facing the United States. United States experience in allocating other international resources, notably international air traffic rights, has been that it is not possible to extend U.S. deregulation policy beyond our borders, except by agreement with other countries. Once those rights have been obtained by negotiation, then it is possible to throw those rights open for use with or without governmental allocation.

The advantage to such a planned approach to obtaining user rights by negotiation is that the parties to the negotiations agree to respect each other's use, and agree to abstain from harmful interference. If this process is based on the real needs of bargaining countries, then the SPACE-

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[214] Outer Space Treaty, *supra* note 20, at art. I.

[215] I.T.C., *supra* note 18, at art. 33.

[216] Notice of Inquiry, *supra* note 7, at 5.

WARC conference may indeed produce an allocation methodology acceptable to all countries, even those heavy users of the GSO such as the United States. However, there is little chance of success if one country declines to enter into negotiations unless its position is accepted. In that case, the likely result is increased conflict and harmful interference, thus causing general deterioration of the GSO resource.

To meet this challenge, the United States must accept a degree of negotiating flexibility so that by allowing other countries' needs to be met those other countries will agree to meet the United States' heavy demands on GSO use. In the absence of such dialogue and flexibility, however, these needs will not be met, and the countries of the world will continue on a collision course toward intolerable congestion due to continued allocation on a first-come, first-served basis.