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CHAPTER FIVE

DOMESTIC APPLICATIONS OF COMMUNICATION SATELLITE TECHNOLOGY

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INTRODUCTION

The promise of communication satellites in an operational setting has already been demonstrated by INTELSAT, the international telecommunications satellite consortium representing 63 nations, in which Comsat participates on behalf of the United States. INTELSAT has successfully established satellites over the Atlantic and Pacific. These satellites provide long-haul, point-to-point transmission routes for various services, including telephony, telegraphy, data and television.

Although we have not yet used satellites to provide commercial services within the United States (except for traffic between the continental United States and Hawaii) much discussion has centered on the potential domestic applications of satellite technology. Concrete proposals to use satellites in serving the vast U.S. domestic market have been made in the course of a pending Federal Communications Commission inquiry. Four parties have advanced

detailed proposals for operational domestic satellite systems. The American Broadcasting Companies, Inc. and the Ford Foundation have proposed special purpose systems for the distribution of television programs. Under the Foundation's proposal, anticipated cost savings made possible by satellite technology would be used to subsidize noncommercial television programming. AT&T and Comsat, on the other hand, have urged the FCC to authorize proposals for general purpose satellite systems. During the proceeding, Comsat and the Foundation each supplemented their original proposal by suggesting pilot rather than full-scale operational domestic systems. Many others have made their views known to the FCC -- including common carrier, broadcast, computer, aviation, press, government and educational interests. Wide disagreement on a broad range of legal, technical, economic and other issues has emerged.

The President expressly requested the Task Force to examine how soon a domestic satellite system would be economically feasible, whether it should be general purpose or specialized, and whether there should be more than one system.

The Task Force has concluded that communication satellites hold sufficient promise for domestic applications in the coming years to warrant a prompt start in that direction. A number of unresolved questions, however, make it premature to establish full-scale domestic satellite operations at this time or to predict when such a full-scale system would be warranted. We recommend as the most prudent course a modest operational pilot domestic satellite program, with Comsat playing the leading role, as a logical first step.

I. SATELLITES MAY PLAY A SIGNIFICANT ROLE IN MEETING OUR DOMESTIC COMMUNICATIONS REQUIREMENTS

A. Technological Developments Portend Potentially Attractive Domestic Applications

In the early 1960's the promise of commercial communications satellites seemed to be limited primarily to intercontinental use as an alternative to undersea cable and high frequency radio and for interconnecting large numbers of countries. The pace of technological change has, however, been much more rapid than most observers foresaw at that time. The successful launch of a satellite (SYNCOM II) into synchronous geo-stationary orbit in 1963 marked the

beginning of a new era. Subsequently, synchronous satellite technology has evolved rapidly, with corresponding reduction in the cost per unit of traffic handled. Continued technological advances such as multiple, narrow beam antennas, more powerful satellites, and improved multiple-access capabilities are now on the horizon. The trends in technology and cost indicate that communication satellites can and probably will play a significant role in providing a variety of domestic communication services, and in enhancing the capability of our existing networks to meet constantly expanding needs.

In comparisons with terrestrial systems, it is important to bear in mind two inherent characteristics of communication satellites which have no exact terrestrial equivalent. The first is the ability of a satellite to deliver the same wide band message (such as television) to many distant locations simultaneously. By "broadcasting" every message it receives over a wide geographic area, the satellite provides multi-point distribution services via a single relay point. By contrast, a complex network of interconnected trunk routes is required to provide this service terrestrially.

The second unique characteristic of satellite systems is their ability to reallocate communications capacity flexibly and rapidly among a number of individual routes -- in other words, to provide variable capacity routes. By contrast, terrestrial facilities provide fixed capacity routes. Thus, in order to accommodate the variations in traffic loading which are inherent in any multiple user communications service, a satellite system need only reallocate its capacity appropriately among its various routes; a terrestrial network, on the other hand, must employ alternate routing to reallocate its incoming traffic among various fixed capacity routes, through extensive switching and interconnection facilities.

This latter feature of communications satellites has not yet been operationally implemented and precise cost comparisons are impossible to develop. When fully exploited, it will permit a single satellite and its associated earth terminals to provide the equivalent of a complete -- though limited capacity -- terrestrial long-haul network, including both transmission and switching functions. Such a system might well prove economically and operationally attractive for establishing a variety of specialized communications

"networks," such as multiple-access, variable information rate data exchange service, computer-aided educational services, and occasional, specialized video "networks."

In addition to television distribution, uses of communication satellites in the foreseeable future might thus include: (a) relay of bulk communications such as multichannel voice/record trunks, high speed data, and video programs among a limited number of points; (b) networking of specialized communications such as voice, data, and graphics among dispersed or mobile users, such as aircraft, ships, computer and information centers; and (c) various scientific and meteorological data collection, distribution and exchange services. Satellites might, therefore, open new horizons in the dissemination and exchange of economic, medical, scientific and educational information among businessmen, doctors, students, teachers and others, and lend added impetus to progress in many areas.

This is not to suggest that communication satellites will revolutionize the present fabric of our already highly developed terrestrial common-carrier network or pose a serious threat to that system. Instead, we anticipate that domestic satellites will complement existing and improved

terrestrial facilities, providing such specialized services and overlaid "networks" as their unique capabilities render economically attractive.

B. It is Economically Feasible with Today's Technology to Provide Some Domestic Services by Satellite

Even with today's technology it would be feasible to establish a full-scale operational satellite system providing television program distribution and long distance relay of bulk telephone and record traffic. Precise comparisons between satellites and equivalent terrestrial facilities are difficult because of their differing operating modes, uncertainties about satellite and earth station designs and costs, and difficulties in projecting demand for new services. But our staff studies indicate that satellites would be competitive with terrestrial facilities in meeting some domestic communications requirements.

Television program distribution appears the most economical early use of domestic satellites, principally because satellites can reach many points within a large geographic area simultaneously through a single transmission facility. For two-way high density routes, on the other hand, substitution of satellite for terrestrial facilities

under existing technology is less promising. While little switching is required for one-way services, the switching and terminal equipment required for two-way trunk routes accounts for the major part of total cost regardless of whether satellite or terrestrial transmission facilities are employed.

This does not argue that a domestic satellite system even today be exclusively dedicated to television program distribution. If capacity can be added to a dedicated system at lower cost than could be provided through a wholly separate system, the provision of other one-way services or of bulk two-way services (such as telephone trunking) may become economically attractive. In addition, services making use of the excess satellite capacity that would otherwise exist during off-peak hours of use might add significantly to the overall viability of the system. Moreover, the suitability of satellites domestically for two-way services should be tested in an operational setting.

II. A NUMBER OF UNRESOLVED QUESTIONS MAKE IT PREMATURE TO ESTABLISH FULL-SCALE DOMESTIC SATELLITE OPERATIONS AT THIS TIME

A. The Industry Structure for Using Satellites to Meet Domestic Communications Requirements Could Evolve in Various Directions

Domestic satellite ownership and operations could evolve in quite different directions. Under one approach, they would be placed substantially under common carrier control. For example, Comsat's operations could be limited to the international arena, with AT&T or the terrestrial common carriers jointly given a monopoly of the space segment and ground environment of any domestic satellite system.

A variant would be to give Comsat or a new domestic satellite entity a monopoly of the space segment with authority to deal only with the terrestrial carriers, as is the general rule today in the international industry. Alternatively, direct dealing with other users might be permitted.

Another alternative would permit entry into the domestic satellite communications field by other entities in addition to the existing carriers. This would be similar to the view taken by the FCC in the "Above 890"

decision, where it authorized private terrestrial microwave systems. For example, broadcasters or other entities desiring to provide supplementary services might be authorized to establish satellite systems subject to appropriate regulatory ground rules.

Still another approach would be to retain for public or quasi-public ownership, on a permanent basis, the space segment alone of any domestic satellite system. Carriers and private entities would be authorized to construct and operate earth stations working with the satellites. They would obtain basic transmission capacity from the satellite operator.

B. The Appropriate Use of the Electromagnetic Spectrum by Domestic Satellite Systems Has Not Been Adequately Resolved

At the present time, commercial satellite communications systems must share the 4 and 6 GHz frequency allocations with terrestrial microwave relay systems, but substantial disagreement has been voiced about whether this shared use of common frequency bands is possible on a widespread basis without harmful interference. Divergence of opinion exists about the number of satellites that could operate simultaneously on the same frequencies in

the orbital sector suitable for U.S. domestic communications purposes. There is also uncertainty about the feasibility of providing satellite services in new spectrum areas above 10 GHz which are not presently authorized for use by satellites; the necessary equipment has not been developed, and there are unresolved questions about the impact of increased energy losses due to atmospheric effects at such high frequencies. Moreover, proposals have been made before the FCC to use portions of the spectrum above 10 GHz for certain terrestrial services.

In short, we do not know whether problems of spectrum use will restrict the feasibility of full-scale domestic communication satellite operations, or whether they will have a major bearing on the desirability of free entry into the domestic communication satellite field.

It is notable that an ITU World Administrative Radio Conference for Space Telecommunications (WARC-ST) is to be held in late 1970 or early 1971. Given the estimated two-year lead time required to establish a domestic satellite system after it is authorized, we believe it unlikely that any useful data will be developed under a domestic pilot program by the time the WARC-ST convenes. We do believe, however, that whatever proposals are submitted by the

United States concerning frequency allocations above 10 GHz must be very carefully drafted so as not to limit the flexibility of the anticipated experimental or operational aspects of our domestic program.

To resolve these issues we need both experimental data on factors such as interference mechanisms for operations below 10 GHz and propagation conditions above 10 GHz, and analysis of a variety of possible approaches to employing these higher frequencies. In a field where the vagaries of radio propagation are subject to a variety of interpretations, there seems little prospect that these complex technical issues will be fully resolved in the absence of more operating experience.

C. Available Data Are Insufficient to Determine the Comparative Advantages of General Purpose vs. Specialized Systems

Substantial disagreement also exists as to the comparative advantages of a general purpose domestic satellite system and one or more systems "dedicated" to specialized uses, such as radio and television program distribution. Advocates of a "dedicated" system for program distribution have contended that such a system would provide better efficiency and economy for specialized television interests than would

a common carrier system having widespread and potentially conflicting responsibilities to several industries. They maintain that the added complexity of a general purpose system -- in space and on the ground -- would not confer appreciable benefits from cost-sharing for broadcast applications, but would instead compromise the economic advantages of a "dedicated" system.

The general purpose approach, supported by Comsat and the other common carriers, has been defended on various grounds. They claim that (a) a general purpose system would use the frequency spectrum more efficiently, and that it would offer substantial economies of scale; (b) economies would flow from the possibility of avoiding duplication of launch vehicles, satellite research and development, procurement, earth station facilities, and tracking, telemetry and command facilities, and common operation and management; (c) further cost reductions would flow from reduced requirements for satellite spares and other back-up facilities; (d) the multi-purpose system would have greater flexibility, especially in orchestrating the highs and lows in traffic demand for individual services;

and (e) introduction of new satellite services would be facilitated.

However, a middle ground may exist: essentially separate systems (e.g., one for wideband service, another for general purpose services) could conceivably be operated within a framework that permits substantial sharing of common facilities and costs.

Finally, if the regulatory framework were to evolve along the lines to be described in Chapter Six of this report, we might rely more on the play of market forces to determine these questions, as we do in other areas of the economy where new techniques are applied -- subject, of course, to appropriate governmental regulation.

D. The Potential Benefits of Satellites in a Domestic Setting are not now Sufficiently Comprehended to Determine How They Might Best be Shared in the Public Interest

However a domestic satellite system is structured, the manner in which any cost savings made possible by the new technology are shared is an open question.

If it were operated as an integral part of the common carrier network, the benefits could be passed on to the public through general reductions in the carrier's rates,

reflecting the reduced cost of providing services by terrestrial facilities as well as by satellite. Alternatively, the benefits could be channeled exclusively to the user of the satellite service, as would be the case with a specialized satellite system. Or, if both common carrier and non-common carrier systems are authorized, competitive market forces might play a large role.

Another aspect of this question concerns the desirability of subsidizing certain non-commercial interests through operation of a domestic satellite system providing commercial services. For example, public or educational broadcasting stations might be offered free satellite channels, as contemplated in various of the domestic satellite proposals submitted to the FCC. The Ford Foundation has gone further and proposed that financial support for non-commercial programming be provided out of the savings from the operation of a domestic television satellite system, enabling the nation to earn, in effect, a "people's dividend" from its enormous investment in space.

While it is essential to have a sound financial basis for public broadcasting, the concept of a "people's dividend" from satellite communications poses problems. For example,

we do not yet know whether any domestic satellite program would in reality generate sufficient savings to permit an appreciable subsidy for non-commercial programming. Moreover, provision of television distribution by domestic satellites will require that the satellite services are priced attractively to commercial broadcasters, who may be reluctant to use satellite facilities if most of the economic incentives were removed.

We feel it is sufficient to conclude now that the wiser course is a policy which is neutral between the satellite and terrestrial technology and allows the natural advantages of each to be sought, developed and put into service. If commercial broadcasting operations are to support non-commercial programming, it would seem preferable, therefore, to devise a method that does not depend upon the mode of distribution involved. In any event, we cannot say whether a "people's dividend" will prove feasible until experience is gained with a domestic satellite program.

E. Any Decision on Domestic Satellites Must Be Consistent with Our International Commitments

The relationship between domestic satellites and the global satellite system is of great significance. We must

consider how an appropriate institutional framework for domestic communication satellites could be related to INTELSAT under the present interim arrangements. And looking ahead, we must fashion flexible machinery for relating domestic and other satellite systems to the global system under the definitive arrangements to be negotiated in 1969.

We should not take any action domestically that would have an unsettling effect on the forthcoming INTELSAT negotiations. The question of entry into the domestic satellite field, and many other questions, cannot be divorced from consideration of INTELSAT policies that remain to be worked out in these negotiations.

III. A PILOT DOMESTIC SATELLITE PROGRAM SHOULD BE ESTABLISHED

In light of the various unresolved issues discussed above, we consider it premature to fix domestic satellites into a particular institutional and operational pattern. There is not yet sufficient understanding of the potential role of satellites domestically to warrant approval of a full-scale domestic satellite system or systems; to do so might well create an irreversible pattern and foreclose valuable options.

Merely to tread water is, however, also undesirable. Most interested parties see promise in the use of communication satellites for domestic services, although they differ on various specific issues. The interest of private parties in investing in a domestic satellite system may not be necessarily or wholly congruent with the public interest, but it cannot be discounted. And while our own independent estimates do not indicate that substantial economies will result in the very near term from the substitution of satellite facilities for a terrestrial equivalent, neither do they show that some uses of domestic satellites -- particularly for television distribution -- are bound to be uneconomical. Inaction would ignore opportunities for cooperating with INTELSAT and would forego the benefits of the insights that potential users and operators, as well as policy makers, might gain from a pilot program. Nor should we ignore opportunities to gain experience that can be shared with other nations, particularly those with underdeveloped terrestrial systems for whom satellites may have very significant potential.

Accordingly, we conclude that a pilot program, frankly tentative and limited in scope, should be established. It would offer a number of concrete benefits:

It would provide valuable technical, economic and operational data for guiding timely future decisions regarding domestic applications of communication satellite technology. The data which would be marshaled would provide a much clearer perspective on

-- use of the frequency spectrum;

-- satellite system costs;

-- the integration of satellite and terrestrial facilities;

-- the optimal use of satellites for television distribution including educational and instructional uses;

-- the feasibility of satellite networking for specialized services and the shared use of satellite facilities;

-- the interests of users.

Such a start, using appropriate advanced technology, should have a stimulating effect on communication satellite research and development especially in areas of particular

interest for specialized applications, such as directivity and pointing accuracy of satellite antennas, multiple-beam techniques, and multiple-access techniques.

A pilot program, even though modest in scope, would provide facilities for significant commercial operations. For example, Comsat has proposed use of two satellites in synchronous orbit, each having a five-year life and capacity of up to twelve color television channels or 21,600 voice channels. Television, voice, data, telegraph, etc., could be transmitted simultaneously. Our own studies indicate that a single satellite with multiple-beam capability might provide up to 24 color television channels or 43,200 voice channels, divided among the four U.S. time zones, at little increase in satellite cost.

The program could also support non-commercial broadcasting and various other public interest projects. For example, in its proposal Comsat offered to participate in experiments, conducted under government auspices, concerning the practicality and economic advantage of using communication satellites to interconnect educational television and radio stations.

Though only a modest beginning, a pilot program would afford an opportunity to explore the possible arrangements for fitting satellites into the present regulatory and institutional structure of our domestic communications industry. By encouraging broad use and possible participation by carriers and other users, the program should have a stimulating effect on the industry.

Finally, the United States would take a constructive step in furthering international cooperation by establishing a domestic pilot program consistent with the objectives of the 1964 INTELSAT intergovernmental agreement, through an understanding with INTELSAT, and by appropriately relating the domestic program to the global system.

We do not mean to suggest that such a modest program will of itself provide sufficient data to justify a permanent commitment at the end of the pilot to one particular technical or institutional mode. Systemic flexibility should be a continuing underlying philosophy of industry regulation. But we do believe that far more enlightened choices will be possible a few years hence, after experience with the pilot is in hand. Authorization at that time of full-scale domestic satellite operations should raise fewer

difficulties than any full-scale domestic satellite system or systems authorized today. And authorization of the pilot need not preclude possible authorization of other systems in the interim, provided, of course, the technical uncertainties discussed earlier are adequately resolved, and that such action does not adversely affect the economic integrity of the pilot.

IV. THE PROGRAM SHOULD HAVE THE FOLLOWING ESSENTIAL FEATURES

A. It Should Employ Appropriate Advanced Technology to Obtain Needed Technical and Operational Data

Satellite technology is developing at a rapid pace. A pilot program that failed to exploit advanced technology already available may not provide technical and operational data needed for making judgments about how to proceed at the end of the pilot program. The facilities employed in such a pilot would also be less attractive for continued use in any subsequently authorized system. Accordingly, authorization of the pilot should be conditioned on a requirement that the parties employ appropriate advanced technology, and that they devote reasonable time and expense to procuring technical data and conducting the experiments necessary or useful for reaching future decisions regarding a

full-scale domestic system or systems. The pilot should not, on the other hand, be burdened with unnecessary features that would cause undue delay or destroy its attractiveness to private investors.

We believe that the pilot can yield valuable technical, operational and economic data covering a range of possible systems, and at the same time be operated on a sound commercial basis. While we envision a pilot program that is principally operational, rather than experimental, we do not anticipate that any of the technical features we recommend would involve expenses that could not either be fairly imposed on those authorized to participate in the program (who, presumably, would reflect such expenses in their rates to users) or that the participants would be unwilling to undertake.

1. Multi-purpose design. The principal area where substantial cost savings may be likely in the near future from a domestic satellite system is television program distribution. Moreover, a dedicated, non-common carrier system could provide an added dimension to the present ownership and operational framework of our domestic communications industry in the area of television program distribution.

But since a multi-purpose pilot program would not involve substantially greater cost than one designed basically for program distribution, it seems to us unwise to forego the opportunity for experimenting with satellites for a variety of domestic communication services. Moreover, a properly structured, multi-purpose pilot program would ensure that cost savings which the program makes possible in particular services are appropriately reflected in the rates charged for such services.

While the pilot program would in effect be general purpose, it should be structured to test, to the extent feasible, the advantages of a system dedicated to television distribution and other specialized wideband services. This requires employment of earth stations of appropriate sizes and performance criteria for the range of such services possible, the testing of various operational approaches, and the maintenance of accounting procedures designed to segregate costs so as to facilitate subsequent determinations regarding the feasibility of a general purpose and specialized system or systems.

Broadcast, special purpose, and general purpose operations should be conducted independently within the

framework of a single pilot program, and they should share common satellite facilities. Each may need a basic share of total capacity; however, in the interests of economies of overall pilot operations, flexibility is preferable to a rigid division of channels for the full-time exclusive use of either system, or for particular classes of users. At the outset, general purpose operations may be very small, while many of the needs of broadcasters, both commercial and non-commercial, may dictate only part-time channel requirements, which should permit effective sharing of channels. Indeed, new network and program sources might be discouraged if required to pay for full-time channels when interconnection is needed for only brief periods during the day.

2. Interference measurements and sharing criteria. Data on potential interference between domestic satellite and microwave relay facilities should be obtained. To this end, receive-only earth stations should be established in both urban and non-urban areas so that interference from terrestrial microwave facilities can be monitored. Transportable ground station equipment should be deployed in metropolitan areas congested with terrestrial microwave

facilities to test the severity of mutual interference and ways of avoiding such interference.

We cannot overemphasize the importance of prompt action to develop and improve criteria for frequency sharing by communication satellite systems and terrestrial communication systems. The pilot program will provide some useful data in these respects. But, independently of the pilot, there is a need for prompt efforts by Government and industry so that sufficient data will be available to help guide the pilot program and to make sound judgments about the potential problems that might be presented by shared use of common frequency bands on a widespread basis. No less important, the data is needed to deal with any such problems, should they arise.

3. Channel multiplication by spectrum reuse.

The use of narrow antenna beams from the satellite, each covering separate geographical areas and providing some reuse of the available frequency assignments, has considerable promise as a means of increasing the channel capacity of an individual satellite and of the orbital space as a whole, thereby reducing the overall cost per channel of satellite services and achieving greater communications capacity from

the frequency spectrum. The development and operational demonstration of such a multiple-beam, spectrum reuse capability may be the most significant technical and economic feature which could be incorporated in the pilot program. Such a capability, if feasible, would be highly desirable. Its inclusion should, therefore, be explored carefully and insisted upon, if feasible. In assessing both the merit and feasibility of such an approach, the continuing advice of NASA should be sought.

4. Service to non-contiguous areas. Multiple antenna beams also offer the possibility of serving non-contiguous areas such as Hawaii, Alaska, Puerto Rico and the Virgin Islands from domestic satellites. The feasibility of serving these areas with such a configuration should be thoroughly examined prior to and during the pilot program to determine whether any of these areas could be served economically either by the pilot or by any subsequent full-scale system which might be developed. The feasibility of serving these areas by domestic satellites and by INTELSAT facilities would have to be compared. Whatever the decisions ultimately reached, we should take no action that conflicts with our commitments to the global system.

B. Broad Participation in the Pilot Program is Desirable */

In addition to a carefully developed and detailed technical and experimental plan, a pilot program would have three basic components:

-- the space segment -- satellites and associated facilities;

-- fixed send/receive earth stations, both large and small;

-- special purpose earth stations, including receive-only stations and portable facilities.

The first two components are essential both to the provision of a variety of two-way communications services and to the distribution of broadcast programs. The special purpose stations would be designed to provide broadcasting and other specialized services; this category includes portable facilities that would be useful in evaluating the feasibility of by-passing the extensive switched terrestrial network for broadcast program origination, regional networking and similar activities, and for serving a variety of demonstrational and experimental purposes.

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*/ Dr. Welsh (NASC) does not concur in this conclusion. Based on what he considers the unfortunate experience we have had with divided ownership of earth stations in the international field, he would prefer that Comsat own and operate all of the facilities of the pilot system.

Ideally, the pilot program should be controlled by a completely neutral and disinterested entity, lest the pattern of ownership of any fully operational system harden prematurely. The Ford Foundation has suggested that NASA is such an entity but there are practical obstacles to NASA's undertaking the pilot project. While NASA could technically provide the space segment, we doubt that it would be the appropriate entity to test the commercial and operational feasibility of domestic satellite services, and in any case it would need Congressional authority to do so. Seeking new legislation could cause considerable delay in starting a program for domestic use of satellites, and it is questionable whether Congress should be asked to appropriate public funds for a project when private interests are apparently willing and able to commit the necessary resources.

Nor does it seem desirable to create a new private corporation to own and operate the pilot program. Creation of such an entity could be a time-consuming process entailing very substantial delay in the initiation of the pilot, and premature in the absence of a better understanding of the role of satellites domestically. It would also prejudice future arrangements.

We think it important that a pilot program be designed to ensure that no participant obtains a pre-emptive position. Since there is little doubt that the pilot project will in fact have a shaping influence on the future regulatory pattern of the domestic satellite industry, the project should be designed to meet this concern. Several steps seem warranted.

First, the Commission should, in announcing approval of the pilot project, make clear that all ownership arrangements authorized for the pilot are strictly provisional and subject to subsequent modification. It should also stress that the extension of the authorized-user rationale to the domestic arena should be a matter for fresh consideration.

The Commission should also insist that the pilot project be so structured that subsequent modification of the ownership arrangements would not cause undue hardship to the parties involved. Otherwise, divestiture or some other substantial alteration of the proposed arrangements might not be practical. Specific provision should thus be made to allow the participants in the pilot program to recover any investment they had made with a reasonable return on that investment. This is not to say the participants would be

protected against risk of loss should the pilot project be a commercial failure. That risk they are apparently willing to assume, providing realistic traffic commitments are forthcoming from the principal users of the system. But if the venture leads to a further stage of development, the participants should be assured against loss in the event that their interest in the pilot program were transferred to other entities.

Finally, ownership arrangements for the pilot should be designed, so far as is feasible, to permit the exploration of various ownership patterns among different interests and, in particular, of the right of users to participate independently of the carriers.

We recognize that the simplest solution would be to authorize Comsat to establish all the facilities used in a pilot program. Systemic integrity would be thereby enhanced and undue delay avoided. While sympathetic to these considerations, they may well be outweighed by advantages of broader participation -- provided that strict conditions are laid down by the FCC, as proposed below.

C. Comsat Should have Primary Responsibility

1. The space segment should be owned by Comsat as trustee. Divided control of the space segment would be administratively cumbersome, and could affect operational efficiency. Comsat is well qualified to establish and maintain the space segment as trustee. By trusteeship, we mean an interim ownership basis with no commitment by the government as to ultimate disposition of the franchise to operate any part of a domestic satellite system. Moreover, the principal benefits possibly flowing from divided ownership of the space segment -- experimentation with the feasibility and the advantages of a specialized broadcast-only system, preservation of flexibility in the ownership arrangements for the pilot, and ensuring a pricing system closely related to the costs of particular services -- need not be lost by entrusting the whole space segment to Comsat. To meet these objectives, Comsat should be required to offer satellite channels directly to broadcasters and for other specialized services, to keep separate records for each service, and to price each service according to its direct and fairly allocable costs. We stress that the recommendation of exclusive Comsat ownership of the space segment as trustee does

not reflect a judgment that it is entitled to such ownership as a matter of "right," under the 1962 Communications Satellite Act.

While we are not persuaded of the advantages of participation by entities other than Comsat in the space segment through an equity interest, subsequent design proposals should receive appropriate consideration by the Commission.

2. Comsat, the terrestrial common carriers and prospective users of wideband services should be eligible to invest as trustees in the ground environment. We think it unnecessary to lay down a specific pattern of earth terminal ownership. We recommend that the FCC, in an initial statement of policy regarding a pilot program, outline the conditions and procedures for development of a system plan under which formal applications for construction of particular facilities would be entertained.

With regard to specific investment in facilities, the FCC might, for example, invite Comsat and the terrestrial common carriers to file applications for shared ownership of the principal send/receive stations, again as trustees, with Comsat acting as manager of each station under

effective decision-making procedures. Since these stations would be used for broadcast operations as well as for the provision of other services, procedures should be established to ensure that the charges for particular services reflect, insofar as possible, only their direct and fairly allocable costs.

Comsat and prospective users of wideband services (e.g., commercial broadcasters, non-commercial and instructional television interests and other public service interests) might be permitted to file applications for the special purpose earth stations, also acting as trustees.

3. Comsat should be program manager of the pilot. With ownership and operational responsibility divided along the foregoing or similar lines, there would be need for central direction and coordination of the program to ensure technical and operational compatibility and fulfillment of the program's objectives. The role of overall Program Manager should be entrusted to Comsat, together with assurances of the requisite authority to satisfactorily discharge its responsibilities. To expedite the resolution of any disputes not otherwise reconciled, the Commission should establish its own special procedures for overseeing

the pilot program. If need be, the ownership or managerial structure could be modified at a later stage of the pilot program.

D. The Pilot Satellite Should Offer Free Satellite Channels for Non-Commercial and Instructional Television

As noted earlier, the pilot or demonstration proposals pending before the FCC contemplate providing free satellite capacity for program distribution to public or educational broadcasting stations. We favor such a provision as a salutary support for these services, in keeping with the action contemplated by Congress in the Public Broadcasting Act of 1967. */

E. An Advisory Committee Should be Created to Protect the Interests of All Users

While we have recommended a pilot program which avoids unduly complicated and cumbersome ownership, operational and managerial arrangements, the many diverse interests who have participated in the FCC proceedings

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*/ Under the same authority, AT&T and the Corporation for Public Broadcasting recently concluded arrangements for some reduced rate terrestrial networking for noncommercial broadcasting.

can and should be protected. Specifically, we recommend that the Commission constitute an Advisory Committee.

The Advisory Committee, in which all interested parties could be represented, would be an appropriate forum for consultations with the entities designated to participate in the actual operations of the program as well as the Commission and Executive Branch.

The Advisory Committee might be a particularly useful forum for non-commercial and instructional users. The satellite capacity made available to them could be utilized for various public interest projects and experiments. For example, the National Library of Medicine has proposed a Biomedical Communications Network to provide improved information and education to the medical community, with satellites used on an experimental basis for interconnection within the network. This and other proposals could be explored in the Advisory Committee during the course of the pilot program.

F. The Pilot Program Should be Consistent with U.S. International Commitments and Appropriately Related to INTELSAT

Neither the United States nor other countries are likely to surrender vital sovereignty over domestic communications. But the international community has a legitimate interest in the use of satellites for domestic purposes. The United States must, for instance, adhere to the rules and regulations of the International Telecommunication Union in its use of the radio spectrum, and to the commitments we have made to INTELSAT for a global satellite system. Thus, domestic satellites should be consistent with INTELSAT's proposed use of the frequency spectrum and orbital space, and should cause no harmful interference with the global system.

While at first glance it might appear desirable to establish the pilot satellites under the same rules governing the satellites established as regular increments to the INTELSAT space segment, such an approach could create severe economic distortions, unduly enlarge the role of the United States in INTELSAT, and create troublesome

domestic legal and policy problems. It does not follow, however, that we should proceed wholly outside of INTELSAT. Such a course might only encourage centrifugal tendencies in INTELSAT. In view of the U.S. role in and commitment to the global system, we should proceed circumspectly in establishing a domestic program. While the dangers of proliferation of satellite systems are not immediately pressing, it would be shortsighted to ignore opportunities for cooperation with INTELSAT in ways that could strengthen the global system.

We recommend, therefore, that the pilot program be established on the basis of an understanding reached with INTELSAT. By establishing appropriate relationships with INTELSAT in connection with a domestic program, we would affirm the consortium's central role and also encourage other nations to look to INTELSAT for guidance and for help in basic planning. Technical coordination of the pilot program with the global system can thus be enhanced, and possibilities explored for related development of the pilot program and the INTELSAT system in a way that reinforces the strengths of both activities. A principal attraction relates to the possibility of sharing common research and development costs of INTELSAT

satellites and the pilot satellites. Other areas of potential mutual benefit should also be explored. These include the shared use of INTELSAT's control and telemetry facilities for the domestic program, shared cost arrangements for launch services, maintenance of common satellite spares and back-up facilities and possibly a joint program for procurement of satellite hardware.

This course would meet legitimate concerns about harmful proliferation of satellite systems, establish the useful precedent that a nation planning a specialized satellite service look first to INTELSAT and work out with the organization an arrangement that fully recognizes and protects the interests of the global system, and demonstrate that INTELSAT has sufficient flexibility to adjust to individual national needs in a manner that does not jeopardize its own future.

G. The 1934 Communications Act and the 1962 Communications Satellite Act, Read Together, Provide the Legal Basis for Authorization of the Pilot Program As Well As for Governmental Regulation and Supervision

Comsat was created by the 1962 Communications Satellite Act. Its powers derive from that Act, and it can function only in accordance with the terms of the Act.

Comsat has adequate legal authority to participate in the pilot. There need be no conflict for the corporation in fulfilling its responsibilities as the United States participant in the global satellite system and its responsibilities as "trustee" in the pilot domestic program.

The Federal Communications Commission has broad regulatory authority under both Acts. Its powers under the 1934 Act are extensive, and apply to such matters as use of particular frequencies, construction of communications facilities, and rates and financial matters. The 1962 Satellite Act provides further guidance for the Commission in its administration of the provisions of the 1934 Act, as amended and as supplemented by the 1962 Act, with respect to satellite communications.

Certain provisions of the 1962 Act have meaning only in the context of the global system -- e.g., Section 201(c)(3), which relates to the establishment of commercial communications to foreign points. However, it would be an unduly restrictive interpretation of the Act to view its provisions regarding governmental regulation and supervision as applicable only to the INTELSAT system. While some of the provisions regarding governmental regulation and

supervision might be construed as expressly applicable only to U.S. participation in the satellite system envisaged by the 1962 Act -- that is, the INTELSAT global system -- their logic extends to any commerical communication satellite system in which the U.S. participates. Congress cannot have intended in 1962 to establish a pattern of governmental responsibilities for regulation and supervision of communication satellites that would not have substantial application to domestic satellite systems.

The role of the Executive Branch with respect to communication satellites is broadly conceived and reaches almost every aspect of Comsat's functions under the 1962 Act. This Act, together with the 1934 Act, provides the broad framework for delineating governmental responsibilities with respect to communications satellites and, accordingly, to the pilot program. The President could be expected to exercise, to the extent applicable, his responsibilities under the 1962 Act with respect to satellite communications.

NASA could also be expected to cooperate in connection with the pilot program, as by consultation and advice regarding the technical characteristics of the system and

furnishing satellite launching and associated services on request and on a reimbursable basis.

The 1962 Act also ensures accountability to Congress of activities and achievements under the pilot program, since the President, Comsat and the FCC each submit annual reports under the Act.

Although Congress has provided the necessary legislative framework for comprehensive governmental regulation and supervision of the pilot program, it would be useful to issue an Executive Order along the lines of Executive Order 11191, of January 4, 1965, to make explicit the responsibilities of the various agencies of the Executive Branch with respect to the pilot program. And while there is, in our view, no present need for further legislation to govern domestic applications of communications satellite technology, provided a pilot program can be successfully launched, we do not rule out the possibility that such legislation may be desirable at a later stage.

H. Intensive, High-level Executive Branch Attention Should be Given to Monitoring the Pilot Program, with One Organization Designated as the Focus

The theme of this chapter has been that we need more data and experience about domestic use of commercial communications satellites before wise and informed decisions can be made about the structure and framework of any mature domestic satellite industry. The pilot program should be structured to yield the requisite data and experience. But the pilot will fail as our experiment unless the government has and uses the capability to evaluate its results. Data will be obtained in a variety of areas, technical, operational and social, including:

-- cooperative sharing by space and terrestrial services to minimize frequency interference;

-- reuse of the frequency spectrum by narrow-beam antennas;

-- problems of integrating satellite services with terrestrial facilities;

-- user acceptance of satellite services;

-- feasibility of regional networking and bypassing manned television operating centers;

-- installation and annual operating costs of the various components of the satellite system, and cost projections for expanded operations;

-- feasibility of general purpose and specialized systems, or some combination thereof;

-- support of non-commercial operations;

-- value of satellite facilities for educational broadcasting and specialized government users such as HEW.

At the end of the pilot program */ it will be timely to consider the broader issues involved: the future role of domestic satellites, and whether they offer sufficient promise to justify continuation beyond the pilot period; whether domestic satellites should be general purpose or specialized, and whether there should be more than one

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*/ Comsat anticipates that it will take about two years to establish the program, from the date of authorization, assuming no administrative delays. It would be useful to fix a definite time period, calculated from the time the pilot program is established, at the end of which the program would be thoroughly reviewed. While the satellites used in the pilot are expected to have a design lifetime of more than five years, that seems unduly long for a true pilot program. Two to three years should be a reasonable length of time within which to achieve the limited objectives of the pilot.

system; and the ownership and regulatory framework that should govern domestic satellite operations.

To assist in evaluating the results of the pilot program and making future decisions in these areas effectively, a continuing Executive Branch role would be highly desirable. This responsibility -- which we conceive to be one of "monitoring" the progress of the pilot program, without derogating from the legal responsibilities of the FCC -- should be vested in an organization designated by the President. By monitoring the progress made under the pilot program, the responsible office would be able to assist the President in making an independent evaluation of the future of domestic applications of satellite technology, and of appropriate institutional arrangements. The office should advise and assist in the structuring of all aspects of the pilot program, gather and assess the data and information acquired during the course of the program, and undertake any independent studies or projects that may be needed to make timely recommendations upon conclusion of the program.

V. THE FCC SHOULD GIVE FAVORABLE CONSIDERATION TO A PILOT DOMESTIC SATELLITE PROGRAM ALONG THE LINES DESCRIBED IN THIS CHAPTER

The program we have outlined should be promptly implemented; a start appears feasible within 1969. We urge the FCC to give it favorable consideration, and recommend that the Commission first issue a statement of general policy outlining the conditions under which formal applications would be entertained.

CHAPTER SIX

THE DOMESTIC TELECOMMUNICATIONS CARRIER INDUSTRY

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CHAPTER SIX

THE DOMESTIC TELECOMMUNICATIONS CARRIER INDUSTRY

I. INTRODUCTION AND SUMMARY

This chapter treats the core of the telecommunications industry -- the traditional services of the domestic common carriers, such as the Bell System, General Telephone and Electronics, Western Union and the some 2,000 independent telephone companies, and related private communications services. Among these services are telephony and telegraphy, the newer offerings such as computer data transmission, and television and radio program transmission from studios or other points of origination to local broadcasting stations.

The President directed the Task Force "to make a comprehensive study of communications policy." He spoke of the need to review past activities in the field of communications, and to formulate a "national communications policy." More specifically, the Task Force was asked to "determine if the Communications Act of 1934 and the Communications Satellite Act of 1962 require revision." In studying the future for satellite communications, both

domestic and international, we were directed to study ways in which the new technology should be integrated into a balanced and dynamic communications system. As the President observed, the new technology -- exciting as it is -- does not mean that all our surface communications facilities have become obsolete.

We have found an examination of the domestic industry to be indispensable, both for itself and because of its interaction with other elements of our mandate. And in our study we found juxtaposed two basic facts: On one hand, an impressive record of past achievement in terms of innovation and market growth within the industry; and on the other, an industry in a state of creative ferment facing a host of new challenges and new opportunities.

A. Given the Nature of Public Message Telephone Service, Integrated Control Remains Vital

On the basis of existing technology, we conclude that the basic structural element of domestic telecommunications services -- the integrated provision of public message telephone service -- is satisfactory; and the case for private monopoly regulated by public authority is convincing. The switched network should remain a high quality system interconnecting all terminals reliably and economically.

This conclusion is based on the fact that public message telephone service, employing the switched network, has characteristics that sharply distinguish it from other services. The ordinary user of public message telephone service, as distinguished from the user of private line services, requires access on demand from his telephone to any one of millions of points. Integrated operational control -- obtained through the combined efforts of the Bell System and the franchised independent telephone companies -- is essential in providing this universal access.*/

This conclusion is also based on the weighty consideration of system optimization, system integrity, and service reliability. And it is based too on considerations of national security; for crisis management requires a

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*/ The extent to which such integrated control requires actual ownership or management of a particular element in the system is, of course, related to technological developments and the evolution of regulatory policy. One example is in the area of domestic satellites, where we recommend a pilot project in which Comsat would provide long-haul circuits to terrestrial carriers.

completely reliable capability for communication, both within the nation and with our forces and allies overseas. System optimization involves the coordinated planning requirements of a vast, interdependent network of communications facilities. Since each element affects many others, development of single segments without regard to their effects upon the total system could well lead to wasteful redundancy. System integrity involves the need for control over quality of the inputs to the network. Users or operators of one part of a communications grid can, by supplying it with improper or distorted signals, interfere with other users throughout the system. Finally, high service reliability, which the American public has rightly come to expect, could be jeopardized by developments which weakened the technical integrity or viability of the public message telephone network. Thus, it is important to have coordination for the technical standards in the network, its interconnections, and its inputs.

That integrated control is a sound organizing principle is well-supported by the impressive rate of past technological advance and market growth: The number of telephones in the United States has quadrupled since the

end of World War II. In only 15 years, direct distance dialing has been extended to more than 90% of all telephones in the United States. In the past two decades, improved transmission systems have been introduced at the rate of one every two years. Although the overall cost of living has risen by 140% since 1940, total telephone rates (local and interstate) have increased only 10%, while interstate rates taken alone have actually fallen by 20%. In short, it can truly be said that the United States has the finest telephone system in the world.

Fully mindful of this record of achievement, we inquire here into the basic elements of a well-conceived and comprehensive national policy that would contribute to continued rapid advance. For we see a host of potentialities emerging for yet more cost-reducing innovation, for new services, and for market growth in many directions. Policy must be designed to exploit as fully as possible those potentialities, while maintaining the integrity and viability of the public message telephone network which constitutes the core of our national telecommunications system. Only such a policy applied as feasible at every stage, from research to the delivery of private and common carrier

services, can over the long run assure our nation an unsurpassed communications basic science, technology and service.

B. The Broad Goal of Public Policy Should be to Release and Encourage Potentialities for Innovation in Technology and in Management, Both Within the Public Message Telephone Network and Outside it, Where Such Changes do not Affect its Basic Integrity and Viability.

Telecommunications policy is under the healthy stress of developments occurring in such industries as the computer, electronic and aerospace, as well as those originating within the traditional confines of the telecommunications industry. It is safe to predict that forces within all these industries, harnessed to the enterprise and imagination of many businessmen, will continue to be powerful stimulants to progress in the years ahead. Public policy should promote an environment assuring free and competitive opportunity for such developments without impairing the integrity and viability of the basic telephone network.

Obviously, in many cases changes and modifications can be introduced within the industry without adversely affecting the basic telephone network. Their potential can and should be tapped to improve that network, and to provide services supplementary to those of the system.

As these developments occur, some should be viewed as characteristic of the great mass of American business, unregulated save by the antitrust laws. Others may, in part, come within the purview of the FCC. Still others may be components of the integrated common carrier network falling within the full scope of public utility regulation.

In approaching these problems, we have been guided by the basic premise underlying the law and policy affecting American industry and commerce: that, unless clearly inimical to the public interest, free market competition affords the most reliable incentives for innovation, cost reduction, and efficient resource allocation. Hence, competition should be the rule and monopoly the exception.

And, where monopoly is required, it should be protected from competition to the extent that the public benefits from its natural monopoly characteristics. In that case, the public is protected by regulatory constraints.

These, then, are the twin principles which underlie the recommendations of this chapter: Maintaining the integrity and viability of the basic network as an integrated system on one hand; on the other, releasing and encouraging potentialities for improvement which might otherwise be restrained by tradition, business habits, or regulatory practices no longer appropriate in the face of new challenges and new opportunities.

II. NEW OPPORTUNITIES ARE EMERGING FOR SERVICES SUPPLEMENTING THOSE OF THE PUBLIC MESSAGE TELEPHONE NETWORK

At the outset, we find it useful to distinguish between the public message telephone service, and leased line or private line service. The former uses a portion of the integrated nationwide network with circuit switches to connect on demand any subscriber's telephone to any one of the 100 million telephone stations throughout the country -- or to any one of the other 100 million throughout the rest of the world. The prime characteristic of this market is universality of access to a multitude of occasional users. In contrast, a telephone or telegraph private line is a circuit connecting two or more points to meet the needs of specific users for full-time access to fixed points. While private line service shares much equipment with the message service -- the same cables, microwave towers, repeater terminals, carrier terminals and the like -- it does not ordinarily employ the elaborate circuit switching facilities of the telephone message service.

Another category, public message telegraph service, requires switching, but of a distinctive kind. Only a few

thousand Western Union offices need be connected, rather than millions of telephone subscribers; and individual telegraph messages, unlike telephone calls, can be bunched or stored and forwarded after a delay. For these reasons Western Union employs a separate and specially tailored message switching plant, in addition to using channels in the telephone switched network.

In recent years, demand by government and business enterprises has been growing rapidly for private line services providing both voice and record links. Such services can be provided with circuits in paired wire and coaxial cable, terrestrial microwave relay and, prospectively, in satellites. In some cases, these circuits are provided by the common carriers. In others, users employ their own private line systems.

The evolution of these supplementary services offers new opportunities for progress in improving communications services. At the same time, it raises pressing policy questions with regard both to the integrity and the viability of the basic integrated network.

A. Subject to Radio Spectrum Limitations, Liberalized Entry into Inter-City Private Line For-Hire Service Appears Justified

While we conclude that salutory competitive pressures

would be introduced by more liberalized entry into private line service, it is for the FCC to determine the merits of specific applications for entry. It is for the FCC to consider the impact of entry in specific cases on the viability of the integrated system. Moreover, a multitude of complex issues confront regulatory bodies in individual proceedings -- issues which are explored in depth on the basis of a record carefully made. Our general comments below should not be taken to imply any view of the merits in specific cases. That, by law, is for the regulatory body.

With the exception of those specialized carriers providing connections to television broadcast and cable systems, the FCC currently permits private line systems outside the existing common carrier network only if they are on a not for-hire basis. In consequence of this policy, the restrictions on interconnection with common carrier networks, and Bell's low Telpak rates for some users, private systems provide only a small portion of the nation's telecommunications services. While over 400 organizations currently employ private microwave, their total of approximately 2.5 million circuit miles is less

than 2% of Bell's total of about 150 million circuit miles.

Private line services, accounting for 15% of Bell's long-haul revenues and 40% of its long-haul circuits, are growing at a faster rate than Bell's other offerings. For Western Union, more than 30% of its revenues represent private line service, some of it in customized computer offerings described in a subsequent section; its private line revenues have increased rapidly in recent years, due chiefly to government use.

We see several advantages to making available more potential business opportunities in these markets. New kinds of services offering a wide range of quality, capacity and price levels might be developed and tested in response to varying needs of particular user groups, thereby enhancing the likelihood of greater consumer satisfaction in these areas. And technological advances, such as microwave equipment produced in competitive equipment markets, might be more rapid if introduced by numerous private line suppliers. Finally, additional competitive pressure, even if confined to supplementary services, could be an important factor in gauging and maintaining high performance in this industry.

In principle, we see no reason for not seeking a similar outcome for satellite and other new long-haul transmission systems when they become operational. Given our lack of operational experience with domestic satellite applications, however, it is too soon to state unequivocally the appropriate disposition. Even so, the burden should continue to be on the carriers to demonstrate why entry privileges should be withheld, rather than vice-versa. As we note in our domestic satellite chapter, a number of attractive prospects exist for specialized satellite services (e.g., wide band, wide-area data exchange networks, TV network distribution and occasional-use networking). These might be offered on a competitive basis, in addition to the potential role of satellites in the basic long lines common-carrier network.

Application of entry policies to the circumstances of the independent telephone companies may involve different considerations. They have argued that lacking the scale economies of the Bell System long-haul network, they could not respond effectively to competition in private lines without injury to their overall level of service. However, these companies own only a small portion of the total nationwide private line circuits, and the bulk of

what they do own involves wholly intrastate lines. Consequently, evaluation of the merits of their position and policy decisions regarding franchises to private line applicants seeking to compete with their private lines is ordinarily and properly for the state regulatory bodies, and beyond the scope of this Report.

1. The issue of service reliability and quality can be resolved in the market place. Of course, the potential benefits from competitive pressures must be weighed together with the effects on the telecommunications system in terms of service reliability and quality, system optimization and an equitable price structure. As a case in point, some have expressed concern that new service competition might offer large users lower costs, but at the price of reduced quality. More generally, they argue that if freer entry were allowed, poorly financed and managed firms may offer service far below what is currently regarded as desirable in terms of quality and reliability. They question whether it is in the public interest to expose potential users to such risks, especially in view of the good service being rendered in this field by existing common carriers.

Subject to qualifications discussed subsequently, we conclude that such questions should be left to the market place. Let the buyer choose among the combinations of price, quality and reliability most appealing to him as a private line user. If the service turns out to be poorer than he expected, he is free to move to an alternative service. Or if the price falls to reflect the poorer performance, perhaps he will choose to remain. This is the essence of the competitive process. One of the great potential benefits of freer entry is to search out and develop new services tailored to particular needs.

Here it is again important to distinguish between the private line customer and the public message telephone user. In the former case, the user is a large business unit competent to choose either to purchase or not to purchase a service between specified points from among the offerings of competing entities. Moreover, so far as quality of private line service is concerned, the choice to go outside the established carriers affects, for the most part, only the customer making the choice. With the public telephone subscribers, the situation is very different. They are less likely than business users of

private lines to require the differentiated service that a competitor of the integrated network might provide. And if suppliers did opt to sacrifice quality for a lower price, they might affect not only their own customers but all other customers of the public network who rely on it for dependable and high quality service to every telephone terminal.

2. Proliferation of private communications systems could raise serious problems for the integrated network. But these problems can be met by allowing the established carriers sufficient flexibility in rates to meet competition, and by strengthening regulatory capabilities to prevent destructive competition. If competition is to yield improved efficiency in communications supply, pricing policies must be related to the markets involved. This is likely to require a change in traditional practices of pricing communications services. Today, common carrier tariffs are applied uniformly to jurisdictional areas and based on system-wide costs rather than the specific costs of serving specific routes. If such a pricing policy were to be maintained, new entrants would be provided with artificial and uneconomic incentives

to enter the low-cost high-density routes. By diverting business on these routes from the established carriers -- frequently called "cream skimming" -- the new entrants could deprive the carriers of revenues which partially help to support service on high cost routes. Such patterns could encourage inefficient investment in communications and impose additional costs on society.

Therefore, when a competitive challenge to the established carriers arises, neither they nor the regulatory agencies should continue to apply the principle of jurisdictional tariff uniformity based upon the aggregate costs of serving all routes. Rather, prices over competitive routes should be based upon the costs and demand characteristics of these routes.

The sound response of policy, we believe, is to provide flexible opportunities for entry, matched by a policy of allowing the established carriers sufficient pricing flexibility to respond economically to the challenge of the new services. However, in placing the new entrant and the established carrier on equal terms, the new entrant should be protected against the threat of non-compensatory or "predatory" pricing on the part of a carrier who has

a monopoly market. The danger of non-compensatory pricing is real. Under a system of regulation dominated by criteria of fair return on the entire rate base of the carrier, the possibility always exists that the carrier would use its superior position in sheltered markets to cover losses in the competitive sector. What is needed is a minimum price standard calculated with reference to the "long-run incremental costs" for the particular service (including the cost of capital and the profits allowed for the incremental capital associated with the service), rather than for the system as a whole. With such a pricing standard, users of non-competitive services would not subsidize the users with competitive alternatives. The competitive services of the existing carriers would still pay the added costs they impose on the system.

The difficulty of determining an appropriate minimum price standard was illustrated by the Telpak rate case. Prior to the "Above 890" decision, which liberalized entry by private microwave systems, Bell's interstate private-line tariff applied uniformly to all consumers. In order to meet the competition of private user systems, Bell introduced discounts ranging up to 85%. Western Union

and the suppliers of private microwave equipment complained to the FCC, which was unable to reach a decision in the initial Telpak hearing on the question of whether Telpak rates were compensatory. However, Bell's cost studies undertaken for the current FCC investigation into rate-making principles indicate that substantial rate increases were necessary in order to make Telpak compensatory.

The problem of defining the limit for the carrier's price flexibility in meeting competition is now one of the subjects of an inquiry before the FCC. If non-compensatory pricing is to be guarded against, the FCC must establish effective regulatory standards over minimum rates. Otherwise, pricing responses of the established carriers could uneconomically foreclose entry of efficient entrants. Given the importance of this issue and its complexity, the FCC should take a more active role on pricing issues than it has taken in the past, including review of subsequent carrier rate increases following competitive responses by carriers.

However, it is also important to recognize that the regulatory power over minimum rates could be exercised in ways which unduly restrict fair competition. Minimum

pricing standards must not be employed as "umbrellas" to protect established firms from each other and from potential new competitors. Rather, they must encourage the substance of competition by permitting liberal exit conditions to complement the liberal entry conditions.

We do not minimize the danger that regulated competition could lead to policies of accommodation rather than of real rivalry. The best protection against this risk is a general understanding of the policies involved, and of the principles which should govern in the resolution of disputes. In such an environment, it should be clear to firms considering entry into the field that they would enter at their risk, with no protection against the established carriers should the latter react by reducing their rates towards a prescribed floor.

3. Under new competitive pressures, an equitable pricing structure can be maintained. Some would object to the proposal for geographical rate flexibility on grounds that the rate structure would thereby be badly fragmented. We recognize that the introduction of rate flexibility would very likely force a lowering of rates in some markets and, conceivably, an increase in others.

Some would question whether such adjustments would be widely acceptable and in the public interest.

With respect to private line services we do not consider this a serious problem. Businessmen are accustomed to incurring different costs -- labor, transportation, materials, taxes, etc. -- depending on location. Despite uniform tariffs, differential effective rates have been a familiar feature of the private-line business for many years. Businessmen and the communities where they operate should be able to adjust to locational discounts as well.

Problems of differential pricing based on cost differences would be more serious in the public message service. There we have a long tradition of charging equal rates for standard units of service regardless of location; and strong objections might be raised if the pricing of ordinary telephone service were to vary according to the underlying cost characteristics of specific markets.

B. Suppliers of Private Line Services, Both For-Hire and User-Owned, Should Be Permitted to Interconnect With Each Other and With Common Carrier Private Line Networks, Subject to Appropriate Standards Regarding Compatibility and Protection

Restrictions on interconnection with common carrier private line systems have been a serious handicap to the growth of private systems; for such restrictions mean that any user system must be self-contained with its own local loops, terminal gear and other equipment. We conclude that such interconnection could be a stimulus to competition, diversity, and development; that it need not pose a serious threat to system integrity; and that it could be made consistent with the needs of national security.

1. Interconnection with common carrier private lines is vital in promoting competition without wasteful duplication of facilities. Conceivably, an efficient new supplier of transmission facilities could bring lines into individual offices in parallel with those of existing carriers, and still price the service attractively enough to maintain a profitable business. But this outcome, involving obvious and wasteful duplication of facilities, could hardly be judged desirable. While such duplication might be more than offset by efficiencies in operations elsewhere, the most economic solution would be to maintain the efficiencies while avoiding the added cost of the duplication. Thus, policy should be aimed at requiring interconnection with the carriers' private lines, in order that new entrants be able to gain access to their own customers.

2. System integrity need not be jeopardized by such a policy. In the past, the carriers have opposed compulsory interconnection on the ground that their network would be adversely affected by the inputs into it made by a foreign attachment, whether that attachment is a piece of user terminal gear or an entire system. Whatever the relevance

of this concern to the switched network, it is not as critical to connection of private lines; in fact, the carriers already permit private line users to attach their own terminal gear and protective devices and a recent Bell tariff offering would permit not-for-hire private systems to interconnect even into the switched network provided it is done through Bell-supplied protective and network control devices and meets certain criteria.

Another fundamental aspect of system integrity involves management responsibility. The carriers have contended that unless they have full and uncompromised responsibility for service among users, they cannot guarantee high levels of reliability and quality. If ownership of a particular service is fragmented in the hands of several entities interconnected with each other, it is difficult or impossible, some assert, to establish fault and responsibility when problems arise.

Again, the distinction between private line and the switched network is salient. In the former, business users of full-time services are generally knowledgeable buyers. Since the user would be dealing with at most only a few

entities serving only the few points to which he is connected by private line, and since we envisage these few entities would have interconnection agreements supervised by the FCC, the problem of divided responsibility should not be of decisive importance.

3. Freer entry should be made consistent with the needs of national security for an integrated nationwide system The growth of long-haul transmission facilities outside the integrated network poses a question of national security. If these lines are not compatible with the Bell System, they would not be part of the pool of circuits available for alternate routing by the carrier system, and they might not be as useful if a crisis required a change in normal routing patterns.

We agree that the further growth of private systems should be governed by rules taking full account of national security interests. However, the freedom of established carriers to meet the specialized carriers' challenge through flexible price competition, makes it most unlikely that significant portions of our evolving domestic transmission facilities could not be coordinated with the integrated system.

If independent line systems are required to interconnect with the private line networks of the established carriers, and maintenance of the integrity of the system is a prerequisite for interconnection; such lines could be used within the nationwide network in time of emergency. We leave it to the FCC with the advice of the Executive Branch, in passing on specific applications, to decide whether additional design or technical constraints on interconnection or requirements for compatibility should be imposed in the interests of national security. If the Commission finds that additional constraints are needed, it should also determine by whom the cost of adaptation should be borne.

C. Self Contained, User-Owned Private Systems and Terminal Equipment Should be Permitted to Interconnect into the Message Telephone Network, Subject to Protection of System Integrity by Development and Publication of System Standards and, Where Necessary, Provision of Protection Equipment

Until now, customer-supplied terminal equipment has been allowed on private lines, but it has not been allowed on the switched network unless a protective interface device (including a modulation/demodulation unit) is provided by the

carrier. One justification for this distinction has been the need to maintain the integrity of the system. Signals generated by customer supplied terminal equipment on private lines generally do not employ the complex switching apparatus of local exchanges. Use of such customer-provided terminal equipment was therefore thought to involve less danger of interference with the integrity of the system than use of such equipment on the switched network. For similar reasons, the telephone companies previously prohibited all interconnections of private systems into the switched network. However, the FCC has recently declared illegal the telephone company tariffs containing general prohibitions against use of customer-owned modulation/demodulation devices and interconnection of private systems for interstate communications. */ The Commission's decision stated that it was illegal to prohibit devices and interconnections, in the absence of a showing that they are harmful to the telephone network.

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*/ In re Carterfone, 13 F.C.C. 2d 420 (1968).

In response to the Commission's decision, the telephone companies have filed new tariffs to permit use of customer-owned terminal devices and interconnection of private systems, subject to a number of limitations which the telephone companies say are necessary to protect the integrity of the switched network. These limitations would require the customer to comply with technical specifications set forth in the tariff; and to use a protective interface device and a network control signalling unit supplied by the telephone company.

These protective measures, some of which are still under challenge before the Commission, would appear to reduce in importance the issue of "system integrity" which has long been the basis for excluding private equipment and systems from use with the switched network. If so, the path would be cleared for the development and use over the switched network of a wider range of terminal devices (particularly specialized terminal equipment necessary for transmitting data) and perhaps also of private communications systems.

D. We Agree With the Consensus of Views Presented by the Parties to the Computer Inquiry that Remote-Access Data Processing, or Teleprocessing, Does not Presently Exhibit Characteristics Justifying Comprehensive Public Utility Regulation

The filings in the FCC's computer inquiry have illuminated problems of competition and entry in the field of communication with and among computers. Although it will be many months before the Commission issues a report, it is not too soon to comment on the issues of policy raised in this pioneer inquiry.

There has been some talk of nationwide "computer utilities." This notion assumes that economies of scale in computation and the advantages of shared equipment are so great that eventually most users will find it economic to procure data processing from a single central computer, or perhaps from a few regional computers. However, this vision of the future overlooks the fact that computer costs are declining more rapidly than the costs of long-haul transmission. Although computer time-sharing will undoubtedly increase from its present level, the long run balance between the cost of duplicating data storage facilities and the cost of gaining access to a central computer favors the first option. Moreover,

teleprocessors are far from overcoming the high costs of managing a time-sharing system, especially one that serves users with diverse processing requirements.

A wide variety of computer services and a healthy pace of entry exist in this field. At this time, it appears that all but the most highly specialized computers will be able to operate at full capacity without seeking a regional or national market. Under present circumstances, our studies provide no basis for recommending the comprehensive regulation of rates or entry in the computer business on the basis of public utility principles. Of course, the FCC's comprehensive computer inquiry will provide more definitive answers, and may reveal specific problems requiring regulatory action. Furthermore, as technology continues to push forward, the factual basis for our current judgment may change. But considerable time remains before such issues become acute.

1. Under present circumstances, the telephone companies should not be permitted to offer teleprocessing

In our view quite properly, AT&T has disclaimed any interest in becoming a data processor. This policy is consistent with the

principle that its scope of operations should be limited to the area for which its public franchise is justified -- in this instance, the management of the integrated public message communications network, and related communications services. The economic strength of a protected market should not be used to gain advantage in tenuously related competitive markets.

To be sure, this principle might lead to uneconomic results if the Bell System's new computer-like circuit-switching system (ESS) were adapted to perform some data processing either as a secondary function or in off-peak hours. However, the ESS, designed for the primary function of analog circuit switching, and with its memory and control completely occupied by specialized telecommunications programming, could not be efficiently adopted for general-purpose data processing. While a policy of excluding the telephone companies from data processing may require re-examination if future generations of computerized switching centers exhibit enormous economies of scale, it seems sound for the present.

2. We find no convincing case for extensive regulation in store-and-forward switching and in hybrid data processing/store-and-forward switching services. At some future time,

the telephone companies' switching computers may become the most efficient instruments for store-and-forward switching. A single systems manager may be required for an interconnected network of store-and-forward switching and data-processing computers cutting across industry lines. But the prospect is remote. Certainly it will not come until the message telephone system is completely digitized. In part because of its great expense, computerized store-and-forward switching has grown up only within single firms, governmental agencies, or among closely connected entities. Today, store-and-forward switching is primarily an incidental feature of teleprocessing services which already provide leased line connections between terminals. Even the few common-user systems provide only in-house communications; they do not connect terminals belonging to different customers.

A single store-and-forward carrier would have to accommodate, on a single set of facilities, terminals with diverse line-speed, response-time and storage requirements. Such diversity would add to the costs of the system, offsetting the economies of scale of a single

supplier. Most firms avoid these diversity costs through in-house or intra-industry systems where limited compatibility problems arise, and where the user or users association can provide whatever coordination is necessary. On the basis of our studies, we cannot conclude that store-and-forward switching should now be provided by the telephone companies, or that the numerous firms which provide it need now be regulated as common carriers. */

The principal complications for policy at this time have arisen from Western Union's vigorous entry into store-and-forward switching via the SICOM and INFOCOM offerings **/ and its desire to provide hybrid data processing/store-and-forward switching services. Since neither pure store-and-forward switching nor hybrid savices seem to involve natural-monopoly elements, it is doubtful that only regulated carriers should be permitted to make such offerings. As discussed more fully in Section IV, however, we see no reason to exclude Western Union from either store-and-forward switching or hybrid services.

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*/ Some day specialized switching service for data users may become a natural monopoly at least within a particular geographic area. When teleprocessing moves to a separate digital network with time division switching, economies of scale may become very strong.

**/ SICOM is a specialized store-and-forward message switching service for the investment community; INFOCOM is a similar service for general business users.

E. Subject to Appropriate Technical Standards, Line Brokerage and Sharing by Companies Providing Store-and-Forward Services, as Well as Line Sharing by Any Private-Line Customer, Should be Permitted

Line sharing and brokerage for purposes of store-and-forward switching are essential to promote promising new computer services on a competitive basis. Firms that supply teleprocessing and data retrieval services lease lines from carriers to connect their customer terminals to a central computer. Under existing brokerage restrictions, these firms are forbidden to allow their customers to satisfy a potentially wide range of communications needs among themselves. Relaxation of this restriction would permit reductions in costs to these customers through more efficient use of their facilities, and would permit the firms to offer store-and-forward switching services using the same computers.

The line sharing prohibition retards development of another important function: the collection of individual signals for transmission to distant terminals. Individual teleprocessing firms are allowed to collect signals from authorized-user terminals. However, as a consequence

of the line-sharing prohibition two or more firms cannot jointly share these lines. */

Since leased lines are not interconnected with the public message telephone switched network (and with a fully interconnected network of store-and-forward switching computers a remote possibility) there are no overriding considerations of system integrity to support the tariff prohibitions. Nor do these specialized teleprocessing networks offer a threat of becoming an alternative to public message telephone service. Even when consumer teleprocessing services develop (e.g. computerized banking) they seem destined largely to utilize the switched network, with the touch-tone telephone in many cases generating the necessary data signals. Therefore, leased line networks will remain a costly communications medium limited to users who exchange large amounts of data, while the telephone network will remain indispensable for general purpose two-way communications.

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*/ Authorized users are customers of the firm leasing a line from the carriers. Authorized users are allowed to use the line for communication with the lessee, but not with one another or even between branches of their own organizations.

A more substantial concern underlying the traditional restrictions on sharing, resale or subdivision of private lines is fear of line arbitrage which would erode the carriers quantity discount tariffs. If a middleman could buy in bulk at the Telpak rate and resell to small users, a pricing structure which discriminates in favor of large users could be seriously eroded. But we cannot regard this a major problem. In fact, the erosion of such price discrimination may be a desirable result of our recommendations for competitive opportunity. By the same token, we find no persuasive reasons for placing limitations on the sharing, brokering, or channelizing of individual private lines in order to achieve more efficient use of these lines.

We understand that AT&T is planning to file in January 1969 a new tariff including modifications in line sharing restrictions. Presumably the FCC will reach conclusions about line sharing and brokerage in its current computer inquiry.

III. OPPORTUNITIES FOR ENLARGED ACCESS TO THE MARKET FOR COMMUNICATIONS EQUIPMENT SHOULD BE EXPLORED

Progress in the development and manufacture of communications equipment is clearly an important condition of progress in the provision of communications service. While experience in providing service is a stimulus to the development of equipment, the service in the end cannot be better than the equipment used in providing it. National communications policy should be concerned that every potentiality for improvement in equipment is fully exploited.

The telephone industry is characterized by a structure of vertical integration. Western Electric, a wholly owned affiliate of AT&T, supplies nearly all the equipment (either through direct manufacture or through outside purchase) to the rest of the Bell System. A parallel relationship exists between General Telephone and Electronics and its manufacturing affiliate Automatic Electric.

The question has frequently been raised about whether these kinds of affiliations are most conducive to technological advance, good service commensurate with

needs of users, and low cost. In addressing this question we find a number of conflicting arguments.

On one hand, carriers argue that affiliation with manufacturers is justified by special considerations of efficiency, research, and development, which do not apply in other industries -- where comparable ties are forbidden. In particular, Bell officials maintain that the quality of communications service in the U.S. -- unmatched anywhere in the world -- is made possible by the fact that the Bell System closely coordinates research, development, design, manufacture, and operations. They point out that it is the teamwork among the Bell Laboratories, Western Electric, the operating companies and the Long Lines division that has yielded the optimum results in service to customers -- as measured by costs, quality and prompt availability of services.

Moreover, the affiliation with Western Electric does not foreclose participation by competitive firms. Of the approximately $3 billion in annual sales by Western Electric to the rest of the Bell System, about one-half represents procurement by Western Electric of supplies, materials and equipment on a competitive basis from outside firms.

On the other hand, concern is expressed in some quarters that even if operating companies were required by law or company policy to purchase by competitive bidding, the intimate relationship between the operating and manufacturing arms of each system would make it difficult for outside suppliers to make their maximum contribution. And some question the degree to which potential manufacturers are deterred from attempting greater access by the structure of ownership in the industry.

In addition, the historical pattern of vertical integration poses a problem under the Sherman Act to which manufacturers of communications equipment, unlike carriers, are subject.

In the very brief time available to the Task Force, we have found mixed and only fragmentary evidence relating to the effects of vertical integration on innovation and market behavior. For example, in sectors of the industry where entry is free, notably in satellite communications, manufacturers not affiliated with any carrier have made very substantial technological breakthroughs. At the same time, the manufacturing ties of telephone carriers may well have contributed to their impressive past performance.

In theory, the carrier's control of manufacturing

could lead to a variety of undesirable consequences, such as uneconomic pricing, inadequate response to opportunities for innovation, and inefficiency. We have no convincing evidence that the performance of the principal manufacturer, Western Electric, has exhibited these tendencies. Moreover, we lacked the time and resources required to seek meaningful comparisons, taking into account all the relevant factors, between Western Electric's profits and performance and those of independent firms.

Dissolution of the ownership ties between Bell and Western Electric has sometimes been suggested as the best way of obtaining the full benefits of diversity and competition for the industry. In view of time constraints, we have not had the opportunity to study this question in depth or to evaluate critically the arguments that an extensive degree of vertical integration is necessary. On the basis of the limited studies which our timetable has permitted, we are not in a position to make a firm recommendation on the question one way or the other.

It is, of course, outside our competence to express a legal judgment on the AT&T-Western Electric tie. That issue must be left to the Justice Department and to the courts.

The question of dissolution aside, we favor access by outside suppliers to the widest extent feasible. For the lesson of experience in most industries is that innovation is a function of diversity and competitive pressure. While the high degree of automation and requirements for system design once placed the telephone industry apart from the rest of the economy, these characteristics now typify other industries as well. With the convergence of communications and computer technology and the growth of the aerospace industry, a number of firms have potential as innovators and manufacturers in the field of advanced communications equipment.

We believe that public policy, and enlightened company policy, should seriously explore every possibility of enlarging opportunities for competitive access to the market for communications equipment, beyond the present level of outside market procurement by the carrier affiliates. Clearly, it is in the public interest to make certain that where and when competition can provide such carriers with equipment that meets compatibility, technical and operational standards, and that it is less expensive

than the equipment of an affiliated manufacturer, the carrier should purchase accordingly.

This implies that information on future procurements be made as widely available as is practicable. It implies also that when systems have passed through the development stage, stable components, where feasible, be broken out for procurement in the open market.

IV. INSTITUTIONAL AND REGULATORY CHANGES WITH RESPECT TO THE OPERATIONS OF WESTERN UNION APPEAR DESIRABLE

A. In Order to Maintain a Viable Public Message Service, Cost Reductions are Essential. Partial Consolidation of this Service with the Post Office Should be Explored

Western Union is now principally engaged in four related fields of activity -- the provision of a public message telegraph service (PMS), a teletypewriter exchange service (Telex), private line services, and an increasingly active role in teleprocessing. As is well known, its public message service has been declining in volume. Although other factors have played a role in the decline, the reduction of rates for long distance telephone service relative to the constantly increasing rates for telegraph service is one of the paramount causes of its present

condition. Since that trend is likely to continue, we doubt that PMS as presently organized has a bright future.

Among the possibilities for strengthening PMS, perhaps the most promising would involve partial consolidation of telegraphic services with the U.S. Post Office. */ If the public message service were to have a service counter in all or most local post offices, the cost could be less than Western Union presently incurs in maintaining its own offices. Yet the coverage would be much greater because the number of post offices is more than double the number of telegraph offices. Moreover, consolidation of PMS's messenger crew with the Post Office's much larger force might result in additional savings.

We have not attempted to explore the many questions of detail that must be resolved prior to even a limited consolidation of postal and telegraph services. We are convinced, however, that it is a realistic and attractive objective whose consideration should be a matter of high priority.

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*/ Some small-scale tests have been made of the use of special delivery mail for the delivery of telegrams.

If the public message service cannot be reinvigorated through a cost-reducing consolidation, the abandonment of the service would merit serious consideration. No doubt, should nationwide PMS disappear, a record service would continue to be offered among the larger cities. The fundamental question, therefore, is whether we ascribe to telegraph service the same values as telephone service -- a service whose widespread availability is sufficiently important to justify financial support, through rate averaging, in sparsely populated areas from prosperous heavily travelled routes.

B. Western Union's Status as the Supplier of PMS Deserves Further Study

A question, separate from the viability of the public message service, is whether Western Union should continue as its supplier -- either through its own offices, or as a co-venturer or co-tenant of the Post Office. Although Western Union has been less than enthusiastic about PMS's prospects, it does see a minor role for the service in its own plans for becoming an integrated record carrier. As Western Union's modernization program progresses during the

1970's, an increasing portion of PMS traffic will move over the Telex network; and the two services will share with Western Union's data processing customers the store-and-forward switching capabilities of its new computers. These plans suggest that economies would exist in providing the public message service jointly with Western Union's other offerings. One of the most useful findings that might come forth from a FCC's impending investigation of Western Union is whether, in fact, PMS is most efficiently provided over these facilities.

The notion of a public message service implies public utility regulation. But Western Union's data processing ambitions have taken the company into competitive areas. Some have questioned whether Western Union will be able to amortize its $800 million investment in computers unless it is permitted to use them for data processing and information retrieval services. In addition, the store-and-forward switching market, which it has already entered, is likely to be competitive; and there are large economies in offering this service jointly with data processing. Even teletypewriter exchange service may no longer be monopolistic, if customers may in the future have the

competitors in teleprocessing. The dangers to fair and effective competition from its entry into competitive markets are accordingly far less than in the case of the telephone companies. The public message telegraph service and Telex, Western Union's monopoly markets, (assuming it acquires TWX), simply do not confer substantial market power, due to the ready substitutability of other services (telephone, in the case of PMS, dataphone using teletypewriters or facsimile in the case of Telex-TWX). Any monopoly power presently possessed by Telex-TWX may be eroded by the alternatives arising under AT&T's proposed new tariff dealing with the connection of private teletypewriter and facsimile equipment to the telephone network through its interface device.

Perhaps Western Union has some advantage over potential competitors in that it controls its own transmission lines; but if our suggestions on interconnection and line brokerage are adopted, these competitors will be able to subdivide bulk capacity leased from Bell or build their own transmission links. With multiplexing equipment to concentrate messages for long distance transmission over these lines,

they might be able to achieve the same transmission economies as Western Union. */

D. If Western Union Continues to Provide Public Message Service the Recommendations of the FCC for Consolidating Telex and TWX Appear Sound

If Western Union continues to provide PMS, the consolidation of AT&T's service and Western Union's Telex service under Western Union proprietorship seems justifiable. No economic case exists for maintaining two separate services.

Whether or not transfer of TWX to Western Union is ultimately concluded, full interconnection between TWX, Telex and a modernized public message telegraph service network is desirable. If user terminals are permitted to interconnect into common carrier networks, subject to appropriate conditions, the consolidation of TWX and Telex would not seriously reduce the overall level of competition. At the same time it would reduce the level of duplication (for some companies now have TWX and Telex machines side

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*/ Western Union presently obtains leased lines from Bell under special non-tariff contract arrangements at lower rates than the general tariff for leased lines available to non-franchised teleprocessing carriers. Establishing conditions for effective competition in teleprocessing may require review of this policy.

by side), and it might contribute to the longer-run financial strength of Western Union.

E. Further Study of Western Union's Alternative Futures is Clearly Warranted

Western Union sees an important role in its future as a prototype supplier of competitive teleprocessing services. And the acquisition of TWX by Western Union has much to commend it. Teletypewriter exchange customers would be managed by the carrier that has shown the greatest interest in promoting its development; and wasteful duplication would be avoided. But the merger of TWX into Telex is not the only way of achieving the full interconnection that would be its primary benefit.

Ultimately, the question of Western Union's future in the regulated sector of the communications industry turns on issues of fact that should be resolved in the FCC inquiry. The root question remains: are PMS and teletypewriter exchange complementary to the message switching and data processing services on which Western Union has staked its future? If a teletypewriter exchange network remains viable, would it still confer monopoly power sufficient to justify the costs of regulation?

A negative answer to these questions would suggest that serious consideration be given to solutions which would

enable Western Union to move forward in teleprocessing, while locating its regulated communications services elsewhere.

The situation is further complicated by possible developments in the international field. If a single international transmission entity is formed, as we recommend in Chapter Two, a new role may develop for Western Union in the provision of service functions previously performed by the international record carriers. Certainly such developments should be taken into account by the Commission and the Congress in their future deliberations about the evolving structure of the domestic and international industries.

V. EFFECTIVE REGULATION, AND EFFECTIVE IMPLEMENTATION OF THE POLICIES PROPOSED HERE, REQUIRE STRENGTHENED CAPABILITIES BOTH IN THE FCC AND IN THE EXECUTIVE BRANCH

A. Regulation of the Integrated Common Carrier Communications Network Remains Necessary. It Should be Modernized, Certain Omissions in the Communications Act of 1934 Should be Redressed, and More Stress in Regulatory Policy Should be Placed on Responsive Pricing Practices, Incentives for Cost Reduction, and Reliance on Market Incentives

The Communications Act of 1934 is the basic charter of the communications industry and of communications policy. It was based on studies made during the twenties and early thirties, and addressed to a communications industry as

archaic, compared to modern media, as the horseless carriage is to the jet plane.

To be sure, the statute has proved capable of adaptation. It has had some of the desirable flexibility of constitutional provisions, as the FCC has grappled with one after another of the problems of revolutionary change. However, the Commission has endured periods of travail, as it sought to resolve difficult and highly contentious disputes, in carrying out policies dimly articulated and directed to conditions no longer prevalent. */

In 1934, the communications industry consisted of disconnected sectors, each endowed with considerable degrees of monopoly power. The distinction between voice and record service is fading. Traditional telegraph service is in economic difficulty. And the telephone network is experiencing the flood tides of change involving private line and other specialized services, computer interconnections, complex relationships with various forms of television transmission, and future accommodations to the use of satellites.

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*/ Like other administrative bodies, it has a number of fundamental problems of the utmost importance to the development of the administrative process. These are issues being examined by the Administrative Conference of the United States. Our observations are confined to substantive issues of regulatory policy within the scope of our mandate.

Today, the industry is a dynamic combination of competitive and monopolistic markets, all related, and all going through processes of rapid transformation.

We cannot predict how the balance will evolve between competitive and the monopolistic elements of the industry. At present, responsible public policy should be directed toward maintaining and modernizing traditional methods for regulating the monopoly sector of the industry -- the integrated network of public message telephone services -- while prudently releasing the competitive energies of the industry elsewhere.

B. The Communications Act of 1934 Requires Certain Amendments, in a Rapidly Changing Technological Environment, in Order to Make Effective Regulation Possible

The basic principle of regulation in the telephone industry -- as well as in most other regulated industries -- is the limitation of the company to a "fair rate of return" on its investment. The rationale for controlling profits is clear and compelling. One would judge a situation highly inequitable if owners and managers could reap disproportionate profits as a consequence of monopoly power derived from a public franchise.

In reaching conclusions as to a fair return on the fair value of a carrier's rate base, even under the sophisticated and elastic tests of modern Supreme Court cases, the work of the FCC would obviously be incomplete if it had no voice over the composition of the rate base. We emphasize that the Commission should not trespass on the managerial functions of the carrier. But its regulatory functions require an adequate opportunity to review the major investments which constitute the interstate rate base.

In a capital-intensive industry like telecommunications, construction and other investment programs are the most important determinants of overall costs. Under Section 214 of the Communications Act of 1934, FCC approval was made a requirement for new lines and extensions. Today, however, large investments exist in non-line equipment. Manifestly, rational regulatory policy requires that the FCC have adequate opportunity to review these investments too, in passing on the entire rate base. We recommend that the FCC, and if necessary, the Congress, take whatever steps are required to accomplish this goal.

To assure interconnection under reasonable terms, the FCC should have full jurisdiction over intercarrier agreements. At present ambiguity exists about the authority of the Commission to compel AT&T to provide facilities to Western Union and to regulate the terms of private contract agreements reached between the carriers. The Commission has concluded that it lacks clear authority to require AT&T to provide communications facilities to Western Union other than to provide a joint service to the public. In the past the FCC requested enabling legislation, which we support, to correct this jurisdictional defect. More generally, the authority of the FCC should be made broad enough both to order any carrier to lease or interconnect its facilities to another carrier system on appropriate terms, and to supervise the terms and conditions of such intercarrier agreements.

C. Dynamic Regulatory Policy Should Guard Against Certain Restrictive Tendencies Inherent in the Concept of "Fair Rate of Return"

Regulation depending mainly on rules for limiting profit can inhibit incentives for cost reduction. When a firm is both limited to a fair rate of return and has the opportunity to set prices in monopoly markets that will achieve a fair return, it may not be under strong pressure to reduce costs. Cost reduction would increase its rate of return, prompting the regulatory agency to require lower prices. On the other hand, if the firm is inefficient, the prospect of a fair rate of return, and the availability of secure markets from which to obtain such a return, may provide protection rather than penalty.

These issues constitute one of the fundamental challenges to policy in the field of regulated monopoly. With the inducements and external pressures that exist in competitive industries, either with respect to internal efficiency or external demand, it is difficult for a regulatory agency to gauge whether a firm is operating at maximum efficiency and providing a full range of services, at prices that most satisfy the public interest. This is

especially true in cases where promising equipment designs and service alternatives can be proved attractive only after they are tested in an operational environment. Yet it is precisely here -- in innovation and in service offerings -- that the danger exists of the monopoly firm having less incentive to risk new approaches than competitive firms.

These observations describe certain generic economic risks in the regulatory process, apart from those inherent in the shortcomings of men and procedures. They are not intended to constitute an exact description of reality; for, in one sense, they are too gloomy. In practice, profit incentives to efficiency do exist in regulated industries because regulation is imperfect and at best has time-lags. Rates are set only intermittently, and the firm is allowed to keep profits made during the interim. The determination of a fair rate of return is not an automatic process; and regulators, in the exercise of their judgment, may be influenced to a degree by the performance of the firm and other considerations. And it is quite possible that the fear of potentially stronger regulatory controls in the future plays a healthy role in

stimulating good performance and in inhibiting excessive exploitation of monopoly positions.

Nevertheless, regulatory agencies have not fully exploited their capacity to use rate regulation imaginatively as an incentive for cost reduction. In terms of legal jurisdiction, regulatory agencies have broad power to devise regulatory standards that provide adequate incentives for efficiency. They can disallow costs, forbid new investments, compel abandonments of service, even revoke a company's license to operate. But these powers are rarely exercised, partly because the absence of yardsticks in monopoly industries makes it difficult to detect inefficiency, and partly because the small size of regulatory staffs forces them to concentrate on traditional regulatory functions.

In our judgment, the main problems of regulatory policy in the future will not be the control of profits as such, important as this issue will continue to be, but management of the interplay between the competitive and the monopoly elements in a manner that promotes internal technical and operating efficiency, and exploits fully new

opportunities -- such as the computer revolution, the growth of other new and existing services, and the emergence of domestic satellites.

In treating these issues, the FCC should make fuller and more sustained use of its power to initiate and conduct long-range studies of the industry. That power is among the most important available to any regulatory body. Long-range studies of high quality such as some conducted by the FPC and the FTC could provide a desirable catalyst both in company and in FCC policies. The industry might be led to experiment with promotional rates and other technical and service innovations.

The FCC should explore promising methods of incentive regulation. As the Commission acquires experience in appraising the performance of the regulated firms through long-range studies and shorter term reviews, it may be able to perfect a system of regulation under which the carrier's profit rewards are geared to its accomplishments in reducing costs and improving service. However, such a system would be equitable only if cost and technology trends external to the firm's own performance can be factored out --

a task which requires substantially more technical resources than present budgets permit.

Finally, it is important to remember that the rate of return among regulated carriers is generally lower than that of manufacturing industry in the aggregate. */ In part, this discrepancy is justified on grounds that the carriers are in a protected, relatively low risk position such that a "fair rate" of return is judged by regulators to be lower than that for normally competitive enterprise. If additional competitive pressures are introduced along the lines recommended in this chapter, we would expect the FCC to take this additional factor into account in fixing the allowable rate of return in the future.

D. In Certain Cases, the Traditional Approach to Pricing Communications Services Should be Altered. The Burden of Proof Regarding Costs and Demand Elasticities Should be Placed on the Carrier

As we indicated earlier, the traditional approach to pricing communications services by adopting uniform tariffs

*/ In 1967 Bell System profits (net of taxes and interest) as a percentage of net assets were 5.79%, compared to 6.90% for manufacturing enterprise in the aggregate.

within a regulatory jurisdiction based upon aggregate system-wide costs is not consistent with permitting entry into specific private line markets on an economic basis. As a result, the traditionally broad conceptions of communications markets must give way to more direct considerations relating to the cost and demand characteristics of specific markets. The levels of aggregation and averaging must be broken apart so that pricing practices can become more responsive to particular market situations.

This change in pricing policy requires that both the carriers and the regulatory agencies devote considerable attention to determinations of the cost and demand characteristics of specific markets. In particular, the carriers must be expected to justify their pricing responses to competition by analyses of cost and demand characteristics of the particular markets where the competition exists.

Correspondingly, the activities of the Commission with respect to pricing should be expanded. It should not base its decisions on jurisdiction-wide analyses, because such an approach may result in accommodation of umbrella pricing practices. Neither can it proceed passively, thereby

risking an accommodation of non-compensatory pricing. The Commission must acquire the staff capability to undertake continuing independent studies of cost, demand and market structure characteristics. In addition, the Commission should encourage further experimentation with rate structures and service conditions as a means of developing greater knowledge of price elasticities and demand characteristics.

E. The FCC Requires an Expanded Staff Capability

In order adequately to deal with these problems as now perceived, the FCC's Common Carrier Bureau should be strengthened. The annual budget for the entire Commission including all of its responsibilities in both common carrier and broadcasting is currently only about $20 million. The Common Carrier Bureau is staffed by less than 100 professionals and the entire Commission has only about 70 more employees than it had 20 years ago.

F. A Stronger Executive Branch Role is Required to Complement the Work of the FCC

If the Executive Branch is to contribute effectively to sound systems planning in the communications industry, it should develop a competence which at present it lacks.

Chapter Nine sets out our recommendations on this important subject.

The new capability within the Executive Branch should include the capacity to engage in a variety of advisory and policy activities. It should have resources for communications systems analysis, and for long-range economic and technological forecasting. Accordingly, the new entity could become a valuable partner of the FCC through many informal consultations on policy and operational problems, and a valuable participant in regulatory proceedings, particularly if it is permitted to appear independently before the Commission in appropriate cases.

CHAPTER SEVEN

FUTURE OPPORTUNITIES FOR TELEVISION

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CHAPTER SEVEN

FUTURE OPPORTUNITIES FOR TELEVISION

I. INTRODUCTION AND SUMMARY

There is no need to belabor the critical importance of the revolution in broadcasting among the revolutions in communications accomplished during the last two generations. For radio and television have accomplished a mutation in the way we live. The average American family has its television set turned on for more than six hours a day. With this intensity of exposure, there are raised problems of structural pluralism and diversity which go to the very essence of our ideals of freedom.

Television is of special importance to government. It is the largest single user of one of the most valuable portions of the spectrum, the very high frequency (VHF) and ultra high frequency (UHF) bands. And its development has often posed difficult problems of interpreting the Communications Act of 1934, especially during the last few years. Pluralism and diversity in the structure of the industry have been contentious issues of communications policy for many

years. The pressure and promise of change -- both in technology and in public policy -- have given these problems new dimensions during the recent past.

The potential for diversity in television has never been greater. The central challenge over the next decade will be to achieve a balanced and harmonious adaptation of traditional regulatory policies to new technologies and new initiatives, in order to allow this potential to be fulfilled. Cable television and satellite communication services are important among the technological changes which press hard upon the structure of the industry, and upon older concepts of regulatory policy; the evolution of educational and other special interest television, and the impetus to that development implicit in the Public Broadcasting Act of 1967, are conspicuous among the new initiatives.

A. We Should Seek as a Major Goal a Television Industry so Structured that a Wide Variety of Needs, Interests, and Tastes can be Achieved at Low Cost Both to the User and to the Viewer

At the outset, it is desirable to describe briefly the kind of structure for the industry that national policy has long sought to achieve. In the Federal Communications Act, Congress directed the FCC to "encourage the larger use of radio in the public interest." Although the terms are vague,

in practice they have been interpreted to define a widely accepted set of objectives.

First. The structure of the industry should make it possible to cater to as wide a variety of tastes as possible, the tastes of small audiences and mass audiences, of cultural minorities and of cultural majorities. Ours is a pluralistic society, in culture as well as in the ethnic origins and the life-styles of its people. A medium of expression as pervasive as television should reflect and enrich this cultural pluralism.

Second. Television should serve as varied as possible an array of social functions, not only entertainment and advertising, important as they are, but also information, education, business, culture, and political expression.

Third. Television should provide an effective means of local expression and local advertising, to preserve the values of localism and to help build a sense of community, both locally and nationally.

Fourth. To promote these ends, the cost of access to the broadcast medium for individuals or groups who desire access to viewers should be as low as possible.

Fifth. Television has become so fundamental a medium of communication in our society that we must seek to make it available to as many people as possible, rural as well as urban, poor as well as affluent. Hence, unnecessary cost barriers to viewing should be avoided.

Sixth. The fundamental values of a democratic, pluralistic society require that, within the limits of the spectrum, and of economic realities, policy should guard against excessive concentration in the control of communications media.

In balancing and reconciling these goals it is helpful to examine the present structure of the television medium, to estimate potentialities for achieving a structure offering more opportunities for diversity, and to outline the conditions requisite to achieving that potential, without undue cost or the sacrifice of other policy objectives.

1. Unlike other media, television presently provides relatively uniform programs, from a limited number of sources. The core of American television is a group of nearly 600 stations (out of 680 in all) affiliated with one or another of the three national networks. Of the non-affiliated stations,

many depend primarily on material purchased from the national networks. These network offerings are supplemented by those of local stations of various types, particularly those of the non-commercial educational stations.

The television industry has not yet achieved a diversity and variety in programming comparable to that of book or magazine publishing, radio, or movies. The situation is roughly analogous to that of the movie industry prior to the 1950's. Before that time, four or five large studios provided most of the films, and generally aimed at the largest possible national and international audiences for each film. Their policies have been altered by the growth of independent film makers and distributors who cater to specialized tastes and interests and, in many instances, to much smaller markets.

Television holds great hope as a vehicle for local, community or even neighborhood communications. Americans are a mobile people, and sound communication policy should be able to make a major contribution not only in deepening the sense of nationalunity, but especially in binding together local areas as true communities. No aspect of communications policy is more important than measures or

arrangements which would permit or encourage the growth of communications of all kinds within localities: the discussion of local issues; contact with local or regional political leaders; tapping local talents; the use of local resources in education, technology, sports, and expression of all sorts of local interests.

In addition, the prevailing pattern of programming, addressed to the broad audience, is not designed to meet the concerns of minority groups. Additional television channels and facilities dedicated to their problems, and to the expression of their concerns, talents and sensibilities are of critical importance to the most fundamental of our national policies -- the fulfillment of our commitment to achieve for disadvantaged minorities equality of opportunity and the full enjoyment of American life.

But the potentialities of television go far beyond their development as a vehicle for self-expression by minorities or distinguishable subgroups who now lack communication media of their own. The number and heterogeneity of books and magazines in this country, and of museums, musical groups, and organizations devoted to every conceivable hobby, sport, and cultural interest attest to the existence of

audiences which might welcome the development of specialized national or regional programs devoted to special interests. At another level, we have only scratched the surface of television's potentialities in education -- in instruction, in professional training, and in adult education. And promising though very limited applications of television have been made in support of governmental programs both at the national and at the local level. For example, television might be an effective way to diffuse knowledge about job training and employment if regular services of this kind can be given sufficient channel time.

2. For our goals to be satisfied on a significant scale, a low-cost multi-channel capability may be required. In order to exploit the potentialities for diversity and localism in television to satisfy these kinds of needs, several conditions must be met. First, the broadcasting system must possess the capacity to bring a significantly larger number of different television signals into the home than is now the case -- although the precise number, which depends on local conditions and needs, cannot now be specified. Second, access to the medium must be readily available to many potential users of limited resources. The

cost of broadcasting to the user is, of course a crucially important factor. To the extent that a television signal cannot be delivered other than over a broad area, as is generally true today, the natural inclination of the broadcaster attempting to cover his costs is to appeal to the common interests of the residents of the entire area rather than to the special interests of a neighborhood, a precinct, or a small but scattered interest group within the broader area. Thus, the broadcasting system should be structured to enable pin-pointing the desired audience for a particular signal or to reach the smaller group within the broader area at a reasonable cost. Finally, since television has much to offer to the poor or disadvantaged, costs to viewers should be kept as low as possible.

B. The Purpose of this Chapter is to Indicate Ways in Which Technological and Business Developments Plus Regulatory Policy Could Contribute to Our Goals.

Under existing conditions of technology and cost, the evolution of the industry towards a pattern of broad-ranging diversity is difficult to envision. Although other factors are also involved, the most basic considerations are (1) the high cost of establishing an over-the-air broadcast station; (2) the absence of cost-reducing innovation in designing and marketing programming materials and (3) the dependence of commercial stations on advertising revenues, and of non-commercial stations on public funds and voluntary contributions. These factors together explain why many UHF allocations have not been exploited, why the performance of many educational stations has generally been weak and, more basically, why television is today viewed largely as a mass-audience medium.

We consider a variety of measures which have been put forward as possible contributions to the goal of diversity. These include low-power UHF stations; pay TV; federal assistance to defray some of the costs of facilities and programming of the non-commercial stations, perhaps leading to a new non-commercial network guided by the Public Broadcasting Corporation; and the possible development of a fourth commercial network.

1. We conclude that the distribution of television to the home via cable is a promising avenue to diversity.

We conclude that one of the most promising avenues to diversity is the distribution of television to the home by

means of cable. Cable television has developed because it has been able to offer two services for which people are willing to pay: access to more stations than are available over-the-air through normal roof-top antenna and a clearer signal than is often available over the air. Cable television can provide an abundance of channels at a relatively low cost per channel; it is potentially well adapted to selective distribution to particular audiences, even if they are scattered throughout a city or area; it provides an effective vehicle for raising money to support television from the viewers themselves (through subscription fees), thereby increasing the resources available for the support of additional programming; and it is already a thriving business able to prosper without governmental subsidy or protection. Cable systems now serve some three million subscribers, out of some 58 million homes equipped with television.

2. We recommend that policy be designed to ensure an adequate level of service over the air, without inhibiting unduly the growth of cable television.

To be sure, unregulated expansion of cable television could involve serious social costs. Those who cannot afford or prefer not to pay the cable subscription fee, or those who cannot be economically served by cable, or have portable television sets, would be injured if the spread of cable transmission so eroded the base for over-the-air service that the service would be destroyed or radically diminished in

coverage. Such prospects seem unlikely. Nonetheless, we believe that these prospects should be acknowledged and that essential safeguards be designed to ensure an adequate level of free over-the-air service without unduly retarding the promising expansion of cable television in accordance with consumer preferences.

The emergency of cable television as a major distributor of information and entertainment will raise problems relating to control of and access to individual cable systems. Insofar as cable television companies originate programs, or bring in signals not otherwise available in the locality, they compete with existing broadcasters, and thus present complex issues of conflict of interest and market control. We note these as serious issues which deserve continuing attention by Congress, the Justice Department and the FCC. Attention should also be paid to conflicts of interest that might arise from multiple nationwide ownership of cable systems as well as cable ownership by television networks, movie producers and distributors, local television stations, and publishers of national magazines. And we note the problem of delineating conditions of access to cable systems by prospective users, and the possibility that some day the imposition of partial common carrier status on cable television systems may be found necessary.

3. We anticipate an expanded role for government and for the Corporation for Public Broadcasting. Finally, we conclude that rapid and effective exploitation of TV's potential for serving important public purposes requires that the Executive Branch assume greater promotional responsibilities, and in particular explore with local and state authorities promising possibilities for pilot programs for community television in disadvantaged areas, and that the Corporation for Public Broadcasting play a leading role in programming innovations.

II. THE HISTORY OF BROADCASTING INDICATES THAT COMPLETE RELIANCE CANNOT BE PLACED ON A SYSTEM OF LOCAL OVER-THE-AIR STATIONS TO ACHIEVE OUR GOALS

A. The Regulation of Radio on the Basis of the Local Station Concept Limits the Program Choices Available to the Listener

The present structure for broadcasting was foreshadowed in the 1920's during the early days of radio. The shortage of radio frequencies, and attendant risks of interference among broadcasting stations led to the imposition of a comprehensive federal licensing scheme. The premises and methods of this regulatory design were carried over to television essentially unchanged.

Under the Federal Radio Act of 1927, which in this regard was substantially re-enacted in the Communications Act of 1934, the Federal Communications Commission was assigned

responsibility for determining the number of transmitters and approving locations, frequencies, powers, types of antennae and hours of operation. Decisions of this kind have represented a balance between technical alternatives and public policy. Specifically, they were designed to ensure that broadcasting stations served particular cities and communities, and were allowed only enough power to cover a particular area.

The concept of a nationwide scheme of local stations produced a relatively large number of individual stations for the nation, but relatively few accessible broadcast signals for the individual listener. If high-powered regional or national stations had been preferred to the local station scheme, a larger number of signals, and, accordingly, a wider variety of program choices would have been available to most listeners, but at a sacrifice in the number of local stations in each area.

B. The History of Television Regulatory Policy Has Been Marked by a Search For Diversity in Television Programming Within A System Based on Local Over-the-Air Stations

When television became commercially feasible in the 1940's, it posed thornier problems of regulatory policy and industry structure than had radio. A television channel requires

far more bandwidth (or spectrum space) than a radio channel. In the only portion of spectrum usable for television broadcasting in its early days, the VHF band, there is room for only 12 television channels. Moreover, adjacent channel interference, as well as interference between transmitters using the same channel in adjacent cities, prevented the assignment of more than a few channels within each locality.

As the industry grew in the years immediately following World War II, serious consideration was given to several methods for expanding the number of programming choices. These included use of ultra-high frequency channels to supplement those available in the VHF band; the creation of noncommercial stations supported by charitable and public funds; attempts under the federal licensing power to require "balanced" program schedules; and projects for "pay-television," whereby viewers pay for individual programs, thereby competing with advertisers for the right to choose them. To date, none of these has succeeded in substantially diversifying the content of television programming, either because of technical and economic difficulties, or because of lack of political or financial support.

The FCC recognized the limitations of the VHF band as early as 1945. Its basic solution was to encourage the

utilization of higher frequencies in the UHF band for television broadcasting. Despite a generous allocation of UHF frequencies to television, however, the growth of UHF television has been disappointingly slow. Indeed, between 1954 (two years after the Commission's initial allocation to UHF) and 1962 the number of UHF stations actually declined. The immediate reason was clear: Sensing a lack of interest by the viewing public, manufacturers did not build television sets to receive UHF signals; at the same time few viewers were willing to purchase adapters for their existing sets. The underlying reason, which this lack of interest reflected, was that the three major networks already had or were in the process of acquiring a substantially full complement of VHF affiliates. Without network affiliation UHF stations had few prospects of being able to offer the kind of programming that would attract large audiences and substantial advertiser support.

While it is unclear whether UHF would have flourished even with full set penetration, the problem of receiver adaptation unquestionably retarded the growth of UHF. In 1964 the All-Channel Receiver Act became effective requiring that all television receivers shipped in interstate commerce be built to receive UHF as well as VHF signals. Subsequently,

the number of homes capable of receiving UHF signals has risen to almost one-half of all the television homes in the country. Full set penetration is foreseeable in the 1970's. Meanwhile, even in the major markets many non-network-affiliated commercial UHF stations are still operating at a loss.

The outlook has brightened in recent years for educational (more accurately, non-commercial or public) television, for which the Commission has reserved a substantial portion of the UHF frequencies allocated to television. Progress has been made especially in states where strong support has been provided by the state government, often through the state university. Long dependent on voluntary contributions, non-commercial broadcasters became entitled to federal assistance in equipment as a result of the passage of the Educational Television Facilities Act in 1962, and to federal assistance in meeting their programming expenses as a result of the passage of the Public Broadcasting Act of 1967. However, a concrete plan and level of financing under the Public Broadcasting Act has not yet been implemented. If this is done -- and we strongly recommend so -- the Corporation for Public Broadcasting could become a vitally constructive factor, helping to meet part of the need for more variety, and a more resourceful localism.

C. The Development of Cable Television Has Been Slowed by the Imposition of Restrictive Rules

While policy-makers tried to nurture the growth of UHF broadcasting, a small group of entrepreneurs introduced a new technology, the coaxial cable, as an alternative to the airwaves for distributing television signals to individual homes. The first CATV ("community antenna television") operators were located in small communities suffering from poor reception due to topographical conditions or remoteness from broadcasting stations. Typically, the CATV operator erected a tall master antenna at a favorable location and delivered the signal by cable to his subscribers. This mode of operation extended the reach of existing broadcasting stations, and was welcomed by most of them. But in the 1960's some CATV operators discovered that they could market their service even in communities with good reception by situating their master antenna (or utilizing microwave relay) to capture the signals of distant stations, thereby offering subscribers a greater choice of programs than was available from the local stations. This constituted a threat to the local station, at least to the marginal UHF, and led the Commission to reexamine its earlier conclusion that it would not assert jurisdiction to regulate cable television systems.

In 1965 and 1966, the Commission imposed three restrictions on cable systems on a temporary basis until its policy implications could be appraised. First, each CATV was required upon request to carry the signals of all stations operating in its own area of coverage. Second, CATV's were required upon request not to duplicate the programming of any local station on the same day a given show was aired on the local station. Third, except by waiver of the rule by the Commission in special cases, cable systems in the top 100 markets (which reach some 89 percent of the nation's television homes) were forbidden to import signals from distant stations into their prime reception area. This restriction deprived cable operators of an important selling point in some major markets. The FCC is now considering the possibility of extending the ban on distant signal importation for an indefinite period, on the theory that UHF growth requires shelter from distant signal competition for at least the next 5 years.

The major theme that emerges from this brief historical survey is the continuing effort of the FCC to develop an adequate multi-channel capability without abandoning its traditional goal of promoting the growth of local over-the-air stations. In pursuit of this important policy the FCC has sometimes found it necessary to impose restrictions on a rival mode.

III. THE INDUSTRY'S FULL POTENTIAL FOR DIVERSITY AND LOCALISM IS UNLIKELY TO BE ACHIEVED SOON, UNDER EXISTING ECONOMIC CONSTRAINTS AND REGULATORY POLICIES

A. The Number and Type of Program Choices Available to the Viewer is Severely Limited

Given the limited capacity of the VHF band and the pace of UHF development, it is not surprising that the number of television signals available to most viewers is relatively small. Only about 42 percent of the country's television families live in or near markets served by four or more stations, and another 33 percent three. These choices are, for the most part, choices among the three major networks. Most network stations do relatively little independent programming, and even the independents devote much of their time to network reruns. The educational stations provide some diversity, but they have been hampered by financial problems. As a result many educational stations are not able to provide a full schedule of programs, and many channels allocated to this service remain unused.

B. The Limitations of the Present System Reflect the High Costs and Limited Revenue Potential of Free Over-the-Air Television Service

Present-day limitations of the medium are not the result of perverse forces; they reflect the basic economics

of the present system of broadcasting. Contrary to widespread impression, scarcity of spectrum space is not the only, nor the most immediate obstacle to diversity. Spectrum limitations do set limits -- and quite stringent limits -- to the number of channels open to TV programmers. But fully half the UHF channels, both commercial and non-commercial, which have been allocated to television remain unused for lack of applicants.

Thus, the most immediate barrier to prospective operators is not spectrum space, but money -- a reasonably attractive prospect of earnings in relation to prospective costs. Establishing a broadcasting station is an expensive undertaking. Before there is a single viewer or advertiser, a substantial outlay is involved -- legal and related expenses to obtain a license, a transmitter, studio equipment, and other facilities. In a reasonably sized market, the minimum total cost of new entry is roughly $500,000. Seeking sources of revenue to match these costs, the new entrant faces a number of handicaps. Typically he is unable to secure network affiliation, because the networks already have a full complement of affiliates in his area. And lack of network affiliation denies him a major source of station revenue and

programming. Typically 20-25 percent of the revenue of network affiliates is in the form of payments from the network for carrying network programs; much of the stations' national spot and local revenue would disappear without the audience base brought in by network affiliation.

Moreover, programming costs are already quite high, and are rising at a rate of about 8 percent a year -- a reflection of general inflation, development of superior but costly new equipment, and a shortage of human talent.

The cost associated with an over-the-air television system has taken its toll of non-commercial as well as of commercial television. Some 162 non-commercial stations are now on the air, but many are not able to provide a full schedule of programs. To be sure, public television is not in competition for the advertiser's dollar; but governmental funds and private gifts have thus far proved an inadequate substitute. The first one-half million dollars a non-commercial station can raise must go to erecting a tower, installing a transmitter, and covering other start-up expenses. The first $1,000 per week it can raise in current funds may be required simply to maintain the equipment and transmit the test-pattern signal. The Carnegie Commission Report has estimated that $213 million would be required in the long run to

defray the annual expenses of an adequate over-the-air educational television system. Obviously, there can be no assurance under present circumstances that support will be forthcoming at the required level.

The same cost and revenue factors that deter establishment of additional commercial stations constrain the opportunities for diversity which existing stations are able to provide. Non-network stations, to which one would naturally look for greater diversity, cannot usually afford to forego the largest advertising revenues that they can obtain. Thus, they cannot easily accommodate the impecunious would-be user -- perhaps a neighborhood group or a local political candidate that cannot pay its own way -- in competition with advertising clients. Access by users catering to limited viewing groups is further constrained by the prevalent impression in the industry that viewers tend to stay tuned to a particular channel, which means that if a viewer switches from the channel to avoid a program which does not appeal to him he may be lost to the channel for the next program, if not for the rest of the evening. This uncertainty tends to inhibit the station owner from offering programming which does not attract the largest possible audience at each time slot, even if the sponsor of a program of more limited appeal is willing to pay the station's usual rates.

IV. BETTER USE OF OVER-THE-AIR CHANNELS AND ESPECIALLY THE DEVELOPMENT OF CABLE TELEVISION SHOW PROMISE IN CONTRIBUTING TO OUR GOALS OF DIVERSITY AND LOCALISM

Two possible avenues of improvement merit exploration: exploiting more fully the presently allocated over-the-air channels; and expanding the number of channels available to the viewer.

A. Room Exists for Improving Performance Within the Existing Pattern of Allocations

1. Under present circumstances, the future of non-commercial UHF broadcasting depends largely on the level of public and private support, while that of commercial UHF will remain debatable until a fourth network is developed, or until low-cost sources of programming can be developed. Most UHF stations, commercial and non-commercial alike, are not broadcasting a full day's programming, although the additional cost of keeping a station's transmitter in operation a full 18 hours a day is small. The fortunes of commercial UHF broadcasting will undoubtedly improve as the technical problems that have plagued UHF are overcome. But the basic questions relate to the degree to which technical improvements will enhance the economics of UHF broadcasting and the extent to which diversity and localism in programming will thereby be promoted.

Three technical factors are commonly cited as roadblocks to UHF prosperity and expanded public service. Foremost among these is poor penetration -- the fact that only about half of the nation's television sets are able to receive UHF signals. With some 10 million sets being produced each year, this disability should be overcome by the early 1970's.

The second barrier to first-rate UHF performance is signal strength. This situation principally reflects the reluctance of individual UHF licensees to invest in adequate antenna towers and high-powered transmitters. Though UHF applicants for both new licenses and modification of existing ones have tended to exhibit increasing interest in improving their signal, most UHF stations operate with substantially less power than is required for good coverage. In many cases, the amount of money required to generate a significantly stronger signal is quite small in relation to the amount the operator has already expended on existing facilities. Needless to say, failure to make such an investment on the part of a broad segment of the UHF industry is a measure of the entrepreneurs' cautious estimate of UHF prospects. Therefore, UHF signals can be expected to improve when licensees see other evidence that UHF generally is becoming or can become a more prosperous enterprise.

The third technical problem for UHF broadcasters is the UHF tuner, which at present does not provide the viewer with a convenient "click" when it reaches the correct spot on the dial. More convenient tuning may be a subject of a forthcoming FCC rule but in any case it will be years before all or most television sets have a UHF tuner comparable to that of VHF.

The second level of concern in our assessment of the future of UHF is the potential impact that technical improvements, whatever their pace and range, will have on the industry and its product. It does not appear likely that striking changes can be expected over the next few years in the performance of commercial UHF. Although the independents' share of the audience is slowly rising, the three networks are likely to retain their strong competitive appeal. Under these circumstances, the cost of putting a UHF channel in operation will in all likelihood continue to make independent UHF a rather difficult economic venture.

The prospects for UHF are thus linked to the question of whether and when a fourth network might come into being. Using the top 100 TV markets (which cover about 90% of the

nation's TV homes as a guide, a fourth station is now on the air in 40 of these markets, which account for about 57% of the nation's TV homes. (VHF stations provide the fourth outlet in 17 of these markets and UHF stations in 23.)*/ In addition, a fourth UHF outlet has been authorized (although not yet operating) in about 30 more of the top markets. This suggests that a fourth network, equivalent in size and approach to the existing networks (which have almost complete access to all of the TV homes in the top 100 markets) is problematical within the next few years. Nevertheless, it is conceivable that a new kind of network could start within that time, offering programming different from that of the existing three networks, and contributing substantially to the achievement of our national goals for broadcasting.

Prospects for a non-commercial network, which could help substantially to strengthen the diversity of program

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* / Two factors reduce the above coverage figure somewhat as applied to a fourth network. First, UHF market penetration is of course still limited by the number of TV homes without all-channel sets and second, the low power now utilized by some UHF stations may also limit reception. The set factor should be virtually eliminated by the early or mid-70's and there are recent indications that UHF licensees are moving toward higher power to achieve a better competitive status in their markets.

offerings, depend on the kind of direct or indirect aid which Congress, state and local governments, and private foundations are willing to provide to non-commercial broadcast stations. We can expect improved prospects for non-commercial UHF with the principle of federal programming support now established by the passage of the Public Broadcasting Act, and with negotiations under way to implement section 396 (h) of the Communications Act of 1934, authorizing free or reduced rate interconnection services for non-commercial television and radio.

It is unlikely, however, that these remedies alone will alter the existing pattern. Even if expanded financial support were forthcoming and non-commercial UHF stations encouraged to undertake a new range of roles, their future would face limits. For the spectrum space for standard-power UHF stations allocated to non-commercial broadcasters is insufficient for more than a single signal in most areas, and no single channel could meet a major city's full range of specialized television needs. For this reason, non-commercial UHF, desirable and promising though it is, is unlikely to constitute a sufficient solution.

2. Government control of programming content is not a desirable path to greater diversity and localism. Direct government controls are not feasible or appealing in satisfying our goals. Although expressly forbidden to exercise censorship or specific program controls, the FCC has some power over programming practices by virtue of its broad authority over licensing and renewals. However, the Commission lacks the resources for extensive monitoring of licensees' programming, or even for individualized treatment of renewal applications. It is difficult to devise practical standards in so nebulous an area, and it is difficult to expect licensees to act contrary to what they regard as their economic interests.

This is not to say that no progress at all is possible in this area. For example, the development of citizens' viewer associations to facilitate communications with networks, individual stations, and government agencies, seems to us a salutary development.

3. Governmental promotion of new applications of television is a necessary, but not a sufficient, condition.

Certainly not all the barriers to fuller utilization of the television medium are economic or technical. Many

of the government mission-support programs alluded to earlier would be feasible today, since their programming costs are low and since the marginal cost of at least some television time on many UHF stations is also quite low. What has been lacking thus far has been an adequate link between the mission agency and the broadcaster -- an "honest broker" who is familiar both with the agency's needs and the medium's costs and capabilities, and who can thus bridge the gap between conception and implementation of imaginative new uses of television in support of public purposes.

We are hopeful that the Executive Branch and the Public Broadcasting Corporation will fill this gap; specific suggestions are set forth in a later section. But such steps cannot be the complete answer. Many of the most important potential uses of television require an expanded multi-channel capability.

4. Over-the-air pay television seems unlikely to reach substantial proportions. Pay television may provide a base for increased diversity, since it would enable viewers to compete with advertisers directly for television time and would also provide a source of revenue, in addition to

advertising, to defray the high costs of programming. But the limited experiments that the Commission has authorized with over-the-air pay TV have been disappointing, as viewers have not been attracted in large numbers. Some observers conclude that viewers are more willing to pay a small fee for a cable connection, which can be used at will, than for a specific program or performance as such. An additional handicap is the substantial cost of metering and signal scrambling and unscrambling required to confine reception to subscribers.

Although a multi-city pay television network, with a much larger subscriber base, might prove more economically attractive, an FCC proposal for just such a broadened test has been tabled in the face of congressional opposition. Such opposition reflects widespread concern that an over-the-air pay television network, if sufficiently extensive, could bid away programming from "free" TV, forcing viewers to pay for programming that, it is argued, they now see for nothing. Whatever its merits, this view is tenacious and widely held.

Moreover, even if opposition to pay television waned, and over-the-air service proved commercially successful, the limitations of spectrum scarcity would foreclose an expanded

multi-channel capability required to give society the freedom to meet all the diverse needs television is capable of serving.

5. Distribution of television programs by satellite constitutes a promising, but limited, development. As discussed in Chapter Five, the most attractive near-term possibility for a domestic satellite system is a method for the distribution of television programs from point of origination to local outlet for rebroadcast at a lower cost than is the case for terrestrial distribution. By itself this would not increase the number of channels available to the home. Although a reduction in the cost of distribution might well speed up the formation of a fourth major network, or new kinds of part time or regional networks this is far from certain. The cost of television distribution is small relative to the cost of programming, and is not the most serious obstacle to a new network. More tangibly, perhaps satellite distribution would promote diversity by virtue of the pledge of Comsat and other proponents to dedicate two channels to the distribution of educational television programs without charge.

In short, more intensive use of existing channel allocations, while promising and worth pursuing, does not obviate the need to explore methods of achieving an expanded multi-channel capability.

B. Although a Number of Methods Can Be Imagined for Expanding the Number of Channels, the Most Promising is Cable Television

1. The high cost and disruptive effects of direct satellite-to-home broadcasting make it unpromising, at least in the near term. In contrast to the "distribution" satellite application noted above, the popular press has recently focused considerable attention on the possibility of using a satellite to broadcast directly to home rooftop antennas. By this means it is postulated that additional television programming could be distributed over the air, providing greater diversity and a capability to reach a variety of audiences too small to support conventional local broadcasting stations.

However, direct satellite-to-home broadcasting faces serious obstacles. To receive even a single television channel directly from a satellite, the individual home-owner would need to purchase a special antenna and converter, whose cost -- with projected technological advances and mass production economies -- seems unlikely to be much below $100. If a 6-12 channel system were desired, the cost of home antenna and converter would likely exceed $100 -- though by what amount is not clear. In any case,

coverage of tens of millions of homes would cost billions of dollars. The satellite required to provide such a multi-channel direct broadcast service -- particularly should individual time zone coverage be desired to conform with consumer viewing habits -- would cost far more than the relatively simple "distribution" satellite. Moreover, its weight might well exceed any foreseeable launch capability short of the Saturn booster, which is likely to be inordinately expensive.

In short, at least over the next decade, direct-to-home satellite broadcasting does not appear attractive in comparison with cable or over-the-air broadcast techniques, in combination with distribution satellites, or with conventional terrestrial distribution services, in meeting the particular television needs of the United States.

Quite aside from direct economic considerations, use of nationwide direct broadcast satellites would seriously conflict with the goals enumerated early in this chapter. Requiring highly centralized control over transmission and program origination, and competing directly with local broadcasting stations, such a system would run counter to our quest for expanded opportunities for local expression.

2. Low-powered (10 kw) UHF stations offer distinct, but limited, promise. The FCC has recently disclosed a plan for supplementing the existing table of allocations by authorizing low-powered (10 kw) UHF stations in certain communities. The advantage of the plan is that, with weaker signals, more stations scattered around the country could share the same frequency band. Conceivably, under reduced spectrum limitations many new stations would emerge, tailoring their programming to the needs of a particular neighborhood, precinct or other grouping.

Although, as discussed later, the low-powered UHF station has distinct promise in a limited range of public applications, it hardly offers a complete solution to the problem of diversity. In some urban areas tall buildings interfere with reception. Moreover, the station's signal contour is unlikely to coincide with the geographical bounds of the particular audience that it is designed to serve, and clearly not with those of scattered groups. Finally, even a low-powered UHF station requires a considerable initial investment; with its audience potential much less than that of the standard UHF station, it seems

a remote possibility that many low-powered UHF stations could cover their costs.

3. The "video record" offers some potential for expanding the range of visual information and entertainment available in the home, but it is inherently limited to material that does not require simultaneous live viewing, and it does not meet the larger social need for low-cost multi-channel facilities for specialized audiences. A number of firms are currently developing techniques for providing the home-owner with visual information and entertainment in record form, just as phonograph records provide audio information and entertainment. While the video record may become a feasible way to distribute programming that need not be viewed live (such as cultural and instructional material), cost may prove a major barrier to its widespread use in the near future. In the near term, at least, the cost of the player (at least $400 in the United States) and the records (around $15 for one hour of black-and-white or one-half hour of color programming) will put the device in the category of a luxury item for high-income families. And widening the market by distributing the records on a rental basis could prove difficult because of

substantial handling and inventory costs. In any event, however useful in the home, the medical school or the laboratory, this development could not make a substantial contribution to the fundamental problems of community building discussed earlier. As we have stressed, these cannot be dealt with unless channels are available cheaply enough to be used for fractional audiences of special interests. However, if video record quality is sufficiently high, its development might assist cable companies and over-the-air stations in building diversified program libraries at low cost.

4. Cable television holds promise of creating a greatly expanded multi-channel capability. Initially, cable television was viewed primarily as a method of obtaining better signal reception. Picture quality remains an important aspect of cable, especially since over-the-air color signals are frequently of poorer quality than is the case of black-and-white.

More recently, cable has been used to increase the subscriber's range of programming choices, through the importation of distant signals. Twenty-channel systems are now technically feasible, at only slightly greater cost than the twelve-channel systems now being installed. Were there sufficient demand, even greater channel capacities could be supplied. In all areas of the country, twenty

channels are more than is necessary to carry existing local stations plus a selection of distant signals. Since the additional cost of utilizing the remaining channels for programming originating within the cable system itself is low, we can expect cable originations to grow. Indeed, some cable operators are already providing channels for local government needs, shopping information, local news, children's programs, the stock ticker, foreign movies and other purposes.

One may, of course, question whether the availability of many channels at low cost will alone evoke sufficient programming originations to fill them. The cost of distributing the additional programming may be slight, but who will defray it? More important, who will defray the costs of the programs themselves? Are there enough advertising dollars to support twenty channels, rather than three or four, when many attract only small audiences?

It is important to bear in mind that advertising revenues are not the sole source of support for a cable system. Subscriber revenues themselves are normally sufficient to cover the costs of distributing the signal. It is not necessary for the cable operator to sell time

on every channel to advertisers, or even charge for the use of every channel, in order to defray his expenses and make a profit. On the contrary, he has a positive incentive to offer a varied programming mix, including items which would not attract a commercial sponsor, even if that required him to shoulder a portion of the programming costs. Many individuals may only be persuaded to subscribe to the cable service if it provides programs of particular appeal which they would otherwise be denied -- for some, a series of local college plays or a foreign film festival; for others, a continuous stock ticker; for yet others a college-level lecture series, or a channel dedicated entirely to the problems and talents of one of the particular subcommunities of the city -- an ethnic, religious, or service group. Having an abundance of channels, the cable operator will be motivated to provide such programming. For the costs to him of a modest studio and simple camera equipment are moderate, while the additional options may attract additional subscribers to the cable. Talent and other programming costs ought to be quite moderate for the type of community programming we have in mind.

Another aspect of cable television is its commercial feasibility. Substantial numbers of individuals have been willing to incur the expense (typically $5 per month) of cable service. In the absence of restrictive government policy, cable television will probably continue to grow rapidly. Those willing to pay will be able to enjoy the benefits, in terms of greater variety and diversity of programming, without governmental assistance, promotion or other intervention.

V. THE FUTURE OF TELEVISION

A. Although Further Development of Cable Television Should be Welcomed, Completely Unrestricted Growth Could be Detrimental to Those Who Depend on Over-the-Air Service

Cable television can bring viewers in a given community new programs from two sources -- signals imported from distant stations, and original material specially produced for distribution on the cable system. As mentioned earlier, importation of distant signals has been forbidden in the top 100 markets. In a recent ruling, Midwest Television, the Commission initiated restrictions on the freedom of cable systems to originate programs as well. The decision allowed origination by the San Diego systems involved in the case, but barred the use of commercials to help finance original programs. These restrictions are avowedly temporary, but the FCC is now considering whether to extend them indefinitely. For the concern is that an unregulated growth of cable television in the major markets could destroy or weaken the existing pattern of over-the-air broadcasting, which the individual enjoys without paying a subscription fee.

Were the only injury in prospect financial loss to the owners of UHF stations, one could say that such injury

is a normal cost of competition and technical progress. But the interests of those stations' viewers need also be taken into account. It is true, of course, that they can subscribe to the cable, but this is subject to the conditions that they have the resources, and that it is available. While advertiser-supported over-the-air television ultimately imposes the costs of broadcast operations upon all users of the advertised products, the cable user is taxed more directly for the service he enjoys, and some may not be able to afford the fee. In addition, a study conducted for us by Complan Associates indicates that under existing technology the cost of wiring the entire country would be prohibitive. In areas remote from population centers, cable television will not be available, pending some technological breakthrough. The inhabitants of such areas will remain dependent upon whatever over-the-air television service is available, and to the extent such service is eliminated by cable competition, these viewers would be adversely affected.

It is important, therefore, to determine the likely impact of cable development on our over-the-air system. Our studies do not indicate that there would be a serious competitive injury to affiliates of the major national

It is therefore urgent that research and analysis be undertaken to enable policy-makers to fashion a solution carefully designed to maximize society's access to the benefits offered by both technologies. In particular, it is necessary to define the objectives of regulatory policy -- to specify a realistic minimum level of over-the-air service so that restrictions on cable do not exceed the level which the public interest requires. Free enterprise should not be hampered by governmental interventions in the absence of well-substantiated judgments which strike an appropriate balance between the competing social values at stake.

In developing such a policy, several aspects of the problem merit attention:

1. The question of copyright liability must be resolved promptly. -- Under the Copyright Act as recently interpreted by the Supreme Court, cable operators (to an extent not yet fully clear) are immune from liability for programs broadcast by distant stations and carried on their wires to subscribers. In contrast, broadcast stations are expressly forbidden by the Communications Act to carry distant signals without authorization from the originating station.

This difference of treatment is frequently cited as a major argument against removing the restrictions in major markets on distant signal importation by cable television, on the ground that over-the-air stations, particularly UHF stations, are placed at a significant competitive disadvantage, without substantial justification. This consideration has weighed heavily with the Commission in developing its present major market policies.

Efforts to amend the Copyright Act to impose some appropriate measure of liability on cable systems foundered in the 90th Congress in part because the question of liability under the existing Act was then still before the Supreme Court. Now that the Court has spoken, Congress should promptly resolve the problem of copyright liability and competitive fairness. Compromise proposals considered in the 90th Congress that would require compulsory royalty-free licensing, compulsory reasonable royalty licensing, or full copyright protection, (depending on the area of broadcasting coverage) indicate a form of a possible solution that would answer the fairness question in a way that would accommodate both private interests and the public interest. Action by Congress which settles the

competitive fairness question would be an appropriate first step in the cable television field, since it would provide a firm basis for the development of regulatory policies designed to gain the full benefits of cable television for the public.

2. Dangers lurk in a "temporizing solution" which, although avowedly temporary, risks becoming, in effect, a permanent decision. -- Since the effect of cable competition on UHF is unclear at present, and since the prospects of UHF even if shielded from such competition are hazy, one alternative would be to continue to "hold the line" against distant signals until some future date, five or ten years hence, to give UHF stations a vital "breathing space" to become established. At that time, it is argued, a more informed judgment can be made as a basis for longer-run policy.

But at the conclusion of such a proposed waiting period, the cable threat to over-the-air stations will not be much less than today. If anything, more stations will have a claim to governmental protection than at present. Whereas the present ban on distant-signal importation was

explicitly adopted as an interim measure to give the FCC and Congress time to evaluate the situation and to develop a policy, the premise of a more permanent ban would be to give UHF stations a chance to grow "strong" enough to be able to withstand cable competition. If such a policy were adopted, UHF stations could and would argue with some equity that they had invested in reliance on the rule, and should be protected until they were in fact able to withstand cable competition. Since at any point in time some stations on the air will be economically marginal (if not actually in the red), the pressure for continued restriction could continue indefinitely.

3. To avoid favoring one mode totally to the exclusion of the other, policy may have to be tailored to ensure a proper balance between permitting the growth of cable television and supporting an adequate level of over-the-air service.

As outlined above, we seek a mix of over-the-air and cable television in order to promote diversity of choices available to the widest possible television audiences. If and to the extent this objective will not be achieved by unrestricted competition among the modes,

institutional arrangements can be devised. Policy could consider specific government support, or rules requiring private business behavior designed to reach such an accommodation.

B. As Cable Television Grows In Importance, Greater Attention Must Be Paid To Problems Of Control And Access.

1. Serious consideration should be given to the question whether to extend the local market "duopoly" rule to cable systems. -- Since 1940 FCC regulations have imposed limits on the number of broadcast outlets under single ownership in any community. A single individual or entity may control no more than one TV, one AM, and one FM station in a given market. The Commission is currently receiving comments on a proposed rule to extend the policy behind this so-called "duopoly" rule, by permitting a single owner only one full-time broadcast station of any sort in a single market.

It may be necessary in this connection to examine policies with respect to cable ownership. A cable owner necessarily controls a number of channels into the homes of his subscribers; to the extent that these new channels serve as sources for the origination of program material,

they will constitute an especially important avenue of influence over community opinion. Acquisition of a cable system by a local broadcaster thus raises questions under traditional policies against undue control of local media Moreover, acquisition could unduly limit the degree of competition between cable and conventional broadcast. The second of these dangers may be adequately covered by antitrust principles; the first clearly is not. On the other hand, one could defend local cross-media ownership on grounds that the stronger financial base of the owner would contribute to more rapid development of the new medium. In any case, the issue of media ownership deserves more extended consideration by the Congress, the Department of Justice and the FCC.

2. Nationwide patterns of ownership should be scrutinized for conflicts of interest or threats of media domination. -- On a nationwide basis, the control of cable television systems is also a source of concern. Owners of nationally-distributed magazines, television stations, film studios, chains of motion picture theaters, and, especially, television networks, will likely prove to be either competitors of or suppliers of program material, or both, to

cable television systems. In view of these possibilities, both the FCC and the Department of Justice, as well as the Congress, should scrutinize developing patterns of ownership in the cable industry with an eye for conflicts of interest or threats of media domination.

The particular problem of multiple ownership of cable systems may call for especially intensive review by the FCC and, perhaps, for corrective action in the immediate future. With respect to AM and FM radio and television outlets, the FCC restricts ownership by any single entity to seven outlets in each category on a nationwide basis. Similar restrictions may be warranted on cable outlets.

3. Problems of access to cable television systems merit continuing study by Congress, the Commission, and local franchising authorities. -- Regardless of who controls a given cable television system, much of its value to its community and to the nation will depend on its being available to users on as broad and equal a basis as possible. Cable TV systems may involve so many channels that common carrier type regulation may be found necessary, at least with respect to a certain minimum number of channels.

Were common carrier status to emerge, allocation of authority between local and federal agencies would be necessary and a tangle of difficult issues would be involved. The principal one would be whether to impose a comprehensive pattern of federal public-utility regulation on cable television. The high cost of duplicating cable facilities gives the service the attributes of a natural monopoly. In the more distant future, if cable displaces much over-the-air service, cable owners would enjoy significant monopoly power over television service. As yet, however, significant monopoly power is not discernible.

Moreover, the burden of regulating thousands of cable systems would be immense; ideally, state and local authorities should assume the burden of regulating cable systems, which are predominantly local in character. But local authorities have thus far been cautious in asserting appropriate controls. We recommend, at a minimum, the creation of a central clearinghouse (perhaps under the auspices of the National Association of Regulatory and Utility Commissioners) for the discussion and dissemination of information which will enable the local franchising authorities to understand the breadth of their powers in

terms of rate regulation, channel reservations, requirements for local programming and other franchise conditions. The recent report of the New York City Task Force on CATV provides an excellent example of how local authorities might proceed in order to fulfill their public interest responsibilities in dealing with cable systems.

The issue of the responsibility of the cable owner is a growing one. If cable expansion is permitted in keeping with its appeal in the marketplace, we are on the threshold of a new era in broadcasting; while there is much the Commission and the Executive Branch can do to assure a smooth transition to new modes of broadcasting and television service, it is imperative that the nature and extent of regulation of cable systems be explored and decided. It is not too soon for Congress to address these questions comprehensively.

VI. THE EXECUTIVE BRANCH AND THE CORPORATION FOR PUBLIC BROADCASTING HAVE IMPORTANT ROLES TO PLAY

A. Executive Branch Agencies Should Participate More Actively in FCC Proceedings. -- As we have seen, broadcasting offers significant potential as a support to a variety of governmental missions such as health,

education, improvement of race relations and elimination of unemployment. Its value in this regard depends largely on the conduct of FCC licensees, who provide broadcasting service. The agencies responsible for missions of the sort listed above have a legitimate interest, therefore, in the conduct and programming practices of broadcast licensees and in proceedings for the grant and renewal of licenses. Under such circumstances the agencies should make their views known to the Commission by appropriate submissions. We have discovered that in general the agencies are unaware of this opportunity to advance their objectives, and we urge their more active participation in relevant rulemaking and licensing proceedings before the Commission.

B. The Government Should Stimulate And Support Pilot Programs To Explore The Utility Of Television To Further Important Public Purposes.

In an earlier section we listed some promising applications of the medium in support of public policy ends. A natural first question is why such programs have not already been tried. The principal answer is that the government has never conducted the kind of comprehensive

experimental efforts necessary to test new applications of the medium.

In the preparation of this Report, we sponsored research studies exploring new uses in this area, and our own staff devoted some time to the problem. We summarize the findings of these studies, and commend them as the basis for serious consideration of experiments of this kind.

1. A pilot communications project for South Central Los Angeles is an illustrative example. -- South Central Los Angeles (which includes Watts) is a sprawling Negro "ghetto", inhabited by more than 300,000 individuals, and afflicted by the classic symptoms of urban poverty and decay -- high unemployment, half the mothers welfare recipients, a high student drop-out rate, lack of adequate public transportation, etc. We asked the RAND Corporation to study the feasibility and merits of experimenting with an expanded use of television to meet some of the urgent needs of the area's residents. On the basis of RAND's study and our own analysis, we believe that such a program is well worth undertaking. One of the most attractive technical configurations is a four-channel, low-power

UHF system; with transmitting facilities and four equipped studios it would entail an initial investment of about $750,000. The RAND investigators concluded that the establishment of such a station would not involve a material dislocation of existing television stations or service. Although today some 60 percent of the area's residents lack receivers having an all-channel capability, that figure is expected to fall to 40 or 50 percent by the time a pilot project could actually become operational. Even at 50 percent penetration, such a system would reach more than 75,000 households.

The channels in the system would be devoted to job information and training; to both in-school and at-home instruction tailored to the special needs of ghetto children; to the presentation of programs created by and for the local community; to public health; adult education; literacy training and other purposes. These needs are not currently being met by the television stations in Los Angeles; their programming (with the exception of a Mexican-American station) is not directed to the special needs of disadvantaged minority groups.

We cannot know to what extent these needs can or will be satisfied by television, but we believe that an experiment to find out is certainly warranted. Low-power UHF is the cheapest present day mechanism for the conduct of such an experiment. If successful, it would be important to consider whether such programs should become part of nationwide services, or maintained as local community services, or both, and then to consider what methods would best promote such programs -- cable systems, UHF stations, some mix, or other alternatives.

2. A pilot project for a remote rural area such as an Indian reservation is another possible application. -- Not all of the poor or disadvantaged are urban dwellers. For example, more than 100,000 Indians, mostly very poor, live on the Navajo reservation in a remote rural area in northern Arizona. In view of the federal government's historic commitment and continuing programs in the area of Indian welfare, the potential of television to alleviate the plight of the reservation's inhabitants constitutes a fit subject for a pilot demonstration program. Again, a multi-channel UHF system seems feasible for this purpose. Television should prove useful in English-language

instruction, in conducting courses in Indian culture and history, and in disseminating information concerning the Navajo political process.

In both the illustrative examples of Los Angeles and the Navajo reservation, we emphasize that basic responsibility would reside in the communities or groups involved to define their needs, to make decisions about the most suitable kinds of programming to meet these needs, and to operate the system. The role of the Federal government would be confined largely to appropriate financial support and technical assistance.

3. Implementation of such pilot programs requires greater Executive Branch capability in communications, and the assumption of a new role by the Corporation for Public Broadcasting.

Pilot projects of the kind we have discussed cut across the responsibilities of several mission-oriented agencies -- HUD, HEW, Labor, Interior. No one of these agencies is ideally situated to assume overall responsibility for the projects (although we hope this factor will not unduly delay the undertaking of the projects). None has or is ideally situated to

acquire, the necessary technical expertise. Prompt and efficient handling of such projects would be greatly facilitated by the creation within the Executive Branch of a central source of technical and systems advice and assistance in telecommunications.

However significantly such capability could be expected to assist in coordinating the needs of the mission-oriented agencies and relating them to available equipment options, we do not envision it as expert in programming. Nevertheless, the pilot projects will require highly imaginative and innovative programming of a kind not likely to be available in the commercial sector. It is here, we believe, that the Public Broadcasting Corporation could play a significant role. In addition to its broader responsibilities relating to the promotion of public television, the Corporation is a logical source to which the federal government could turn for assistance in developing suitable programming to advance public needs.

The need and opportunities for service by the Corporation for Public Broadcasting will be greatly expanded, if cable television development multiplies the number of channels. The potential for experiment with various forms of

non-commercial programming will increase proportionately, and an important opportunity will be wasted if the Corporation for Public Broadcasting is unable to take advantage of these developing possibilities. More important still are the governmental uses, on both the federal and local level, which will be made possible with an expanded multi-channel capability. Many local governments especially will be in need of advice as well as more active forms of aid in determining how to make use of the one or more channels which will likely be reserved for them by cable operators. Conversely, potential producers and packagers of program material useful to governments will be desirous of gaining quick and informed understanding of the ways in which they can be most effective in seeking to serve city and state, as well as federal, interests. Here again, the Corporation for Public Broadcasting can perform a vital role.