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SPACE COMMUNICATIONS AND THE LAW: ADEQUATE INTERNATIONAL CONTROL AFTER 1963?

*Samuel D. Estep** and *Amalya L. Kearsse***

DURING the current year, a space event of legal and technological significance will occur. The American Telephone and Telegraph Company (A.T. & T.), using the launching facilities of the National Aeronautics and Space Administration (NASA), will launch its first satellite for research in the area of commercial communications.† The A.T. & T. sphere will be the first tested by a private, commercial organization specifically for business purposes—to implement a plan eventually to provide increased and improved telecommunications on a grand scale at a lower cost. The satellite will relay television signals from the United States to England, Germany, and France. Before a communication network can be commercially feasible, however, certain legal problems of space communications must be solved.

Although the ownership and operation of the commercial communication satellite system are primarily domestic questions, the international ramifications have been a matter of some concern to our State Department.¹ To the extent that the satellite will be used for communications with foreign countries, those countries should perhaps have an opportunity to participate. Indeed, President Kennedy has issued an invitation to all nations to participate in a global communications system, through ownership or otherwise,² although new legislation may be necessary to achieve this. The Federal Communications Act prohibition on granting a license to a corporation more than one-fifth of whose stock is held by foreign interests³ would have to bow to this more pressing international concern.

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† After this article was accepted for publication but before this issue went to press, Telstar was successfully launched on July 10, 1962. On this historic occasion three countries sufficiently advanced technologically to be equipped to use the satellite transmitted the following pictures across the Atlantic Ocean: United States—the American flag; France—Yves Montand; Great Britain—the Post Office Department.—S.D.E. & A.L.K.

¹ Klass, *Indecision Bogs Communication Satellites*, *Aviation Week*, April 17, 1961, p. 104.

² *Kennedy Sets Commercial Satellite Policy*, *Aviation Week*, July 31, 1961, p. 25.

³ 48 Stat. 1064 (1934), as amended, 47 U.S.C. § 222(d) (1958).

If a foreign state is not allowed to participate in the manner or to the extent it wishes, or if it wishes not to participate and not to have signals from the commercial satellites received in its territory, or wants to prevent use of the system by anyone, it could conceivably upset or interfere with the entire commercial satellite program. In addition to potential piecemeal interference, the possible development of a method of preventing a satellite from even being successfully orbited is of real concern to the Defense Department and NASA.

At its 1959 Administrative Radio Conference, the International Telecommunication Union (ITU) made allocations of several frequency bands for space and earth-space radiocommunication services; however, all such allocations have been authorized for one purpose only: research. This limitation of permissible uses will have great significance in analyzing the problems attending operational satellite systems which have been allocated no frequency channels. Already various satellites are being used by government agencies for weather observation ("Tiros"),⁴ radionavigation ("Transit"),⁵ and reconnaissance,⁶ as well as research.

⁴ Launched July 12, 1961. See *Aviation Week*, July 17, 1961, p. 37. Another weather observation satellite, "Nimbus," is planned by NASA to carry six television cameras, solar converters, recorders, and command equipment. See Alexander, *Nimbus Uses Wheels, Jets for Control*, *Aviation Week*, July 10, 1961, pp. 77-79.

⁵ Launched June 28, 1960. See Glazer, *The Law-Making Treaties of the International Telecommunication Union Through Time and in Space*, 60 *MICH. L. REV.* 269, 298, n.101 (1962). This Navy satellite system would enable ships to fix their positions to within one-half mile, by receiving signals from four satellites. The satellites would transmit at a very high frequency in a narrow band at stated times and would operate in any weather.

⁶ Already in use are the "Midas" and "Samos" satellites. The Samos satellite is designed for reconnaissance with high-resolution cameras. See *Aviation Week*, Feb. 6, 1961, p. 30. Midas is an infra-red, early warning satellite for the detection of intercontinental ballistic missiles. The Midas missile orbits are planned so that the Air Force will be able to observe the whole earth with about ten satellites in polar orbit. Cf. *Aviation Week*, Jan. 16, 1961, p. 88. Still in the development stage are three more reconnaissance satellites: "Lofter," "Vela Hotel," and "Early Spring." Lofter is a system using infra-red and ultra-violet rays for detection of hostile ICBM's during their boost phase. See Comment, *USAF To Fund New ICBM Warning System*, *Aviation Week*, April 3, 1961, p. 33. The Vela Hotel satellite will detect nuclear explosions in outer space, 50,000 to 75,000 nautical miles from earth. The first of five launches of two satellites each is scheduled for 1963-1964. These spheres will monitor space in all directions. To escape detection, a test ban violator would have to test an unshielded device more than 100 million miles from earth. Johnsen, *Space Nuclear Test Research Accelerated*, *Aviation Week*, Aug. 7, 1961, p. 33. Early Spring is the Navy's space mine system; it is a vertical interceptor satellite containing an optical scanning system capable of discriminating between stars, known harmless or friendly vehicles, and suspect orbiting objects. It will be able to identify targets and relay data to the ground for positive con-

Because the limited number of frequencies technologically available for space use⁷ have been authorized for other uses or for research, communications with operational satellite systems are now unauthorized and could, in fact, cause harmful interference with validly licensed occupants of the radio spectrum. Moreover, operational systems cannot at this time claim ITU protection against harmful interference whether caused intentionally or unintentionally.

Important as these problems are, however, the most immediate threat to the proposed plan is the possibility of intentional interference with its communication signals. Analysis of the proprieties of jamming must include some consideration of customary international law and an examination of the scope and effect of existing international agreements for dealing with interference. Because existing international law, both customary and treaty, is inadequate to meet the needs of a successful satellite communication system, some suggestions will be made as to questions which must be answered at an early date.

The first opportunity for reaching answers to some of these questions will come next year. At the 1959 ITU Radio Conference, the delegates tentatively scheduled for 1963 an Extraordinary Conference, primarily for the purpose of allocating the frequencies necessary for controlling and using satellites. It is clear, however, that mere allocation of frequencies will not assure the success of the programs contemplated. Although a scheme of allocations will minimize unintentional interference, procedures to cope with intentional interference require additional consideration; the mere allocation of frequency bands to one service or another will not insure inviolability. And just as allocation of

trol of destruction if desired. Its optical scanning system is said to be so sensitive that it will be able to pick up a pinpoint target in a test room so small that it would be scarcely visible to an observer who would have had the precise location shown to him. This satellite may include instruments for the destruction of a target; destruction would be achieved by the satellite's aligning itself in a near-collision head-on orbit, with destruction achieved by using a proximity-sensitive device to make direct collision unnecessary. See *Aviation Week*, March 13, 1961, p. 75; *Aviation Week*, July 17, 1961, p. 38.

⁷ The "frequency" of a transmission is determined by the length of the radio wave. Because of differences in propagation characteristics of waves of various lengths, only certain frequencies can pass through the ionosphere, the strongly ionized layer just above the height of 80 kilometers above sea level. This "frequency-selective" characteristic of the ionosphere limits the number of usable frequencies and makes frequency allocation an important policy decision.

frequencies cannot be divorced from regulation of jamming, so both of these problems are inextricably bound up with other problems such as ownership, access, and regulation of the satellite systems—problems which, if unsolved, may provide powerful incentives to jam. There can be no guarantee of a successful satellite program until there is thoughtful and productive consideration of these interrelated problems.

I. CUSTOMARY INTERNATIONAL LAW

A. *Jamming as Protest Against Transgression by Radiowaves*

It is an accepted principle of customary international law that a state has the right to object to transgression of its territory by offensive radiowaves of foreign origin.⁸ It can object either by diplomatic protest or by interfering with the radio signal, otherwise known as jamming. The latter is the state's only unilaterally effective means of enforcing its sovereign right to exclude a signal from its territory. The right to jam bears with it the duty, so far as possible, not to transmit with so much power that reception of the signal is prevented in other states;⁹ however, it has been suggested that if reception in other innocent states is interrupted unavoidably, the right to jam has not been abused.¹⁰ Moreover, a state is entitled to jam an offending signal even though its jamming signal must obliterate radio communication on that frequency within the territory from which the transmission emanates.¹¹

Jamming is usually accomplished by broadcasting a buzz or other raucous sound on the same frequency used by the offending broadcaster, with enough power that the offending signal is drowned out. This is the way the Soviet Union jams Voice of America, but Voice of America has equipment with which it can change frequencies, playing, as it were, a game of hide-and-seek with the Soviet buzz. Because broadcasting equipment is extremely

⁸ See BRIGGS, *THE LAW OF NATIONS* 325 (2d ed. 1952); 1 HYDE, *INTERNATIONAL LAW CHIEFLY AS INTERPRETED AND APPLIED BY THE UNITED STATES* § 192 (2d ed. 1945); JESSUP & TAUBENFELD, *CONTROLS FOR OUTER SPACE AND THE ANTARCTIC ANALOGY* 204 (1959); OPPENHEIM, *INTERNATIONAL LAW* 529 (8th ed. Lauterpacht 1955); STENUIT, *LA RADIO-PHONIE ET LE DROIT INTERNATIONAL PUBLIC* 137 (1932).

⁹ See BRIGGS, *op. cit. supra* note 8, at 310-13; Scott, *The Institute of International Law*, 21 *AM. J. INT'L L.* 716, 728 (1927). See also Appendix, example 2.

¹⁰ STENUIT, *op. cit. supra* note 8, at 139.

¹¹ See HYDE, *op. cit. supra* note 8; Scott, *supra* note 9.

expensive, and is usually associated with a specific frequency, most services are unable to avail themselves of more than one channel.¹² There have, of course, been other instances of international jamming. When a Moscow station broadcast criticisms of the Roumanian government into Roumania and urged the people to revolt, the Roumanian government buzz-jammed the Moscow station, as it apparently had a right to do.¹³ On another occasion, during a general strike in England, when radio was the only means of communication between the government and the people, the most important British station was buzz-jammed by Moscow.¹⁴ If this was done intentionally, it was clearly in contravention of international law principles.

Two theories have been offered by which a state has the right to jam: by one, the right results from the state's exclusive national sovereignty over its airspace;¹⁵ by the other, the right is included in the sovereign right of a state to punish crimes against its security, although they are committed in another country, if the punitive action does not violate a third state's sovereignty.¹⁶ By the first theory, the right to exclude foreign radio signals is dependent upon the state's relation to the "airspace" above it.¹⁷ Radiowaves, however, are not airborne objects; they are electromagnetic impulses which travel independently of the atmosphere. They do not actually "disturb"¹⁸ the airspace; and especially in the context of satellite communications, the fact that they pass through airspace at all is incidental. Therefore, to base the right to jam solely on the ownership of airspace is to assume a context artificial for the purposes of regulating radio transmission.¹⁹ Since radiowaves do not in fact observe airspace as a controlling boundary, airspace alone should not govern the right to use or jam them.

The national security theory, on the other hand, appears to

¹² STAFF OF SENATE COMM. ON AERONAUTICAL AND SPACE SCIENCES, 86TH CONG., 2d SESS., REPORT ON POLICY PLANNING FOR SPACE TELECOMMUNICATIONS 34 (Comm. Print 1960) [hereinafter cited as SENATE STAFF REPORT].

¹³ See W. DAVIS, RADIO LAW 359 (1929). There is no indication as to whether or not the buzz signal jammed stations outside of Roumania.

¹⁴ *Ibid.*

¹⁵ See BRIGGS, HYDE, JESSUP & TAUBENFELD, and OPPENHEIM, *op. cit. supra* note 8.

¹⁶ See STENUIT, *op. cit. supra* note 8.

¹⁷ See Appendix, example 3.

¹⁸ Statement by Cooper in a discussion in 1956 PROCEEDINGS OF THE AMERICAN SOCIETY OF INTERNATIONAL LAW.

¹⁹ *Ibid.*

condone jamming whether or not the signals pass through the state's airspace. If the signal constitutes a threat to the state's security, the state can legitimately jam the signal although it does not pass through its airspace. However, a signal which bypasses a state's airspace is not receivable in that state, and the jamming, to have any effect at all, would necessarily be a jamming of the reception in another state, either directly or by disabling the relay equipment carried by a transmitting satellite.²⁰ Jamming another state directly would usually be precluded by the theory itself—the concomitant duty not to infringe on the sovereignty of another state.²¹ Only if the offending broadcast were an act of the other government or condoned by the government would it seem that a direct jamming of the transmission would not constitute a breach of the duty. On the other hand, there appears to be nothing prohibiting a state's jamming the satellite itself, by overloading its components so that no use may be made of that frequency.²² Outside of a call-to-arms against a state by its neighbors—an unlikely subject for a broadcast, but perhaps not so improbable as one might initially suspect²³—it is difficult to imagine a situation in which a signal incapable of reception in that state would constitute a real peril to its security. Nevertheless, an instance which suggests itself as a possible source of an assertion of the right to jam is the broadcast of a propaganda program into a "satellite" country. It is conceivable that the parent country would claim the right to jam that broadcast especially if the parent country did not have a "puppet" government in the satellite country to do its bidding. In such a case, only the state invaded by the signals should have the right to counteract the intrusion, not the parent state at whom the propaganda may be indirectly aimed.²⁴

²⁰ See statement and testimony of Pierce in *Hearings Before the House Committee on Science and Astronautics*, 86th Cong., 1st Sess., No. 9, at 35 (Comm. Print 1959). A passive satellite carries no equipment; it merely reflects signals back to receivers on earth. The passive-type satellite, therefore, could not be jammed directly.

²¹ See BRIGGS, *op. cit. supra* note 8, at 298, §10-11.

²² A satellite will be equipped to transmit only a few frequencies. The problem then is the same as for ground stations, the inability to change frequencies when one is jammed.

²³ Art. 2, International Convention Concerning the Use of Broadcasting in the Cause of Peace, Sept. 23, 1936, 186 L.N.T.S. 301, prohibits just such a situation. For a more extended discussion of this convention, see *infra*.

²⁴ Practically, such a signal would not be receivable by the great majority of people in the "satellite" state, since reception may well require special equipment. It has been suggested, however, that someone interested enough in propaganda might manufacture

Technologically, there seems to be no means of erasing a signal buzz-jamming a passive satellite (one which only reflects signals), except perhaps by transmitting with all the more power, which usually is not feasible. An active satellite (one which receives and rebroadcasts signals) is subject to the additional peril of being jammed by having its receiving and retransmission components overloaded, disabling it for the purposes of its legitimate users.²⁵ Practically, there is no difference between loss of communications caused by jamming a ground transmitter and by jamming a satellite; nor should there be a legal difference. Therefore, the possibility of jamming a communication satellite brings into focus the need to define, if possible, the status of outer space.

B. *Airspace and National Sovereignty*

The general consensus of the majority of jurists is that existing international agreements recognize the sovereignty of a state over its superjacent "airspace," and that space beyond the earth's atmosphere is not included.²⁶ Under this "orbit point" theory, the upper boundary of "airspace" is the height at which a vehicle ceases to be lifted by air currents and starts circling the earth by centrifugal force.²⁷ Therefore, since satellites do not travel by

and sell at very low prices receiving sets to people in areas which would otherwise not be able to receive broadcasts. See Smythe, *Communications Satellites*, 17 BULL. ATOMIC SCIENTISTS 65, 68 (1961).

²⁵ This additional peril, however, may be more amenable to technological solution. See Pierce statement and testimony, *supra* note 20; N.Y. Times, June 4, 1961, p. 53, col. 1.

²⁶ Galina, *On the Question of Interplanetary Law*, in SYMPOSIUM PREPARED FOR SENATE COMM. ON AERONAUTICAL AND SPACE SCIENCES, LEGAL PROBLEMS OF SPACE EXPLORATIONS, S. Doc. No. 26, 87th Cong., 1st Sess. 1051 (1961) [hereinafter referred to as SENATE SYMPOSIUM]. See also statements of Roy, Meyer, Schachter, and Cooper at the 1956 Proceedings of the American Society of International Law as reported by Haley, *Space Law and Metalaw—Jurisdiction Defined*, 24 J. AIR L. & COM. 286 (1957); Jenks, *International Law and Activities in Space*, 5 INT'L & COMP. L.Q. 99 (1956).

²⁷ Cooper, *The Problem of a Definition of "Airspace,"* in SYMPOSIUM PREPARED FOR SENATE SPEC. COMM. ON SPACE AND ASTRONAUTICS, SPACE LAW, 83d Cong., 2d Sess. 403 (Comm. Print 1959). This appears to be the best definition of the upper boundary of airspace formulated thus far. Its main attraction is that it provides a line that is capable of physical and mathematical demarcation at a reasonably stable height. (For an object traveling at 25,000 feet per second the line would be approximately 275,000 feet above the earth's surface.) This definition also abandons the contention that aerodynamic lift must be the sole support available to the vehicle up to the line of demarcation between airspace and outer space. Its principal defect lies in the fact that the line will vary with change in design and other factors of the particular flight instrumentality concerned. *Ibid.* It is suggested, however, that the definition provides the main thrust of a sound and workable rule, without actually describing the thing whose definition was attempted, unless "airspace" is deemed to be a word of art. Generally, "airspace"

airlift,²⁸ they revolve in an area unregulated by international treaty law.²⁹ A few jurists have tendered the theory that a state's territory extends upward to the height to which it can exercise effective control—regardless of what conventions have recognized,³⁰ and a few others have interpreted the existing conventions and agreements with respect to "airspace" as properly having application to outer space, on the theory that the framers of those conventions did not intend to use "airspace" in its limited scientific sense, and did not foresee the need to be scientifically and technically precise in describing the space above a state.³¹ The latter theorists, then, would say that existing agreements recognize the sovereignty of each state upward ad infinitum.³² Under neither theory, of course, would space over the high seas be subject to a claim of jurisdiction.

If the airspace limitation were accepted, outer space would be freed of all regulation, unless formal agreements were made; until then any nation could orbit a satellite. By the same token, however, such a satellite would be vulnerable to being jammed without legal protection. If, on the other hand, the sovereignty

is thought to designate the earth's atmosphere; since the earth's atmosphere extends to 1,000 miles or more above the earth, much satellite flight will be within the upper regions of the atmosphere. "In discussing air and space, it should be recognized that there is no division, per se, between the two. For all practical purposes air and space merge, forming a continuous and indivisible field of operation." White, *Air and Space Are Indivisible*, *Air Force Magazine*, March 1958, pp. 40, 41.

²⁸ But see theories offered by French jurists, cited note 31 *infra*.

²⁹ Since Russia has "depreciated the authority of customary international law and suggested that durable international rules arise only from the explicit consent of the states," it has been suggested that informal law may have little weight. Note, 74 HARV. L. REV. 1154, 1155 (1961). See Margolis, *Soviet Views on the Relationship Between National and International Law*, 4 INT'L & COMP. L.Q. 116, 123, 126 (1955); Triska & Slusser, *Treaties and Other Sources of Order in International Relations: The Soviet View*, 52 AM. J. INT'L L. 699, 713, 715, 720-21 (1958). It is noteworthy, however, that the Soviet Union has seen fit, in connection with at least one treaty, to reserve to itself its customary rights "under the general rules of international law . . ." See *procès-verbal* of the International Convention Concerning the Use of Broadcasting in the Cause of Peace, Sept. 23, 1936, 186 L.N.T.S. 301, 317. Furthermore, it has been argued that in view of the ITU's having regulated airborne or floating objects outside national territories in article 7 of the ITU Radio Regulations, the Union has demonstrated its competence to deal with space problems which are outside the jurisdiction of any nation, without modification of the present ITU convention. See Glazer, *supra* note 5, at 301-02.

³⁰ KELSEN, *GENERAL THEORY OF LAW AND STATE* 218 (1945); Cooper, *High Altitude Flight and National Sovereignty*, 4 INT'L L.Q. 411 (1951). This attitude has since been abandoned by Cooper. See *Legal Problems of Upper Space*, 1956 AM. SOC'Y INT'L L. PROCEEDINGS.

³¹ See Danier & Saporta, *Les Satellites Artificiels*, 18 REV. GEN. DE L'AIR 297 (1955); Hingorani, *La Souveraineté sur l'Espace Exoatmosphérique*, 20 REV. GEN. DE L'AIR 248 (1957).

³² Hingorani, *supra* note 31.

of a state be deemed to extend upward *usque ad coelum*, each passage of a satellite over a territory would be a trespass, which each subjacent state would have the right to prevent or penalize.³³ Neither the Soviet Union nor the United States has, in fact, acknowledged any upper limit on her own national sovereignty; nor has either publicly entertained any notion that her satellites are trespassing on the territories of the world. One Russian legal scholar has stated that satellites violate no treaties or agreements. His contention is that they do not violate the air sovereignty of any state because they do not "pass over" any state. Rather, the territories of the states, because of the earth's rotation, pass under the satellite's orbit which is fixed in relation to the earth and the stars.³⁴

But assuming some concept of violation of airspace is retained, there are two additional theories pertinent to each of the foregoing theories regardless of which upper limit is used. These theories concern the lateral measurement of the upward extent of national sovereignty. By the commonly accepted theory, lines would be drawn from the center of the earth through the boundary points of each state, straight out to or into space. The superjacent air or space territories of adjacent states would thus be contiguous. One author, however, has suggested that the superjacent territory of each state might be a column of air, or air and space, formed by parallel lines which would in effect be parallel to the line between the center of the earth and the geometric center of the territory.³⁵ The implementation of this theory would leave wedges of air and space which, like the air over the high seas, would belong to no state. These wedges could mean the difference between legitimate and illegitimate jamming of a radio signal³⁶ or of a satellite.³⁷ This theory would move toward constricting the states' right to jam, but there are two serious objections. First, the near-impossibility of constructing in practice the cylindrical lines required offsets any positive value to be gained from the restriction of the right to jam. Second, it would increase

³³ See Appendix, example 2; BRIGGS, *op. cit. supra* note 8, at §10.

³⁴ Zadorozhnyi, *The Artificial Satellite and International Law*, SENATE SYMPOSIUM 1054.

³⁵ Schofield, *Control of Outer Space*, 10 *AIR U.Q. REV.* 93 (1958). See Appendix, example 1.

³⁶ See Appendix, example 4.

³⁷ See Appendix, example 5.

the number of unregulated areas from which radio signals could be sent to a given state without any nation necessarily being responsible.³⁸ Although the space above the high seas is also susceptible to this use, there is no sense in multiplying the dangers, and there seems to be little justification for adopting a theory that will provide this additional unregulated space.

Leaving aside the lateral boundary theories, neither of the alternative doctrines proposed to define the upper limit of national sovereignty offers a satellite immunity from legitimate jamming; the one theory, the *usque ad coelum* theory, condones jamming, while the other, the airspace theory, neither condones nor condemns. On the *usque ad coelum* theory, a state could legitimately obstruct space activities over its territory by objects such as military satellites which violated its "public policy." This theory holds attraction for small states interested not merely in their own internal security, but in the furtherance of the public policy of the United Nations³⁹ and the survival of mankind. This theory is the only remaining basis on which such a state can justify interfering when its own internal security is not involved. It would, however, lead to the farfetched result of segmenting all of outer space and requiring permission from all nations for satellite flight. On the other hand, the airspace theory, places satellites outside the protection of any nation. This means that state *A* would have no right to jam state *B*'s satellite, but state *B* also would have no right to protest if state *A* did jam. Airspace principles thus are of little real assistance in matters of satellite communications.

To fill some of the gaps left by the airspace theories, some writers have proposed that the law of space be formed by analogy to the law of the high seas.⁴⁰ Space, like the high seas, would be unregulated; the celestial bodies would be like the newly discovered continents and, therefore, subject to national sovereignty claims, or like the sedentary fisheries of the high seas, belonging

³⁸ Furthermore, from a position sufficiently high above the earth's surface, a bomb could be dropped from outside a state which, by virtue of the earth's rotation, could fall 250 miles within that state. See Schofield, *supra* note 35.

³⁹ Glazer, *supra* note 5, at 292-93, discusses the abuse of right principle.

⁴⁰ See Schachter, *Who Owns the Universe?*, *ACROSS THE SPACE FRONTIER* 118-31 (Ryan ed. 1952). It is interesting to note that Grotius, in arguing for freedom of the seas, analogized the sea to the air (in those days not differentiated from space), which he said was by nature incapable of appropriation. See GROTIUS, *THE FREEDOM OF THE SEAS* 28 (1608).

to the states which effectively used and exploited them without impeding free space travel.⁴¹ However, the problems involved in conquering the cosmos are by their nature different from those which concern maritime and air navigation,⁴² and would seem to require different solutions. Furthermore, whereas the military danger from the sea *decreases* for a nation as the distance between it and a warship increases, recent thought is that, because of the added range in vision, the danger to a nation may actually *increase* as the distance between it and a spaceship increases, at least up to 1,000 miles.⁴³ It is apparent that the road to a logical and reasonable law of space and space communications does not lie in asking what is the law of the sea.⁴⁴

The belief that outer space must have a legal "status" which can be discovered or agreed upon is apparently a volatile assumption.⁴⁵ Instead, the question to be asked is: "What legal consequences should be entailed by certain activities in order that they be accommodated with other activities under given policies?"⁴⁶ The test should not be whether it passes through a state's airspace or whether it threatens a state's security. Rather, an initial test should be whether or not the radio signal is generally receivable in the jamming state⁴⁷ and transmits a message whose character justifies interference with reception. This question cuts across the two proffered standards to reach the essential problem of impact on the receiving state. Any formulated answers should include the rule that a state be forbidden to jam signals by disabling the broadcasting equipment of a satellite, and be limited to over-

⁴¹ See Schachter, *supra* note 40.

⁴² See Korovin, *International Status of Cosmic Space*, Int'l Affairs (U.S.S.R.) Jan. 1959, pp. 53, 54-55.

⁴³ See Craig, *National Sovereignty at High Altitudes*, SENATE SYMPOSIUM 169; von Braun, *Prelude to Space Travel*, ACROSS THE SPACE FRONTIER 12-70 (Ryan ed. 1952).

⁴⁴ Cf. MATEESCO, DROIT AÉRIEN-AÉRONAUTIQUE 75-77 (1954). Mateesco reasons that space law logically cannot come from analogy to sea law. The sea is finite in all dimensions and is a material substance. Space, on the other hand, is non-material. It is that within which all else exists, but it does not itself have an objective nature and should not be reified. Even the term "airspace" ("*l'espace aérien*") is a misjoinder of terms, and should be rather "air place" ("*le milieu aérien*").

⁴⁵ See McDougal & Lipson, *Perspectives for a Law of Outer Space*, 52 AM. J. INT'L L. 407 (1958).

⁴⁶ *Id.* at 412 n.15. See also MATEESCO, *op. cit. supra* note 44.

⁴⁷ Under this formulation, states which are technologically advanced could put radio installations high in their airspace at a position to intercept, claim interference from, and jam satellite signals whose direction was such that they were not generally receivable on the ground. For practical purposes, this category of states now includes only the Soviet Union and the United States.

powering within its own territory any offending signal. It could perhaps jam reception of the signal in another state if that state so allowed or requested, provided the jamming did not require intrusion on the reception of the signal in a third state which did not want the signal jammed.

It is very doubtful, however, that satisfactory answers can be formulated on a case-by-case basis under customary international law principles. Instead, specific treaty coverage will be required to meet the challenge presented by these rapid advances in technology.

II. TREATY LAW

A. *The Broadcasting Treaty of 1936*

Initial consideration, in the area of formal agreements, should be given to the International Convention Concerning the Use of Broadcasting in the Cause of Peace, signed at Geneva in 1936.⁴⁸ This treaty, seeking to make new international law, rather than merely codifying customary law, is currently binding upon relatively few countries.⁴⁹ The main thrust of its provisions is the condemnation of international transmissions constituting an incitement to war or revolt,⁵⁰ and transmissions of incorrect information likely to ripple international tranquility.⁵¹ The Convention requires that harmful "statements the incorrectness of which is or ought to be known to the persons responsible for the broadcast," must be corrected at the earliest possible time and by the most effective means, "even if the incorrectness has become apparent only after the broadcast has taken place."⁵²

The 1926 Moscow broadcasts into Roumania, mentioned earlier,⁵³ urging the Roumanian people to revolt, would have been outlawed by the Convention provision forbidding incitement of

⁴⁸ Sept. 23, 1936, 186 L.N.T.S. 301.

⁴⁹ Only India, Great Britain and Northern Ireland, Denmark, New Zealand, Luxembourg, Brazil, France, Norway, Egypt, and Estonia signed *and* ratified the Convention. Australia, Burma, Southern Rhodesia, Union of South Africa, Ireland, Sweden, Salvador, Guatemala, and Finland acceded to the Convention; Albania, Argentina, Austria, Belgium, Chile, Colombia, the Dominican Republic, Greece, Lithuania, Mexico, the Netherlands, Roumania, Spain, Switzerland, Czechoslovakia, Turkey, the Soviet Union, and Uruguay signed, but did not ratify, the Convention. The United States and Germany neither signed and ratified, nor acceded to the Convention. 186 L.N.T.S. 301, 303.

⁵⁰ See arts. 1, 2, 186 L.N.T.S. 301, 309.

⁵¹ See arts. 3, 4, 186 L.N.T.S. 301, 309.

⁵² Art. 3, 186 L.N.T.S. 301, 309.

⁵³ See notes 13 and 14 *supra*, and accompanying text.

a population to "acts incompatible with the internal order or the security" of a contracting party.⁵⁴ And although an exhaustive set of measures is provided for the settlement of disputes such as this, actually there is nothing in the body of the Convention which detracts from the Roumanian claim of the right to jam the Moscow transmission. The only factor militating against the recognition of such a right is the specific reservation by three states⁵⁵ of the right to jam an improper transmission. From the fact that some states felt it necessary to make explicit reservation of the right to jam, it may be argued that the treaty has closed to its signers the remedial avenues customarily available, including jamming.

No compelling reason exists for limiting the scope and effect of this Convention to earth transmissions. It is true that international agreements, exclusive of the 1959 ITU Radio Regulations, are generally deemed to be moored to their "airspace" context.⁵⁶ But the effect of a treacherous transmission will be the same whether it travels directly from state to state or first uses a satellite as a staging platform. Certainly had the drafters and signers been able to project their thinking into today's orbit, there would have been no difference in the provisions, no words to exclude satellite transmissions from the proscriptions of the Convention.

The effectiveness of the Convention today, however, in connection with outer space activities, would be limited at best. The Soviet Union, although it signed the Convention, never ratified it, and the United States did not sign, ratify, or accede to the Convention and did not become a member of the League of Nations. Thus, with these two strikes against it, the Broadcasting Convention will of necessity bow to the International Telecommunication Convention as a possible coordinator of interests to be furthered by communication systems.

B. *The International Telecommunication Union*

The International Telecommunication Union, which today is a specialized agency of the United Nations, had its origin in the

⁵⁴ Art. 1, 186 L.N.T.S. 301, 309.

⁵⁵ Belgium, Spain, the Soviet Union. See the *procès-verbal*, 186 L.N.T.S. 301, at 314, 315, 317.

⁵⁶ See text accompanying note 26 *supra*.

International Telegraph Union, formed in 1865.⁵⁷ Today it includes among its 54 members who accepted the 1959 Convention most of the leading nations of the world.⁵⁸ Its rule-making process, however, is quite a cumbersome one. Its treaties and regulations are binding only on states that have accepted them; regulations annexed to the Convention may be changed only after an Administrative Conference, which convenes every few years, and even then each signatory is free to append to Regulations thus promulgated any conditions or reservations it wishes. In addition, in some countries such as the United States final acceptance is further delayed by the necessity of obtaining formal approval as for a treaty. Nevertheless, in 1959, the deliberations of the Administrative Radio Conference resulted significantly in the insertion in a revision of the Radio Regulations, of frequency allocations for newly-defined space radiocommunication services. This marked the first international accord directed specifically toward outer space activities.

1. *Limitations as to Frequencies Covered:* As a result of the 1959 Conference, the ITU has specified the types of services to operate on all frequency bands between ten kilocycles and forty gigacycles.⁵⁹ These two frequencies, however, do not mark the limits of frequencies technologically available for space transmissions. There have been recent successes with submarine-to-satellite-to-submarine relays in the 3-30 kc range,⁶⁰ and the Echo I satellite, launched in August of 1960, made transmissions on a frequency of 2,000 gc.⁶¹ Operations on these frequencies which do not interfere with transmissions between 10 kc and 40 gc are

⁵⁷ For history of the ITU, see CODDING, *THE INTERNATIONAL TELECOMMUNICATION UNION—AN EXPERIMENT IN INTERNATIONAL COOPERATION* (1952); Glazer, *The Law-Making Treaties of the International Telecommunication Union Through Time and in Space*, 60 MICH. L. REV. 269, 269-84 (1962).

⁵⁸ The United States, the Soviet Union, and the United Kingdom accepted the 1959 Convention. Italy, Germany, and France have not yet done so. See U.S. DEPT. OF STATE, *TREATIES IN FORCE* 287 (1962). U.S. Dept. of State Communiqué, May 17, 1962. Many more nations, including all the major powers, are members of the ITU under earlier conventions which are still binding. See U.S. DEPT. OF STATE, *TREATIES IN FORCE* 287 (1962).

⁵⁹ A gigacycle (gc) is one billion cycles. Usually called kilomegacycles, the new term has been brought into use by the ITU.

⁶⁰ See *Aviation Week*, April 10, 1961, p. 39.

⁶¹ F. Llewellyn, "Sky Hooks for Telephone Systems," Lectures sponsored by Institute of Science and Technology and given at The University of Michigan, Jan. 11 & 12, 1961 (unpublished). Other ultra high frequencies have been proposed for earth-space use; specifically, the American Rocket Society has suggested that the band from 80 to 81 gc be set aside for space use. See SENATE STAFF REPORT 85.

apparently outside the scope of the ITU provisions, and so are neither regulated nor protected by the Convention. Practically, however, most of the frequencies available for space use are within the portion of the spectrum covered by the ITU.⁶²

2. *Limitations as to Uses:* The frequency assignments made in Geneva in 1959 for space and earth-space services, were limited to use for research purposes only. There is no indication in the Radio Regulations as to just what constitutes research, and conceivably the line between experimentation and commercial or other services using communication satellites could become very difficult to draw. Use of the ITU space frequencies for non-research purposes such as navigation, weather reporting, and commercial communications would be unauthorized,⁶³ and such operations would be accorded no ITU protection. Since article 3 of the Regulations requires that non-military frequency assignments be made only on the express condition that harmful interference not be caused to services carried on in accordance with the Convention and its Regulations, any of these services might momentarily be required to cease its transmissions.⁶⁴ Yet it is absolutely essential for technical reasons that channels of communication to satellites and, indeed, to all missiles be kept clear.⁶⁵

3. *Limitations as to Enforcement Procedures:* The procedures designed to cope with problems of harmful interference are outlined in article 15 of the Radio Regulations. The state having jurisdiction over the station experiencing the interference must notify the state having jurisdiction over the interfering station, and the latter state is then obligated to take such steps as may be necessary to eliminate the interference.⁶⁶ It is doubtful that this procedure will be successful when the interference has been an intentional act by the government or its agency. If the protest fails, the state concerned can forward details of the case to the Interna-

⁶² See note 7 *supra*.

⁶³ It has been suggested that these systems would not be forbidden per se, but merely would not be given protection and would be required to protect from harmful interference the services operating according to the ITU Radio Regulations. See Glazer, *supra* note 57, at 290 n.72.

⁶⁴ ITU Radio Regulations, para. 611 (Geneva 1959).

⁶⁵ Interference may delay launching or may jeopardize the launching itself at the instant of "lift-off." It may cause loss of telemetered data from experiments in progress, or it may cause failure of command and guidance systems from the ground. See SENATE STAFF REPORT 67.

⁶⁶ ITU Radio Regulations, paras. 704-13 (Geneva 1959).

tional Frequency Registration Board (IFRB), a permanent organ of the ITU, "for its information,"⁶⁷ and request the Board to act in accordance with article 9, section VII of the Regulations. That section provides, in part, that in cases of alleged contravention or non-observance of the Regulations, or of harmful interference, the Board should prepare and forward to the states concerned a report containing its findings and recommendations for the solution of the problem. Article 9 further provides that if no answer is received from one or more of the states concerned within thirty days, the Board "shall consider that the suggestions or recommendations concerned are unacceptable to the administrations which did not answer. If it was the requesting administration which failed to answer within this period, the Board shall close the study."⁶⁸ Presumably, a negative inference may be drawn from the last sentence of this section, to the effect that the Board's study would not be terminated by a failure to answer by the state whose action is complained of. Since no further steps are prescribed for the Board to take, it is perhaps to be inferred that the Board will begin its study cycle again, or send out more suggestions.

Compare with the procedures outlined in the Regulations, the remedial provisions in the Broadcasting Convention. The latter treaty outlines a series of steps designed to reach an ultimate solution to the matter in dispute: the controversy would be negotiated first in diplomatic channels, then, if necessary, in conformity with provisions in force between the parties for the settlement of international disputes; if these measures failed, the matter would then be submitted first to arbitration, then, if necessary, to the Permanent Court of International Justice or to an arbitral tribunal constituted in conformity with The Hague Convention for the Pacific Settlement of Disputes.⁶⁹

⁶⁷ ITU Radio Regulations, para. 716 (Geneva 1959).

⁶⁸ ITU Radio Regulations, para. 634 (Geneva 1959).

⁶⁹ Art. 7, International Convention Concerning the Use of Broadcasting in the Cause of Peace, Sept. 23, 1936, 186 L.N.T.S. 301, 311: "Should a dispute arise between the High Contracting Parties regarding the interpretation or application of the present Convention for which it has been found impossible to arrive at a satisfactory settlement through the diplomatic channel, it shall be settled in conformity with the provisions in force between the Parties concerning the settlement of international disputes.

"In the absence of any such provisions between the Parties to the dispute, the said Parties shall submit it to arbitration or to judicial settlement. Failing agreement concerning the choice of another tribunal, they shall submit the dispute, at the request of one of them, to the Permanent Court of International Justice, provided they are all Parties to the Protocol of December 16th, 1920, regarding the Statute of the Court; or, if they are not

The only provision in the International Telecommunication Convention for settlement of disputes appears in article 27 which recommends diplomatic negotiations, and provides, in the alternative, an arbitration arrangement. The decision of the arbitrators of the dispute is to be final and binding on the parties.⁷⁰ There is, however, no intimation as to how a state which refuses to accede to an arbitration award against it would be compelled to comply.

There is also no clear indication in the Convention or in the Regulations as to whether or not the provisions for settlement of disputes were intended to replace the customary right of a state to jam an offending signal. At the Madrid ITU Conference of 1932, an Italian proposal to codify the sovereign right of a state to jam any emission which appeared dangerous to its security, or was contrary to the laws of the country, or to public order or decency, found no support from the conference, and lapsed.⁷¹ The refusal of the conventions to codify the right to jam radio signals, together with the explicit reservation to members who signed and ratified the 1959 Convention of the "right to cut off any private telephone or telegraph communication which may appear dangerous to the security of the State or contrary to their laws, to public order or to decency,"⁷² adds weight to the proposition that the ITU provisions were meant to supplant jamming rather than to supplement it. Article 32 of the Convention, however, reserves to each member the "right to suspend the international telecommunication service for an indefinite time, either generally or only for certain relations and/or for certain kinds of correspondence, outgoing, incoming, or in transit, provided that it immediately notifies such action to each of the other Members and Associate Members through the medium of the General Secretariat."⁷³ A strong argument can be made for reading this article as al-

all Parties to the above Protocol, they shall submit the dispute to an arbitral tribunal, constituted in conformity with the Hague Convention of October 18th, 1907, for the Pacific Settlement of International Disputes.

"Before having recourse to the procedures specified in paragraphs 1 and 2 above, the High Contracting Parties may, by common consent, appeal to the good offices of the International Committee on Intellectual Co-operation, which would be in a position to constitute a special committee for this purpose."

⁷⁰ Annex 4, "Arbitration," International Telecommunication Convention, para. 409, 75 (Geneva 1959).

⁷¹ See MANCE, INTERNATIONAL TELECOMMUNICATIONS 36-40 (1944).

⁷² Art. 31, para. 2, International Telecommunication Convention 31 (Geneva 1959).

⁷³ Art. 32, International Telecommunication Convention 31-32 (Geneva 1959).

lowing a state merely to cease its participation in an international service, without allowing it to jam a signal in whose reception it plays no official part. On the other hand, reading the word "suspend" as "exclude" gives a nation the right to prevent any incoming transmission, and jamming is not explicitly forbidden as the means.

Some inference may perhaps be drawn from the failure of the members expressly to reserve the customary international right to jam. Such reservations were made by the Belgian and Spanish delegations to the Broadcasting Treaty;⁷⁴ and the Soviet delegation to that Convention expressly reserved the customary rights pending settlement of a dispute according to the treaty's provisions.⁷⁵ The ITU Convention Protocol contains "general" reservations only by Ghana, Guinea, and Iran,⁷⁶ and special reservations in this respect only by Israel and the Arab republics against each other.⁷⁷ Moreover, the "general" reservations are made contingent upon the failure of an offending Member to comply with the requirements of the Convention or upon the imperiling of telecommunication services by the reservations to the Convention by a Member. Despite the possible contrary inference to be drawn from the absence of reservation of the right to jam, the more realistic conclusion from the ambivalence of the ITU Convention and Regulations is that ITU provisions do not forbid resort to the customary international right to jam an offending signal.

4. *Limitations as to Military Installations:* Article 47 of the ITU Convention contains the provisions dealing with harmful interference from all except military radio installations:

"1. All stations, whatever their purpose, must be established and operated in such a manner as not to result in harmful interference to the radio services or communications of other Members or Associate Members or of recognized private operating agencies which carry on radio service, and which operate in accordance with the provisions of the Radio Regulations.

"2. Each Member or Associate Member undertakes to

⁷⁴ See 186 L.N.T.S. at 314, 315.

⁷⁵ See 186 L.N.T.S. at 317.

⁷⁶ See Final Protocol, International Telecommunication Convention, number XXVII (Geneva 1959).

⁷⁷ See Final Protocol, International Telecommunication Convention, numbers XII and XXIV (Geneva 1959).

require the private operating agencies which it recognizes and the other operating agencies duly authorized for this purpose, to observe the provisions of . . . [paragraph 1].

"3. Further, the Members and Associate Members recognize the desirability of taking all practicable steps to prevent the operation of electrical apparatus and installations of all kinds from causing harmful interference to the radio services or communications mentioned in . . . [paragraph 1]."

This provision must be read, however, in the light of article 50 of the Convention which reserves to members their complete freedom with regard to military radio installations of their army, naval, and air forces, merely urging them to observe, so far as possible, the provisions of the Convention and the Regulations. This provision apparently cuts through the ITU regulations and allocations so that a state could use any frequency or jam any signal at any time for military purposes without the prospect of invocation of ITU sanctions (such as they are). Even if the ITU provisions supersede the general right to protest by jamming, a state could legitimately have its military installations jam even a signal transmitted in accordance with ITU allocations.⁷⁸

There is but scant indication of the effect of the ITU provisions in a situation in which a member state (State *A*) decides to jam a transmission from a military installation of another member state (State *B*). Postulations of the full scope and impact of article 50 are merely conjecture. It may be that a state, by having signed the Convention, would be deemed to have consented to any use by another member of its military radio installations, in full freedom; in this case, state *A* would have no right to jam the military signal of state *B*. A different result would perhaps be reached if *B*'s transmission were a menace to *A*'s national security, on international common-law grounds, or under a treaty such as the Broadcasting Convention. Another possible interpretation of article 50 is that *A*'s right to jam will depend upon whether or not *B* has complied "so far as possible" with the provisions of the Regulations, to prevent harmful interference. The propriety of *A*'s jamming thus would not be ascertainable until a determination is

⁷⁸ Note that at customary international law, a belligerent nation retained complete control over the passage of radiowaves over its territory. See HYDE, *INTERNATIONAL LAW CHIEFLY AS INTERPRETED AND APPLIED BY THE UNITED STATES* 607 (1945); Scott, *The Institute of International Law*, 21 *AM. J. INT'L L.* 716, 727 (1927).

made of the rectitude of *B*'s transmission. A third construction of article 50, obviously applicable if *A*'s transmission is from a military installation, is that the Convention simply does not control military radio installations. The result of this interpretation is that *A* may jam *B*, or *B* may jam *A*, with frequency rights accruing to "the firstest with the mostest."

Furthermore, nowhere in the Convention or its regulations is the word "military" defined. Arguably, satellites launched by military departments of a government would be exempt from fulfilling (except "so far as possible") the ITU requirements.⁷⁹ Thus the provision might act to exempt satellites launched by our Air Force rather than NASA, although their purposes are no less peaceful and research-oriented than would be NASA's. Or, perhaps, as has been suggested, the Soviet Union's satellites, which are not launched by any of its military agencies, could be claimed to fall within article 50 by sheer force of the presence of military personnel within.⁸⁰ The same, of course, is true of our own manned satellites. Furthermore, as article 50 now reads, the purpose of the communication need not be military if only the radio installation is. If the United States Congress should enact legislation requiring that a commercial satellite system be government-owned for the first few years of its operation, there is the real possibility that military radio installations would be involved.⁸¹ As of this writing, however, it appears likely that Congress will enact a compromise bill which provides for private ownership.⁸² This would preclude classification of the installation as military.

⁷⁹ See Glazer, *supra* note 57, at 297.

⁸⁰ See *ibid.*

⁸¹ See statement of Congressman Ryan (N.Y.), reported in *N.Y. Times*, July 28, 1961, p. 7, col. 1. Likewise, the head of the President's study group on the commercial satellite system recommended that the satellites be developed in connection with the military services, since government facilities and financing would be needed. See Wiesner Report printed in full, *Aviation Week*, Jan. 23, 1961, pp. 79-87.

⁸² See story in *N.Y. Times*, March 29, 1962, p. 14, col. 4. As of April 30, 1962 both House and Senate committees had approved a bill which was a compromise between the original Administration proposal, the desires of various members of Congress, and views of the communication industry, *N.Y. Times*, April 30, 1962, p. 17, col. 2. The compromise bill provides that 50% of the stock will be sold to international communications carriers and the other 50% will be sold to the general public. The no-par value stock is to be sold at no more than \$100 a share. Foreign governments, corporations, and persons would be permitted to own up to one-fifth of the non-carrier stock. The compromise was achieved only after a long and vigorous national debate on the question of ownership. If privately owned, many feared that A.T. & T. would monopolize the system, taking advantage of technological advances achieved largely through research financed by American tax-

Closely related to the characterization problem, is the question of how another state can identify a satellite as military or non-military. In contrast to aircraft and naval vessels, space ships are of such a nature as to elude identification as military or non-military by other than the launching state unless the latter voluntarily announces the character of the satellite. Furthermore, article 19, paragraph 6 of the Radio Regulations provides that each member may "establish its own measures for identifying its stations used for national defence." This right is qualified by the member's duty, "as far as possible," to use recognizable call signs containing distinctive letters showing its nationality. But even if an objective characterization of the radio installation were possible, the prac-

payers, *Aviation Week*, July 17, 1961, p. 38, although President McNeeley, of A.T. & T. reports that his company has put many millions of dollars into research and development work which is contributing directly to satellite communications, *N.Y. Times*, April 26, 1962, p. 16, col. 3. At one time at least, it was believed that NASA administrator, James Webb, concurred in the recommendation by the United Research Corporation, following a NASA-sponsored study, to "defer private ownership by adopting a policy of interim public ownership with private operation and the clear intention to transfer to private ownership at the earliest feasible time, unless it is later determined that such transfer is not in the best public interest." See *Aviation Week*, July 3, 1961, p. 31. Senator Russell Long (La.), Chairman of the Senate Subcommittee on Monopoly, early announced his opposition to ownership by a very few large corporations, and suggested that the question of ownership was not a routine question to be decided by a regulatory agency, but a major public policy problem which should be settled by Congress. See *Aviation Week*, July 17, 1961, p. 38.

If the system is to be privately owned, the additional problem arises of who will be allowed to participate in the ownership. At least three plans were under consideration: ownership by one company, leasing services to the other companies (*N.Y. Times*, June 4, 1961, p. 1); ownership by a joint venture including only international common carriers (*N.Y. Times*, June 6, 1961, p. 12); ownership by a joint venture which would extend as well to manufacturers of equipment for the satellite system (*N.Y. Times*, June 4, 1961, p. 1); Klass, *Aerospace Companies' Role Stirs Commercial Satellite Controversy*, *Aviation Week*, May 22, 1961, p. 28; *Aviation Week*, June 5, 1961, p. 39; Klass, *Commercial Satellite Owner Limits Will Be Reconsidered by FCC*, *Aviation Week*, June 12, 1961, p. 34. The Kennedy administration has left the question of the nature of private ownership to be determined by the FCC (*N.Y. Times*, July 25, 1961, p. 1, col. 1 and *Aviation Week*, July 31, 1961, p. 25), but the Justice Department also formulated a set of requirements to be fulfilled to avoid the sanctions of the antitrust laws (*N.Y. Times*, June 4, 1961, p. 1, col. 3). In late summer 1961, the FCC dismissed the General Electric petition for participation in the ownership of the system by equipment manufacturers, and authorized nine international communication common carriers to proceed to organize a joint venture to own and operate a system. The FCC authorization specified that equipment must be selected through competitive bidding by the manufacturers (so that subsidiaries of the carriers would not get preference) and that no single carrier be in a position to dominate "to the detriment of any other common carrier." See *N.Y. Times*, July 26, 1961, p. 12, col. 3; *Aviation Week*, July 31, 1961, p. 25. When the Administration submitted its proposal to Congress private ownership was provided for with two classes of stock, one with voting and dividend rights to be sold at \$1,000 a share to the general public, including communication companies, and the other to the communication carriers who would have received their financial gain by including the stock in their rate bases.

tically operative identification techniques are within the exclusive control of the launching state. Even assuming, therefore, that a clearer definition of "military" is possible and forthcoming, the ease with which a satellite could alternately or simultaneously carry on commercial and military reconnaissance activities casts some doubt on the wisdom of maintaining such a stark distinction between military and non-military radio installations, and perhaps on the desirability of exempting military transmissions at all.

A possible solution is suggested by the evolution of a new meaning of the word "peaceful." The United Nations resolution⁸³ limiting outer space activities to "peaceful" uses is now deemed not to prohibit "military" uses.⁸⁴ "Peaceful" now has come to mean "non-aggressive," rather than "non-military," thus placing the military satellite in an unregulated position as long as it is non-aggressive. Similarly, as to military installations, a distinction could be recognized between peaceful military uses and combative military uses. Since the use of military installations for essentially peaceful uses should not be available as an escape hatch from the ITU provisions, no exception should be made for this type of transmission. On the other hand, when a transmission is used for combative purposes, ITU provisions will receive meager consideration. Therefore, the exemption provision should be limited to non-peaceful military uses, and should constitute, as indeed article 50 does now, only a recognition that the members retain their entire freedom with regard to such uses. No state should be required to take especial care not to interrupt such uses; a state's transmission outside the ITU provisions should be given no extra consideration by other users of the airwaves.

III. PROBLEMS TO BE RESOLVED AT THE 1963 EXTRAORDINARY CONFERENCE

The inadequacies of existing international law, both customary and treaty, to deal with the problems of operating a global

⁸³ U.N. GEN. ASS. OFF. REC., 13th Sess., Plenary 792 (A/4090) (1958).

⁸⁴ A.B.A., *Report of Committee on the Law of Outer Space—Recommendations: 1959*, SENATE SYMPOSIUM 571, 576. *But cf.* definition by the International Atomic Energy Agency, of "peaceful" as "non-military." *Ibid.* If "peaceful" means non-aggressive, any use not constituting an attack is permissible, including defensive actions such as reconnaissance. The United States favors this definition. The Soviet Union, on the other hand, seems to favor defining as "peaceful" only non-military activities, especially since the United States use of U-2 reconnaissance flights and launching of "Midas" and "Samos" (see note 6 *supra*). See N.Y. Times, July 30, 1961, § 4 (Week's Review), p. 7, col. 1.

satellite communication system make it clear that new international arrangements must be made. The first opportunity will come at the Extraordinary Administrative Radio Conference, hopefully to be held in 1963, whose first order of business is to provide adequate frequency allocations for all classes of space communications services. Certainly frequency allocations are of pressing importance in a world with a radio spectrum bursting at the seams, and the problem of assignment of channels for the imminent commercial satellite systems surely ranks among the first in urgency. In addition to difficult technical matters, many important policy questions must be answered if the allocations are to be wisely made. It will be very difficult to decide how many channels which are or will be technically available, should be assigned to communication satellite use. In addition to avoiding undue interference with existing earth-bound radio installations, consideration must be given to avoiding obstruction of astronomical research which today depends so much on extremely weak radio transmissions from celestial bodies from far out in space. Likewise, in assigning frequencies for space communications some reasonable adjustment must be reached to avoid any more interference with and from military transmissions than is necessary. Resolution of these matters will be unusually difficult and delicate from both the technical and policy standpoints. As a minimum the delegates must change or at least clarify existing regulations concerning "research," "military," and the range of regulated frequencies, for the reasons pointed out above. Many additional problems, as well, must be met head-on, and as early as possible, if a commercial system is to operate successfully.

Consideration should be given to the advisability of committing the operation of a global commercial satellite system to the care of an international, non-commercial organization, such as the United Nations or the International Telecommunication Union. In a discussion not directed specifically to communications satellites, Professors McDougal and Lipson have made a suggestion which could be applied to such satellites also. They suggest that the United Nations enter the field of satellite experimentation with the cooperation of the states which possess the facilities for launching and tracking. The United Nations would decide the purpose of the flights, determine their payloads, design the instru-

mentation, and finance the construction of the satellites and their contents.⁸⁵

Application of this idea to a communications satellite would be attractive primarily to the many states which will not have an immediate requirement for substantial allocation of frequencies for their own space activities, but which will be concerned lest the large states such as the United States and the Soviet Union pre-empt the frequencies technologically most desirable, or use the lower frequencies in a way that will cause significant interference with ground services.⁸⁶ For the states which have no present need to participate in the operation of a commercial system, but which will grow into the need, international and non-exclusive ownership, open to newcomers, would be most desirable. Such countries will not be able to do with satellite frequencies what it is suspected some have done with ground allocations, *i.e.*, file notice with the IFRB of use of a frequency which actually is not being used presently merely to assure availability in the future. Unless some protective device is provided the presently less-industrialized countries will find all channels pre-empted by those countries now capable of using them.

In considering this solution, however, the positions of the Soviet Union and the United States are extremely important. At present, and undoubtedly for a considerable time to come, these two countries are the only ones technically and financially able to orbit and support communication satellites. They are not likely to want to give up operating control, at least unless they are given a dominating position in the governing board. Nevertheless, these two powers cannot afford to ignore the interests of the less affluent countries who must agree to any changes in existing regulations. If the existing rules are not changed to protect non-research space communications against jamming, the other powers will have a fairly strong bargaining position.

If a single-nation system is put into orbit and operated, addi-

⁸⁵ See McDougal & Lipson, *supra* note 45, at 430-31.

⁸⁶ The first occasion of conflict between space and earth transmissions was in 1957, when a Russian sputnik made use of the frequencies of 20.005 mc and 40.002 mc. The 20.005 mc frequency is in the center of a channel which the ITU has assigned as the Standard Frequency Service. The sputnik transmissions were on the exact frequency assigned to Station PEN at Kootwijk, the Netherlands, and only five kilocycles from the frequency 20.0 assigned to Station WWV in Maryland. See Haley, *Space Age Presents Immediate Legal Problems*, FIRST COLLOQUIUM ON THE LAW OF OUTER SPACE 5, 10-11 (Haley & Heinrich ed. 1959).

tional matters arise which deal with the relationship between the owner and non-participating states. How will the owner of the system handle the problem of "freeloaders" who have refused to participate? What rights will a state have to participate, and what means for enforcing these rights? What rights would an owner have against a "freeloading" state which had, for one reason or another, been denied the opportunity to participate in the system? And what provision should be made for states which have no present need to participate, but may have in the future? A suggested solution to the last question is that allocations might be of limited duration, subject to re-examination of the licensee's comparative merit.⁸⁷ If United Nations or ITU ownership is not feasible, the possibility of limiting the duration of assignments certainly should be considered now, before any allocations are made.

Probably the ITU would be technologically more competent to operate a satellite system than the United Nations proper. Since the ITU is now a special agency of the United Nations, it might be more realistic to speak only in terms of possible ITU operation of such a system. At this time, however, "the ITU is *not* prepared . . . to go into the operating business of such multi-million dollar network. It would take months and months, going into years to change the regulatory technical character of the ITU to fulfill such functions. Similarly, any new organization which might be created to act as an operating agency would . . . require much more time than is available to acquire the necessary know-how and competence."⁸⁸

If there is to be no central, non-partisan ownership of the commercial system, there will likely arise a situation in which both the United States and the Soviet Union seek to put systems into operation. Assuming that the sponsoring groups are willing to risk non-use because two systems are more than will be needed, who is to decide whether or not there is room from the standpoint of frequency interference for more than one system circling the earth? Who is to decide, if there is room for only one, which sponsor's

⁸⁷ This suggestion, of course, opens up the possibilities of censorship—through the refusal to renew a license because of broadcasts unfavorable to a particular state. This also is a problem meriting attention. Cf. text accompanying notes 94, 95 *infra*.

⁸⁸ Gross, Secretary General of the ITU, Address to the XII International Astronautical Congress, Washington, D. C., October 4, 1961.

system will prevail? Will the choice depend, partially or wholly, on the type of system proposed?⁸⁹ Will anyone other than the sponsor have a voice in determining the kind of system to be used? If more than one system is put into operation, how will frequency allocations be made? The present system, for all its notification and charts and allocations, operates on the order of a first-come, first-served basis, with the IFRB registering the assignment of the government which first notifies it, and thereafter informing all other assigning governments that the frequencies have been assigned.⁹⁰ Certainly these are problems which must be considered as soon as possible.

At least as pressing a problem, whose solution is precedent to commercial satellite success, is the formulation of a set of sensible rules governing generally when the owner of the satellite will have the right to protest interference with his system's communications.⁹¹

The first such problem presented is the choice between the theories upon which a state may claim the right to jam a "transgressing" radio signal. Neither the sovereignty-over-airspace theory nor the national security theory is entirely satisfactory, both allowing jamming in instances which seem not to justify interference.⁹² And granted that a state does have sovereignty over the airspace over its territory, the second problem is how high this sovereignty extends. To limit it to "airspace" in the context of satellite communications is to impose an artificial boundary line; to recognize its extension *ad infinitum* is to thwart legitimate satellite use, without giving more than two or three states the power to enforce their right.

A second, and probably much more important and realistic

⁸⁹ Among the choices to be made concerning types of satellite systems are those between active and passive systems, and between low-, medium-, and high-altitude systems. Cost has about eliminated the passive system; and combined cost and technology dictate a slight preference for the medium-altitude system over the low- and high-altitude systems. See *Fortune Magazine*, July 1961, pp. 158-60, 248.

⁹⁰ Arts. 2, 9, ITU Radio Regulations (Geneva 1959).

⁹¹ Probably some consideration should be given to the need to formulate rules which will differentiate between types of uses of the system. The immunity or vulnerability to jamming may be different for (1) commercial private telephone and telegraph communications, (2) commercial public broadcasts, (3) official propaganda, and (4) official communications other than propaganda.

⁹² See examples set out in Appendix.

question is the matter of program content. If only typical commercial messages are transmitted from one country to another, such as is now done by international wire or telephone companies, content of the message in the great majority of the cases has no political significance. On the other hand, if news and possibly propaganda is broadcast for general reception, attempts to control the content undoubtedly would be made, possibly by jamming, and with satellites the effect is very likely to prevent reception of the broadcast in countries other than just the one objecting to receipt within its own territorial boundaries.

If an international body is given jurisdiction over the space communication satellites the problem of regulating program content becomes absolutely crucial. Experience in the United States with allocation of channels by a licensing procedure certainly does not justify any hopes that international licensing will be a matter solely of technical engineering accommodations. Investigations by Congress, comments by members of the Federal Communications Commission, and public protests by various vocal groups against television programming of violence, sex, and crime, not to mention stupid or vapid fare, indicate that allocation of a technically limited supply of radio channels will inevitably become a battleground for making basic social value judgments. International accommodation promises to be at least as difficult. The Broadcasting Treaty of 1936, which raised the same concerns, was ratified by neither the Soviet Union nor the United States.⁹³ The great difference of opinion that exists today about control of program content is illustrated by recent Geneva negotiations between the United States and Russia, with Russia advocating prevention or regulation of critical comments about another nation, and the United States rejecting such regulation as impinging unduly on basic concepts of freedom of speech.⁹⁴ It is perhaps noteworthy that the United Nations resolution condemning propaganda which might provoke acts of aggression or threats to peace, requests control by each government only "within its constitutional limits."⁹⁵

⁹³ See text accompanying notes 47-57 *supra*.

⁹⁴ See N.Y. Times, April 10, 1962, p. 5, col. 3.

⁹⁵ Resolution 110 (II) adopted by the United Nations General Assembly at its 108th plenary meeting on Nov. 3, 1947. U.N. GEN. ASS. OFF. REC. 2d Sess., Resolutions, Sept. 16-Nov. 29, at 14 (A/519) (1947).

IV. CONCLUSIONS

In the final analysis, it is difficult to believe that existing rules of international law, either customary or treaty, can fill the needs of a modern world expanding operations beyond its own atmosphere. Perhaps international law, much as the common law enunciated in the law courts of seventeenth century England, has become too rigid in its classifications, categorizations, and theories. There is no High Lord Chancellor to step outside of the system, get a panoramic view of the legal and cosmic systems, and then formulate policies which will not be twisted and warped by trying to fit them into out-dated and ossified legal rules. Many of the legal results which would come from application of customary international law rules would be reached by application of the policy ends deemed paramount; but many of the undesirable effects of fitting new problems into old molds could be obviated and avoided by establishing a new set of standards.

Such a set of standards should be formulated at the 1963 Radio Conference, or, if agreement cannot be reached at the conference, as soon as possible thereafter. The questions to be asked are: What ends do we want to serve? What standards do we need to best serve these ends? "What legal consequences should be entailed by certain activities in order that they be accommodated with other activities under given policies?"⁹⁶ These questions apply to all satellites but probably with greater force and certainly with more urgency to communications satellites. The broad classes of problems likely to arise are foreseeable; an attempt should be made to cope with them before they arise, perhaps even to prevent their emergence.

Among the first tasks of the delegates to the 1963 Conference should be the reshaping of article 50 of the ITU Convention dealing with military installations. There is no reason to provide such a broad opportunity to escape the ITU regulations. A feasible and more desirable formulation for reserving to the states their military freedom would recognize such freedom with regard only to combative uses of radio. Although the inevitable lack of effect of the ITU regulations in the event of actual combat suggests that there is no practical reason to attempt to regulate such usage, this does

⁹⁶ McDougal & Lipson, *supra* note 45.

not justify the existing sweeping exception for all military radio installations.

Finally, and perhaps most important, is the need for agreement on effective means of enforcing any set of rules to be formulated and invoked by an injured state or other owner of a space communication system. The procedures presently outlined in the ITU Radio Regulations to cope with instances of harmful interference are at least inept and possibly are completely unworkable for space communications. It may prove impossible for the two great missile powers and the other countries of the world to agree on a more effective enforcement procedure, but an attempt must be made. Because the need for freedom from interference is technically so important to the success of the missile and satellite programs of both countries, a mutual and actually almost identical concern exists in the United States and the Soviet Union to find a solution. If they cannot agree in this field it is hard to visualize a situation in which they can. This may be one of those fortunate situations where both countries will be forced to agree on and operate a regulatory scheme, and it may be that in doing so each will learn that some measure of mutual trust is possible.

Several alternatives may be suggested as routes to effective enforcement. If uniform national legislation is possible, an aggrieved party might seek determination and enforcement of his rights in the national courts of the offending party. This might be more effective than the executive routes for enforcement now prescribed in the Radio Regulations. An alternative, again more efficacious than the present measures, would be to allow the aggrieved party to bring suit in a court of his own state, with other states required to give full faith and credit to the determination in that court. Again, this system avoids the executive branches of the government (assuming some separation of powers), and would more closely approach, as it were, a determination by the state's super ego rather than its ego. A third route which might be chosen is the ultimate adjudication of the dispute by the International Court of Justice. Preliminary negotiation channels such as appear in article 7 of the Broadcasting Convention might be provided; or it might be possible to convert the IFRB into a regulatory, adjudicative agency, with a right of appeal to the International Court.⁹⁷ A fourth possi-

⁹⁷ See suggestions made in Glazer, *supra* note 57, at 315.

bility is the creation of a special technical adjudicatory agency, like the European Community Court, or an international FCC-type body, which would have the ultimate role in deciding disputes. Any of these routes is preferable to the avenue outlined by the present Radio Regulations, which seems to be at best an unfinished traffic circle or possibly even a dead end street.

These, then, are some of the pressing problems in addition to frequency allocation which should be considered by all nations and should be faced by the delegates to the Extraordinary Conference next year. Setting policy on frequency allocation is first a very knotty technical problem and the parameters of the possible solutions must be established by telecommunication engineers and scientists. Nevertheless, adopting the opinions of this technical group on scientific matters must not be accepted as the only, or even the best, method for making social policy judgments. Very important national and international political problems are bound up in the decisions to be made, hopefully at the 1963 Conference. The United States should be prepared to present and promote adoption of our concepts concerning the values to be agreed on by the nations of the world. We must be flexible in our approach to the negotiations, but unless we have thoroughly considered what our position should be as to these matters we will perhaps inadvertently limit fundamental rights such as freedom of speech. Only complete failure to reach any agreement at the conference on regulation of space communications could bode more ill for the success of our program. Now is the time to remember that many a tragedy can be averted by a bit of farsighted planning.

APPENDIX

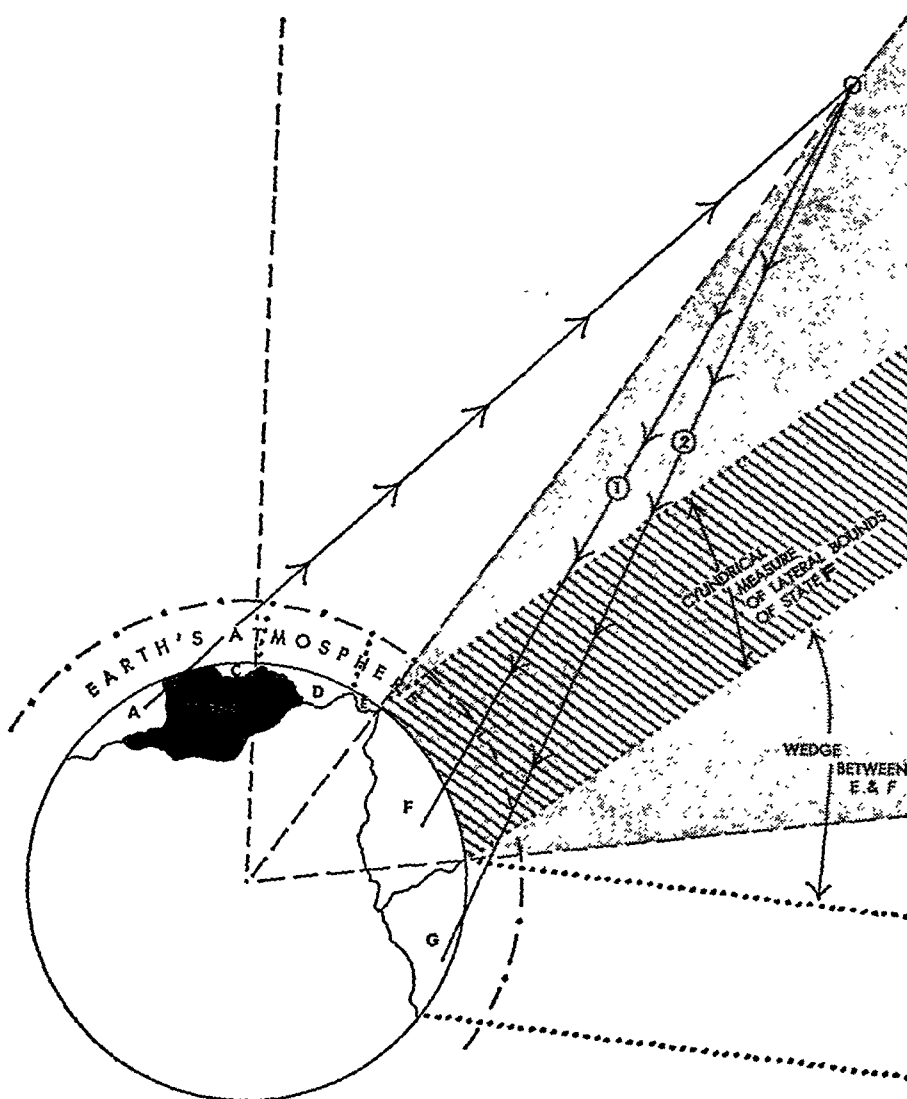
The satellite shown is about the distance from the earth that a 24-hour equatorial satellite would be (the earth as shown, however, has about twice the diameter it should have). The solid lines with arrows represent radio signals, with the arrowheads indicating the direction of the transmission.

Example 1. (See note 35 and accompanying text.)—*States F and G:*

F and *G* are adjacent states. The dashed (---) lines drawn from the center of the earth through points on their common boundary would mark the boundary of their air sovereignties under the prevailing theory. The dotted (· · ·) lines are parallel lines drawn upward from the boundaries of each state, parallel to the line which would be drawn between the center of the earth and the geometric center (centroid) of that state. (These lines are not, however, perpendicular to a chord drawn between two points on the boundary line the state: unless the state were a perfect circle on the earth's surface, the infinite number of chords connecting boundary points would produce many divergent parallel columns.) The wedge-shaped space between the parallel columns of States *F* and *G* represents space which would be unowned under the "wedge" theory.

Example 2. (See notes 9, 33 and accompanying text.)—*States E and G:*

None of the radio signals is receivable in State *E*, nor do they pass through *E*'s airspace. State *E* could nevertheless jam the signal as it passed above its airspace terri-



tory if it were a threat to its security, or as it passed through its territory under the *usque ad coelum* doctrine.

The signal numbered (1), descending into State *F*, does not pass through or over the territory of State *G* under any theory. If, to jam that signal, *G* had to invade the territory of *F* or *E*, *G* would have the duty not to jam.

Example 3. (See text accompanying note 17.)—*States C and F:*

The radio signal ascending to the satellite passes through the airspace of *C*. Because

radiowaves travel in a straight line, and because of the upward direction of the transmissions, ground receivers in *C* could not capture this signal. Likewise, although the signal numbered (2) is traveling *downward* through State *F*, its direction is such that it would not be received in State *F*. Technically, however, under the "airspace" theory, *C* and *F* could jam these transmissions.

Example 4. (See text accompanying note 36.)—*State D:*

Using the theory that a state may jam a signal only if it passes through its airspace, State *D* could jam the signal passing above it only if the boundary lines of its airspace were drawn straight out from the center of the earth. If the parallel column theory is used, the signal does not pass through *D*'s airspace.

Example 5. (See text accompanying note 37.)—*State F:*

State *F* could jam the radio signal (number (1)) regardless of whether the airspace doctrine or the *usque ad coelum* doctrine was used. But on the *usque ad coelum* and resulting trespass rationale (where national security was not involved), *F* could not legitimately jam the satellite directly if the parallel column theory were used.