University of Pennsylvania
Law Review

FOUNDED 1852

Formerly
American Law Register

VOL. 113 JANUARY 1965 No. 3

ORGANIZATION AND CONTROL OF COMMUNICATIONS SATELLITES *

HARVEY J. LEVIN †

The Communications Satellite Act of 1962 [1] is a compromise which created a new type of legal entity to establish, own, and operate the United States' portion of a global system of communications satellites. Although Congress refused to assign the system exclusively to the private communications carriers, it likewise rejected any plan to exclude them. Rejected also were single-company ownership and any form of Government ownership or operation. Instead, Congress created the Communications Satellite Corporation (ComSat),

* The ideas expressed here were revised extensively during my tenure as Fellow in Law & Economics at Harvard University, 1963-1964, where I benefited from many valuable suggestions by Professors Carl Kaysen, Donald F. Turner, John R. Meyer, Phil Areeda, and Paul W. Cherington. Special thanks are due also to Mr. Mark S. Massel of the Brookings Institution for helpful initial advice, and to Professor William S. Vickrey of Columbia University for reviewing strategic parts of the final argument. Staff members or officials of the international communications carriers, the Federal Communications Commission, and the Communications Satellite Corporation provided generous and crucial expertise. Acknowledgement is due finally to the assistance of my graduate student, Patricia Anne Lewis. The views expressed herein are, of course, my own and are not necessarily shared by any of these individuals or organizations.

† Weller Professor of Economics, Hofstra University. A.B. 1944, Hamilton College; A.M. 1948, Ph.D. 1953, Columbia University.

[1] Communications Satellite Act of 1962, §§ 301-05, 76 Stat. 423-25, 47 U.S.C. §§ 731-35 (Supp. IV, 1963).

a private joint venture whose corporate stock is available in amounts prorated by class to American and foreign common carriers, equipment manufacturers, aerospace companies, and the general public.

The act's overriding objective is the reconciliation of private ownership and profits with rapid development of a global relay and a wide diffusion of its benefits. To speed development of the relay the United States Government will make available, on a reimbursable basis, booster-launching facilities, space know-how, and basic "research and development" ("R&D"). To assure wide diffusion of benefits, international communications rates will be regulated, equipment suppliers are to be assured competitive access, corporation stock is to be broadly distributed, and service will be provided even to unprofitable foreign markets when deemed to be in the national interest.

In recognition of the technical and economic barriers to creation of competing satellite systems and the resulting oligopolistic character of international telecommunications, the act imposes elaborate direct controls on this "common carrier's common carrier," more comprehensive than present supervision of ordinary communications carriers. Although the range of economic choices regulated by these controls is not unparalleled, the regulatory apparatus in its comprehensiveness and complexity is unprecedented. Most important, the act attempts to tailor the corporation's internal organization in order to define the goals toward which management should strive.[2]

A major question during the coming years will be the degree to which this experiment in industrial organization can serve as a prototype in other areas where the Government seeks to divest itself of sizable investments in scientific enterprise. The answer will depend on responses to two related questions: Can ComSat's internal antitrust-regulatory safeguards and the industry's economic structure effectively reconcile speedy growth of the system with a wide diffusion of its benefits? Or will the act be perverted into a vehicle for subterfuge and sham as predicted by its most outspoken critics?

Thus the Article starts in part I with a brief description of the emerging economic and regulatory framework of space communication.

---

[2] See generally Kaysen, *The Corporation: How Much Power? What Scope?*, in THE CORPORATION IN MODERN SOCIETY 85, 104-05 (Mason ed. 1960). Business power, of course, can be limited by diffusing it widely, or by subjecting it to external controls, although wide diffusion still appears to be an unpromising device in international communication. The Communications Satellite Act has rather sought to strengthen direct regulation not so much through increasing the FCC's regulatory powers, as by spelling out the corresponding duties of other Government bodies. In the main, however, the act chooses to deal with business power primarily through "institutionalization within the firm of responsibility for the exercise of power." *Id.* at 103.

It proceeds in part II to consider why Congress chose this new type of joint venture. Review of the rejected alternatives will aid in the appraisal of ComSat's future performance. Finally, and perhaps most important, part III considers several potential dangers to ComSat's fulfillment of its sponsors' expectations.

I. The Economic and Regulatory Framework of Space Communication

A functioning communications satellite system will involve: delivery of messages from customers by conventional means to a central, interconnected ground station; transmission overseas, or across an intervening land mass, via satellite relay; reception at a foreign ground station; interconnection there with conventional communications systems, and delivery to the public. Each link in the chain is indispensable, and all links must be technically integrated, especially for telephone or teleprinter, though not necessarily owned in common.

A satellite facility is strikingly different from existing intercontinental cables in several ways. First, it serves as a "common carrier's common carrier," supplementing the existing world-wide communications network long operated by the American carriers and their foreign counterparts. Hence it must compete with, as well as be intergrated into, the older systems which employ submarine cable, tropospheric scatter, and high-frequency radio. Second, its installation and continued operation will require expensive Government launch facilities and complex international agreements on radio frequency assignments and the location of ground stations. Again, the satellites once launched are almost impossible to repair or modify, and thus initial technical decisions are frozen into the structure to a degree rare in other projects. The system's operation in space also raises unique problems of national sovereignty and private property. Furthermore, its tremendous communication capability permits such pioneering endeavors as intercontinental transmission of high-speed data processing, television, and facsimile, but also produces a serious problem of excess capacity. Finally, its potential for dissemination of information in underdeveloped economies promises unique international opportunities. This, combined with the system's military value and the American Government's crucial role in space research and rocket technology, guarantees continued national interest in its early, effective development.

From the outset, public and private interest in communications satellites has arisen in partial response to a projected deficiency in

international communication capability. This "gap" in channel capacity is variously expected to materialize by 1975, by 1970, or by sometime "after 1965." [3] Such predictions are based on projected growth rates of present private and governmental use, supplemented by estimates of new uses in the future, as compared with the expected future channel capacity of the older nonsatellite systems.

In addition to commercial demand the new satellite facility is geared to meet diplomatic needs and the alleged requirements of national prestige in the "cold war," although it seems unlikely that any private commercial system can forestall establishment of additional systems to serve "unique" governmental needs.[4]

The significance of such a system is shaped by the present structure of the international telecommunications business. Most of the world's traffic originates or terminates in the United States, and much of the American business is transacted with Europe and the Near East. Although nine-tenths of the United States' overseas message volume in 1961 was telegraph, international telephone accounted for over two-fifths of the revenues. Telephone channels in that year, moreover, requiring twenty-two times the bandwidth of telegraph channels, are estimated to have accounted for over nine-tenths of the channel requirements for international communication.

Past growth rates suggest that the most rapid expansion of traffic will be in telex (two-way teletype) and telephone—with telephone growing the most in absolute terms and telegraph falling sharply in relative terms. By 1970 United States' overseas telephone calls are expected to account for one-fourth of the total traffic, telegraph some two-thirds, and telex the remainder. At that time, revenue shares are also expected to be one-half for telephone, one-fourth for telegraph, and the rest for telex and private nonvoice circuits,[5] while commercial television, facsimile, and Government business may possibly add to the demand for a new broad-band capacity.

---

[3] *Hearings on S. 2650 and S. 2814 Before the Senate Committee on Aeronautical and Space Sciences*, 87th Cong., 2d Sess. 80 (1962) (Dr. Elmer W. Engstrom, RCA) [hereinafter cited as *Kerr Hearings*].

[4] During 1961 the Defense Department alone provided $19,000,000 (22%) of an estimated $88,000,000 earned by American and foreign firms handling overseas telephone calls between the United States and other countries. It also leased about 15% of all commercial intercontinental circuits in 1962, and a full 25% of those operating in the North Atlantic. See REIGER, NICHOLS, EARLY & DEWS, COMMUNICATIONS SATELLITES: TECHNOLOGY, ECONOMICS AND SYSTEM CHOICES 77-81, 91 (Rand Memorandum RM-3487-RC, Feb. 1963) [hereinafter cited as Rand Memorandum RM-3487-RC]. Nonetheless the Department is estimated to have conducted a full four-fifths of its overseas communications business on its own facilities, whose undepreciated value then exceeded $1,000,000,000. *Id.* at 75-77.

[5] Booz, Allen & Hamilton, Business Planning Study for a Commercial Telecommunications Satellite for Lockheed Aircraft Corporation, 1960, pt. I, ch. 3 [hereinafter cited as Lockheed Study].

The type of system chosen to meet this demand necessarily affects the potential user, the equipment supplier, and the Government. The position of each dictates a variant response.

A. The Common Carriers

The nine international common carriers see the satellite as a potentially inexpensive way to transmit intercontinental messages in the face of crowded radio frequencies and limited cable capacity. By far the largest of these carriers—the American Telephone and Telegraph Company—dominates the domestic telephone industry, virtually monopolizes international voice communication, and controls cable and microwave links for the American radio-television networks. With its subsidiaries, the company has pioneered in experimental satellites and space components for orbital and ground station facilities. To retain control of the satellite link it has persistently opposed Government ownership and long favored a closed venture limited to the international common carriers.

Present regulations have left AT&T with a substantial competitive advantage over her main rivals—eight other carriers largely restricted to record communication.[6] The two major record carriers—RCA Communications (which uses mainly radio circuits) and Western Union (cables)—favor permissive merger policies to facilitate a two-carrier duopoly in the communications business as a whole instead of the present unbalanced competitive situation.

The message carriers see communications satellites as a source of even greater competitive imbalance unless they are guaranteed participation on a basis equal to that of AT&T. In their view the increasingly blurred line between voice and record communication requires that each carrier be authorized to provide a full range of service—record, voice, condensed data, television, and facsimile. Therefore, they have urged Congress to permit them to combine their domestic and international operations to create a single integrated carrier (1) to compete with AT&T domestically and internationally, in both voice and record communication, and (2) so organized, to

[6] The high standards of Bell Laboratories are well-known. AT&T's competitive success, however, is due at least in part to existing FCC regulations. While eight telegraph carriers must compete for international record business, AT&T has a virtual monopoly of voice traffic. The record companies must also lease AT&T cables to supplement their own facilities, and are thus dependent on their major rival. Until recently, moreover, they were excluded from virtually all international voice communication and thus unable to compete with AT&T for the growing military market for combined voice-record service.

participate in the joint ownership of a global satellite system.[7] Congress has not yet acted on this proposal and, indeed, is traditionally opposed to mergers in the international field.[8] Consequently, the problem is still how to guarantee all carriers assured, equitable, and nondiscriminatory access to a satellite facility affiliated in some fashion with the industry's most powerful member.

B. The Equipment Manufacturers

Just as the common carriers view the satellite system as an extension of their existing technology, some sixty "hardware companies" which manufacture the equipment needed for space devices, ground stations, and booster facilities naturally view the system as a market for their outputs. In addition to such independent manufacturers as General Electric, Lockheed, Bendix, etc., many of the carriers maintain wholly-owned manufacturing subsidiaries. Because the subsidiaries are not regulated, it may be feared that their carrier parents may recoup on the equipment-producing side of the enterprise what they forgo in their regulated activities. At issue also is the strategic disadvantage of other hardware manufacturers in supplying a satellite system in which, unlike their rivals, they or their parent companies are not owners.

The more numerous the hardware suppliers who are willing and able to contract with the National Aeronautics & Space Administration (NASA) or ComSat for research or hardware assignments, the greater is the possibility of avoiding excessive reliance on any single integrated common carrier. The hardware companies, however, are hardly likely to risk substantial venture capital, or even to participate extensively as Government contractors, without some assurance that they will be able subsequently to sell to the operating system on a fair and equitable basis. The issue posed, once more, is whether equitable access requires outright participation in ownership by all competing companies in addition to special internal safeguards.

---

[7] See *Hearings on S. Res. 258 Before a Subcommittee of the Senate Committee on the Judiciary*, 87th Cong., 2d Sess. 390-92, 449-50, 458-60 (1962) (David Sarnoff, RCA; Samuel M. Barr, Western Union) [hereinafter cited as *Kefauver Hearings II*]; *cf. id.* at 409. See generally *id.* at 456-64; *Kerr Hearings* 78-89 (Engstrom); *Hearings on S. 2814 and S. 2814, Amendment, Before the Senate Committee on Commerce*, 87th Cong., 2d Sess. 282-84 (1962) (Barr) [hereinafter cited as *Pastore Hearings II*].

[8] In a landmark decision, however, the FCC recently authorized the record carriers to share in joint ownership of a fourth transatlantic cable capable of handling combined voice-record services of the sort previously open only to AT&T. See FCC Public Notice No. 48671, March 17, 1964; FCC Mimeo No. 48733, March 17, 1964.

C. The Government

The State Department, NASA, and the Federal Communications Commission must play crucial roles in establishing and regulating any global satellite system, no matter who is the legal owner of the system.

While it is established that NASA is to provide all booster and tracking facilities, the bulk of basic R&D, advice on the system's technical characteristics and on its compatibility with conventional facilities, a number of economic and political determinations still remain to be made. Are booster facilities to be leased at full or less than full cost, with or without allocable overhead and/or recovery of some portion of development costs? Flat fees may be charged for each launching, or royalties could be collected annually from the revenues earned.

Foreign policy problems are also posed by the system's international organization. The possibility exists that NASA's fees might be charged in part to underdeveloped countries least able to pay. In addition the State Department must work closely with the Federal Communications Commission and any satellite corporation in foreign negotiations on interconnection and frequency allocation. It must also approve any assistance to underdeveloped countries for improving their domestic communications systems and, eventually, for building ground stations. The line between business and political-foreign policy matters may be thin.[9] Hence, close cooperation between the State Department and the corporation will be necessary in such delicate matters as determining the location of ground stations abroad, dividing revenues and allocating costs (including development costs) among foreign partners in a global system, relations with the International Telecommunications Union (ITU), negotiations with the Soviet Union, and accommodating the Government's needs for global channel capacity for military and diplomatic communications.[10]

[9] See Estep, *Some International Aspects of Communications Satellite Systems*, 58 NW. U.L. REV. 237, 249-57 (1963).

[10] Doubts have been raised as to whether public and private functions can in fact be separated. For example, can the United States avoid responsibility for overseas actions of the corporation in view of the corporation's three presidentially-appointed directors? Will such appointments, along with other extensive Government involvement, create an impression among small investors that the Government has endorsed the corporation as a good investment risk? See generally *Hearings on H.R. 11040 Before the Senate Committee on Foreign Relations*, 87th Cong., 2d Sess. 346-70 (1962) (Benjamin V. Cohen, State Dep't) [hereinafter cited as *Sparkman Hearings*]; SCHWARTZ & GOLDSEN, FOREIGN PARTICIPATION IN COMMUNICATIONS SATELLITE SYSTEMS: IMPLICATIONS OF THE COMMUNICATIONS SATELLITE ACT OF 1962, at 17-20, 53-56 (Rand Memorandum RM-3484-RC, Feb. 1963) [hereinafter cited as Rand Memorandum RM-3484-RC].

The FCC, through its jurisdiction over all common carriers, including its power to approve extensions of their communication facilities, controls their right to participate in any satellite relay. In addition the Commission must license all American ground stations, negotiate with ITU for radio frequency allocations, and arrange for interconnection with remote foreign points when deemed in the national interest. Besides working closely with NASA in establishing technical standards, the FCC's role will be crucial in rate regulation and the policing of competitive procurement.

Such overlapping jurisdictions may create serious administrative-regulatory problems,[11] especially since the different agencies view the satellite system differently. The Defense Department sees it as a potential military resource; the FCC, as an adjunct to existing common carrier facilities, a "cable in the sky"; the State Department and the United Nations, as a unique means to hasten the growth of underdeveloped nations, and even as a safeguard against war through misinformation or accident. It is not surprising that the present act has already been criticized for failing to provide adequately for coordination among the various agencies involved.[12]

D. National Goals

As mentioned earlier, national policy towards space communications seeks to promote rapid growth, wide diffusion, and private ownership and operation.[13]

"Growth" includes the development of the underlying rocket technology and communications components for both orbital facilities and ground stations. It also includes the physical establishment of all components of a global facility, including ground stations in underdeveloped countries. The policy of promoting rapid growth has tended to imply a rate of development in excess of that warranted by projected divergences between the expected supply of and demand for channel capacity.

---

[11] On the relations between ComSat and various Government bodies, see *id.* at 57-59.

[12] Rosenblum, *Regulation in Orbit: Administrative Aspects of the Communications Satellite Act of 1962*, 58 Nw. U.L. Rev. 216, 233-34 (1963). See generally Rand Memorandum RM-3484-RC, at 57-59.

[13] Private ownership has been preferred from the outset insofar as consistent with other national goals. See Communications Satellite Act of 1962, §§ 102(a)-(c), 76 Stat. 419, 47 U.S.C. §§ 701(a)-(c) (Supp. IV, 1963); Statement of President Kennedy on Communications Satellite Policy, Section A, in *Hearings on Space Communication and S.J. Res. 32 Before the Communications Subcommittee of the Senate Committee on Commerce*, 87th Cong., 1st Sess. 4 (1961) [hereinafter cited as *Pastore Hearings I*].

"Diffusion of benefits" is dependent upon potential economies in international (and ultimately domestic) communication, with resultant rate reductions for potential users. The ultimate beneficiary should be the final consumer who utilizes the communications services of the common carriers which reap the immediate benefits of the system. "Diffusion" also encompasses equal and unrestricted opportunity for all equipment manufacturers to supply the satellite system and full access by all users and suppliers to all results of Government-supported R&D.

An overriding regulatory problem is reconciliation of conflicts among the various national objectives. To justify the huge Government investments in R&D and booster technology, the widest diffusion of benefits at home and abroad is essential.[14] Yet service to less-developed countries may unavoidably increase charges to the general user above those which would result if service were limited to high-traffic areas only. Rapid development of the system may conflict with efforts to establish the kind of organizational structure most conducive to competition.[15] American foreign policy goals may conflict with an economically efficient pricing of satellite channels.[16] Efficient spectrum usage favors low-altitude random systems,[17] while other factors favor the high-altitude synchronous type.[18]

---

[14] Communications satellites involve special international considerations because of their capacity to provide a global, multilateral communication service, as opposed to the bilateral service by cable and point-to-point radio. Remote, underdeveloped areas, no less than advanced nations, can be closely connected with the outside world. New forms of foreign aid may emerge through technical assistance to remote areas for development of their internal communications systems. Global satellite communication may enhance international understanding through opportunities for public confrontation of national leaders and for the spreading of literacy and education. Finally, joint undertakings with Communist nations may demonstrate a peaceful and cooperative approach to space exploration. See *Pastore Hearings II*, at 151-60 (McGhee, Dep't of State). See generally *Hearings on Space Satellite Communications Before the Subcommittee on Monopoly of the Senate Select Committee on Small Business*, 87th Cong., 1st Sess. 82-87 (1961) [hereinafter cited as *Long Hearings I*].

Such programs, however, will not materialize in the near future. A major source of long-run demand for intercontinental service is expected to be television and high-speed data transmission for which technical facilities are not yet available in underdeveloped areas. Time and language differences clearly limit the usefulness of global television circuits. American educational-informational objectives can also be promoted through taped television or through documentary film exhibition. Overland microwave links with the major terminal stations elsewhere may be a more practical way to help underdeveloped countries than direct global interconnection. See Johnson, *The Commercial Uses of Communications Satellites*, Cal. Management Rev., Spring, 1963, p. 55; Meckling, *The Economic Importance of Space Technology*, Rand Corporation Statement No. 17, May 9, 1962.

[15] See pp. 325-33, 337-40 *infra*.

[16] See pp. 349-56 *infra*.

[17] See notes 35, 38 *infra*.

[18] See pp. 327-31 *infra*.

To the extent that conflicts between various goals cannot be eliminated, compromises naturally must be made. The central issue, however, is whether these and other contradictions are inherent in *any* satellite system, or to what extent institutional design may exacerbate or minimize them.

Any satellite corporation necessarily must retain considerable discretion over the location of its ground stations, the rate at which new techniques and orbital components are innovated, the level and structure of rates, the selection of its suppliers, and the accommodation of potential users. It will be difficult to ensure that such discretion is used to reconcile the divergent goals of national space policies with each other and with acceptable short and long-run profits. It remains to be seen whether the nation's "chosen instrument"—ComSat—can accomplish this task better than the rejected options, or even adequately.

II. The Organizational Choice

In creating ComSat as a joint venture subject to Government influence, but owned and operated by broad-based private interests, Congress rejected a number of alternatives, including a completely governmental project along the lines of the Atomic Energy Commission[19] or the Tennessee Valley Authority,[20] and varied suggestions of purely commercial joint ventures[21] and single-company operations. In outline its choice apparently resulted from these presumptions:

> (1) National interest and foreign policy objectives require the development of a global satellite system at a rate more rapid than mere commercial considerations would dictate.
>
> (2) Technical-economic barriers preclude the establishment of more than one system in the foreseeable future. Therefore, a choice must be made among single-company ownership, a joint venture, or a Government-owned system.

---

[19] NASA would have been authorized to establish the satellite component. Title would have remained with the Government, but private contractors, operating the system for a fee, would have built their own ground stations and then contracted with the operators for access to the system's channels. *Sparkman Hearings* 269-71, 278, 351-52, 356-66 (Senator Wayne Morse; Hugh L. Dryden, NASA; Joseph L. Rauh; Cohen). For a modified version see Kefauver Amendment to S. 2814, in *Pastore Hearings II*, at 11, 19-20.

[20] A Government corporation, after establishing the system (satellites *plus* stations), would have operated it, renting channels to potential users. See S. 2890, 87th Cong., 2d Sess. § 4(c) (1962), in *Hearings on S. Res. 258 Before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary*, 87th Cong., 2d Sess. 262 (1962) (Kefauver Amendment to S. 2814) [hereinafter cited as *Kefauver Hearings I*]; *Pastore Hearings II*, at 17-27.

[21] P. 337 *infra*.

(3) A joint venture is preferable to single-company ownership mainly because the latter would probably create insuperable obstacles to equitable access and a wide diffusion of benefits.

(4) A joint venture is preferable also to any Government-owned system in view of the nation's long preference for private ownership and operation of communications, especially since the satellite relay is conceived as an adjunct to conventional common carrier facilities.

(5) The main issue therefore is the *form* of a joint venture and the safeguards to be imposed.

(6) The superior antitrust-regulatory safeguards of a broad-based venture make it preferable to a consortium of carriers, and its superior access to resources and know-how better recommend it than a joint venture limited to newcomers. In a broad-based venture internal organizational arrangements can be instituted which, without obstructing speedy growth, can cope with potential impediments to a wide diffusion of benefits.[22]

We proceed to examine the validity of each assumption.

A. The Need for Speedy Development

If time had been no concern the country might have waited until the market could support: (1) more than one independent private satellite system; (2) a variety of systems, public or private, high or low altitude; or (3) a single joint venture limited to newcomers with no interests in communications or equipment manufacturing. By the sacrifice of some speed, Congress might have chosen a more competitive instrument than the special type of joint venture finally created.[23]

There was, in fact, wide agreement in 1962 that commercial considerations alone would not produce, within the next decade, the investment needed for a global relay. Although some projections show demand for communication circuits exceeding supply by 1970 or 1975, unpredictable improvements in cable technology may allow increased traffic without new capital expenditures until an even later date.[24] Since a single stationary satellite over the Atlantic could

[22] These impediments are considered pp. 338-49 *infra.*

[23] See KAYSEN & TURNER, ANTITRUST POLICY—AN ECONOMIC AND LEGAL ANALYSIS 140 (1959).

[24] For example, the first transatlantic cable in 1956 had an initial capacity of thirty-six voice channels. The latest has a capacity of 128 channels, or, with

provide as much global channel capacity as existed in 1962, the probability of long-run unused capacity was readily apparent.

If commercial viability was remote at that time, however, the value of a satellite relay for military-foreign policy purposes was not. Radar blackouts, radio outages (due to sun-spots), and hostile jamming techniques combined to point up the need for a global system. Meteorology and weather prediction stood to benefit. Most important, national prestige urged rapid development: the United States was unwilling to grant the Soviet Union a lead in space technology. The chance of a spectacular peace-time "break-through" (*e.g.*, satellite communication) had long looked attractive, as did the opportunity to recoup quickly incidental civilian benefits from the country's huge investment in rocket technology.

But the desirability of speedy development does not explain the selection of the joint venture form. Congress might still have instituted a Government-owned system or simply permitted the FCC to license a single-company venture. In fact Congress rejected both of these alternatives partly because the alleged technical-economic barriers to establishment of more than one competing system argued in favor of the most representative single system. Other options might have appeared more attractive if additional systems had been expected to follow soon thereafter.

B. Barriers to Multiple Satellite Systems

High capital costs, spectrum scarcities, and the vast channel capacity of a single system allegedly create severe barriers to additional satellite systems. While these entry barriers may be inherent in communications satellites however organized, the height of these barriers appears to be determined to a large extent by the form of the original system. Where both components of the original global relay—satellites and ground stations—are jointly owned, the barriers to multiple entry are highest, but even here are insuperable only in the short-run.

---

three TASI transmitters, a limit of 239 voice trunks. As a result, cost-per-mile-per-voice-trunk fell between 1956 and 1963 to one-seventh the original amount. Additional technological improvements may reduce cost-per-voice-channel to only one-third the cost of the second generation cable. NICHOLS, SUBMARINE TELEPHONE CABLES AND INTERNATIONAL TELECOMMUNICATIONS 12 (Rand Memorandum RM-3472-RC, Feb. 1963) [hereinafter cited as Rand Memorandum RM-3472-RC]. AT&T's projected fourth generation cable is expected to provide at least 720 voice circuits by 1966, and to reduce costs-per-voice-channel to a mere 5% of those in the first cable. See NICHOLS, HIGH CAPACITY SUBMARINE TELEPHONE CABLES: IMPLICATIONS FOR COMMUNICATIONS SATELLITE RESEARCH AND DEVELOPMENT 2-6 (Rand Memorandum RM-3877-NASA, Sept. 1963) [hereinafter cited as Rand Memorandum RM-3877-NASA].

1. High Capital Costs

For joint ownership of both components, capital costs were estimated in 1962 at 400-500 million dollars exclusive of booster and tracking facilities.[25] However, more recent estimates (Table I) show considerable variations in capital costs responsive to such factors as the type of system, the length of satellite orbital life, the probability of launch success, and the character of the ground station equipment. Furthermore, the size of the United States' burden necessarily varies with the extent of foreign participation.

Even if one assumes exclusive American ownership of both components, most estimates of initial investment in Table I fall well within the very high capital requirements for optimal-size plants in steel, automobiles, and petroleum refining.[26] Foreign-ownership participation in a global system would make single-company ownership of the United States' portion look even less fanciful.[27] Although each carrier or aerospace-hardware company would hardly construct its own *system*, there may well be firms among them with sufficient resources and know-how to do so single-handedly, or in small groups. In that case the absolute capital requirements for a global system, though impressive, did not ipso facto rule out single-company ownership or the possibility of more than one system.

The time that would be required to raise venture capital of such magnitude was a more serious matter. The shorter the development period which national policy permitted, the more difficult it would be for any but the largest and most experienced enterprises to do the job alone. With additional time the profit potential of a global system might enable other less-established firms to raise the needed capital.

If satellite and ground-station components were to be separately-owned, on the other hand, wider participation by individual carriers was possible, since different companies might operate different links.

[25] Lockheed's long-run estimate for a high-altitude, two-satellite synchronous system with twenty ground stations, including the satellite replacement program through 1980, was $435,000,000 including $122,400,000 for the stations and their personnel through 1967. Lockheed Study 67-69. General Electric estimated that a low-altitude random system with ten satellites and twenty ground stations would cost from $400,000,000 to $500,000,000 by 1980, allocated equally between the ground stations and the satellites. *Hearings Before the House Committee on Science and Astronautics*, 87th Cong., 1st Sess., Ser. 19, pt. 1, at 154, 159 (1961) [hereinafter cited as *Brooks Hearings*].

[26] BAIN, BARRIERS TO NEW COMPETITION 158 (1956). Individual ground stations in the random system will probably cost less than optimal-size plants in such industries as rayon, liquor, cement, tires and tubes, or soap. *Ibid.*

[27] AT&T and the British Post Office are jointly expected to spend some $363,000,000 on new submarine cable between 1963 and 1965, a sum at least comparable to the cost of establishing any of the systems cited in Table I. See Rand Memorandum RM-3472-RC, at 32-34; *id.* at 25-27.

TABLE I

ILLUSTRATIVE COST ESTIMATES FOR EARLY GLOBAL SATELLITE SYSTEMS [28]
(includes satellites, terminal stations, data & management center)

Type of System	*In-Service Time (%)*	*Initial Investment ($ millions)*	*Annual Operating Costs [29] ($ millions)*	*Level Annual Costs [30] ($ millions)*
RANDOM				
Ground Equipment (16 stations, antenna, data & management center) [31]		159.7	40.0	68.6
Satellites				
18 RA (9 RA)	98.2 (86.5)	84.9 (42.4)	84.9 (42.4)	98.4 (49.2)
18 RB (9 RB)		74.3 (37.1)	37.1 (18.6)	46.2 (23.1)
18 RC (9 RC)		66.0 (33.0)	13.2 (6.6)	20.2 (10.1)
36 RC		132.0	26.4	40.3
Total Costs [32]				
18 RA (9 RA)		244.6 (202.1)	124.9 (82.4)	167.0 (117.8)
18 RB (9 RB)		234.0 (196.8)	77.1 (58.6)	114.8 (91.7)
18 RC (9 RC)		226.0 (192.7)	53.2 (46.6)	88.8 (78.7)
36 RC		291.7	66.4	108.9
STATIONARY (Synchronous)				
Ground Equipment (16 stations, antenna, data & management centers) [33]		26.6	6.7	11.5
Satellites				
6 SB (3 SB)	100. (100.)	126.0 (63.0)	126.0 (63.0)	146.2 (73.1)
6 SC (3 SC)		78.8 (39.4)	26.3 (13.1)	35.1 (17.5)
9 SC		118.1	39.4	52.6
Total Costs [34]				
6 SB (3 SB)		152.6 (89.6)	132.7 (70.7)	157.7 (84.6)
6 SB (3 SC)		105.4 (66.0)	33.0 (19.8)	46.6 (29.0)
9 SC		144.7	46.1	64.0

[28] For derivation of all cost estimates see Rand Memorandum RM-3487-RC, at 37-56. Cost estimates for each of the two basic systems—random and stationary—are based on assumptions regarding: (a) number of satellites in orbit; (b) effective lifetime of satellites in orbit; (c) satellites' launch-success probability; (d) number and type of terminal stations. Symbols are as follows:

R—Random System S—Stationary (Synchronous) System

Year A—in near future

Year B—some years later than A when launch probabilities and orbital lifetime improved

Year C—a later year, with further improvements.

Symbols can therefore be read as follows: 36 RC means "a system of 36 low-altitude, random-orbiting satellites, at year C"; 3 SB means "a system of three stationary, high-altitude satellites at year B," etc. Estimated costs of ground stations, antenna combinations, data and management centers follow model in Rand Memorandum.

[29] Refers to annual operating costs of ground stations and annual replacement costs of satellites.

Comparative cost estimates for synchronous and random systems [35] in Table I are instructive. The satellite component of an early synchronous system has been estimated to cost several times more than the same component for a contemporaneous random system. However, since the cost of the ground-station component would be only one-fifth or one-sixth as large, the cost of individual stations would be well within the capabilities of individual carriers.[36]

Insofar as a random system seemed by far the more practical in 1962, the national commitment to speedy development contributed substantially to the entry barrier of high capital costs. Moreover, in view of the far greater fixed cost of a random system's ground stations, the random system offered far greater scale economies with consequently increased danger of cutthroat ground station competition. Thus relatively few carriers could be expected to build their own terminals in a random system. Joint ownership of satellites and stations by the same entity therefore seemed to some carriers essential for equal access.[37] For that reason, too, the system's capital costs then became more prohibitive.

---

[30] Level annual costs are based on a 15-year period at 16% interest. They are derived from initial placement costs on the assumption that a system of any given lifetime would be replaced entirely by the end of its lifetime. Conversion of capital outlays and annual operating costs into "level annual costs" facilitates comparisons of systems whose costs may be distributed differently over the system's lifetime. Rand Memorandum RM-3487-RC, at 49-50.

[31] *Id.* at 48, table II.

[32] Includes costs of terminal stations and data & management center, cost of initial set of satellites placed in orbit, and annual replacement costs after system has operated for a few years.

[33] See *id.* at 48, table II.

[34] Note 32 *supra.*

[35] A random system consists of some fifteen to forty relatively simple satellites in random orbit of about 6,000 nautical miles altitude. Ground stations can communicate with each other only when an orbiting satellite comes into the "line-of-sight" of any pair of stations. Hence, ideally, a sufficient number of satellites must be orbited to enable every pair of stations always to be within the "line-of-sight" of at least one satellite. A synchronous or stationary system consists of relatively complex satellites in equatorial orbits of 19,300 nautical miles altitude. Because the movement of such satellites corresponds to the earth's, they will appear stationary to each ground station. Virtually all inhabited portions of the globe can be covered by three synchronous satellites, if properly placed. Rand Memorandum RM-3487-RC, at 5-12, 27-29, 33-36.

[36] Ground stations for a random system may cost an average of some $9,400,000 each, excluding annual operating costs of approximately $2,400,000. This contrasts with capital outlays of a mere $1,300,000 per station in a synchronous system, plus some $325,000 in annual operating costs. *Id.* at 47-48.

[37] Western Union, for one, was fearful that AT&T might funnel a large volume of business through its own ground stations, thereby undercutting any other carrier's stations. To remain free of further dependence on her main rival, Western Union therefore urged that all American ground stations together with the satellite segment itself be owned by the same consortium. *Hearings on Space Satellite Communications Before the Subcommittee on Monopoly of the Senate Select Sub-*

2. Spectrum Scarcities

Technical spectrum scarcities constitute a second impediment to multiple satellite systems. Space communication now requires wide-frequency bandwidths, although improved booster technology and heavier satellites operating with greater power may alter the situation. For the present, therefore, we confront the anomaly of a technique which may ultimately raise channel capacity several-fold, but which initially constitutes an uneconomic use of the spectrum.[38]

Spectrum scarcities may grow more serious as the additional military-meteorological satellite systems now planned come into operation, although again technological change eventually may facilitate an accommodation of these other systems.[39] More important than technical scarcities, however, is the present inadequacy of the administrative techniques by which frequencies are allocated nationally and internationally. A single satellite system would greatly ease the regulatory problems in such matters as frequency sharing between earth and space, frequency registration and utilization, avoidance of interference, and international frequency negotiations.

3. Multilateral Character of the Service

A further factor militating against multiple satellite systems is the multilateral character of the international negotiations required for communications operations among various countries with conflicting interests. The old bilateral relations between countries with cable and radio circuits more easily permitted separate competing operations in the United States.

---

committee on Small Business, 87th Cong., 1st Sess., pt. 2, at 578-79 (1961) [hereinafter cited as *Long Hearings II*]; *Kefauver Hearings II*, at 446-54; *Pastore Hearings II*, at 281-82. Other parties inferentially proposed joint ownership of stations and satellites provided that *the carriers held both*, but separate ownership where noncarriers or mixed interests held the satellite segment. *Id.* at 224-26 (Dr. Henri G. Busignies, IT&T), 242-44 (Joseph Beirne, CWA); see notes 62-63 *infra*.

[38] A synchronous system would create even greater difficulties at first. The present random system, with considerably less channel capacity than a future high-altitude synchronous type, will permit greater re-use of particular frequencies by different pairs of ground stations, an advantage not offset by a synchronous system's lesser interference with conventional (earth-bound) facilities. See *Brooks Hearings* 317-20 (James E. Dingman, AT&T).

[39] The United States' proposals for 2,975 megacycles of spectrum space could ultimately accommodate a maximum of 200,000 voice channels. Less efficient usage of the spectrum seems unavoidable at the outset, however, for optimal use of weak satellite power. True, the new microwave technology permits close beaming of point-to-point signals and, thus, far more intensive utilization of the spectrum than do the older high frequency or mobile radio techniques. Even so, wideband modulation today requires twenty times the bandwidth which an improved single sideband transmission is eventually expected to need. At present, therefore, only some 10,000 voice channels could be accommodated in any major geographic area. See generally Rand Memorandum RM-3487-RC, at 3-4, 18.

4. Magnitude of Channel Capacity

Perhaps the most serious barrier to multiple satellite systems, at least for the foreseeable future, is the excess channel capacity of a single system relative to cost and market demand. More than any other factor, this consideration confirms Congress' doubts about the likelihood of multiple commercial entry.

For example, it was estimated in 1960 that a low-altitude global system of twenty satellites and twenty-six ground stations would provide some 7,800 voice channels by 1970. Such capacity was far in excess of: (1) global capacity in 1960 of only 543 voice channels (691 voice trunks);[40] (2) liberal predictions that only 4,650 channels would be needed by 1970—a figure, however, that far exceeded the 1,475 effective cable circuits expected in that year. Even in 1975 this twenty-satellite random system would almost satisfy the expected requirement of 8,000 channels without considering the 1,750 cable channels also anticipated.[41]

Yet the low-altitude random system was widely believed to be technically inferior to a high-altitude synchronous system. It was estimated that the latter, operating with a single satellite over the Atlantic, would yield more than 1,000 voice channels. Some estimates were as high as 4,800 channels, depending on the type of satellite used. This compares with trans-Atlantic submarine cable capacity in 1962 of only 200 voice channels, estimated capacity of 600 channels by 1970, and anticipated needs of some 900 channels by that time. Some of the projected two-satellite synchronous systems would far exceed the maximum anticipated channel requirements in 1970 for trans-Atlantic and trans-Pacific traffic.[42]

---

[40] The difference between numbers of voice channels and numbers of voice trunks reflects the employment of so-called TASI transmitters on both ends of the trans-Atlantic cables. TASI units by facilitating the use of pauses in telephone communication enable a voice channel to transmit more intelligence than otherwise. See Rand Memorandum RM-3472-RC, at 22-23.

[41] Estimates in this paragraph are drawn from Report of the *Ad Hoc* Carrier Committee Inquiry Into Administrative and Regulatory Problems of Commercially Operable Space Communications Systems, No. 14024, FCC, March 29, 1961, in *Pastore Hearings I*, 203, 222-23; Rand Memorandum RM-3472-RC, at 22-23, 26-27; Lockheed Study 64A. AT&T actually estimated global capacity in 1961 as 550 circuits, needs by 1970 as 3,000, and trans-Atlantic requirements at 1,400. The company proposed an initial system of thirty satellites in 7,000-mile polar orbits, each satellite providing 2,400 voice channels, or four program-quality television channels. Sufficient satellites would be added ultimately to assure that two were always mutually visible from each pair of ground stations. *Brooks Hearings* 313, 320-22 (Dingman).

[42] A two-satellite synchronous system (over the Atlantic and Pacific), with twenty ground stations, was estimated to provide 2,000 channels by 1970 (at a cost of $420,000,000) and 5,000 channels by 1980 (at a cost of $495,000,000). This capacity would more than meet expected needs by 1980 of 5,870 channels in those areas when added to expected cable capacity of 1,130 channels. See Lockheed Study 64-A, 67-70, app. E(5). Other estimates in the paragraph are drawn from KLEIN,

None of these or other early estimates predicted a commercially solvent global system until 1970 or 1975. In fact the long period of losses has frequently been cited to justify inclusion of satellite investment in the common carrier's rate base, or even to warrant an overt Government subsidy. In view of the further possibility that technical improvements may enhance the channel capacity of satellite as well as cable links, the economic feasibility of more than one commercial system seems especially doubtful. Perhaps the most that we can anticipate in the near future is a single viable satellite link between the United States and Western Europe.

Thus serious barriers to multiple systems did exist in 1962, obstacles which the desire for rapid development undoubtedly aggravated. A joint venture, however, was not the only solution. A single system could have been launched by a single company or by the Government itself.[43]

C. Rejection of Single-Company Ownership

Among private companies, AT&T was obviously in the best position to develop the system. Her early success with Telstar indicated both the capacity and desire for vigorous independent action.[44] To the promise of rapid development the company added great financial resources which might have been considerably augmented by such foreign participants as the British Post Office. Furthermore, with foreign ownership of the portions of the system outside the United States,[45] even the costly single ownership of both ground station and satellite components would have been quite possible, especially if NASA charged no more than marginal launching costs for booster and tracking facilities.

GOLDSEN, LIPSON, MECKLING, MOORE & REIGER, COMMUNICATIONS SATELLITES AND PUBLIC POLICY: AN INTRODUCTORY REPORT 18-21 (Rand Memorandum RM-2925-NASA, Dec. 1961) [hereinafter cited as Rand Memorandum RM-2925-NASA]; Rand Memorandum RM-3472-RC, at 26-27.

[43] At the outset the satellite's two principal users will undoubtedly be AT&T and the Government. Sole ownership by either might guarantee more certain and adequate use of the facility. AT&T, for example, would be less tempted to withhold its business in the hope of forcing an under-utilized facility to price itself out of the market if it owned the facility outright. The Government, on the other hand, might be less likely to divert confidential military-diplomatic traffic to a separate Government-owned system under sections 102(d) and 201(a)(6) of the act if the facility which private companies used was itself Government-owned.

[44] AT&T's vital interest in satellites had become public knowledge by the time it signed a cooperative agreement with NASA for booster and launch facilities on July 27, 1961. The advantages and disadvantages of a single-company venture were examined in Rand Memorandum RM-2925-NASA, at 111-120. The option was also considered in passing in *Long Hearings I*, at 5-9.

[45] The extent of foreign participation would depend on the opportunities and incentives for common market and Soviet-bloc countries to establish their own systems and the degree to which the United States' lead in missile technology and

Despite these considerations, opposition to single-company ownership was overwhelming in view of its threat of monopoly with concomitant antitrust and regulatory problems. The Government's space program was viewed as a huge investment whose gains could be fully justified only by wide diffusion.[46] Regulation of a single-company system would fall to the FCC, and there was considerable uneasiness about this agency's performance as a rate regulator and "watch-dog" over competitive procurement.[47] In addition to hostility toward private monopoly, there was fear of having the image of the United States reflected abroad by a single giant enterprise.[48]

Furthermore, since single-company ownership was the option most vulnerable to charges of restricted access, those opposed to Government ownership feared to advocate a system subject to such strong objection. AT&T itself apparently sought to prevent the issue from emerging as single-company ownership versus Government ownership because the company sponsored, with other carriers and the FCC,[49] a joint venture open to all international common carriers and, eventually, to the hardware companies and general public as well.[50] Single-company ownership, in fact, was never formally proposed in Congress.

D. Rejection of Government Ownership

While public ownership of the space components on superficial analysis might seem to depart radically from customary American

orbital components induces other countries to participate. Even under the present act, foreign nations are permitted to build their own ground stations and to acquire up to one-fifth of the corporation's voting stock held by noncarriers. Communications Satellite Act of 1962, § 304(d), 76 Stat. 425, 47 U.S.C. § 743(d) (Supp. IV, 1963). By now, however, eighteen nations (excluding the Soviet Union) have actually joined with the United States to initiate the creation of an international joint venture (61% of whose stock ComSat will hold) to establish the space component of a global system. See U.S. State Dep't Press Release No. 346, July 28, 1964. Even the USSR has expressed interest in some sort of participation. N.Y. Times, April 8, 1964, p. 42, col. 2 (editorial).

[46] See, *e.g.*, Statement of Sen. Wayne Morse in *Hearings on Antitrust Problems of the Space Satellite Communications System Before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary*, 87th Cong., 2d Sess. 74-83 (1962) [hereinafter cited as *Kefauver Hearings I*].

[47] See, *e.g.*, *id.* at 186-201 (Dr. Dallas W. Smythe, Professor).

[48] See *id.* at 16-17 (Senator Ralph W. Yarborough).

[49] The Commission's eager adoption of the carriers' joint venture was criticized as too affirmative, especially in view of its traditional passivity, and as improper in light of its solicitation of technical and organizational advice from the very enterprises it was supposed to be regulating and which had the greatest financial interest in keeping out the Government. See Testimony in *Sparkman Hearings* 81-83; *Kefauver Hearings I*, at 190-99 (Smythe).

[50] AT&T's strategy was probably directed in part to undercutting the claims of its most militant congressional opponents who were seeking to keep out all carriers. However, it may have fared better with a less conservative policy. For example, it might have utilized its impressive technical capabilities in an attempt to present Congress with a fait accompli in the form of a complete system of experimental satellites.

reliance on regulated private communications carriers, it is, in fact, comparable to those vital public facilities used by private companies in the transportation, atomic energy, and military R&D fields.

In transportation, at least, whenever the agencies and the "ways" are owned separately (as in motor and air transport), the Government normally provides the "ways," and charges for their use. In broadcasting the airwaves are publicly owned and policed, but used free of charge by privately-owned broadcasting stations and networks. Perhaps only in our public utilities (including wire communication) are the distribution and production-generation facilities in general both privately as well as jointly owned. However, even here such ownership is not required for technical reasons as shown, of course, by those cases where both components are publicly owned. Even the railroads' jointly and privately-owned "ways" have been provided at least partly through governmental aid.

In addition to the historical argument strong analytical reasons exist for government ownership. The system is not only a "way" needed by all ground stations, but one requiring a special, expensive installation which the Government is financially best equipped to provide. Furthermore, the Government is alone capable of furnishing it without the conflicts of interest which private ownership of both the ground stations and the "ways" might engender. Carrier ownership of a space system's components can be likened to carrier ownership of both motor carriers and turnpikes. Separate ownership in the space field would at least maximize whatever possibilities for ground-station competition may arise from the future development of synchronous systems.

In operation a Government-owned relay might have provided greater safeguards for equal access by users and suppliers as well as better control of rates and greater capacity for promotional pricing. It might have offered superior capacity to bear the losses of technologically-induced obsolescence when new systems were instituted, as well as increased opportunity to enter into cooperative ventures with Communist nations, especially where such ventures required long-run subsidies. Furthermore, Government ownership could have facilitated recovery of the Government's development "equity" while fulfilling the system's public service responsibilities. Such ownership promised maximum coordination of civilian and military space programs and an end to reliance on ineffective regulation under conditions of natural monopoly.[51]

[51] See Rand Memorandum RM-2925-NASA, at 120-25; United Research, Inc., *The Commercial Application of Communications Satellites: A Study of Major National Policy Considerations*, in *Hearings on H.R. 10100 Before the House Com-*

Why, then, was Government ownership dismissed virtually from the outset? To some extent the old "opening wedge" argument was persuasive. Despite the contrary history of turnpikes and motor carriers, it was feared that, "with one foot in the door," the Government might soon intrude elsewhere in communications at home and abroad. In addition public ownership was opposed as requiring considerable in-house talent, as likely to interfere with the integration of satellite and conventional facilities, and as liable to disrupt the flow of private venture capital into R&D.

Furthermore, private ownership of some sort was expected to secure needed scientific-engineering talent more rapidly than a Government-owned system, while better facilitating the flow of venture capital into vital R&D without disturbing the economic-regulatory structure of the communications industry.[52] Its proponents also hoped that it would provide greater inducements to economic efficiency and greater likelihood that the burden of development would be placed squarely on the system's users.[53]

In the final analysis, however, the rejection of a Government-owned space relay was based in large part on crucial factual assumptions that remained in dispute to the very end:[54]

> (1) Private ownership of a global relay is legally possible and desirable notwithstanding the uncertain state of space law and the fact that orbital objects cannot be policed.[55]
>
> (2) Private ownership is crucial for speedy development and efficient operation even though the Government also has the know-how and resources, and can alone provide necessary booster and tracking capability.[56]

---

mittee on Science and Astronautics, 87th Cong., 2d Sess. 283, 325-27 (1962) [hereinafter cited as *Miller Hearings*]. The acknowledged disadvantages of Government ownership might conceivably have been reduced by allowing private operation. *Id.* at 327; Rand Memorandum RM-2925-NASA, at 125-28. After such operation for a limited interim period, a transfer to private owners might have been feasible. *Cf. Miller Hearings* 328-29. Such an arrangement might have helped to maximize the Nation's flexibility in planning, while the presumption of eventual private ownership would facilitate the flow of venture capital. *Ibid.* There are, of course, many precedents for selling Government-owned facilities and know-how to private parties after an initial developmental period.

[52] *Id.* at 322-23.

[53] *Ibid.*

[54] See *Pastore Hearings II*, at 68-70 (Newton Minow, FCC). For provocative testimony challenging these assumptions see *Long Hearings I*, at 99-110.

[55] *Long Hearings I*, at 270-72 (James E. Webb, NASA), 404-05 (Ryan); *Kefauver Hearings I*, at 163 (Loevinger, Justice Dep't); *Pastore Hearings II*, at 136-37 (Minow, Craven, FCC), 153-60 (Stevenson); *Sparkman Hearings* 176-77, 207-09, 217 (Dean Rusk, State Dep't), 360-64 (Morse, Lausche, Cohen); see *Long Hearings I*, at 219-20 (Javits); *Kefauver Hearings I*, at 115-17 (Philip J. Farley, State Dep't), 139 (Celler).

[56] *Pastore Hearings I*, at 7-8, 20-21 (Minow, FCC); *Kefauver Hearings I*, at 11-12 (Yarborough). *But see Kefauver Hearings I*, at 74-75, 81-83 (Morse).

(3) Although satellites can accommodate far more varied services than cable, have unique foreign policy implications, and are far more expensive to install,[57] they are essentially an adjunct of existing communications facilities[58] and thus most suitably owned and operated by the international common carriers.[59]

(4) The complex international negotiations needed for satellite communication are best handled by the common carriers—even though such negotiations, necessarily multirather than bilateral, involve the State Department and FCC in crucial ways.[60]

(5) The great capital and operating costs of any system, added to the need to service uneconomic markets, virtually guarantee losses for a long time, and private common carriers rather than the Government should bear these losses.[61]

(6) The satellite and ground station components must be jointly owned, even though they are technologically distinct, and common ownership would open the door to government intrusion into both domestic and international communication.

In regard to this last point, it is ironical that those who urged exclusive joint ownership of the satellites and the stations[62] may inadvertently have intensified the opposition to Government ownership of *either* component, whereas those who proposed separate ownership

---

[57] *Long Hearings I*, at 204-05, 208 (Busignies); *Pastore Hearings II*, at 237-38 (Beirne), *cf. Pastore Hearings II*, at 151-52 (McGhee); *Kefauver Hearings II*, at 387-89 (Sarnoff). *Contra, Kefauver Hearings I*, at 81 (Morse).

[58] *Hearings on H.R. 10115 and H.R. 10138 Before the House Committee on Interstate and Foreign Commerce*, 87th Cong., 2d Sess., pt. 2, at 402 (Minow) [hereinafter cited as *Harris Hearings II*]; *Kerr Hearings* 197-297 (Minow); *Long Hearings I*, at 204-05, 208 (Busignies); *Kefauver Hearings I*, at 81 (Morse), 387-89 (Sarnoff, RCA); *Pastore Hearings II*, at 151-52, 160-65 (McGhee), 237-38 (Beirne).

[59] *Kerr Hearings* 197-98 (Minow).

[60] *Harris Hearings II*, at 403 (Minow); *Kerr Hearings* 198-99 (Minow); *Pastore Hearings II*, at 160-65 (McGhee); *Kefauver Hearings I*, at 299-302 (Minow, Craven).

[61] *Harris Hearings II*, at 403 (Minow); *Kerr Hearings* 199 (Minow); *Long Hearings I*, at 473-74 (Craven); *Hearings Before House Committee on Science and Astronautics, ser. 2*, at 326-29 (Dingman); see *id.* at 59-61 (Engstrom); *cf. id.* at 414-15 (Leonard E. Root, Lockheed); *Kefauver Hearings I*, at 118-19 (Farley). See also *Harris Hearings II*, at 507-09 (Busignies).

[62] Joint ownership of both components was explicitly proposed in *Kefauver Hearings II*, at 446-47, 450-52 (Barr); *Pastore Hearings II*, at 281-84 (Barr). Consideration was also given to eventual joint ownership of the whole global system under the United Nations. See Memorandum of Professor Leon Lipson, in *Pastore Hearings II*, at 302, 304.

of the two components [63] may actually have made the case for Government ownership of the *satellites* more palatable.[64]

All these factors underlie the rejection of Government enterprise in favor of a regulated joint venture. Absent such considerations, the organizational decision might also have been different. Because Congress' choice was influenced by highly emotional, oft-unsupported claims and counterclaims, ComSat's statutory responsibilities demand the most careful employment of management's discretionary power. Discretion must be exercised well within the broad limits set by external and internal constraints. ComSat officials must constantly remain aware that their organizational arrangements are more a compromise with existing power realities than any ideal mechanism guaranteeing "automatic" fulfillment of the act's directives.

E. The Debate Over Joint Ventures

The remaining option, the joint venture, was available in three basic types: narrow-based, broad-based, and exclusionary, *i.e.*, excluding all carriers and hardware companies. On economic grounds the narrow-based venture offered considerable advantage. Administratively it was by general agreement more manageable than a broad-based venture. Like the broad-based, but unlike the exclusionary venture, the narrow-based joint venture was able to spread the cost of a satellite system among domestic as well as international messages. If the present domestic carriers had been excluded, and therefore satellite costs could not directly be apportioned to domestic users, the consequent burden on international users alone might have priced the system beyond market demand for a long time.

The choice of a broad-based over a narrow consortium, like the dismissal of a Government-owned system, was largely motivated by socio-political considerations. Congress preferred the possibly slower-growing broad venture to a narrow-based undertaking which seemed more likely to impede "wide diffusion." The exclusionary venture,

[63] Proposals for separate ownership of satellites and stations took several forms. One proposal called for safeguarding the corporation's rights to control its own stations in the face of pressures for exclusive ownership by the carriers. See *Pastore Hearings II*, at 30-31 (Dr. Edward C. Welsh, Nat'l Aeronautics and Space Council), 51-53 (Nicholas deB. Katzenbach, Justice Dep't), 289-91 (Edward R. Murrow, USIA). A second suggestion would have protected the carriers' rights to own stations, *in addition* to the corporation's rights. See *Harris Hearings II*, at 669-71 (Engstrom); *Pastore Hearings II*, at 63-64 (Minow). A third approach would have excluded the corporation completely by limiting ground station ownership to the common carriers. See *Pastore Hearings II*, at 180-83 (Dingman). A modification of this approach would have the carriers own "at least" the stations, though if possible the satellite segment also. See note 37 *supra*.

[64] At one point RCA explicitly alluded to such an arrangement. See *Brooks Hearings* 59, 67 (Engstrom).

however, was rejected because its development was likely to be considerably slower than that of the broad-based venture. This consideration outweighed the exclusionary undertaking's potentially lessened restraints on trade and possibility of greater diffusion.[65]

The remedy which Congress finally selected was thus obviously not commission regulation pure and simple. It was in fact a set of special techniques intended to produce, by internal organizational constraints, some of the results that a competitive economic structure would have produced externally. In section III we will examine these safeguards and the competitive principles which they sought to impose on ComSat's behavior as buyer of hardware and R&D and as seller of channel capacity to the common carriers.[66]

III. The Communications Satellite Corporation

ComSat can be distinguished from joint ventures in other fields both by the ingenuity of its internal antitrust-regulatory safeguards, and by the greater range and specificity of the goals it is supposed to further and which can be cited to exonerate any restrictive behavior. Any evaluation of ComSat must therefore involve a consideration of these elaborate mechanisms and of their probable ability, as contrasted with the options rejected by Congress, to prevent ComSat from: (1) eliminating potential competition in international communications; (2) foreclosing access to its facilities by potential users or suppliers who do not hold stock; (3) retarding technological progress in space communication to preserve the capital value of the co-owners' investments elsewhere; (4) falling under one-company control; (5) imposing excessive or discriminatory charges on its customers, or shifting onto them the charges which the *corporation*

---

[65] The classic case for a consortium of carriers appears in Response of AT&T, Inquiry Into Administrative and Regulatory Problems of Commercially Operable Space Communications Systems, No. 14024, FCC, March 29, 1961, in *Brooks Hearings* 337, 339-45; Reply of AT&T, pp. 376-86, Inquiry Into Administrative and Regulatory Problems, *supra*; Report of the *Ad Hoc* Carrier Committee, Inquiry Into Administrative and Regulatory Problems, *supra*, in *Pastore Hearings I*, at 203-69. Early versions of a broad-based venture open to hardware-aerospace as well as carrier interests are in Response of General Electric Co., in *Brooks Hearings* 148, 166-68, and Comments of Lockheed Aircraft Corp., *id.* at 410-17. A joint venture from which all carriers were excluded, to avoid conflicts of interest, was considered at length in *Long Hearings II*, at 550-58, 611-13, 628-33, 649-51. The more extreme version of a venture from which aerospace-hardware interests, as well as the carriers, would be excluded is mentioned in *Long Hearings I*, at 90-92 (Leland Johnson, Rand Corp.).

[66] These competitive principles are well stated. *Id.* at 25-28 (Loevinger); *Harris Hearings I*, at 131 (Loevinger). On the creation of internal structural arrangements to supplement the external constraints, see *Kefauver Hearings I*, at 146-50 (Loevinger).

should be paying to the Government for access to space know-how and facilities.[67]

A. Elimination of Potential Competition

Creation of the Communications Satellite Corporation will harm potential competition only if it discourages or prevents: (1) individual carriers or equipment manufacturers from building their own satellite systems; (2) the formation of joint ventures by newcomers unaffiliated with these interests; (3) competition between the major common carrier or hardware stockholders in business outside the venture, or competition between these companies and the joint venture itself.

The first eventuality is unlikely. Had a joint venture not been authorized, to be sure, either AT&T or the Government could have acted alone, or separate companies could have built different *segments* of a single global system. Therefore, it cannot be said that "but for the joint venture, no entry would take place." But the Communications Satellite Act did not itself preclude the development of a set of competing satellite systems. The technical factors which prevented such competition—capital costs, spectrum scarcity, channel capacity—have already been reviewed.[68]

Second, the act itself does not discourage ventures by newcomers. True, if existing aerospace-communications companies had been excluded from owning stock in any joint satellite venture, and if speed had been no concern, a facility might eventually have been established by newcomers with no ties in these fields. Such a venture might have better subjected the older cable-radio interests to vigorous competition than does a venture run by enterprises with heavy investments in these conventional fields.[69] But the aerospace-communications companies *were* the most likely sources of know-how and resources, and speed *was* a desideratum.

---

[67] Collusion among participants outside of a joint venture and the preservation of capital values elsewhere—points comparable to (1) and (4)—are frequently mentioned as potential dangers of joint ventures. BREWSTER, ANTITRUST AND AMERICAN BUSINESS ABROAD 202-06 (1958). Points comparable to (2) and (3)—discrimination in access among users and suppliers—are often raised where a joint venture provides a unique facility. KAYSEN & TURNER, *op. cit. supra* note 23, at 137. Point (4)—single-company control—is closely intertwined with the first three, and point (5) relates to joint ventures in any field where Government has provided valuable overhead capital and where, on this count, it seeks to recover an equity.

[68] See pp. 326-32 *supra*.

[69] The rates of an independent system originally might have been higher than those of a system whose rate base also included domestic communications facilities. But when fully utilized, the independent relay's charges might well be lower and competitive pressures on the older radio-cable services correspondingly greater.

The passage of time would clearly have increased the possibility that some of ComSat's stockholders, if prevented from participating in a joint venture, might have established their own separate systems. Newcomers also would have been more likely to do so eventually if all carriers and hardware companies had been excluded. Development of additional systems was dependent on the possibility that new markets and new technology might one day ease spectrum scarcities, reduce the costs of ground stations and orbital components, while improving launch success and satellite reliability.[70] In this remote sense, therefore, the Satellite Act may have dimmed the incentive for independent action by carriers. Legislation which excluded all carriers and hardware companies might have encouraged newcomers to create their own systems. But foreclosure of this possibility is far from an elimination of present or potential competition in any immediate or tangible sense.

A Government-owned system is the only certain alternative whose development the act precluded, at least in the United States.[71] Such a system might have developed quickly and subjected the older cable and radio systems to new competition. Antitrust, however, is not concerned with the elimination of federal-government competition, any more than it considers any deterrent effects of ComSat on the common-market countries.

Third, the major restrictive danger that remains, therefore, is that the rival carriers and equipment manufacturers who participate in ComSat may not go their own way afterwards; that cooperating closely on a daily basis, they may be tempted also to do so in their outside business by market-sharing and price-fixing; that ComSat may

---

[70] Similar issues were raised in United States v. Pan Am. World Airways, Inc., 193 F. Supp. 18 (S.D.N.Y. 1961), *rev'd on other grounds*, 371 U.S. 296 (1963). Grace and Pan American had jointly created Panagra on the understanding that the new line would not compete with the latter on the east coast of South America. The cost of establishing airports and other facilities and negotiating with the local governments was allegedly too great for either company alone at that time. The creation of Panagra, subject to the restrictive territorial agreement, clearly deterred potential future competition between Pan American and Panagra and possibly also between Grace and Pan American. Such deterrence can be conceptualized then as the "price" paid to establish Panagra earlier than otherwise. The communications satellite situation poses similar issues even after allowance is made for the longer time period before changing demand and cost conditions would facilitate establishment of a system by newcomers to communications.

[71] The act, however, does explicitly permit the Government to create its own system to handle "unique governmental needs." Communications Satellite Act of 1962, §§ 102(d), 201(a)(b), 76 Stat. 419, 421, 47 U.S.C. §§ 701(d), 721(a)(6) (Supp. IV, 1963). The Government is apparently expected to use the commercial system for all other matters, whatever its cost, and regardless of whether it might sometimes be more economical to use under-utilized military or meteorological systems. On the need for a special amendment to correct this situation, see *Hearings Before Senate Foreign Relations Committee* 203-05 (Morse, Rusk), 282-84 (Morse, Dryden), 301-07 (McNamara); *cf. id.* at 233 (Morse, Morrow).

be kept from competing vigorously with firms which participate as co-owners and whose representatives serve as its directors.

Although sui generis in many ways, ComSat at least superficially resembles the very kind of joint venture which, in the absence of explicit legislative sanction, would probably be termed presumptively unlawful.[72] Both ComSat and its major stockholders—the common carriers—will sell in the same market where both possess substantial market power. The carrier stockholders will not only be rivals outside the venture, but also produce services within it that are vertically related to those of other probable co-owners (the equipment manufacturers). Such conditions often nurture anticompetitive practices.[73]

It is by no means self-evident, however, as frequently asserted, that the Satellite Act will "exempt" ComSat's major stockholders from the antitrust laws—even in their satellite activities.[74] The act explicitly subjects ComSat to the federal antitrust laws and empowers the Attorney General to take it to court for cause.[75] Nonetheless, an "exemption theory," taking a more subtle form, might run as follows:

> (1) A joint venture limited to the carriers alone, because of its marked anticompetitive inclination, would be challenged under the antitrust laws, notwithstanding the FCC's jurisdiction.
>
> (2) To mitigate antitrust objections, as well as for other reasons, Congress broadened ComSat's ownership base, and imposed explicit national policy commitments on the co-owners, presumably even at the expense of profits.
>
> (3) The furtherance of these national goals[76] can fairly be cited to justify restraints which arise even in a broad-based venture.
>
> (4) Restraints which might otherwise be illegal are thus acceptable as ancillary to the legitimate pursuit of the act's explicit goals.

---

[72] See KAYSEN & TURNER, *op. cit. supra* note 23, at 138-39.

[73] For example, the price-output decisions of the joint venturers may become overly interrelated. The partners may reduce their competition with each other outside because joint participation in management, investment, and internal pricing, by enhancing their knowledge of one another, may prevent any partner from altering his market share without precipitating immediate retaliation. Power in one market may be used to foreclose vertical access in another, with price-output decisions coordinated to the detriment of nonparticipants. See BREWSTER, *op. cit. supra* note 67, at 202-05; KAYSEN & TURNER, *op. cit. supra* note 23, at 138-39.

[74] See *Kefauver Hearings I*, at 2-3 (Kefauver), 58-62 (Katzenbach), 142-49, 160-61 (Loevinger); *Kefauver Hearings II*, at 346-48 (Celler); *Pastore Hearings II*, at 55-56 (Kefauver), 347 (Katzenbach).

[75] Communications Satellite Act of 1962, §§ 102(c), 403(a), 76 Stat. 419, 426, 47 U.S.C. §§ 701(c), 743(a) (Supp. IV, 1963).

[76] See Communications Satellite Act of 1962, § 102, 76 Stat. 419, 47 U.S.C. § 701 (Supp. IV, 1963).

A claim of "exemption" here is clearly a sloganized challenge to the effectiveness of ComSat's internal safeguards and the explicitness of its national responsibilities. As such, however, it may unwittingly perform a useful function of its own. Since ComSat's principal justification lies in its internal arrangements designed to forestall trade restraints and promote specific national goals more effectively than other viable options, close public scrutiny of both areas can have only a salutary effect. Whether ComSat's co-owners will in fact "get off" easier than other joint venturers (and thus be "exempted") should the internal safeguards not work will depend on whether the courts grant wider latitude to joint venturers who pursue explicit statutory goals than to those who can justify their actions only by reference to private business purposes.[77]

B. Discrimination Among Potential Users

A joint venture by nature poses a considerable danger of discrimination in access in favor of participants in the venture. As an antitrust matter, such foreclosure runs counter to the prescriptions of equitable, nondiscriminatory treatment found in the landmark cases of *United States v. Terminal R.R. Ass'n*[78] and *Associated Press v. United States.*[79]

In *Terminal,* where the outsiders could neither create a comparable facility nor survive without one, the Court made equal access by all potential users mandatory.[80] In organizing the satellite system Congress appears to have imposed a similar legislative requirement on ComSat.

The Associated Press, in contrast, was not required to admit outsiders, but was merely prohibited from discriminating in new admissions against the rivals of existing members.[81] The "indispensability" of Associated Press' service, based on the inferiority of

---

[77] Of course regulatory goals could also be cited to exonerate the restrictive conduct of a common-carrier consortium or a venture of newcomers. ComSat's elaborate internal safeguards, however, are a unique effort to offset the anticompetitive tendencies inherent in regulation. For alternative theses on the manner in which regulation comes to subordinate competitive to regulatory norms, see Jaffe, *The Effective Limits of the Administrative Process: A Reevaluation,* 67 HARV. L. REV. 1105 (1954); Schwartz, *Legal Restriction of Competition in the Regulated Industries: An Abdication of Judicial Responsibility,* 67 HARV. L. REV. 436 (1954).

[78] 224 U.S. 383 (1912).

[79] 326 U.S. 1 (1945).

[80] United States v. Terminal R.R. Ass'n, 224 U.S. 383, 411 (1911).

[81] Associated Press v. United States, 326 U.S. 1, 21 (1945).

possible substitute services, suggests a further analogy with the satellite case insofar as: (1) those excluded from a joint satellite venture can in theory use high-frequency radio or submarine cable; but (2) the former is already in many uses a poor substitute for cable, not to mention a satellite link; and (3) submarine cable is as yet unable to accommodate the full variety and volume of service which an operating satellite system will supposedly be able to handle by 1970.[82]

Complete exclusion of all nonowners is thus clearly indefensible under *Terminal* and *Associated Press*. A more likely occurrence is foreclosed access through preferential treatment of owners when channel demand exceeds supply. In view of likely underutilization in the near future, this danger is not immediate. Its future seriousness will depend on the actual divergence between supply of, and demand for, channel capacity, as well as the degree to which channels are leased without full authority to use them interchangeably for various communication media such as telephone, data transmission, and the like.[83]

A more imminent peril is rate discrimination, *e.g.*, charging major co-owners less for channel usage than nonowners who seek direct access for competitive services. Possible safeguards here include sophisticated accounting checks on internal pricing arrangements and a prescription of uniform rates for all major users of the facility, whether or not they share in ownership.[84]

C. Discrimination Among Potential Suppliers

Competitive imbalance is clearly possible if some, but not all, hardware companies hold stock in a joint venture directly or indirectly through their common-carrier parents. Although such imbalance is not impossible under the present act, its occurrence is less likely than under a common-carrier consortium or under single-company ownership.

---

[82] In addition to antitrust precedent, a final justification for equal access is found in the equity which the Government may claim in the satellite system through its provision of essential social-overhead capital. Unencumbered access for users and potential suppliers promotes a wide diffusion of benefits.

[83] Projections of demand and supply, see pp. 331-32 *supra*, suggest that underutilization will continue for years, even on routes with the densest traffic. Furthermore, there are at present no valid economic or engineering reasons for ComSat to designate specific channel uses. At some future point, however, when demand exceeds supply at the regulated price rate then prevailing, ComSat may be forced to ration its channels according to nonprice criteria, thus permitting discrimination in favor of stockholders.

[84] Even uniform rates may be discriminatory as a result of underlying differences in the cost and demand conditions of different markets. See pp. 352-53 *infra*.

The present possibility for such discrimination arises from the factual context of ComSat. The major carriers are participating as owners. Most of them, as well as many other actual or prospective investors, have important equipment-manufacturing ties, usually subsidiaries or affiliates, which they would ordinarily favor.[85] If so inclined and not specially prevented, ComSat might indulge in such favoritism by shaping model design to favor the capabilities of particular hardware companies. Manufacturers represented on ComSat's board and privy to its long-range plans would have a decisive advantage in winning additional contracts even if the FCC, despite its lack of expertise in this area, is more successful than expected in enforcing competitive bidding. Indeed, any hardware company which has worked for NASA or ComSat would, on that count alone, probably have gained crucial experience and knowledge advantageous for winning continued contractual support.[86]

The only special safeguard the proposed common-carrier consortium proposed in this area was the prescription that the FCC maintain competition in the procurement of hardware and R&D. ComSat's broad ownership base, on the other hand, was expected to strengthen such additional checks on monopolistic domination of foreclosed access as government directors, FCC policing, carrier good-will, or the direct application of antitrust laws. Congress rejected proposed safeguards against restrictive patent practices by ComSat stockholders who patent inventions emerging from Government space contracts.[87] Nonetheless, general Government policies toward such patents do provide some protection.[88]

---

[85] *Harris Hearings II*, at 688-89 (Ryan); *Kefauver Hearings I*, at 145-46 (Loevinger); *Kefauver Hearings II*, at 357-59 (Long); *Pastore Hearings II*, at 56 (Kefauver). ComSat's four major carrier stockholders, each with hardware ties and capabilities for R&D, include AT&T (with 29% of total common stock outstanding), IT&T (10.5%), General Telephone & Electronics (3.5%), and RCA Communications (2.5%). See Prospectus of the Communications Satellite Corporation, June 2, 1964, p. 7.

[86] To date, for example, ComSat has contracted with AT&T, RCA, Space Technology Laboratories, Inc. (in association with IT&T), and with Hughes Aircraft Corporation for work on a variety of satellite hardware, and again with AT&T for the use of its Andover terminal station. Prospectus of the Communications Satellite Corporation, June 2, 1964, pp. 15-16; see Notice of First Annual Meeting of Shareholders of the Communications Satellite Corporation, Aug. 13, 1964, p. 4; Communications Satellite Corporation, First Report to Shareholders, Aug. 3, 1964, pp. 9-11. ComSat appears to be well aware of the delicacy of such arrangements. See First Report of ComSat Pursuant to Section 404(b) of the Communications Satellite Act, Jan. 31, 1964, p. 4; By-Laws of the Communications Satellite Corporation, May 18, 1964, art. 4.02.

[87] See 108 CONG. REC. 16822-28 (1962) (remarks of Senator Morse).

[88] The Government retains patents on all inventions resulting from NASA-financed research or, in cases where patent rights are waived, may retain a nonexclusive, royalty-free license with unlimited right to sublicense without payment. See National Aeronautics and Space Act of 1958, §§ 203(a), (f), (g), 72 Stat. 429, 435, 42 U.S.C. §§ 2457(a), (f), (g), 2473(a) (1958); *Hearings on NASA*

Several questions remain unresolved. Is the general application of the antitrust laws to ComSat meaningful without specific application of specific provisions? Will the ownership participation of some but not all hardware manufacturers impede nonparticipants in selling to the corporation under fair conditions? Will the FCC subject to special scrutiny corporate actions which the Government directors disapprove? Can any private system avoid the transfer of the industry's external structure into the area of intracorporate bargaining?

Finally there remains the danger that the carrier stockholders will seek favored treatment for their equipment subsidiaries even at inflated hardware prices. Although the carriers might then be forced to pay a higher price for use of corporation facilities, these payments could be passed on to the ultimate consumer as higher rates. The carriers' unregulated hardware affiliates would still benefit from premium earnings.

D. Retardation of Technological Progress

The extensive hardware and communications interests of most major prospective stockholders are an unavoidable consequence of the attempt to secure private ownership together with speedy development. A widely-feared but not inevitable concomitant would be an attempt by the joint venturers to retard new innovations which might threaten their older capital investments.

AT&T, for example, is deeply committed to low-orbiting random systems and to the continued development of cable technology.[89] At the same time its large equity, technological know-how, and possible initial loans to ComSat guarantee it considerable power in the satellite corporation, especially since other carrier stockholders are also dependent on it for access to transoceanic cables vital to their other business interests. AT&T, furthermore, by diverting its own business from satellite to cable facilities, could keep ComSat's rates unfavorably high relative to substitutes, thus reducing utilization of the satellite system.[90] AT&T's satellite stockholdings might deter such diversion,

Authorization for Fiscal Year 1964 Before Senate Committee on Aeronautical and Space Sciences, 88th Cong., 1st Sess., p. 1, at 237 (1963); *cf. id.* at 238. See also *Kefauver Hearings II*, at 586-87 (cooperative agreement between NASA and AT&T); Barber, *Economic and Legal Problems of Government Patent Policies*, in *Hearings on the Impact of Government Patent Policies Before the Monopoly Subcommittee of the Senate Committee on Small Business*, 88th Cong., 1st Sess. 47-74 (1963) (critique of proposed changes in NASA's patent policies).

[89] See *Miller Hearings* 136-20 (Dingman). See also Rand Memorandum RM-3877-NASA, at 2-8 (implications of AT&T's projected 720 circuit cable).

[90] *Kefauver Hearings I*, at 14-15 (Yarborough), 177 (Ryan). In fairness to AT&T, by no means all public statements of all its rivals reveal undue alarm over the danger of single-company domination, given appropriate safeguards. See

depending on AT&T's valuation of ComSat losses as against the gains expected from keeping its own cable facilities fully utilized. ComSat losses also might be more easily sustained if the satellite system's policies could be influenced to the advantage of a stockholder's outside interests.

If the act's regulatory safeguards can effectively curb the dangers of single-company domination, technological retardation will be less likely. The crucial question appears to be whether AT&T's great power can be adequately controlled by the fifteen directors, of whom no more than three may be selected, directly or indirectly, by AT&T.[91] Will the noncarrier directors' desires for profits negate the carriers' interest in preserving old capital values? Or will the large hardware companies prefer to cooperate in retarding technical innovation in return for procurement decisions which favor them at the expense of nonparticipating manufacturers? The answers to questions like these will determine whether ComSat will sacrifice the national interest in a high-altitude system in an attempt to maintain the value of an earlier investment in a random system.[92]

The act does, in fact, provide several safeguards to cope with these problems. It limits each common carrier to direct or indirect votes for no more than three of the six common carrier directors.[93] Six other directors are to be chosen by the public stockholders (including the noncarrier hardware interests), and three by the President. Furthermore, the carriers' share of total stock outstanding is limited to fifty percent; individual holdings by noncarriers, to not more than ten percent of the whole; foreign interests, to no more than twenty percent.[94] However, it has been argued that AT&T could still dominate through stock manipulation [95] or, as noted above, by divert-

---

Kefauver Hearings II, at 397-98 (Sarnoff), 433-34, 438-39 (Puckett, Hughes). AT&T has in fact announced plans to meet its future trans-Atlantic needs by satellites rather than additional cables. N.Y. Times, Dec. 11, 1963, p. 22, col. 1; Prospectus of Communications Satellite Corporation, June 2, 1964, p. 27.

[91] See text accompanying notes 93-107 *infra*.

[92] Domination through majority vote control presents no serious problem. Even in a narrow-based consortium each carrier can be represented equally on the board of directors, without regard to its equity shares. Domination through majority stockholdings can be curbed even more readily in a broad-based venture where the share of capital subscribed by any single stockholder can be more easily limited. The domination that results from predominant usage is more difficult to control. It is doubtful whether anything short of access to a second system would be effective, for the power relationships outside the venture might simply be reproduced in the bargains struck inside.

[93] Communications Satellite Act of 1962, § 303(a), 76 Stat. 423, 47 U.S.C. § 733(a) (Supp. IV, 1963).

[94] Communications Satellite Act of 1962, §§ 304(b), (d), 76 Stat. 424-25, 47 U.S.C. §§ 734(b), (d) (Supp. IV, 1963).

[95] If AT&T should provide some 80% of satellite use, for example, it could theoretically purchase 80% of the voting stock reserved for all carriers. Although this would permit her to elect only three directors, the company might achieve

ing its demand from satellite to cable or radio facilities. Unrestricted ownership would reduce this danger by widening the sources of venture capital. As the number of owners increases, however, so does the opportunity for one of them to dominate with a small percentage of stock.

Moreover, by widening the categories of eligible participants and setting a ceiling of $100 per share on the initial price of stock, the act sought further to prevent excessive dependence for capital on any single entity. The possibility remains, however, that subsequent issues will be sold at far higher prices, with a resultant bunching of stockholdings. Much will depend here on management's discretion. Noteworthy in this regard are the careful, apparently successful efforts of ComSat's interim board to secure the widest initial distribution of common stock,[96] and the recent election of six of its members as the organization's public directors—men presumably committed to this low-price, wide-distribution policy.[97]

Other safeguards are provided to assure an optimal rate of technological progress. Thus the FCC must approve the technical characteristics of any system's components and insure their compatibility with each other and with conventional communications facilities.[98] The act also gives NASA an advisory function in evaluat-

---

dominance by colluding successfully with another carrier and an equipment manufacturer or, conceivably, with two equipment manufacturers. Numerous other strategies are also possible. *Kefauver Hearings I*, at 160-61. Such dangers may have been exaggerated during the legislative proceedings. See note 96 *infra* (ComSat's special safeguards to guarantee wide stock distribution). The possibility remains, nonetheless, that internal collusion among the major stockholders will be no easier to check (or any less likely to occur) than collusion among the companies outside.

[96] In accordance with § 302, ComSat's fourteen presidentially-appointed incorporators served as its interim board of directors. To facilitate the widest initial stock distribution, this Board set the opening stock price at $20, and imposed a 1% ceiling on the percentage of all stock which any noncarrier could hold, in both cases figures well below the statutory maxima. Further, it reduced AT&T's stockholdings according to an FCC stock-allocation formula to be applied if the shares reserved for all common carriers were oversubscribed. Finally, the board sought to provide the kind of information needed by innumerable prospective shareholders, inexperienced as investors, who were believed likely as a group to underestimate the risks involved. See Prospectus of Communications Satellite Corporation, June 2, 1964, pp. 4-6 (risks), 26-28 (competition), 7, 52-53 (carrier subscription matters); First Report of ComSat Pursuant to Section 404(b) of the Communications Satellite Act, Jan. 31, 1964, pp. 11-12. The distribution of public (noncarrier) shares is indicated generally in Communications Satellite Corporation, First Report to Shareholders, Aug. 3, 1964, pp. 14-15.

[97] See N.Y. Times, Sept. 18, 1964, pp. 45, 52, col. 1.

[98] Communications Satellite Act of 1962, §§ 201(c)(4), (6), 76 Stat. 421, 47 U.S.C. §§ 721(c)(4), (6) (Supp. IV, 1963). In addition § 214(d) of the Communications Act of 1934, 57 Stat. 12 (1943), 47 U.S.C. § 214(d) (1958), empowers the FCC to require or to disapprove extensions or modifications of communications equipment by common carriers. The act presumably applies to a satellite relay. See *Kefauver Hearings II*, at 304-05 (Minow).

ing these characteristics.[99] It allows the President a general supervisory and coordinating function,[100] and gives to the FCC power to authorize the construction and operation of all terminal stations.[101] NASA also has the power to provide experimental booster and tracking facilities contingent upon a showing that an experiment will significantly further space know-how and technology.[102]

However, even these provisions are not entirely free of problems. The act requires NASA to provide all boosters needed to maintain any existing satellite system once the system has been approved by the FCC.[103] Conceivably, therefore, under FCC approval NASA may have to service a system to which it would never have granted its facilities at the outset under section 201(b)(3).[104] Thus, under section 201(c)(6), even against NASA's advice under section 201(b)(1), the FCC could approve the technical characteristics of the operational satellite system to be employed by the corporation.[105] Furthermore, the FCC has never deprived any common carrier or broadcaster of its license in order to force the institution of superior technical standards.[106] If licenses clearly designated as temporary are rarely taken back, how likely is the Commission to withdraw approval where hundreds of millions of dollars have been invested?[107]

---

99 Communications Satellite Act of 1962, §§ 201(b)(1), (4), 76 Stat. 421, 47 U.S.C. §§ 721(b)(1), (4) (Supp. IV, 1963).

100 Communications Satellite Act of 1962, § 201(a), 76 Stat. 421, 47 U.S.C. § 721(a) (Supp. IV, 1963).

101 Communications Satellite Act of 1962, § 201(c)(7), 76 Stat. 421, 47 U.S.C. § 721(c)(7) (Supp. IV, 1963).

102 Communications Satellite Act of 1962, § 201(b)(3), 76 Stat. 421, 47 U.S.C. § 721(b)(3) (Supp. IV, 1963).

103 Communications Satellite Act of 1962, § 201(b)(5), 76 Stat. 421, 47 U.S.C. § 721(b)(5) (Supp. IV, 1963).

104 Communications Satellite Act of 1962, § 201(b)(3), 76 Stat. 421, 47 U.S.C. § 721(b)(3) (Supp. IV, 1963), requires that NASA furnish launchings and associated services that the administration feels are necessary for the development of the system.

105 Ambiguities in jurisdictional areas among the governmental bodies regulating ComSat are serious. See Rosenblum, *Regulation in Orbit: Administrative Aspects of the Communications Act of 1962*, 58 NW. U.L. REV. 216, 233-34 (1963).

106 Of course, the Commission's power to prescribe depreciation rates would obviously influence rates of innovation. *Kefauver Hearings II*, at 304-06 (Hyde, Strassburg, Minow, FCC).

107 The FCC has argued that the international character of the system will determine its rate of innovation. For example, the heavy cable investments of AT&T may be outweighed by those of the British Post Office. Moreover, new techniques are often introduced gradually, thus avoiding any dramatic obsolescence. See *Kefauver Hearings II*, at 298-307. Unlike short-lived satellite equipment, however, ground-station hardware is long-lived. Control of the stations (the bulk of investment capital) will clearly influence the kind of orbital components used. Retardation on the American side remains a danger, notwithstanding the international scope of the enterprise. Beyond the act's formal safeguards, however, there remain two ultimate constraints: the possibility that foreign governments may withdraw to create

One final complication must be mentioned. An apparent retardation of technological progress may be explained as an attempt to diversify communications techniques to protect against future uncertainties. Carrier spokesmen and some regulatory officials see submarine cable, high-frequency radio, tropospheric scatter, high and low-altitude satellites, all as important supplements (not substitutes) in the event of military disaster or the vagaries of nature.[108] Hence inclusion of satellite investment in the common-carrier rate base is said to be doubly attractive—it facilitates internal subsidization of service to underdeveloped countries and of additional "outmoded" cable and radio facilities in time of national crisis. These national objectives are said to justify higher rates than would eventually be charged if the satellite service were priced exclusively on its own rate base. Even if we grant, arguendo, the importance of these goals, however, it is by no means clear that internal subsidization will achieve them more efficiently than an overt subsidy.

E. Pricing Policy

The special characteristics of a satellite relay aggravate the traditional regulatory problem of reconciling fairness in pricing with economic efficiency. The statutory responsibilities imposed on ComSat include nondiscriminatory access to its facilities and the widest diffusion of its benefits. There are further commitments to service unprofitable markets in the developing nations and to the early establishment of a global system.[109] Political pressures on an American-dominated system may compel ComSat to service poorer countries long before their internal communications systems justify such service. In other ways, too, considerations of fairness could clash seriously with functional efficiency. Finally, ComSat may be pressed to offer preferential prices to the Government and to pay the full costs of NASA's booster-tracking facilities, including some contribution to allocated overhead.

1. Alternative Pricing Principles

Efficiency requires that common carriers be permitted to rent channels from ComSat so long as the price they pay exceeds the cost of providing them. Where joint costs are substantial, however, and

their own systems, or that they would press for internationalization. See Rand Memorandum RM-3484-RC, at 78; N.Y. Times, Feb. 9, 1964, p. 31, cols. 1-2; *id.*, Nov. 13, 1963, p. 17, cols. 1-2. See generally Rand Memorandum RM-3484-RC, at 77-81.

[108] *Pastore Hearings II*, at 173-75 (Dingman).

[109] Pp. 322-23 *supra*.

average total costs decline, a price that covers short-run, or even long-run, incremental cost may not yield revenues adequate to cover the system's total costs. This statement must be explained.

"Joint costs" refer to the unavoidable expenditures for developing, building, launching, tracking, and replacing the orbital satellites required for any and all pairs of ground stations. Such costs are "joint" in that several links can be provided by a single capital outlay, and because the elimination of service on one link, at least in a random system, will not increase the capacity of another.[110] "Incremental costs" are costs incurred solely to open another communications link between any existing pair of ground stations, largely through modification of equipment. More precisely, the incremental cost of expanding service in a random orbiting system is the added cost of equipping any pair of ground stations to communicate with each other as well as with other stations to which they are already linked. In a stationary satellite system incremental costs will also include the foregone returns that the channels could have earned in their best alternative use,[111] so-called opportunity costs of using the link rather than permitting its use by stations located on some other link.

Preliminary studies indicate that average total costs per voice channel will tend to decline indefinitely as the system's capacity rises.[112] Thus the cost of launching and using satellites will probably increase with rising channel capacity, but less than proportionately. Likewise, a relatively small increase in cost may be expected to yield a fairly substantial increase in the voice channel capacity of any ground station. Once a station is established, relatively minor, inexpensive modifications of equipment will enable it to communicate with additional points.

---

[110] The closing of any link in a random-orbiting system will release no additional channel capacity for any other link because each satellite is used by different stations at different times. In a stationary system several pairs of stations can use each satellite simultaneously and, thus, must compete for channels. Joint costs in such a system are therefore more properly calculated as total costs minus the incremental costs incurred to equip any ground station to communicate with any other less the cost of bidding any channels away from their best alternative use when peak demands for them by different stations coincide. See generally Johnson, *Joint Cost and Price Discrimination*, 37 *J. Business* 34-37 (1964). This section of the Article uses as a point of departure Johnson's illuminating analysis and the supporting Rand Corporation documents on which he draws.

[111] In a random orbiting system these opportunity costs are always zero because the satellites will rarely be within simultaneous line of sight of a sufficient number of ground stations to account for all available channels. Hence the channels will be usable by relatively few stations at any time. In a stationary system, on the other hand, many stations may compete simultaneously for access to any given channel. However, the cost of bidding a channel away from some alternative user will be low unless the peak demands of different pairs of stations for the same channel coincide. Time differences and language barriers make this unlikely. See *id.* at 37. See generally *id.* at 34-37.

[112] Rand Memorandum RM-3487-RC, at 39-50.

ComSat's joint costs could be allocated in a variety of ways, each striking a somewhat different balance between the regulatory requirements of equity and efficiency. They could be: (1) covered in full by a Government subsidy, with prices on each link meeting only long or short-run incremental costs; (2) distributed according to the user's ability to pay; (3) priced to diffuse benefits widely; (4) shared equally among all participating ground stations; (5) apportioned according to the relative size of incremental costs on each line; (6) allocated according to the elasticity of demand for channels on the several links.[113]

(1) Incremental-cost pricing with Government subsidy is probably the soundest option in this case although the one least likely to be used. Economic efficiency dictates that public utility customers be served wherever they are willing to pay at least the added cost of providing service.[114] Governmental subsidization of the resulting deficit is justified further by the wide potential benefits of such service. In the case of satellites, moreover, the subsidy can be drawn widely from among all participating nations on an ability-to-pay basis, thus enhancing the service's appeal to the poorer nations, and largely reconciling, on a pragmatic basis, fairness and functional efficiency. Indeed this last advantage may well constitute the most persuasive argument of all.

Ironically, however, there are drastic practical impediments to any such combination of incremental-cost pricing and Government subsidy. The long, stormy debate over Government ownership of the satellite system resulted in Congress' strong, final commitment to "self-sustaining" private ownership. The heated accusations of Government "giveaway," and the loose counterclaims that a private corporation would save the taxpayers millions of dollars, may have muddied the issues irretrievably.[115] Reaction against any arrangement that relieved ComSat from "fully" paying its own way would undoubtedly intensify political obstacles which have virtually precluded the use in the United States of marginal-cost pricing with public subsidy.

---

113 In each case incremental cost would provide a minimum level for ComSat's rates. The several principles of joint-cost allocation would then produce prices ranging from marginal cost, on the one hand, to some maximum determined by options (5) and (6). If principles (2), (3), and (4) were applied directly to price rather than to the allocation of joint costs, somewhat different rates might result.

114 For a classic defense of marginal-cost pricing in the public utilities see Vickrey, *Some Objections to Marginal-Cost Pricing*, 56 J. POL. ECON. 218 (1948). A highly useful review and critique of all aspects appears in BONBRIGHT, PRINCIPLES OF PUBLIC UTILITY RATES 317-36, 386-406 (1961).

115 The unfortunate legislative history of the Communications Satellite Act virtually precludes any reliance on Government subsidy. A private joint venture was justified partly as a way to develop the system without extensive Government

(2) Distribution of joint costs according to user's ability to pay would have great psychological appeal to the poorer nations. Since wide disparities of income affect the social acceptability of full-cost pricing, ComSat might be pressed by poorer nations to combine incremental-cost pricing, once adopted, with a surcharge based on user's ability to pay. Such a pricing arrangement, however, is likely to result in an increase in the system's unused capacity by raising its average per unit costs. As a means to reduce income disparities, falsification of relative prices is, furthermore, inferior to explicit money grants to less fortunate groups or nations. Money grants are also more consistent with economic efficiency than pricing by ability-to-pay with cost differences ignored.[116]

(3) Distribution of joint costs on a diffusion-of-benefit principle also involves waiver of the surcharge in whole or in part for users in some markets. Such pricing might even require that some segments be priced below marginal cost to promote their "premature" use.[117] The basic charge, however, would be equal to marginal costs. Thus the main difference between variation of surcharges according to ability-to-pay and diffusion-of-benefits would be the attempt, under diffusion pricing, to anticipate the effects on economic growth and productivity.

(4) Developing nations may in fact prefer an equal sharing of joint costs to an option that reflects relative incremental costs on the several links (5) or relative demand elasticities (6). This would be especially true where pricing by ability to pay or diffusion of benefits has been rejected.

Equal sharing of joint costs, or equal apportionment of total costs, again jeopardizes efficiency. In economically advanced markets, for example, where inexpensive alternatives to the satellite are readily available, potential customers would use the satellite only so long as it was cheaper than expansion of their overland cable or microwave

aid. The continuing controversy over the terms on which NASA should provide ComSat with booster facilities, research, and know-how indicates how sensitive this area remains. See *Hearings Before the Subcommittee on Communications of the Senate Committee on Commerce*, 88th Cong., 1st Sess., ser. 3, at 56-64 (1963) (Pastore, Monroney, Dryden); *Hearings on Nomination of Incorporators Before the Senate Committee on Aeronautical and Space Sciences*, 88th Cong., 1st Sess. 77-91 (1963) (Senator Stuart Symington, Sundlun, ComSat).

116 BONBRIGHT, *op. cit. supra* note 114, at 116-17.

117 Pricing below incremental cost can be justified where social benefits exceed private benefits—for example, the facilitation of population—and industrial benefits—decentralization for national security through below-cost pricing of railroad service, or the subsidization of rapid transit to relieve highway congestion. *Id.* at 112-13. Likewise pricing above marginal cost is justifiable where social cost exceeds private cost, *e.g.*, in the pricing of peak-hour subway service. See *id.* at 118. See generally *id.* at 117-119.

links. Pricing at incremental cost would enable the corporation to compete effectively in such markets. Allocation of any of the system's joint costs to customers in advanced markets would lead to diversion of their business elsewhere. The result would be higher average total costs for the users who remain and greater idle satellite capacity.

Uniform rates, or an equal sharing of joint costs superimposed on a basic charge set at marginal cost, are also inequitable since incremental costs and demand elasticities may vary on different segments of the system.[118] Spurious equalitarianism may have superficial appeal for the poorer partners, so long as they are unable to secure outright grants, but it is conducive to neither fairness nor efficiency.

(5) The apportionment of joint costs according to the relative size of incremental costs on each of the system's links is justified by the theory that, if fully-distributed costs are to serve as an approximation of reasonable rates, total costs should be apportioned "to reflect relative differential or incremental or marginal costs, not absolute costs. . . . Fully apportioned costs, then, should reflect cost relationships, not absolute costs." [119] Here rates would be proportional to marginal costs and hence arguably "nondiscriminatory." [120] Because long-run incremental costs in the various markets will be comparable for the present, however, there would be little difference between rates calculated on this basis and rates based on an equal allocation of joint costs. Consequently the same criticism applies to both.

(6) In the future, when traffic becomes heavy and demand presses on capacity, ComSat might differentiate in its rates between peak and off-peak services. By allowing rates to determine the market for both products, so far as possible, ComSat would necessarily differentiate in favor of the off-peak service.[121] Such rate differentials may not be termed discriminatory, however, because the cost of on-peak service (the main product) would include all incremental capacity costs, while the costs of off-peak service (the by-product) would include separable costs only.[122] Once more the rate differentials would ultimately reflect relative marginal costs, and the result would be more effective use of plant. But, if we assume that per unit production costs will decline substantially over the relevant range of output, the revenues generated would again fail to cover total costs.

---

[118] See generally *id.* at 124-26, 130-34.

[119] *Id.* at 340-41.

[120] See generally *id.* at 375-77.

[121] *Cf. id.* at 381.

[122] *Id.* at 359.

To generate adequate revenues, ComSat must institute some form of value-of-service pricing, allocating the system's joint costs among its several links according to the respective demand elasticities on those links. The resulting rate differentials will then exceed those justifiable by any cost allocation strictly based on *cost* relationships, but this discrimination offers an assured way of covering total costs.[123] Such pricing is not objectionable provided that even users who pay the relatively higher rates still benefit because the favored users, otherwise priced out of the market, now pay incremental costs plus something extra toward joint costs.[124] But value-of-service discrimination should never be allowed unless the favored users are charged for *long*-run, not merely short-run, marginal costs.

Incremental-cost pricing in markets having readily-available, cheap alternatives would force ComSat to shift its joint costs elsewhere. It could shift them, for example, to its transoceanic links, where potential demand is high but conventional facilities are far more costly than overland cable or microwave links, or to links in the developing countries, where, for the limited capacity now needed, the best conventional alternatives are also very expensive. In both cases common carriers would be willing to pay considerably more than incremental cost for needed channel capacity.

Premium pricing of this type is economically sound insofar as *all* users would pay lower rates if those in the most competitive markets, willing to pay no more than incremental cost, are charged no more than incremental cost. However, such pricing would precipitate serious complaints that ComSat had met competition in the wealthier countries, where conventional facilities are convenient and inexpensive, by exploiting links subject to weaker competition. In the final analysis, therefore, intransigent congressional insistence on ComSat paying its own way may force adoption of pricing principles that injure the Nation's image abroad. Some form of incremental-cost pricing with prorated subsidy may be the only practical way to reconcile efficiency with subjective notions of fairness.

2. Government Policy and Relay Pricing

No pricing analysis can ignore the possibility of renewed pressures on ComSat to lease channels to the United States Government at preferential rates—in partial repayment for its large role in develop-

123 *Cf. id.* at 359-60.

124 See generally *id.* at 383-84.

ment.[125] Such rate reductions would presumably require the imposition of higher charges to nongovernment users, since ComSat and its carrier stockholders would seem to have little opportunity or incentive to shift onto their equipment-manufacturing subsidiaries the burden of such concessions.

Even if it does not seek price concessions, the Government may still seek a favorable allocation of its business between commercial and Government-owned satellite facilities. Even the Defense Department presently uses commercial transportation and communications facilities when spreading commercial overhead is more economical than creating its own and where security is no obstacle. In view of the Defense Department's plan to establish its own satellite system,[126] ComSat cannot ignore the comparable possibility of a Government desire to spread the overhead of that satellite system (created to handle "unique" Government needs), instead of utilizing an admittedly monopolistic commercial system. Of course, the Government may in fact be unable to switch its business from ComSat to idle channels on a Government system when ComSat's rates are too high,[127] or it might be unwilling to assume responsibility for raising ComSat's rates still further.[128] In any case ComSat's pricing policy for the foreseeable future is sure to be affected by Government purchasing policy and practice.

Furthermore, the pricing of NASA's facilities and know-how will necessarily affect the magnitude of the satellite system's joint and residual costs and thereby of ComSat's pricing problems. The

---

[125] See generally *Hearings on H.R. 1140 Before Senate Foreign Relations Committee*, 87th Cong., 2d Sess. 59-66, 91-2 (Morse, Minow), 129, 136-40, 235-38 (Morse, Murrow), 188-90 (Morse, Rusk). Eighteen nations already hold stock in the system. If they too sought preferential rates, their bargaining power would depend on their capacity to contribute to R&D, their strategic value as sites for terminal stations, the danger of precipitating any movement toward internationalization, or towards the withdrawal of regional blocs intent on creating their own system. See Rand Memorandum RM-3484-RC, at 51, 58-62.

[126] See Langer, *ComSat II: Commercial System To Avoid Tie With Defense Department*, 146 SCIENCE 751 (1964); Business Week, July 18, 1964, p. 36.

[127] Suggestive of the possible inadequacy of sections 102(d) and 201(a)(6) on this point are the fears voiced in *Hearings on H.R. 1140 Before Senate Foreign Relations Committee*, 87th Cong., 2d Sess. 180, 203-5 (Morse, Rusk), 233 (Morse, Murrow), 282-84 (Morse, Dryden), 300-05 (Gore, Robert McNamara).

[128] During its early years AT&T and the Government will undoubtedly be ComSat's main customers. See note 43 *supra*. Loss of either client's major business could price ComSat completely out of the market. Yet separate military systems might still be desirable for national security. Insofar as they eliminated foreign sensitivities about extensive military use of a commercial system, they would also encourage maximum foreign participation in ComSat (as stockholders and users), thus offsetting any loss of strictly military business. See Rand Memorandum RM-3484-RC, at 22-26. Foreign governments might conceivably be willing to tolerate some routine United States governmental or military use of ComSat, as they now do of jointly-owned cable links, to guarantee its viability and the chance of lower charges. *Id.* at 22-23.

more that NASA charges ComSat for booster-tracking facilities or space research, for example, the greater would be the deficit that results from incremental-cost pricing on the system's several links. The greater, therefore, would be ComSat's subsequent difficulties in reconciling fairness and efficiency. The situation is further complicated, however, by the fact that NASA's pricing arrangements could also serve to recover for the whole community at least some of the Government's equity in any satellite system.

NASA's choices are: (1) charging ComSat only for marginal launching costs in order to stimulate growth; (2) charging for some portion of overhead, including past development costs, to recover the community's equity; (3) leasing launch facilities to aerospace companies for limited, renewable periods at varying rental fees; or (4) permitting them to be built outright by private companies under Government license. NASA could also vary its charges inversely to ComSat's willingness to divulge resulting technical information, or to allow NASA royalty-free, nonexclusive patents.[129] In the extreme NASA could even provide booster and related services without charge, thereafter recovering marginal launching costs, plus some development costs, through long-run concessions in the rates which the Government would subsequently pay to use ComSat's facilities.[130] Finally, NASA's pricing decision could be determined independently of any attempt to recover the Government's equity in the system.

IV. Conclusion

ComSat was not created because "no entry would [otherwise] take place." [131] The Government or AT&T could have acted alone; or separate companies could have established individual segments of a global relay. Nor was the corporation "the only way in which the participants could themselves achieve the economies [and other goals] or undertake the risks." [132] The carriers had already proposed a consortium. Nor, finally, was ComSat "with [its] . . . participants . . . the only effective way in which the goals could have been . . .

[129] The prototype here is the cooperative agreement between NASA and AT&T to launch Telstar. If this option were used, ComSat would actually (1) reimburse NASA for marginal launching-tracking costs only; (2) divulge all technical information which results; and (3) grant NASA nonexclusive, royalty-free licenses on any patents which result, and permission to sublease licenses as well. See *Kefauver Hearings II*, at 584-90 (cooperative agreement between NASA and AT&T).

[130] Compare Congress' free land grants to the railroads in the last century. Their market value was recovered subsequently through reduced rates and free passage for certain classes of users.

[131] Kaysen & Turner, Antitrust Policy—An Economic and Legal Analysis 137 (1959).

[132] *Id.* at 139.

reached." [133] Clearly, there were other viable arrangements including, if time allowed, a venture limited to newcomers with interests unrelated to communications. Rather, ComSat was preferred to other options as a better way to *reconcile* speedy growth, wide diffusion, service to unprofitable markets, and private ownership. It was not expected to *maximize* each of these goals; it was always clear that some other option could promote one or more of them more effectively.

Whether ComSat will succeed in its task of reconciliation depends in part on the adequacy of both its intracorporate safeguards and the numerous external constraints imposed by Congress. But management's exercise of discretion will still determine ComSat's performance. Awareness of the potential dangers inherent in the corporation's economic-regulatory framework is therefore of special importance.

An American-dominated joint venture in control of the sole global satellite relay is highly vulnerable to Sino-Soviet propaganda even if ComSat were successful in providing low-cost efficient service to all. To avoid serious impairment of international confidence in American leadership in space communication, therefore, foreclosed or inequitable access by any class of users or suppliers must be prevented, collusion among the co-owners in their outside business ventures must be thwarted, attempts to rig ComSat policies to protect earlier investments in "outmoded" satellite or cable systems must be rigorously avoided.

---

[133] *Ibid.*