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The Reality of Change, Satellite Technology, Economics, and Institutional Resistance

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Thirty-five years ago, the visionary author Authur C. Clarke conceived a new idea in telecommunications—a communications satellite in geostationary orbit. A little over a decade later, the government of the United States set out to make the idea a reality. By the mid 1960s, the idea had been translated into a fledgling industry built around a global commercial consortium. In the 1970s that worldwide consortium was augmented by a number of national and regional systems. As the 1980s begin more new systems are proposed each year. Indeed, the business of satellite communications seems to be on a path of accelerating change. That change is extraordinary given the already revolutionary developments in the technology and economics of the satellite industry in its first twenty-five years. But the essence of satellite communications is, and will continue to be, change. The changes in technology over the last quarter century (and the changes in the economics of satellite systems that followed) have brought the world faster, less expensive, and more efficient communications.

Those changes have been brought about in part by the initial research and development program undertaken by the United States government, in part by the research efforts of the manufacturers of the satellites and the earth stations, to some degree by the research efforts of the satellite operators, but in critical part (and increasingly in recent years) by the demands and needs of the end users of the services that satellite communications offer. These combined changes in technology and economics have lowered both the complexity and cost of using satellite communications—most of the national and regional systems have been key instruments, as well as beneficiaries, of these developments. This reality of change has permitted satellite communications to remain a business of dreams—one can be reasonably certain that the technology and economic arrangements of tomorrow will provide more effective and efficient services than those that exist today. The only threat to the dreams will come from attempts to hinder change.

Unfortunately, the administrative and commercial arrangements created only a quarter century ago as the underpinnings for the nascent satellite communications industry may prove to be barriers to the kind of innovation and change that they were intended to nurture. As happens all too often with human institutions, the institutions become bureaucratized and, ultimately, dysfunctional; they lose sight of their objectives, of serving the needs they were created to serve in the most effective way possible. While it is not yet clear that the existing structure of satellite communications, particularly the INTELSAT organization, has become too rigid to adapt to change, the danger clearly exists.

To understand this danger, and to appreciate the kinds of flexible arrangements that may be necessary in the next few years, one must review the origins and structure of INTELSAT, the limits imposed by the 1972 Agreement, and INTELSAT's recent reactions to alternative specialized satellite communications systems.

THE ORIGINS OF INTELSAT

The creation of INTELSAT was a direct outgrowth of the actions of the United States government in the Communications Satellite Act of 1962. In creating Comsat, the President and the Congress mandated the establishment of a global commercial satellite communications system in which Comsat would be the U.S. participant.

After the embarrassment of the first Soviet Sputnik launch, the United States adopted a policy of demonstrating its technological capabilities in space as an urgent priority. There was no time to await technical developments which could ensure a multiplicity of competing systems. With the imminent threat of the introduction of a Soviet space communications capability, the goal of the United States was to establish a Western commercial system first. Thus, the Congress mandated Comsat's role in a single satellite system, not necessarily as the best way to proceed, but as the most effective and immediate way to proceed, given the technical, economic, and political constraints of the era.

Indeed, there was considerable concern that competition be preserved to the extent possible. In his July 24, 1961, speech on space communications, President John F. Kennedy stated that private ownership of the global system was favored with an assurance of "maximum possible competition." The drafters of the legislation, therefore, provided for competition where feasible, such as in procurement of system components.

Aware of the potential limitations of the global system of which Comsat was a part, the legislative history of the Satellite Act also shows that, in authorizing the system that became INTELSAT to operate on a common carrier basis, Congress recognized that the proposed structure might not be optimal for all future demands for satellite communications, and that the door should be left open for alternative technical and entrepreneurial advances. Congress enacted Section 102(d) of the Satellite Act to ensure that the FCC would have the power to authorize future alternative satellite systems, if warranted. The importance of this was emphasized by Senator Church when he stated "we cannot now foretell how well the corporate instrumentality established

by this act will serve the needs of our people . . . [C]ertainly this enabling legislation should not preclude the establishment of alternative systems, whether under private or public management."

INTELSAT STRUCTURE

Following the passage of the Satellite Act and the creation of Comsat, preliminary discussions with other governments were conducted and INTELSAT was created in 1964. Established initially under an "Interim Agreement," the arrangements between governments were completed and a definitive agreement established in 1972. INTELSAT is owned and governed by signatories appointed by its 110 member nations. Signatories are invariably the communications operators of a nation; they range from government agencies, to government owned monopolies, to companies with a mixture of government and private ownership, to purely private enterprises. For example, the signatory designated by the United States through statute is a private company, the Communications Satellite Corporation ("Comsat").

In contrast, the signatory designated by the United Kingdom, British Telecom, is a corporation jointly owned by the government and private investors. Indeed, the Thatcher government apparently intends to sell additional substantial portions of the government equity interest to private shareholders. For France, the signatory is the government of France, represented by the Ministère des Postes, de Télécommunications et de la Télédiffusion.

Under the agreement that governs INTELSAT, the day-to-day operations are carried out by an "Executive Organ" of several hundred employees headed by a director general. Executive decisions and policy direction are provided by a Board of Governors dominated by the major investors (voting is weighted according to ownership interest). The broad policy judgments and long-term direction are set by an Assembly of Parties composed of representatives of the member governments. The representatives at the Assembly are often not the signatories but officials of the governments. Put bluntly, INTELSAT is not so much an organ-

ization of governments as a consortium of national communications monopolies operating for their commercial advantage.

DEVELOPMENT OF INTELSAT

As noted earlier, when INTELSAT was established it was conceived as a single global system largely as a result of a combination of technical, economic, and timing constraints. In the last two decades, the timing consideration has entirely disappeared and the technology and its economics have changed radically. Technological advances permit continually more efficient use of the radio frequency spectrum and the orbital arc. Advances in the design of satellite and earth station hardware also have resulted in reduced costs for satellites, for earth stations, and, most important, for entire systems. Where once only a limited number of general purpose communications satellites were technically and economically feasible, today's technology and the consequent economics permit an increasing number of systems tailored both to particular geographic areas and to particular user groups.

Thus, INTELSAT, while emerging as the dominant international communications satellite provider, is by no means a global monopoly. The first departure from the single global system was the development of domestic communications satellite systems separate from INTELSAT. While INTELSAT provides some facilities for domestic use, most domestic satellite communications are provided by national carriers. Domestic satellite systems exist, or are planned, in a number of INTELSAT member nations; systems in Brazil, Canada, France, Indonesia, Japan, Luxembourg, the United States, and the United Kingdom are examples. Indeed, the highly competitive U.S. communications satellite industry has, in aggregate, as much transmission capacity as INTELSAT. Non-INTELSAT domestic satellite communications facilities have existed for almost a decade.

More recently, INTELSAT's international dominance has been eroded and more erosion is planned. The transborder use of domestic satellites in North America, the Palapa system, Arabsat, Eutelsat, and a recent proposal by Luxembourg represent

regional satellite communications systems which serve expanding international as well as domestic markets in their particular parts of the world.

Only in transoceanic satellite communications has INTELSAT maintained the dominant role; even there, however, the consortium is being challenged. Both Unisat in the United Kingdom and the French Telecom were designed with the capability to provide transatlantic facilities. Unisat offered its transatlantic capacity on a leased basis to INTELSAT, which rejected it. Telecom has been followed in France by the mysterious Videosat proposal. Japan published a study last year of the practicability of a non-INTELSAT transpacific satellite communications system. Finally, in the United States, five private companies have filed for permission to provide intercontinental satellite communications facilities: four across the Atlantic and one between North and South America. Three of the U.S. proposals seek to provide specialized Customer Premises Services (CPS) while the other two seek direct competition with INTELSAT in public switched services. Orion Satellite Corporation, which made the first of these proposals, sought only CPS and it appears that that is the kind of arrangement that the United States government may permit.

SUCCESS OF INTELSAT

INTELSAT has been a success, although not an unqualified one. It is one of the dominant communications satellite service providers in the world and the dominant service provider for international communications. Given its size, its market position, and its unique relationship with national telecommunications operations around the globe, it will remain not only viable, but dominant in intercontinental satellite communications. In short, INTELSAT has achieved many of the objectives set for it in 1964; it is a resounding commercial success.

INTELSAT has not achieved all of its objectives, however; it still does not provide direct and cost-effective public network services to many parts of the developing and newly industrialized world. The INTELSAT system, largely because of its design,

doesn't meet as efficiently as possible the technical and economic needs of many geographic areas—strategically important areas such as the Pacific Basin, for example. But INTELSAT has the wherewithal to achieve this critical objective; if it adheres to its mandate under the INTELSAT Agreement.

INTELSAT was never intended to do everything. It was primarily intended to provide facilities and services for switched voice and equivalent data services and to provide capacity for conventional television transmission.

Article 3 of the INTELSAT Agreement clearly recognizes that intention. Article 3 was written to assure that INTELSAT would pay attention to its primary purpose and, at several points, admonishes INTELSAT's management to ensure that their plans do not impair that primary purpose.

Throughout INTELSAT's two decades of life, the less powerful member nations have been promised by the INTELSAT Board of Governors and, more recently, the Executive Organ, that INTELSAT will meet the objective for which it was created and focus its resources on its prime mission. Thus far, INTELSAT has made substantial progress toward achieving a low cost, worldwide public network; with the capital resources that will be generated by INTELSAT's revenues over the next decade, INTELSAT could finally fulfill its promise and accomplish the mission for which it was created.

LIMITS OF INTELSAT

Today, however, much of the INTELSAT promise is still rhetoric and not reality. Many member nations, in large part because of constraints on space segment technology (most of which are rapidly disappearing), have been unable to take their place as full partners in INTELSAT.

INTELSAT chooses to employ satellite space segment technology designed to serve high volume, public switched traffic best, particularly in the North Atlantic market. As a result, earth station investment (not to mention operating costs) averages twice as much per half circuit for developing and newly industrializing

nations as it does in industrialized nations. A different technological choice by INTELSAT might raise space segment cost somewhat, but could sharply reduce earth station cost, particularly for small users, thus creating substantially lower total system costs for developing nations. One example of how INTELSAT might achieve such an impact would be through separate satellite designs for each ocean region which employed spotbeams covering gateways within each nation. Rural and domestic services could be most efficiently and cost effectively served by regional or national systems (offered by INTELSAT and others) which provided higher power levels and greater connectivity within national and regional markets. The major partners in INTELSAT, however, have chosen to ignore such design alternatives, leaving the developing world to carry a much heavier burden of ground segment cost than is necessary.

A fairer allocation of INTELSAT's resources could alter this, assuring real access and the best possible satellite communications to all who want to use the INTELSAT space segment.

Diversion of resources to the construction (in some cases, the reconstruction) of facilities for uses that are beyond INTELSAT's primary mission will constrain INTELSAT's ability to make sure that all its member nations become full members in operational terms. Equally important, it is unwise and inappropriate under the terms of the agreement for INTELSAT to divert resources to monopoly communications markets over which it has no monopoly mandate and which may be better served by alternative facilities arrangements. INTELSAT was never intended to do everything. It was primarily intended to provide facilities and services for a global public network. Article 3 of the INTELSAT Agreement clearly recognizes that intention.

And Article 3, while permitting INTELSAT to provide domestic satellite services and specialized services, does not give INTELSAT any monopoly over such offerings and only permits them to be provided if they do not damage the primary mission. As the European Space Agency (ESA) has noted, the Agreement, particularly the wording of Article 14, is the result of a difficult compromise reached, in the comparatively fast moving world of space, a long time ago. The text is purposely cautious and diplo-

matic. In fact, according to the ESA, the spirit of Article 14 was to adapt to future circumstances in a pragmatic fashion. Combined with Article 3, it protects against unreasonable moves either by INTELSAT or its members. No one's interests are served by interpreting the Agreement too narrowly, whether to give INTELSAT too much reach or any one member too much leeway. Rather, all interests are served by understanding that INTELSAT cannot cover the entire universe of communications needs and was never intended to do so. While protecting and preserving INTELSAT's primary mission as a provider of public telecommunications services is vital, equally vital is assuring that all the needs of commerce and society are met most effectively. The structure of telecommunications must reflect its role as a resource for other and usually more important social and economic activity.

DANGERS OF INTELSAT UNWILLINGNESS TO CHANGE

INTELSAT's recent attacks on alternative systems which employ specialized technology (e.g., technology tailored to particular uses, such as CPS in a particular geographic region), coupled with its unwillingness to move to satellite designs intended to lower total system costs for the smaller users, threatens to create conflicts and barriers to the entry of new systems and services. Out of those conflicts and barriers can only grow real dangers to fulfilling the promise of satellite communications, and chief among the dangers are: (1) that INTELSAT, by attempting to be all things to all people and diverting resources from fulfilling its primary mission, will damage its ability to provide the global public service network which it is charged with providing; and (2) that other vital needs of international commerce will remain unmet, or that the ability to meet them will be delayed, damaging economic activity vital for prosperity and growth in the industrialized and developing world alike.

As explored earlier, INTELSAT has been a success, but not an unqualified one. One result of this less than complete success has been the emergence of regional alternatives which

fulfill public telecommunication needs that INTELSAT has not met, regional alternatives which, in many circumstances, provide less expensive service on a full-system cost basis. Indeed, a major reason for INTELSAT's inability to meet the basic communications needs of the developing world has been its failure to develop economically efficient satellite resources which could be accessed by low cost earth stations. The technology exists to permit INTELSAT to provide efficient satellite resources both for so-called high volume routes, such as those between the United States and Japan, and for low volume routes, such as those between island nations in Micronesia and other areas of the Pacific Basin. That technology forms the technical basis for proposals such as Japan's for the Pacific Basin or that of National Exchange, Inc., for the domestic U.S. market. To move from its current system design to one more responsive to the needs of the developing world will take redesign and the reapplication of resources by INTELSAT, such as the redesign recently suggested by Mr. Chitre, Director of Systems Planning for INTELSAT. That INTELSAT has not moved more rapidly in this direction is unfortunate. The failure to move as rapidly as possible encourages the growth of possibly unnecessary alternative public telecommunications services.

In short, INTELSAT should be applying its resources to assure quality international public communications services to all its member nations. The diversion of resources to other needs both detracts from its primary mission and is highly impolitic. Indeed, given the strictures of Article 3 of the INTELSAT Agreement, it would appear to be improper for INTELSAT to pour precious resources into serving the specialized needs of specific groups of users before it has fulfilled its primary mission.

Following on the dangers of INTELSAT losing sight of its primary mission is the question of the growing promotion and creation of alternatives to the INTELSAT facilities. As the director general of INTELSAT pointed out in testimony before the United States Senate, much of the development of alternatives results from its inability to provide public services in various parts of the world. These existing alternatives, in Palapa, in Arabsat, in Eutelsat, have generated new proposals for alternatives to INTELSAT which seek to fill its public telecommunications role in regions

vital to INTELSAT's continued operation, such as the Japanese proposal for the Pacific. Whether such direct competitive proposals are in the best interests of all users and the INTELSAT system is a question that may need to be examined and debated both within and outside of INTELSAT.

At the moment, however, most nations do not appear to be amenable to direct competition with INTELSAT in its primary role. What some propose is new arrangements to meet new needs, both in services and facilities. As officials of the European Space Agency have observed, the INTELSAT system probably has reached the point where no additional economies of scale exist; new and separate facilities under different management can meet specialized "utilizations" more efficiently and effectively.

NEED FOR FLEXIBILITY AND CHANGE

Given the increasing reliance of international commerce on communications, inefficiencies and inadequacies in communications facilities will present operational problems and opportunity costs which can slow down or stifle economic growth and competitiveness. No nation can afford such damage to its economic development if it can be avoided. And, given the evidence of experience, there is little doubt that restricting the growth of alternatives will result in the public telecommunications service suppliers ignoring specialized needs. In the United States, only after the authorization of user-owned communications facilities as alternatives to the public network were a wide range of business needs and demands met. Moreover, as Bank of America noted in its recent letter concerning the Orion Satellite Corporation proposal to the FCC,

> Current development in United States telecommunications . . . demonstrate the limitations of existing international . . . satellite offerings. Satellite domestic satellite telecommunications can be far more effective and responsive to user needs than the services provided by the existing international telecommunications structure. One such alternative is embodied in the proposal by Orion Satellite Corporation. Orion would offer Bank of America

> the opportunity to own group and space equipment for telecommunications to and from Europe. It will permit the bank to communicate directly with its offices and facilities through user-owned, on-premises facilities, relieving administrative burdens and providing unprecedented flexibility and reliability.

Stated simply, without the development of alternative facilities, the economic activity dependent on telecommunications and the economic growth it represents will suffer.

After all, telecommunications is a servant. That truth is often forgotten when people begin debating about how communications facilities should be structured, who should operate them, or how they should be used. A recent report on International Telecommunications and Information published by the Foreign Relations Committee of the U.S. Senate highlights the fact that telecommunications is not an end in itself, that it exists solely to support other economic and social activity. In the words of the report, "data processing, telecommunications, and other information technologies provide the underpinning for increased productivity and growth in other industries and for continuing overall economic development."

International telecommunications provides an essential support system for the commerce that fuels the economic growth of the entire world. Without efficient communications at reasonable cost, international finance, multinational manufacturing, and a variety of increasingly important forms of counter trade could not exist. Moreover, without increasingly efficient and effective telecommunications systems, ever more sensitive and adaptable to the needs of end users, the continuing expansion of international commerce vital to national growth and development cannot be sustained. For telecommunications to remain a good servant, it must adapt and change as it grows.

CONCLUSION

The continuing revolution in satellite communications technology can provide even greater gains in the next twenty years than were provided in the last twenty. But to fulfill even half its promise,