Festiman
12/17

Friday 12/12/69

6:10 Gessaman had gone home; called Mr. Plummer and gave him your message about inclusion in his statement that the primary responsibility has to lie with the State of Alaska. He said they could get it in O.K.

Also said he had heard from Dr. Richardson in Tribus' office that there was a press release this afternoon -- but Mr. Plummer checked the ticker and saw nothing. (Didn't know whether it was released from the Commerce Department or Alaska.)

Friday 12/12/69

5:55 Mr. Whitehead asked us to call Don Gessaman and tell him that on page 14 of Mr. Plummer's statement, they should indicate that primary responsibility has to lie with the State of Alaska. 3664 (BOB)

If Gessaman is not in his office, we should notify Plummer (Acting Director, OTM). 5180

(Apparently Plummer's office was to send copies of his testimony up to the Hill this afternoon)

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF TELECOMMUNICATIONS MANAGEMENT
WASHINGTON, D.C. 20504

Date: December 11, 1969

Subject: Statement before Congressional Committee

To: Director, Bureau of the Budget

Via: George A. Lincoln, Director, OEP

I recommend approval of the attached statement. Subcommittee Counsel Frank Hammill has asked for copies of my statement by December 12.

Representative Joseph E. Karth (D. Minn.), Chairman of the House Science and Astronautics Committee Subcommittee on Space Science and Applications, has scheduled hearings for December 16-18, to inquire into whether the results of National Aeronautics and Space Administration research and development are being applied to the best advantage.

Witnesses have been invited and scheduled to testify in Room 2321 Rayburn House Office Building, as follows:

December 16, 1969 - Morning
NASA - Messrs. Shapley, Jaffee and Marsten
Office of Telecommunications Management - W. E. Plummer, Acting

December 17, 1969 - Morning
Alaska Delegation - Rep. Pollock and Senators Gravel and Stevens

December 18, 1969 - Morning
* Communications Satellite Corporation - (probably Dr. Charyk)
Radio Corporation of America ALASCOM
American Telephone and Telegraph Company

W. E. Plummer
Acting

cc: Gen. Lincoln, OEP
Mr. Kendall, OEP
Mr. Gillis, OEP
Mr. Whitehead, WHO

Attachment

*Note: Attached Agenda

COMMITTEE ON SCIENCE AND ASTRONAUTICS
HOUSE OF REPRESENTATIVES
WASHINGTON, D. C.

Hearings of the
Subcommittee on Space Science and Applications

on

ASSESSMENT OF SPACE COMMUNICATIONS TECHNOLOGY

Tuesday, December 16	Mr. Willis H. Shapley Associate Deputy Administrator National Aeronautics and Space Administration
	Mr. Leonard Jaffe Deputy Associate Administrator (Applications) National Aeronautics and Space Administration
	Dr. Richard B. Marsten Director, Communications Programs National Aeronautics and Space Administration
	Mr. William E. Plummer Acting Director Office of Telecommunications Management Executive Office of the President
Wednesday, December 17	Hon. Mike Gravel U.S. Senate, Alaska
	Hon. Theodore F. Stevens U.S. Senate, Alaska
	Hon. Howard W. Pollock U.S. House of Representatives (at Large), Alaska
	Dr. Joseph V. Charyk President, Communications Satellite Corporation
Thursday, December 18	Mr. Howard R. Hawkins President, RCA Global Communications, Incorporated President, RCA Alaska Communications, Incorporated
	Mr. Richard R. Hough Vice President, Long Lines Department American Telephone and Telegraph Company

All Sessions -- 10 a.m., Room 2325 Rayburn House Office Building

OFFICE OF
TELECOMMUNICATIONS
MANAGEMENT

STATEMENT

OF

MR. WILLIAM E. PLUMMER

ACTING DIRECTOR OF TELECOMMUNICATIONS MANAGEMENT
OFFICE OF EMERGENCY PREPAREDNESS
EXECUTIVE OFFICE OF THE PRESIDENT

BEFORE THE

SCIENCE AND ASTRONAUTICS COMMITTEE

SUBCOMMITTEE ON SPACE SCIENCE AND APPLICATIONS

HOUSE OF REPRESENTATIVES

December 16, 1969

COORDINATION DRAFT 12/11/69

STATEMENT OF WILLIAM E. PLUMMER
ACTING DIRECTOR OF TELECOMMUNICATIONS MANAGEMENT
OFFICE OF EMERGENCY PREPAREDNESS

INTRODUCTION

Mr. Chairman and Members of the Committee:

At the outset, I would like to enter into the record that, for the past three months, I have been an Acting Assistant Director of the Office of Emergency Preparedness and, in addition, the Acting Director of Telecommunications Management.

I am confident that the Chairman and the Members of this Committee are fully aware of the organization and functions of my office, hence I do not intend to take up your time in describing the office. I have, however, brought with me a current charter which includes the Executive Orders by which this office was established and certain authority and responsibilities assigned to it. With your permission I will submit it for the record.
(HANDOUT)

As the Acting Director of Telecommunications Management, I have been asked to appear today to review activity relating to commercial communication satellite applications resulting from research and development by the National Aeronautics and Space Administration (NASA). Since you

have heard from NASA and expect to hear from Members of Congress and private corporations, I will merely present an overview of the subject as seen from the national policy-making level by the Director of Telecommunications Management (DTM).

I will treat two broad subject areas: first, the progress made toward achieving the objectives of the Communications Satellite Act of 1962 which illustrate a practical application of space technology; and second, some potential opportunities for additional practical applications.

I feel that I need not tell the distinguished members of this Committee of the growing and crucial importance of telecommunication in today's world. Our nation's social, political and economic well-being depend in very large measure upon the telecommunication technology; and it is in the interest of all of us to assure that this dynamic technology -- which includes many diverse means of communicating -- continues to grow.

It is equally important that the fruits of this technology be used in the interest of all of our people and in the interest of the world's peoples as rapidly and economically as possible. I am of the opinion that, in general, we in this country have in fact put to rapid and economic use a very great part of the technology which has been developed over the past two decades.

Space technology is one of the means by which progress in telecommunication has been dramatically stimulated. It is by no means the only technology which is important or useful to the nation and the world -- it is the most glamorous.

Although the United States Government operates many Government-owned telecommunication systems, it relies, as a matter of policy, upon the commercial common carriers, except for unique Governmental requirements. The United States Government is the largest single customer of the commercial common carriers. For example, the Government leased about 460 million dollars of telecommunication facilities and services from commercial sources in FY 69.

* * *

PROGRESS IN PRACTICAL APPLICATIONS

I will first discuss the progress that has been made by the United States in using space technology in practical commercial communication applications.

The Congress in the Communications Satellite Act of 1962 set the basic goal to "establish... as expeditiously as practicable a commercial communications satellite system, as part of an improved global communications network." This has been largely achieved -- and far more rapidly than was expected. Major milestones in the development of the global system include:

-- The incorporation of the Communications Satellite Corporation in February 1963.

-- The "Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System," August 20, 1964.

-- Operation of the first commercial communications satellite (EARLY BIRD) April 1965.

-- Achievement of global coverage by the INTELSAT System in June 1969.

These important milestones were treated in detail in the last Annual Report by the President to Congress on Activities and

Accomplishments under the Communications Satellite Act of 1962 which is provided for the record.

(HANDOUT)

A composite summary of the progress made in commercial satellite communications is shown in a progress chart submitted for the record.

(HANDOUT)

Please note on the progress chart the development milestones in the national space program, specifically NASA's Application Technology Satellite (ATS) project and its predecessor, the SNYCOM project. The results of the NASA R&D projects have been used in the INTELSAT satellites. These important NASA developments, when combined with other advanced electronics and space technology, enables a single INTELSAT III satellite to relay simultaneously, among many standard earth stations, approximately 1200 two-way voice circuits or four high-quality color television circuits.

The realization of the INTELSAT System has substantially augmented the international telecommunications capability for both private and Government uses. The resulting benefits include significant reductions in rates for international telecommunication services. In addition, the unique capability to provide real time distribution of transoceanic television has added new possibilities toward rapid interchange of ideas and information among nations. Furthermore, this system has provided valuable alternate means for satisfying U. S. Government telecommunication requirements, including those of the NASA APOLLO network.

The capability and versatility of the INTELSAT system were demonstrated dramatically during the astronauts' walk on the Moon last July. It has been estimated that more than five hundred million people throughout the world witnessed this historic event as it happened.

The Director of Telecommunications Management has had a direct role in the formulation and promulgation of national policy relating to the programs which I have discussed. The following list summarizes some of the more important actions involving satellite communications matters in which my office and agencies of the Executive Branch participated:

-- (1962-1963) Formulated U. S. position for International Telecommunication Union Extraordinary Administrative Radio Conference, Geneva, 1963/ which allocated frequencies for space services, and implemented Final Acts resulting from the Conference as regards the U. S.

-- (1964) Participated in the planning and formulating of the U S. position leading to the Interim Arrangements for the INTELSAT Consortium.

-- (1965-1966) Established national policy to effect Government use by NASA and DOD of leased commercial communication satellite facilities and services;

-- (1965-1966) Formulated national policy on avoiding Government facilities interference to commercial earth stations.

-- (1967-1968) Fostered the introduction of advanced technology satellites into the global system. (INTELSAT IV series)

-- (1968-1969) Formulated U. S. Preliminary Views on the Space World Administrative Radio Conference to be convened in Geneva in 1971 and established an interference measurement program to provide data needed to support the the U. S. position, with NASA serving as lead agency in the measurement program.

-- (1968-1969) Arranged for analysis of the electromagnetic environment for the Alaskan earth station which will provide interstate service.

It is appropriate to observe that in the early 1960's urgent needs existed for improved international telecommunications throughout the world and that this demand presented a ready market for improved telecommunications, particularly with developing countries. These demands provided a real stimulus for the development and growth of the global system. Furthermore, the telecommunications capability inherent with satellites provided an economic alternative to communications entities and users.

The significant progress achieved in the INTELSAT global system provides positive illustrations of the practical use of space technology flowing from the nation's space program.

* * *

OPPORTUNITIES FOR ADDITIONAL PRACTICAL APPLICATIONS

The second portion of this statement relates to opportunities for additional practical applications of satellite technology. Since the Committee has heard from NASA and will hear from several carriers, I will limit myself to identifying, without elaboration, some possible new applications of commercial communication satellites during the early 1970's:

1. Domestic applications to provide public telecommunication services (telephone, data and television distribution) within and among the 50 States, the Commonwealth of Puerto Rico and U. S. territories.
2. Domestic applications to provide intrastate public telecommunication services in the special case of Alaska.
3. Expansion of the range of public telecommunication services in international applications (e.g., high speed data, demand access, etc.)
4. International and possibly domestic applications to provide specialized telecommunication services (e.g., aeronautical and maritime mobile).

In the interest of time and due to the complexity of each item, I will only discuss the first two new applications.

Domestic Applications

With regard to the first item, we have established limited domestic application of communications satellites with earth stations located in Hawaii and Puerto Rico. Facilities are planned to be operational in Alaska during the summer of 1970.

The Nation has available a vast complex of terrestrial telecommunications except in Alaska; therefore, the requirements for additional domestic capability via the satellite medium stem from a completely different level of demand, as contrasted with the international sector. Nevertheless, the unique attributes of satellites, particularly their capability for reaching many widely dispersed locations simultaneously from a single geostationary relay, provide another alternative to the telecommunication system designer, owner and user.

Experience in the international global system provides a model for the exploitation of new technology in practical applications. The reason for the success of the new INTELSAT enterprise, in large measure, was brought about by using

a systems approach -- emphasizing rigorous engineering and management -- a fundamental principle in the implementation of modern telecommunication systems. The key steps of such a systems approach include the following:

-- Analysis of potential user needs and demands.

-- Formulation of a meaningful system plan (scenario) for practical application.

-- Evaluation of alternatives to satisfy realistic user needs and demands.

-- Implementation of a technically feasible and economically viable system.

The use of this method is essential if we are to preserve the integrity of existing capability and to effectuate a net enhancement of the total capability available to the people of our nation at the lowest cost.

The potential for satisfying additional domestic telecommunication requirements by means of satellite technology has been considered by private and Government organizations for several years. There are no insurmountable technical obstacles or national policies which preclude beginning an orderly development of domestic satellite communications. I'm sure the Committee recognizes that this matter is primarily within the province of the Federal Communications Commission, where it is being treated in Docket 16495, Notice of Inquiry, dated March 2, 1966 in the matter of "Establishment of Domestic Communication Satellite Facilities by Non-Government Entities." However, it is widely known that the matter is currently under review by the Administration.

Alaska Applications

With regard to the second item, Alaska is by far the largest state in the Union with a total land area of 571,065 square miles, twice that of Texas. Alaska's population was about 284,000 in September 1969 and many people live in widely dispersed small villages remote from any population centers. With its immense size and sparse population, Alaska has by far the lowest population density of any state. In addition, Alaska is the northernmost state, and climatic and terrain conditions are by far the most difficult of those of any region in the United States. Thus, the problems of transportation and communications for Alaska are among the most difficult on the North American continent.

All long line telephone, telegraph and related commercial communications services have been provided in Alaska by the Government-owned Alaska Communication System (ACS) since 1901.

This system is generally filled to capacity and is unable to satisfy a number of current outstanding requirements.

In accordance with Public Law 90-135, November 14, 1967, the Department of Defense is in the process of disposing of the Alaska Communications System. RCA ALASCOM Inc., the successful bidder, is scheduled to take over ownership of the ACS on July 1, 1970. Meanwhile, the COMSAT Corporation is constructing a standard earth station at Talkeetna, Alaska to work with a Pacific Ocean INTELSAT satellite and this is scheduled for operation on July 1, 1970.

Thus, today, telecommunication in Alaska is in a transitional period. There are many ad hoc efforts by the State of Alaska, the Federal Government and private industry, to determine the trends in telecommunicatinn needs and to plan for facilities and systems to meet these needs. These consist of various and separate proposals for adding terrestrial and satellite communication systems. In this connection, the FCC said that it intends to hold comprehensive hearings on ownership of the Talkeetna-Anchorage microwave link and has scheduled a pre-hearing conference for December 16, 1969.

With respect to communication satellites for providing intrastate service, I have a few observations. First, feasibility studies we have seen indicate that the establishment of a separate dedicated satellite system for Alaska is the least economical approach.

The most practical approach would be to combine the coverage of Alaska with a broader-based U S. domestic system. Second, due to the small, widely dispersed population and limited market demand, it appears that some form of subsidy by the State or Federal Government will be needed if modern telecommunication services, including television distribution, are to be provided throughout Alaska.

Based on the situation existing today, I suggest that the following steps need to be taken in realizing an orderly transition to modern communications in Alaska:

-- Conducting a comprehensive survey of user needs.

-- Preparing a composite long-range plan for Alaska telecommunication providing for an optimum mix of terrestrial and satellite facilities.

-- Moving as rapidly as possible toward the objective of satisfying Alaska's communications needs and, where appropriate, making use of the domestic satellite system capability, when available.

* * *

SUMMARY

In summary

-- There have been significant benefits to the public in practical applications utilizing the results of NASA R&D.

-- We have not encountered significant institutional barriers to capitalizing on NASA R&D.

-- There are opportunities for expanding the range of uses of satellite communications technology; however, orderly implementation programs should be pursued to assure maximum quantity, quality and economy of service to users.

-- With respect to Alaska, it is important to recognize the advantages of using a diversified, complementary and integrated mix of both space and terrestrial telecommunication facilities, based on demonstrated needs and demands.

This completes my quick overview! Thank you, Mr. Chairman.

# # #

Telecommunications

November 5, 1969

Dear Andy:

Thank you for the copy of the book "The Radio Spectrum, Its Use and Regulation." I have previously read through many of the articles in this book and in particular the one by William K. Jones, to which you refer.

I regret that I cannot offer any specific advice on how you might further dramatize the plight of the land mobile services. I am afraid that we simply have to resort to a number of ad hoc improvisations until we have a better handle on the whole subject of spectrum allocation. We recognize that this is an important matter, as we discussed, and are continuing to give the matter considerable consideration.

Sincerely,

Clay T. Whitehead
Staff Assistant

Mr. Andrew R. Paul
Public Affairs
Motorola Communications and
Electronics Inc.
Washington Liaison Office
Suite 810
2000 L Street, N. W.
Washington, D. C. 20036

cc: Mr. Whitehead
Central Files

CTWhitehead:ed

MOTOROLA Communications and Electronics Inc.

ADDRESS REPLY TO:
Washington Liasion Office
Suite 810
2000 L Street, N.W.
Washington, D. C. 20036

October 31, 1969

Mr. Clay T. Whitehead
Executive Office of the President
The White House
Washington, D.C.

Dear Tom:

I want to thank you again for the meeting you had with Len Kolsky and myself a few weeks ago. We understand your concern with the entire matter of spectrum utilization and allocation, and we appreciated your awareness of the land mobile problem.

You referred to the potential necessity of a new agency, possibly representing the Executive Branch, to determine priorities for access to the scarce radio spectrum. This is an extremely difficult problem. Efforts to arrive at priorities among the various land mobile services were undertaken by the Land Mobile Advisory Committee, but that group was unable to do so. Such questions as to whether the use of radio by a plumber as opposed to a towing service presented LMAC with an insoluble problem.

As I recall, you suggested that one basis for such a priority determination might lie in the sale of spectrum. While this may have meaningful merit in determining which of two broadcasters should be granted a channel, or whether a wire line common carrier should prevail over a broadcaster, this approach presents a rather unique problem where the contest might be between land mobile and non-land mobile parties. This whole subject was pursued in a conference held at Airlie House and a report on this meeting by William K. Jones is in the enclosed book, The Radio Spectrum, Its Use and Regulation.

On the land mobile spectrum specifically, we were interested in your remarks regarding the possible availability of obtaining relief in the 420-450 MHz band presently allocated to the Fed-

eral Government. To the extent that this band is also contiguous to existing land mobile space, it is an appealing alternative in that land mobile equipment could be readily developed to operate on these frequencies.

In either event, we are concerned that the "clout" of land mobile services would be insufficient to compete with our more politically potent opponents. We believe that the facts are on our side, and we would be glad to provide you with any additional data you might wish. Frankly, however, our more pressing need may well be some objective advice as to how we can better dramatize the plight of the land mobile services. We would be most grateful for any guidance you could offer in this regard.

Sincerely yours,

Andrew R. Paul
Public Affairs

AP/pg

Encl.

Did not
go out

Fed. Comm. Organization

THE WHITE HOUSE

WASHINGTON

July 23, 1969

MEMORANDUM FOR

Dr. Lee A. DuBridge
Mr. Robert Mayo
General George Lincoln
General James O'Connell
Dr. Paul McCracken
Dr. Henry A. Kissinger

Attached is a draft memorandum for the President regarding organization in the Executive Branch for Telecommunications Policy and Management. Can we have your comments by Wednesday, July 30th.

It is important to reach a decision on this matter as soon as possible in view of the need to recruit a new Director of Telecommunications Management.

Clay T. Whitehead
Staff Assistant

Attachment

THE WHITE HOUSE

WASHINGTON

July 1969

MEMORANDUM FOR THE PRESIDENT

There are a number of important problems with respect to Federal telecommunications policies that suggest reorganization or at least revision of our policy machinery:

1. The communications industry is heavily regulated by the FCC and is heavily affected by the communications activities of Federal agencies. However, neither the FCC nor the executive branch have a significant capability for systematic analysis of telecommunications policies and opportunities, their impact, their effectiveness, or their costs. The cooperation between the FCC and various parts of the executive branch appears to consist largely of gentlemen's compromises among competing interests and philosophies. The increasingly rapid rate of technological change and introduction of new services makes policy-by-precedent increasingly less relevant, more restrictive, or counterproductive.

2. The so-called National Communications System remains a loose confederation af agency systems. In spite of the highly desirable interconnection capabilities that have been developed over the last few years, there has not been adequate specification of emergency capabilities, hardness, and priority override features necessary to permit informed decisions about the adequacy, performance, and cost of the system. No one seems to know whether a "unified" NCS is desirable, what it means, would cost, or would accomplish.

3. The extremely rapid rate at which communications are growing in the United States has brought about increasing conflicts over the use of various parts of the frequency spectrum and the beginnings of a spectrum shortage crisis.

Federal organization weaknesses:

Since World War II, there have been a number of studies of Federal communications organization and a number of reorganizations and shifts of responsibilities within the executive branch. None has

proved particularly satisfactory, and, indeed, there does not seem to be any neat solution to this problem. The lack of a good solution apparently is due in part to the quasi-independence of the FCC from the executive branch and in part to the conflicting requirements of Executive Office telecommunications coordination and individual agency mission responsibilities.

The study of the Federal Government communications organization completed in December 1968 by the Bureau of the Budget provides a good statement of the shortcomings of our current organization. The Bureau of the Budget reported a need for:

(1) a strengthened organization for policy planning, formulation and direction of Federal communications activities.

(2) a reorganized and strengthened National Communications System (NCS) within the Department of Defense.

(3) an improved procurement and technical assistance effort in communications on behalf of those Federal agencies which do not now have adequate resources in this field.

(4) unified frequency spectrum management process.

(5) a coordinated technical assistance program for State and local government in this area.

The recently released GAO report focused on the government's communications and particularly the progress toward establishment of unified National Communications System directed by the President in 1963. The GAO also found a need for stronger coordination of government telecommunications planning, and recommended a single entity responsible for both planning and operation of the Government's telecommunications activities. GAO also recommended clarification of what the unified NCS is intended to be.

Current organization for communications policymaking:

The Director of Telecommunications Management (DTM) in the Office of Emergency Preparedness is now charged by Executive

Order and Presidential memorandum with the responsibility for coordinating telecommunications activities in the executive branch. The DTM also is designated Special Assistant to the President for Telecommunications. However, the history of the organization reveals that attempts by the DTM to exercise leadership in communications policy have been largely ineffectual. This situation results from a number of factors such as organizational location, inadequate staff, and fragmentation of policy authority among half a dozen agencies with no one having overall responsibility. In view of its claimed responsibilities, the credibility of the DTM is questioned by agencies with operating responsibilities.

There is now no office in the executive branch with the responsibility or the capability to review national telecommunications policies as expressed in legislation and in FCC policies. The antitrust division of Justice has occasionally filed briefs on competitive aspects of decisions before the FCC, but these derive largely from antitrust considerations rather than from systematic analysis of communications issues. The Council of Economic Advisers has shown almost no capability or interest in telecommunications, and OST is certainly not equipped for addressing the fundamental economic and institutional problems of the industry and its regulation by the FCC. The Administration is therefore largely unable to exert leadership or take initiatives in spite of vulnerability to criticism for FCC policies and national communications problems.

Executive branch responsibilities:

There are six major functions that are the responsibility of the executive branch in the telecommunications area:

1. Assignment of frequencies for Government communications.

2. Research and development.

3. Analysis of technological and economic alternatives and formulation of recommendations for national policy with respect to telecommunications.

4. Definition and assurance of emergency communications capabilities.

5. Policy planning responsibilities for Government communications activities.

6. Procurement of Government communications services and operation of Government communications facilities.

Some of these functions are now being performed by the DTM or various departments. The problem we now face is which of these functions should be assigned to what agency and how they should be interconnected.

Agency views:

The Budget Bureau study of Federal communications organization made a number of major recommendations (see attached summary) and was recently distributed to the concerned departments. Agency views on the Budget Bureau recommendations have been received (summary attached). These views share a common theme that (1) stronger coordination from the top is required in establishing Government policy for its own telecommunications requirements and that (2) the Federal Government should take a stronger role in the evolution of national telecommunications to deal with the increasingly rapid rate of technological change and industry growth. There is also agreement that a much stronger analytic capability within the executive branch is needed to achieve these goals.

There is, however, no consensus among the agencies about the extent to which the Bureau's specific organizational suggestions will actually advance the above objectives. The history of this area suggests strongly that it will be unprofitable to seek further agreement among the agencies. There is no solution that will represent a desirable compromise to all concerned, and no solution appears sufficiently strong on its merits that it looms out as the obvious choice.

Alternatives:

A number of organizational arrangements have been suggested in the Congress or the press. These include establishment of a Department of Communications, transfer of all DTM functions to an existing Cabinet department, and significant expansion within the Executive Office of the President by creation of a new Office.

Determination of emergency communications requirements clearly must remain in OEP. However, major involvement by the executive branch in nongovernmental communications policy matters could be centered in one of the Cabinet departments or in the Executive Offices.

There appear to be three feasible alternatives:

(1) Maintain essentially the status quo, but clarify and strengthen the conflicting Executive Orders through which the DTM derives his authority.

(2) Alter slightly the status quo by strengthening the DTM and including in addition a capability for analysis of non-Government policy issues that would enable the Administration to play an expanded role in that area. This alternative could lead toward considerable pressure for a separate independent office in the Executive Office in a few years.

(3) Create a new organizational unit in the Department of Commerce that would perform the needed analysis of major national communications issues; take an increasingly active role in advocating policy to the FCC and (through the President) to Congress; and eventually be responsible for unified management of spectrum resources for both Government and non-Government users. This alternative would require shifting of spectrum management responsibilities from the DTM, leaving only emergency communications requirements in OEP.

The first alternative would leave the Administration largely incapable of dealing with national communications policy problems. It also would do little to encourage straightening out of the acknowledged problems in the Government's own communications.

The third alternative is probably the best long-run solution. However, the Department of Defense has long taken the position that, for national security reasons, spectrum management responsibility for Government uses should remain in the Executive Office. There also would be opposition from the Congress and the FCC to moving non-Government spectrum management to the Executive Branch at this time since there is no demonstrated capability.

It is probable that the second alternative would permit almost as much to be accomplished over the next two or three years as would the third option, since such a significant upgrading of capabilities is required. Furthermore, it would avoid the political opposition that could be expected to the more sweeping proposal.

We therefore recommend the approach of the second alternative above. This is outlined in more detail in the attached recommendation.

Peter M. Flanigan
Assistant to the President

Attachments

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Peter M. Flanigan
Assistant to the President

Attachments

BOB recommendations concerning Federal communications organization

The Bureau of the Budget report recommended that:

1. The Federal Government should establish a new and strengthened central policy and long-range planning organization for communications in an existing executive branch agency -- either Commerce or Transportation.

2. The NCS staff should undertake implementing studies (a) to transfer the Federal Telecommunications System from the General Services Administration to the Department of Defense for merger with the military administrative communications systems to provide service for all Federal agencies and (b) to appropriately locate and combine the roles and functions of the Executive Agent and the Manager of the NCS within the Office of the Secretary of Defense to provide unified guidance to the NCS from within the Defense Department. An effective mechanism should be provided whereby the member agencies of the NCS can advise and be consulted by the Manager, NCS.

3. The National Communications System staff within the Department of Defense should provide a central source of procurement-related assistance for use by executive agencies.

4. The management of the Government's portion of the frequency spectrum should be a function of the new communications policy organization. If a single manager is provided for the entire spectrum, the total function should be placed in the new organization. The new organization should have a limited in-house research capability to support its frequency spectrum management and general policy development responsibilities.

5. The new communications policy organization should coordinate action on requests to Federal agencies from State and local governments for technical assistance in telecommunication and should provide such assistance to Federal agencies who lack in-house capability.

Agency views on Budget Bureau recommendations

The Bureau circulated its study report among those agencies having significant telecommunications responsibilities and requested their views. The following is a summary of the agency responses:

-- The Department of Commerce concurred in the report's major findings and recommendations. The Department specifically supported vesting overall management of the spectrum in one executive agency. Its comment on the report's major organizational recommendation -- "The establishment and location of such an agency in an existing Department will enable meanifghul Executive Branch participation in the development of comprehensive national policies."

-- The Department of Defense (including the views of the Executive Agent of the National Communications Systems) agreed with the need for a new and strengthened policy and long range planning organization but believes that it should be constituted as a separate office outside OEP but in the Executive Office of the President. The DOD does not concur in the need for an implementing study to transfer the Federal Telecommunications System from GSA to Defense nor does it favor a combination of the roles and functions of the Executive Agent and Manager, NCS within the Department. Instead, it recommends an exploration in depth of the entire NCS structure and concept.

-- The Federal Communications Commission agrees that the role of the Federal Government in communications can and should be strengthened and made more effective but within the organizational framework presently prevailing. The FCC completely disagrees with the recommendation to establish a single radio spectrum manager in an executive agency in that it would adversely affect the Commission's functions.

-- The General Services Administration agrees with all of the study report recommendations except the one that a strengthened NCS should be located in DOD. GSA states that a merger of the civilian and military administrative networks has "obvious merit" but it should not be organized within Defense.

-- The Department of Justice agrees with the formulation of a new communications policy organization. The Department disagrees with the transfer of the Federal Telecommunications System to Defense and questions the feasibility of assigning responsibility for procurement and procurement-related assistance for agencies without in-house capabilities to Defense.

-- The National Aeronautics and Space Administration concurs generally with the report. NASA believes further consideration should be given to retaining the central policy organization in the Executive Office, however, if there are reasons against retention in the Executive Office it should be placed in the Department of Commerce. The problems of the National Communications System are separable from the broader problems of communications policy. Therefore, it is recommended that full responsibility for the planning, designing, and operating of the NCS be placed in the Department of Defense and assigned to a senior official in the Office of the Secretary.

-- The Special Assistant for National Security Affairs agrees in general with the study conclusions but does not believe that "policy guidance with respect to the objectives, requirements and composition of the NCS" should be vested in Commerce or Transportation. Further, he belives a National Security Council Council study should be iniated to re-examine the objectives and alternative system concepts prior to any reorganization.

-- The Office of Emergency Preparedness (including the views of the Director of Telecommunications Management) points out that the study report does not focus adequately on the emergency preparedness aspects of telecommunications management. General Lincoln proposes that the Office of Telecommunications Management remain under OEP until the emergency preparedness implications of relocation are examined thoroughly.

-- The Office of Science and Technology -- (views not yet received).

-- The Department of State has no objection to the study report's proposals from the standpoint of foreign policy considerations and believes that "advantages would flow from a strengthened central policy formulation and planning organization."

-- The Department of Transportation agrees on the need for coordinated policy direction at departmental level, improved procurement and technical assistance, and the unification of radio frequency spectrum management. The Department differs with the study report in that it believes that the Executive Agent role provided by DOD for the National Communications System should not remain within Defense but should be transferred to the policy organization.

-- The Central Intelligence Agency agrees with the need for a new and strengthened central policy organization but, since it should have direct access to the President, it should not be a subordinate function within a Department or Agency. CIA is opposed to relocating or reorganizing the Office of the Executive Agent, NCS before the policy organization is established and an assessment of its effectiveness completed.

Recommendation

The Office of the Director of Telecommunications Management should be strengthened and expanded to enable the DTM to serve as the focal point for all executive branch telecommunications activities and to be the Administration spokesman on national telecommunications policy issues. The DTM would be expected to be the primary executive branch office for the analysis and formulation of recommendations for both national communications policy and Federal telecommunications procurement. These responsibilities would include:

-- economic, technical, and systems analysis of communications policies and opportunities;

-- taking an increasingly active role in advocating policy to the FCC and through the President to the Congress, to include specific recommendations on spectrum management for non-Government uses.

-- management and allocation of Government spectrum use, to include development of improved spectrum management techniques aimed toward eventual unified Government and non-Government spectrum management.

-- guidance and information to Federal, State, and local Government agencies in communications planning and procurement.

-- responsibility for policies and standards for procurement of Federal administrative telecommunications services and/or systems.

A Telecommunications Research and Analysis Center would be established in the Department of Commerce, reporting to the Assistant Secretary for Science and Technology. The Center would be responsible for both technical and economic analysis and research, responsive to the needs defined by the DTM. The TRAC would incorporate the current research program of the Institute for Telecommunications Sciences, as well as appropriate elements of other Commerce activities in telecommunications. Its specific functions would include:

-- establishment and operation of a national electromagnetic compatibility analysis facility.

-- research and analysis of improved spectrum utilization techniques to support the DTM in Government spectrum management and in making recommendations to the FCC on non-Government spectrum management policies.

-- research and analysis leading to the development by DTM of improved technical and operating standards.

-- continuation of basic telecommunication science research and provision of services to other Government agencies and industry.

The DTM should be raised immediately to executive pay level IV and authorized an expanded staff that would include a limited capability for economic, legal, technical, and systems analysis. He would be expected to contract for significant portions of the research and analysis required to support his responsibilities and also to draw heavily on the Commerce Telecommunications Research and Analysis Center.

A NSSM should be issued as soon as the new DTM is selected. This study should define appropriate NSC machinery for dealing with national security and emergency telecommunications issues and should provide general guidance to the DTM on emergency requirements and policies.

Implementation

This recommendation could be implemented almost immediately through the following actions:

A. By Executive Order

-- clarify and bolster DTM authority and eliminate existing patchwork of Presidential memoranda and conflicting Executive Orders. The Office of Telecommunications Management should be

institutionalized as a separate Office within OEP, eliminating the positions of Assistant Director and Special Assistant to the President for Telecommunications. The DTM should be raised to Level IV and should report to the President for all matters except emergency preparedness requirements, for which he would support the Director of OEP.

-- similarly clarify authority and responsibility of the Department of Commerce.

B. By Secretarial Order

-- establish a Telecommunications Research and Analysis Center under the Assistant Secretary of Commerce for Science and Technology.

C. Subsequent Action

Once sufficient capability in the analysis of national communications policy issues and the associated capability for improved Government and non-Government spectrum management is achieved, Government and non-Government spectrum management responsibilities should be consolidated. This almost certainly will require in a few years establishment of a new agency outside OEP, either in the Executive Office, in a Cabinet Department, or as an independent agency.

-- at an appropriate time, introduce legislation to establish a new agency and transfer non-Government spectrum management from the FCC to the new agency; emergency preparedness functions would remain in OEP.

-- at an appropriate later time, transfer to the new agency by Executive Order responsibility for procurement of Federal administrative telecommunications services and/or systems.

THE WHITE HOUSE

WASHINGTON

November 21, 1969

MEMORANDUM FOR

Attached are:

(1) A discussion of the executive branch organization for telecommunications and ~~issues connected with recent proposals for reorganization and~~ a recommended reorganization.

(2) A description of the responsibilities of a new Office of Telecommunications Policy.

Insert

Ltd ~~We~~ I would like to have your comments by November 28, ~~prior to submitting a recommendation to the President.~~ Reporting Date for

Peter Flanigan
Assistant to the President

Attachments

Insert: Both the Bureau of the Budget & the President's staff of the Advisory Council on Executive Organization have assisted in the preparation of this recommendation. ~~We would like to have~~ We would like to have your comments before submitting a final recommendation to the President. I would appreciate having your comment by December 10. 13

Draft

EXECUTIVE BRANCH ORGANIZATION FOR TELECOMMUNICATIONS

In spite of the rapidly growing importance of telecommunications to the Nation and for the government's own missions, there is no effective policy-making capability for telecommunications in the executive branch. The Administration is therefore largely unable to exert leadership or take initiatives in spite of vulnerability to criticism for FCC policies. Government-wide coordination of its own telecommunications activities has not been adequate. These problems have been manifested in several ways:

1. There is a serious lack of effective machinery for dealing expeditiously with domestic telecommunications issues. The government has been grappling for several years, with only limited success, with such issues as "foreign attachments" to the public telephone network, cable TV and pay TV, the possible uses and industry structure for a domestic satellite communications system, and policies for computer communications. There is a current tendency to resolve such issues by past precedents and by compromises between the FCC and various agencies in the executive branch, but the increasingly rapid rate of technological change and introduction of new services makes policy-by-precedent increasingly less relevant, more restrictive, or counterproductive. Neither the FCC nor the executive branch has a significant capability for systematic economic and technical analysis.

2. Efforts to coordinate the procurement and use of telecommunications facilities and services by the Federal government have had limited success. The current coordination arrangements, embodied in the National Communications System (NCS) structure, have achieved certain desirable interconnections and operating procedures, but have not produced the desired assurances that the government is procuring the services needed in an efficient manner. Although present policies call for a "unified" NCS, there is little agreement on what further unification is needed, or what it would cost or accomplish.

3. The current procedures for spectrum allocation are highly inflexible and are increasingly creating a spectrum shortage crisis. The shortage is especially severe in the land mobile radio allocations, which are becoming increasingly important to local police and fire protection services, among many other claimants.

Current organization for communications policy-making and coordination

The Director of Telecommunications Management (DTM) in the Office of Emergency Preparedness is now charged by Executive Order and Presidential memorandum with the responsibility for coordinating telecommunications activities in the executive branch. The DTM also is designated Special Assistant to the President for Telecommunications. However, the history of the organization reveals that attempts by the DTM to exercise leadership in communications policy have been largely ineffectual. The responsibilities and authority of the DTM are questioned by agencies with operating responsibilities. This situation results from a number of factors including organizational location, inadequate staff, and lack of clear authority.

There is now no office in the executive branch with the responsibility or the capability to review the whole range of national telecommunications policies as expressed in legislation and in FCC policies. The Antitrust Division of the Department of Justice has occasionally filed briefs on the competitive aspects of decisions before the FCC, but these derive largely from antitrust considerations rather than from familiarity with communications issues. The Department of Commerce has a telecommunications research capability, but no responsibility or familiarity with communications policy. Neither the Council of Economic Advisers nor the Office of Science and Technology are equipped to address the fundamental economic and institutional problems of the communications industry and its regulation by the FCC, or the problems of the government's own telecommunications.

Studies of Federal organization

Since World War II, there have been a number of studies of Federal communications organization and a number of reorganizations and shifts of responsibilities within the executive branch. None has proved particularly satisfactory, and, indeed, there is no ideal solution. This is due in part to the quasi-independence of the FCC from the executive branch and in part to the conflicting ~~requirements for executive branch coordination,~~ individual agency mission responsibilities ~~and Federal regulatory responsibilities.~~ within the executive branch.

The study of the Federal government communications organization completed in December 1968 by the Bureau of the Budget provides

a good statement of the shortcomings of our current organization. The Bureau of the Budget reported a need for:

(1) a strengthened organization for policy planning, formulation and direction of Federal communications activities.

(2) a reorganized and strengthened National Communications System (NCS) within the Department of Defense.

(3) an improved procurement and technical assistance effort in communications on behalf of those Federal agencies which do not now have adequate resources in this field.

(4) a unified frequency spectrum management process.

(5) a coordinated technical assistance program for State and local government in this area.

The recently released report of the Government Accounting Office focused on the government's communications and evaluated the progress toward establishment of a unified National Communications System as directed by the President in 1963. The GAO found a need for stronger coordination of government telecommunications planning, and recommended a single entity be responsible for policy direction and control of the Government's telecommunications systems. The GAO also recommended clarification of what a "unified" NCS is intended to be.

Reorganization issues

The Budget Bureau study of Federal communications organization made a number of major recommendations and was recently distributed to the departments concerned. Agency views on this study have the common themes (1) that stronger coordination from the top is required in establishing Government policy for its own telecommunications requirements, and (2) that the Federal government should take a stronger role in the evolution of national telecommunications to deal with the increasingly rapid rate of technological change and industry growth. There is also agreement that a much stronger analytic capability within the executive branch is needed to achieve these goals.

There are a variety of possible ways in which telecommunications responsibilities could be reshuffled or strengthened. As a starting point, there is widespread agreement that a single office should bear ultimate responsibility for:

(1) analyses and formulation of overall telecommunications policy for the executive branch.

(2) policy-level coordination of Federal government procurement and use of telecommunications services and equipment.

(3) allocation and assignment of spectrum resources to government users.

There are several further issues.

The first is where such a single office should be located. There are two competing sets of considerations. Further expansion of telecommunications activities within the Executive Office of the President would force undesirable growth in the size of the Executive Office of the President, while telecommunications does not require the frequent direct Presidential attention implied by a location within the Executive Office. On the other hand, placing the central office within an executive department (e.g., Commerce or Transportation) raises serious questions about the impartiality of frequency allocation and assignment among government users and assurance of vital national security interests. Both sides of this issue have considerable merit, but from the standpoint of practicality and the need to minimize even temporary disruptions of our policy machinery, the policy functions should for the time being remain in the Executive Office. However, as much of the operational and research responsibilities as possible should be carried out in the departments and agencies.

Another issue is whether the authority to allocate and assign frequency spectrum to nongovernment uses, now vested in the FCC, should be transferred to the central, executive branch policy office.

Consolidation of spectrum allocation authority would permit greater flexibility in assignment policies and eventually, even more efficient spectrum use. However, such a move requires legislation, it raises concerns about political interference in the assignment of frequencies, and it would inundate the new office with a highly routine workload. (The FCC now processes 800,000 applications yearly, compared to 37,000 now handled by the DTM.) For these reasons, immediate consolidation of these responsibilities is not recommended, but planning for eventual consolidation should be started.

A third issue concerns organizational arrangements for management of Federal communications networks to implement policy guidance. This is currently done through the National Communications System (NCS) structure. Both the BOB and GAO studies concluded that changes should be made in the NCS arrangements. However, the issues involved are too detailed and too complex to be settled in the context of reorganization of policy machinery. Therefore, the NCS arrangements should not be changed at this time, but should be studied as a priority matter by the new central policy office as soon as it is established. The study would review the effectiveness and objectives, system concepts, ~~and~~ organizational arrangements, of the NCS structure, and should include a thorough examination by the National Security Council of national security objectives for telecommunications.

~~The study also should include an evaluation of the effectiveness of the NCS structure and develop recommendations for the President regarding~~ the best objectives and management arrangements for overall coordination of Federal telecommunications activities.

Recommendations should be developed for the President regarding

~~Recommendation~~

An Office of Telecommunications Policy should be established as an independent entity in the Executive Office of the President. The Director of this office, appointed by the President, would have primary executive branch responsibility for both national telecommunications policies and Federal administrative telecommunication operations. The responsibilities of the Office of Telecommunications Policy would include:

-- economic, technical and systems analysis of telecommunications policies and opportunities in support of national policy formulation and U. S. participation in international telecommunications activities.

-- developing executive branch policy on telecommunications matters including, but not limited to, industry organization and practices, regulatory policies, and the allocation and use of the electromagnetic spectrum for both government and nongovernment use.

-- advocating executive branch policies to the FCC, and through the President to the Congress; and representing the Executive branch in FCC proceedings.

-- exercising final authority for the assignment of the spectrum to government users, and developing with the FCC a long-range plan for improved management of the total radio spectrum.

-- reviewing and evaluating the research and development for, and planning, operation, testing, procurement, and use of all telecommunication systems and services by the Federal government; developing appropriate policies and standards for such systems; and making recommendations to the Bureau of the Budget and responsible departmental officials concerning the scope and funding of competing, overlapping, or inefficient programs.

-- exercising the functions conferred on the President by the Communications Satellite Act.

-- under the policy guidance of the Director, Office of Emergency Preparedness, coordinating plans and programs for testing of and preparing to the use of telecommunications resources in a state of national emergency.

-- test, review, and report to the President, through the National Security Council, on the ability of national communications resources to meet established national security requirements efficiently and responsively.

-- coordinating Federal assistance to state and local governments in the telecommunications field.

In performing these functions, the Director, Office of Telecommunications Policy, will be assisted by a small staff, augmented as required by: (1) ad hoc, interagency and nongovernment task groups, (2) independent consultants, (3) contract studies, (4) a new Telecommunications Research and Analysis Center, (5) the Interdepartment Radio Advisory Committee, and (6) a new Telecommunications Advisory Committee composed of experts from outside of the government. So long as the NCS structure is retained, he will also be assisted by the Executive Agent of the NCS.

A Telecommunications Research and Analysis Center (TRAC) should be established in the Department of Commerce, reporting to the Assistant Secretary for Science and Technology. The TRAC would provide a centralized research, engineering, and analysis capability in support of spectrum management and such other areas as may be required. Specific functions of the TRAC would be to:

-- conduct research and analysis in the general field of telecommunication sciences in support of other government agencies or in response to specific directives from the Office of Telecommunications Policy, with particular emphasis on radio propagation, radio systems characteristics, and operating techniques leading to improved utilization of the radio resource.

-- develop and operate a national electromagnetic compatibility analysis facility under the general policy guidance of the Director, OTP.

-- provide the administrative and technical support required by the Interdepartment Radio Advisory Committee. This support will operate in accordance with policies and criteria laid down by the OTP, and will be responsive to OTP requests for information and special frequency assignment actions.

The Office of Telecommunications Policy should be established with an initial strength of up to 30 professionals, including up to 15 at supergrade levels. The position of Director, Office of Telecommunications Policy should be established at executive pay level III. Provision should be made within the budget of the office for adequate consulting fees and contractual support; and for administrative support to, and space for, task groups and personnel on short-term detail.

The Office of Telecommunications Management in the OEP should be abolished. All policy functions of that office not directly related to emergency preparedness should be transferred to the Office of Telecommunications Policy, along with appropriate emergency planning functions, final spectrum management authority, and NCS responsibilities. The major portion of the Frequency Management Directorate of the OTM should be transferred to the Department of Commerce to provide the technical and clerical support functions described above. The position of Special Assistant to the President for Telecommunications should be abolished.

The Office of Telecommunications Policy will exercise the policy functions of the Executive Office of the President with respect to the planning, integration, and emergency use of the telecommunications systems of the executive branch, subject to general policy guidance on appropriate matters from the National Security Council and the Director, OEP. This function will continue to be exercised through the mechanism of the National Communications System (NCS), until such time as changes in that mechanism are suggested by the policy review recommended above and approved by the President.

Draft

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Insert A

A third issue arises concerning the National Communications System. It is not clear that the NCS needs to be continued in its present form. The operational problems which prompted establishment of the NCS in 1963 have been largely overcome. There are a variety of possible arrangements under which the present level of coordination could be retained. The objectives, system concepts, and organizational arrangements for the NCS should be reviewed by an appropriate task group as soon as the location of the central policy office is settled. The NCS question is too complex to be settled in the reorganization of policy machinery.

Recommendation

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and NCS responsibilities

The Office of Telecommunications Policy will exercise the policy functions of the Executive Office of the President with respect to the planning, integration, and emergency use of the telecommunications systems of the executive branch, subject to general policy guidance on appropriate matters from the National Security Council and the Director, OEP. ~~Currently,~~ this function ~~is~~ will continue to be exercised through the mechanism of the National Communications System (NCS). ~~An ad hoc~~ group within the Executive Office of the President should be established to review this mechanism. This group should develop recommendations for the President concerning the need for the NCS and the proper objectives, configuration and management arrangements for the overall coordination of executive branch telecommunications. ~~It~~ until such time as changes in that mechanism are suggested by the policy review recommended above & ~~adop~~ approved by the President. ~~The Director of Telecommunication~~ Policy will ~~with~~ with

RESPONSIBILITIES OF THE OFFICE OF TELECOMMUNICATIONS POLICY

The Director of the Office of Telecommunications Policy develops the executive branch position on national telecommunications policy, coordinates the planning and operation of the telecommunications systems of the Federal government, discharges ~~assigned to the President~~ Presidential responsibilities in the areas of spectrum management and satellite communications, and performs emergency planning and control functions for telecommunications.

The Director serves as the President's principal advisor on telecommunications policy, including:

(1) The organization, practices, and regulation of the U. S. domestic and international communications industry.

(2) The allocation, use, and management of the radio spectrum resource for ~~both~~ government ~~and commercial~~ use, & preparation of recommendations to the FCC on spectrum allocation for civilian use.

(3) The preparation of U. S. positions for international communication conferences, conventions, and organizations.

(4) Federal research and development programs in support of the above.

The Director assures that the executive branch position on telecommunication policy issues is effectively presented to the Congress and to the Federal Communications Commission in the form of legislative proposals, recommendations, and testimony as required.

The Director's responsibilities for the planning and operation of Federal government telecommunications systems include:

(1) Development of government-wide standards for equipment and procedures, as required in the interest of economy or effectiveness.

(2) Evaluation of the ability of national communications resources adequately and efficiently to meet established national security and emergency communications requirements.

(3) Recommendations to the Bureau of the Budget concerning the funding of communications systems and research and development programs.

(4) Preparation of guidelines for the most economical procurement of Federal telecommunications services.

The Director exercises the authority, delegated by the President, to assign radio frequencies for use by the government. He is assisted in this responsibility by the Telecommunications Research and Analysis Center to be established in the Department of Commerce and the Interdepartmental Radio Advisory Committee. He carries out the responsibilities conferred on the President by the Communications Satellite Act. The Director coordinates the development of plans and programs for the mobilization and use of telecommunications resources in an emergency, and prepares to administer national telecommunications resources in the event of war under the overall policy guidance of the Director, OEP.

The Director coordinates assistance in telecommunications matters provided by the Federal government to State and local governments. He appoints scientists, engineers, and economists from outside government to advise on telecommunications matters.

To carry out these responsibilities, the Director must have the following qualifications:

(1) A thorough grasp of the social, economic, engineering, and national security factors which must be considered in formulating telecommunications policies and standards.

(2) Familiarity with telecommunications needs and opportunities of government, industry, and the public, and with the structure of private and governmental telecommunications institutions, both national and international.

(3) The ability to initiate and coordinate telecommunications policy matters on an interdepartmental basis in cooperation with industry and public interest groups, and to define and analyze those key policy issues requiring Presidential involvement.

(4) The ability to direct studies utilizing systems analysis, systems engineering, and economics needed for the systematic analysis of telecommunications policies and opportunities, their impact, their effectiveness, and their costs.

MEMORANDUM

Insert A

THE WHITE HOUSE

WASHINGTON

~~two objectives~~ organizational

A third issue concerns ~~the~~ arrangements for management of Federal communications networks to ~~carry out the~~ implement ~~the~~ policy guidance. ~~of the~~ This is currently done through the National Communications System (NCS) structure. Both the BOB & GAO studies concluded that changes should be made in the NCS arrangements. However, ~~the detailed~~ issues involved are too detailed ~~for~~ & too complex to be settled in the context of ~~policy~~ reorganization ~~for~~ policy machinery. Therefore, the NCS arrangements should not be changed at this time, but should be studied as ~~soon as~~ a priority matter by the new central policy office as soon as it is established. The study would review the objectives, system concepts,

MEMORANDUM

THE WHITE HOUSE

WASHINGTON

& organizational arrangements of the NCS ~~system arrangement~~ structure, & should include a ~~thorough~~ thorough examination of the national security ~~telecommunications~~ objectives ~~to be placed~~ for telecommunications. ~~It is~~ The ~~study should be designed to formulate~~ recommendations for the President concerning the ~~need for~~ effectiveness of the NCS structure, the proper objectives & management arrangements for coordination.

The study should also include an evaluation of the effectiveness of the NCS structure & ~~present~~ develop recommendations for the Pres. regarding the best objectives & management arrangements for overall coordination of Federal telecommunications activities.

MEMORANDUM

THE WHITE HOUSE

WASHINGTON

(list of people given to Joyce)

To:

From: Pete Flanigan

Attached are:

(1) A discussion of the executive branch organization for telecommunications & issues connected with recent proposals for reorganization.

(2) A recommended reorganization

(3) A description of the responsibilities of a new Office of Telecommunications Policy.

~~May~~ I would like to have your comments by ~~December~~ November 28, prior to submitting a recommendation to the President.

PMF

Separate memos for list.

Triple space

~~DRAFT 11/12/69~~ Executive Branch Organization for Telecommunications

~~MEMORANDUM FOR THE PRESIDENT~~

In spite of the rapidly growing importance of telecommunications to the Nation and for the government's own missions, there is no effective policy-making capability for telecommunications in the executive branch. Government-wide coordination of its own telecommunications activities has not been adequate. The Administration is therefore largely unable to exert leadership or take initiatives in spite of vulnerability to criticism for FCC policies. These problems have been manifested ~~[illegible]~~ in several ways:

1. There is a serious lack of effective machinery for dealing expeditiously with domestic telecommunications issues. The government has been grappling for several years, with only limited success, with such issues as "foreign attachments" to the public telephone network, cable TV and pay TV, the possible uses and industry structure for a domestic satellite communications system, and policies for computer communications. There is a current tendency to resolve such issues by past precedents and by compromises between the FCC and various agencies in the executive branch, but The increasingly rapid rate of technological change and introduction of new services makes policy-by-precedent increasingly less relevant, more restrictive, or counterproductive. Neither the FCC nor the executive branch have a significant capability for systematic, economic and technical analysis.

2. Efforts to coordinate the procurement and use of telecommunications facilities and services by the Federal government have not been very successful. The current coordination arrangements, embodied in the National Communications System (NCS) structure, have achieved certain desirable interconnections and operating procedures, but have not produced the desired assurances that the government is procuring the services needed in an efficient manner. Although present policies call for ~~No one seems to know whether~~ a "unified" NCS ~~is desirable,~~ there is little agreement on what further implementation is needed, or what it ~~means~~ would cost, ~~or would~~ accomplish.

3. The current procedures for allocation ~~of the frequency~~ spectrum are highly inflexible and are increasingly creating a spectrum shortage crisis. The shortage is especially severe in the land mobile radio allocations, which are becoming increasingly important to local police and fire protection services, among many other claimants.

Current organization for communications policy-making and coordination:

The Director of Telecommunications Management (DTM) in the Office of Emergency Preparedness is now charged by Executive Order and Presidential memorandum with the responsibility for coordinating

telecommunications activities in the executive branch. The DTM also is designated Special Assistant to the President for Telecommunications. However, the history of the organization reveals that attempts by the DTM to exercise leadership in communications policy have been largely ineffectual. This situation results from a number of factors ~~such as~~ including organizational location, inadequate staff, and ~~fragmentation of policy authority among half a dozen agencies with no one having overall responsibility.~~ lack of clear authority. The ~~In view of its claimed~~ responsibilities & authority ~~the credibility~~ of the DTM ~~is~~ are questioned by agencies with operating responsibilities.

There is now no office in the executive branch with the responsibility or the capability to review the whole range of national telecommunications policies as expressed in legislation and in FCC policies. The antitrust division of the Department of Justice has occasionally filed briefs on the competitive aspects of decisions before the FCC, but these derive largely from antitrust considerations rather than from familiarity with communications issues. ~~The~~ Neither the Council of Economic Advisers nor the Office of Science & Technology ~~has shown almost no capability or interest in telecommunications, and OST is certainly~~ are not equipped ~~for addressing~~ to address the fundamental economic and institutional problems of the communications industry and its regulation by the FCC, or the problems of the government's own telecommunications

The Department of Commerce has a telecommunications research capability, but no responsibility or familiarity with communications policy. ~~problems~~

Studies of
Federal organization~~, weaknesses~~:

Since World War II, there have been a number of studies of Federal communications organization and a number of reorganizations and shifts of responsibilities within the executive branch. None has proved particularly satisfactory, and, indeed, there ~~does not seem~~ is no ideal ~~to be any neat~~ solution~~, to this problem.~~ ~~The lack of a good solution~~ This situation ~~apparently~~ is due in part to the quasi-independence of the FCC from the executive branch and in part to the conflicting requirements ~~of~~ for Executive ~~Office telecommunications~~ branch coordination~~,~~ and individual agency mission responsibilities, & Federal regulatory responsibilities.

The study of the Federal government communications organization completed in December 1968 by the Bureau of the Budget provides a good statement of the shortcomings of our current organization. The Bureau of the Budget reported a need for:

(1) a strengthened organization for policy planning, formulation and direction of Federal communications activities.

(2) a reorganized and strengthened National Communications System (NCS) within the Department of Defense.

(3) an improved procurement and technical assistance effort in communications on behalf of those Federal agencies which do not now have adequate resources in this field.

(4) a unified frequency spectrum management process.

(5) a coordinated technical assistance program for State and local government in this area.

of the Government Accounting Office

The recently released ~~GAO~~ report, focused on the government's communications ~~and particularly~~ a evaluation the progress toward establishment of a unified National Communications System, as directed by the President in 1963. The GAO ~~also~~ found a need for stronger coordination of government telecommunications planning, and recommended a single entity be responsible for ~~both planning and operation~~ policy direction & control of the Government's telecommunications ~~activities.~~ systems. The GAO also recommended clarification of what ~~the~~ a unified NCS is intended to be.

Issues ~~in~~ reorganization:

The Budget Bureau study of Federal communications organization made a number of major recommendations and was recently distributed to the concerned departments. Agency views on this study have the common theme that (1) stronger coordination from the top is required in establishing Government policy for its own telecommunications requirements and that (2) the Federal Government should take a stronger role in the evolution of national telecommunications to deal with the increasingly rapid rate of technological change and industry growth. There is also agreement that a much stronger analytic capability within the executive branch is needed to achieve these goals.

There are a variety of possible ways in which telecommunications responsibilities could be reshuffled or strengthened. As a starting

point, there is widespread agreement that a single office should bear ultimate responsibility for:

(1) analyses and formulation of overall telecommunications policy for the executive branch.

(2) policy-level coordination of Federal Government procurement and use of telecommunications services and equipment.

(3) allocation and assignment of spectrum resources to government users.

There are several further issues. The first is where such an office should be located. There are two competing sets of considerations, ~~about where such a central office should be located~~. Further expansion of telecommunications activities within the Executive Office of the President ~~is undesirable because (1) it~~ would force growth in the Executive Office of the President, ~~and (2) it is not felt that~~ while telecommunications ~~warrants the degree of~~ does not require the frequent direct Presidential attention implied by a location within the Executive Office. On the other hand, placing the central office within an executive department (e.g., Commerce or Transportation) raises serious questions about ~~(1)~~ the impartiality of frequency allocation and assignment among government users and (2) the ~~protection~~ assurance of vital national security interests. Both sides of this issue have considerable merit, but a practical matter from the standpoint of practicality & the need to minimize disruptions of our policy machinery, the policy functions should for the time being remain in the Executive Office. However as much of the operational & research responsibilities as possible should be (over)

Another issue is whether the authority to allocate and assign frequency spectrum to nongovernment users, now vested in the FCC, should be transferred to the central, executive branch policy office.

carried out in the departments & agencies.

Consolidation of spectrum allocation authority would permit greater flexibility in assignment policies and eventually, even more efficient spectrum use. However, such a move requires legislation, it raises concerns about political interference in the assignment of frequencies, and it would inundate the new office with a high routine workload. (The FCC now processes 800,000 applications yearly, compared to 37,000 now handled by the OTM.) For these reasons, immediate consolidation of these responsibilities is not recommended, but planning for eventual consolidation should be started.

A third issue arises concerning the National Communications System. It is not clear that the NCS needs to be continued in its present form. The operational problems which prompted establishment of the NCS in 1963 have been largely overcome. There are a variety of possible arrangements under which the present level of coordination could be retained. The objectives, system concepts and organizational arrangements for the NCS should be reviewed by an appropriate task group as soon as the location of central policy office is settled. The NCS question is too complex to be settled in the reorganization of policy machinery.

Recommendation:

In view of all the considerations set forth above, it appears preferable to retain the telecommunications policy function in the Executive Office of the President. However, it is not desirable to expand the size of the Executive Offices, nor is it desirable to make the research and analysis that is required entirely dependent on funding limitations facing Executive Office agencies.

Attached are a recommended organizational change and a description of the responsibilities of a new Office of Telecommunications Policy. May I have your comments by November 24, prior to submitting the recommendation to the President.

Attachments

Recommendation

An Office of Telecommunications Policy should be established as an independent entity in the Executive Office of the President. The Director of this office, appointed by the President, would have primary executive branch responsibility for both national telecommunications policies and Federal administrative telecommunication operations. The responsibilities of the Office of Telecommunications Policy would include:

-- economic, technical and systems analysis of telecommunications policies and opportunities in support of national policy formulation and U. S. participation in international telecommunications activities.

-- developing executive branch policy on telecommunications matters including, but not limited to, industry organization and practices, regulatory policies, and the allocation and use of the electromagnetic spectrum for both government and nongovernment use.

-- advocating executive branch policies to the FCC, and through the President to the Congress.

-- exercising final authority for the assignment of the spectrum to government users, and developing with the FCC a long-range plan for improved management of the total radio spectrum.

-- reviewing the research and development for, and the procurement and use of, telecommunication systems and services by the Federal government; developing appropriate policies and standards for such systems; and making recommendations to the Bureau of the Budget and responsible departmental officials concerning the scope and funding of competing, overlapping or inefficient programs.

-- exercising the functions conferred on the President under the Communications Satellite Act.

-- under the ~~general~~ policy guidance of the Director, Office of Emergency Preparedness, coordinating ~~policy~~, plans and programs for, and preparing to administer, the use of telecommunications resources in a state of national emergency.

-- review and report to the President, through the National Security Council, on the ability of national communications resources to meet established national security requirements efficiently and responsively.

-- coordinating Federal assistance to state and local governments in the telecommunications field.

In performing these functions, the Director, Office of Telecommunications Policy, will be assisted by a small staff, augmented as required by: (1) ad hoc, interagency and nongovernment task groups, (2) independent consultants, (3) contract studies, (4) a new Telecommunications Research and Analysis Center, (5) the Interdepartment Radio Advisory Committee, and (6) a new Telecommunications Advisory Committee composed of experts from outside of the government.

A Telecommunications Research and Analysis Center (TRAC) should be established in the Department of Commerce, reporting to the Assistant Secretary for Science and Technology. The TRAC would provide a centralized research, engineering, and analysis capability in support of spectrum management and such other areas as may be required. Specific functions of the TRAC would be to:

-- conduct research and analysis in the general field of telecommunication sciences in support of other government agencies or in response to specific directives from the Office of Telecommunications Policy, with particular emphasis on radio propagation, radio systems characteristics, and operating techniques leading to improved utilization of the radio resource.

-- develop and operate a national electromagnetic compatibility analysis facility under the general policy guidance of the Director, OTP.

-- provide the administrative and technical support required by the Interdepartment Radio Advisory Committee. This support will operate in
a accordance with policies and criteria laid down by the OTP, and will be responsive to OTP requests for information and special frequency assignment actions.

The Director, Office of Telecommunications Policy will be vested with the authority to assign radio frequencies to government users. He will be assisted in this responsibility by the IRAC, which will receive technical and clerical support from the TRAC.

The Office of Telecommunications Policy should be established with an initial strength of up to 30 professionals, including up to 15 at super-grade levels. The position of Director, Office of Telecommunications Policy should be established at executive pay level III. Provision should be made within the budget of the office for adequate consulting fees and contractual support; and for administrative support to, and space for, task groups and personnel on detail.

The Office of Telecommunications Management in the OEP should be abolished. All policy functions of that office, appropriate emergency planning functions, and final spectrum management authority should be transferred to the Office of Telecommunications Policy. The major portion of the Frequency Management Directorate of the OTM should be transferred to the Department of Commerce to provide the technical and clerical support functions described above. The position of Special Assistant to the President for Telecommunications should be abolished.

The Office of Telecommunications Policy will exercise the policy functions of the Executive Office of the President with respect to the planning, integration, and emergency use of the telecommunications systems of the executive branch, subject to general policy guidance on appropriate matters from the National Security Council and the Director, OEP. Currently, this function is exercised through the mechanism of the National Communications System (NCS). An ad hoc group within the Executive Office of the President should be established

to review this mechanism. This group should develop recommendations for the President concerning the need for the NCS and the proper objectives, configuration, and management arrangements for the overall coordination of executive branch telecommunications.

RESPONSIBILITIES OF THE OFFICE OF TELECOMMUNICATIONS POLICY

The Director of the Office of Telecommunications Policy develops the executive branch position on national telecommunications policy, coordinates the planning and operation of the telecommunications systems of the Federal government, discharges responsibilities assigned to the President in the areas of spectrum management and satellite communications, and performs emergency planning and control functions for telecommunications.

The Director serves as the President's principal advisor on telecommunications policy, including:

(1) The organization, practices, and regulation of the U. S. domestic and international communications industry.

(2) The allocation, use, and management of the radio spectrum resource for both government and commercial uses.

(3) The preparation of U. S. positions for international communication conferences, conventions, and organizations.

(4) Federal research and development programs in support of the above.

The Director assures that the executive branch position on telecommunication policy issues is effectively presented to the Congress and to the Federal Communication Commission in the form of legislative proposals, recommendations, and testimony as required.

The Director's responsibilities for the planning and operation of Federal government telecommunications systems include:

(1) Development of government-wide standards for equipment and procedures, as required in the interest of economy or effectiveness.

(2) Evaluation of the ability of national communications resources adequately and efficiently to meet established national security and emergency communications requirements.

(3) Recommendations to the Bureau of the Budget concerning the funding of communications systems and research and development programs.

(4) Preparation of guidelines for the most economical procurement of Federal telecommunications services.

The Director exercises the authority, delegated by the President, to assign radio frequencies for use by the government. He is assisted in this responsibility by the Electrospace Research and Engineering Agency in the Departme of Commerce and the Interdepartmental Radio Advisory Committee. He carries out the responsibilities conferred on the President by the Communications Satellite Act. The Director coordinates the development of plans and programs for the mobilization and use of telecommunications resources in an emergency, and prepares to administer national telecommunications resources in the event of war under the overall policy guidance of the Director, OEP

The Director coordinates assistance in telecommunications matters provided by the Federal government to state and local governments. He appoints scientists, engineers, and economists from outside government to advise on telecommunications matters.

To carry out these responsibilities, the Director must have the following qualifications:

(1) A thorough grasp of the national security, social, economic, and engineering factors which must be considered in formulating telecommunications policies and standards.

(2) Familiarity with telecommunications needs and opportunities of government, industry, and the public, and with the structure of private and governmental telecommunications institutions, both national and international.

(3) The ability to initiate and coordinate telecommunications policy matters on an interdepartmental basis in cooperation with industry and public interest groups, and to define and analyze those key policy issues requiring Presidential involvement.

(4) The ability to direct studies utilizing systems analysis, systems engineering, and economics needed for the systematic analysis of telecommunications policies and opportunities, their impact, their effectiveness, and their costs.

THE WHITE HOUSE

WASHINGTON

November 13, 1969

TO Tom Whitehead

FROM Charles Joyce CJ

Attached are pencilled comments on your draft.

There are only a couple of substantive points.

1. On Page 3, I suggest deleting "fragmentation of policy authority, etc." as one of the factors currently limiting DTM performance. I'm not really sure that policy authority is fragmented, and to the extent that it is, we are not really changing anything. I have proposed an alternative limiting factor; you may not like it.

2. The GAO did not recommend that a single entity be responsible for both planning and operation of the Government's telecommunications systems. I have changed this statement using words from the GAO report. The digest of that report is attached for your information.

Attachments

Admn, NASA
Admin, GSA

Sec State
Dir, BOB
Science Advisor
Asst to Pres for Nat Sec Aff.
Sec Def
Sec Comm
Sec Transp
Dir, OEP
Dir, CIA

DRAFT 11/12/69

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In spite of the rapidly growing importance of telecommunications to the Nation and for the government's own missions, there is no effective policy-making capability for telecommunications in the executive branch. Government-wide coordination of its own telecommunications activities has not been adequate. The Administration is therefore largely unable to exert leadership or take initiatives in spite of vulnerability to criticism for ~~FCC~~ the policies. of the Federal Communications Commission (FCC).

1. There is a serious lack of effective machinery for dealing expeditiously with domestic telecommunications issues. The government has been grappling for several years, with only limited success, with such issues as "foreign attachments" to the public telephone network, cable TV and pay TV, the possible uses and industry structure for a domestic satellite communications system, and policies for computer communications. There is a current tendency to resolve such issues by past precedents and by compromises between the FCC and various agencies in the executive branch. The increasingly rapid rate of technological change and introduction of new services makes policy-by-precedent increasingly less relevant, more restrictive, or counterproductive. Neither the FCC nor the executive branch ~~have~~ has a significant capability for systematic, economic and technical analysis.

2. Efforts to coordinate the procurement and use of telecommunications facilities and services by the Federal government have not been very successful. The current coordination arrangements, embodied in the National Communications System (NCS) structure, have achieved certain desirable interconnections and operating procedures, but have not produced the desired assurances that the government is procuring the services needed in an efficient manner. Although present policies call for a "unified" NCS, there is ~~manner. No one seems to know whether a "unified" NCS is desirable,~~ no agreement on what further "unification" is needed, what it ~~what it means~~, would cost, or would accomplish.

3. The current procedures for allocating the frequency spectrum are highly inflexible and are increasingly creating a spectrum shortage crisis. The shortage is especially severe in the land mobile radio allocations, which are becoming increasingly important to local police and fire protection services, among many other claimants.

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telecommunications activities in the executive branch. The DTM also is designated Special Assistant to the President for Telecommunications. However, the history of the organization reveals that attempts by the DTM to exercise leadership in communications policy have been largely ineffectual. This situation results from a number of factors ~~such as~~ including organizational location, inadequate staff, and ~~fragmentation of policy authority among half a dozen agencies with no one having overall responsibility.~~ a lack of effective communication in the past between the White House and the DTM. ~~In view of its claimed responsibilities, the credibility of~~ The authority and responsibilities claimed by the DTM ~~is~~ are questioned by agencies with operating responsibilities.

~~There is now no~~ No other office in the executive branch has any significant ~~with the~~ responsibility or ~~the~~ capability to review national telecommunications policies as expressed in legislation and in FCC policies. The antitrust division of the Department of Justice has occasionally filed briefs on the competitive aspects of decisions before the FCC, but these derive largely from antitrust considerations rather than from familiarity with communications issues. ~~issues.~~ Neither The Council of Economic Advisers nor the Office of Science and Technology are ~~has shown almost no capability or interest in telecommunications, and OST is certainly not~~ equipped ~~for addressing~~ to address the fundamental economic and institutional problems of the communications industry and its regulation by the FCC.

The Department of Commerce has a communications research laboratory in Colorado, but no responsibility or capability in the communications policy area.

Recent Studies of

Federal organization weaknesses:

Since World War II, there have been a number of studies of Federal communications organization and a number of reorganizations and shifts of responsibilities within the executive branch. None has proved particularly satisfactory, and, indeed, there ~~does not seem to be any neat~~ is no ideal solution to this problem. ~~The lack of a good solution apparently~~ This is due in part to the quasi-independence of the FCC from the executive branch and in part to the conflicting requirements of Executive ~~Office~~ branch telecommunications coordination, ~~and~~ individual agency mission responsibilities, and governmental regulatory responsibilities.

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(1) a strengthened organization for policy planning, formulation and direction of Federal communications activities.

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(3) an improved procurement and technical assistance effort in communications on behalf of those Federal agencies which do not now have adequate resources in this field.

(4) a unified frequency spectrum management process.

(5) a coordinated technical assistance program for State and local governments in this area.

In July 1969, the General Accounting Office (GAO) released a report which evaluates the progress toward establishment of a unified National Communications System as directed by the President in 1963. The GAO found a need for stronger coordination of government telecommunications planning. It recommended that a single entity be responsible for policy direction and control, with the functions of planning, designing and coordinating the Government's telecommunications systems. The GAO also recommended clarification of what a unified NCS is intended to be.

Issues in reorganization:

The Budget Bureau study of Federal communications organization made a number of major recommendations and was recently distributed to the concerned departments. Agency views on this study have the common theme that (1) stronger coordination from the top is required in establishing Government policy for its own telecommunications requirements and that (2) the Federal Government should take a stronger role in the evolution of national telecommunications to deal with the increasingly rapid rate of technological change and industry growth. There is also agreement that a much stronger analytic capability within the executive branch is needed to achieve these goals.

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(1) analyses and formulation of overall telecommunications policy for the executive branch.

(2) policy-level coordination of Federal Government procurement and use of telecommunications services and equipment.

(3) allocation and assignment of spectrum resources to government users.

The first issue is where such an office should be located. There are two competing sets of considerations. ~~about where such a central office should be located.~~ On the one hand, further expansion of telecommunications activities within the Executive Office of the President is undesirable because: (1) it forces growth in the Executive Office of the President, and (2) ~~it is not felt that~~ telecommunications does not clearly warrant the degree of direct Presidential attention implied by a location within the Executive Office. On the other hand, placing the central office within an executive department (e.g., Commerce or Transportation) raises questions about: (1) the impartiality of frequency allocation and assignment among government users, and (2) the protection of vital national security interests.

A second ~~Another~~ issue is whether the authority to allocate and assign frequency spectrum to nongovernment users, now vested in the FCC, should be transferred to the central, executive branch policy office.

Consolidation of spectrum allocation authority would permit greater flexibility in assignment policies and eventually, even more efficient spectrum use. However, such a move requires legislation, it raises concerns about political interference in the assignment of frequencies, and it would inundate the new office with a high routine workload. (The FCC now processes 800,000 applications yearly, compared to the 37,000 now handled by the OTP.) For these reasons, immediate consolidation of these responsibilities is not recommended, but planning for eventual consolidation should be started.

A third issue arises concerning the National Communications System. It is not clear that the NCS needs to be continued in its present form. The operational problems which prompted establishment of the NCS in 1963 have been largely overcome. There are a variety of possible arrangements under which the present level of coordination could be retained. The objectives, system concepts and organizational arrangements for the NCS should be reviewed by an appropriate task group as soon as the location of the central policy office is settled. The NCS question is too complex to be settled in the reorganization of policy machinery.

Recommendation:

In view of all the considerations set forth above, it appears preferable to retain the telecommunications policy function in the Executive Office of the President. However, it is not desirable to expand the size of the Executive Offices, nor is it desirable to make the research and analysis that is required entirely dependent on funding limitations facing Executive Office agencies.

Attached are a recommended organizational change and a description of the responsibilities of a new Office of Telecommunications Policy. May I have your comments by November 24, prior to submitting the recommendation to the President.

Attachments

Recommendation

An Office of Telecommunications Policy should be established as an independent entity in the Executive Office of the President. The Director of this office, appointed by the President, would have primary executive branch responsibility for both national telecommunications policies and Federal administrative telecommunication operations. The responsibilities of the Office of Telecommunications Policy would include:

-- economic, technical and systems analysis of telecommunications policies and opportunities in support of national policy formulation and U. S. participation in international telecommunications activities.

-- developing executive branch policy on telecommunications matters including, but not limited to, industry organization and practices, regulatory policies, and the allocation and use of the electromagnetic spectrum for both government and nongovernment use.

-- advocating executive branch policies to the FCC, and through the President to the Congress.

-- exercising final authority for the assignment of the spectrum to government users, and developing with the FCC a long-range plan for improved management of the total radio spectrum.

-- reviewing the research and development for, and the procurement and use of, telecommunication systems and services by the Federal government; developing appropriate policies and standards for such systems; and making recommendations to the Bureau of the Budget and responsible departmental officials concerning the scope and funding of competing, overlapping or inefficient programs.

-- exercising the functions conferred on the President under the Communications Satellite Act.

-- under the general policy guidance of the Director, Office of Emergency Preparedness, coordinating policy, plans and programs for, and preparing to administer, the use of telecommunications resources in a state of national emergency.

-- review and report to the President, through the National Security Council, on the ability of national communications resources to meet established national security requirements efficiently and responsively.

-- coordinating Federal assistance to state and local governments in the telecommunications field.

In performing these functions, the Director, Office of Telecommunications Policy, will be assisted by a small staff, augmented as required by: (1) ad hoc, interagency and nongovernment task groups, (2) independent consultants, (3) contract studies, (4) a new Telecommunications Research and Analysis Center, (5) the Interdepartment Radio Advisory Committee, and (6) a new Telecommunications Advisory Committee composed of experts from outside of the government.

A Telecommunications Research and Analysis Center (TRAC) should be established in the Department of Commerce, reporting to the Assistant Secretary for Science and Technology. The TRAC would provide a centralized research, engineering, and analysis capability in support of spectrum management and such other areas as may be required. Specific functions of the TRAC would be to:

-- conduct research and analysis in the general field of telecommunication sciences in support of other government agencies or in response to specific directives from the Office of Telecommunications Policy, with particular emphasis on radio propagation, radio systems characteristics, and operating techniques leading to improved utilization of the radio resource.

-- develop and operate a national electromagnetic compatibility analysis facility under the general policy guidance of the Director, OTP.

-- provide the administrative and technical support required by the Interdepartment Radio Advisory Committee. This support will operate in accordance with policies and criteria laid down by the OTP, and will be responsive to OTP requests for information and special frequency assignment actions.

The Director, Office of Telecommunications Policy will be vested with the authority to assign radio frequencies to government users. He will be assisted in this responsibility by the IRAC, which will receive technical and clerical support from the TRAC.

The Office of Telecommunications Policy should be established with an initial strength of up to 30 professionals, including up to 15 at super-grade levels. The position of Director, Office of Telecommunications Policy should be established at executive pay level III. Provision should be made within the budget of the office for adequate consulting fees and contractual support; and for administrative support to, and space for, task groups and personnel on detail.

The Office of Telecommunications Management (OTM) in the OEP should be abolished. All policy functions of that office, appropriate emergency planning functions, and final spectrum management authority should be transferred to the Office of Telecommunications Policy. The major portion of the Frequency Management Directorate of the OTM should be transferred to the Department of Commerce to provide the technical and clerical support functions described above. The position of Special Assistant to the President for Telecommunications should be abolished.

The Office of Telecommunications Policy will exercise the policy functions of the Executive Office of the President with respect to the planning, integration, and emergency use of the telecommunications systems of the executive branch, subject to general policy guidance on appropriate matters from the National Security Council and the Director, OEP. Currently, this function is exercised through the mechanism of the National Communications System (NCS). An ad hoc group within the Executive Office of the President should be established

to review this mechanism. This group should develop recommendations for the President concerning the need for the NCS and the proper objectives, configuration and management arrangements for the overall coordination of executive branch telecommunications.

RESPONSIBILITIES OF THE OFFICE OF TELECOMMUNICATIONS POLICY

The Director of the Office of Telecommunications Policy develops the executive branch position on national telecommunications policy, coordinates the planning and operation of the telecommunications systems of the Federal government, discharges responsibilities assigned to the President in the areas of spectrum management and satellite communications, and performs emergency planning and control functions for telecommunications.

The Director serves as the President's principal advisor on telecommunications policy, including:

(1) The organization, practices, and regulation of the U. S. domestic and international communications industry.

(2) The allocation, use, and management of the radio spectrum resource for both government and commercial uses.

(3) The preparation of U. S. positions for international communication conferences, conventions, and organizations.

(4) Federal ~~reserach~~ research and development programs in support of the above.

The Director assures that the executive branch position on telecommunication policy issues is effectively presented to the Congress and to the Federal Communications Commission in the form of legislative proposals, recommendations, and testimony as required.

The Director's responsibilities for the planning and operation of Federal government telecommunications systems include:

(1) Development of government-wide standards for equipment and procedures, as required in the interest of economy or effectiveness.

(2) Evaluation of the ability of national communications resources adequately and efficiently to meet established national security and emergency communications requirements.

(3) Recommendations to the Bureau of the Budget concerning the funding of communications systems and research and development programs.

(4) Preparation of guidelines for the most economical procurement of Federal telecommunications services.

a Telecommunications Research and Analysis Center to be established

The Director exercises the authority, delegated by the President, to assign radio frequencies for use by the government. He is assisted in this responsibility by the ~~Electrospace Research and Engineering Agency~~ in the Department of Commerce and the Interdepartmental Radio Advisory Committee. He carries out the responsibilities conferred on the President by the Communications Satellite Act. The Director coordinates the development of plans and programs for the mobilization and use of telecommunications resources in an emergency, and prepares to administer national telecommunications resources in the event of war under the overall policy guidance of the Director, OEP

The Director coordinates assistance in telecommunications matters provided by the Federal government to state and local governments. He appoints scientists, engineers, and economists from outside government to advise on telecommunications matters.

To carry out these responsibilities, the Director must have the following qualifications:

(1) A thorough grasp of the national security, social, economic, and engineering factors which must be considered in formulating telecommunications policies and standards.

(2) Familiarity with telecommunications needs and opportunities of government, industry, and the public, and with the structure of private and governmental telecommunications institutions, both national and international.

(3) The ability to initiate and coordinate telecommunications policy matters on an interdepartmental basis in cooperation with industry and public interest groups, and to define and analyze those key policy issues requiring Presidential involvement.

(4) The ability to direct studies utilizing systems analysis, systems engineering, and economics needed for the systematic analysis of telecommunications policies and opportunities, their impact, their effectiveness, and their costs.

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

REVIEW OF STATUS OF DEVELOPMENT TOWARD ESTABLISHMENT OF A UNIFIED NATIONAL COMMUNICATIONS SYSTEM

B-166655

D I G E S T

WHY THE REVIEW WAS MADE

On August 21, 1963, the President directed the establishment of a unified National Communications System (NCS) in order to strengthen the communications support of all major functions of the Government. The objective was to provide necessary communications for the Federal Government under all conditions ranging from normal situations to national emergencies and international crises, including nuclear attack. (See ch. 3.)

The Government's telecommunications needs are varied, complex, worldwide in scope, and oftentimes very costly. Although precise data are not available, about $1 billion annually has been estimated to be associated with the Government's long-distance communications costs in which NCS is principally involved. (See ch. 1.)

The General Accounting Office (GAO) made this review because of the importance of the system, potential savings through a unified system, and the interest of the Congress in the telecommunications area.

FINDINGS AND CONCLUSIONS

The need for the President to have necessary communications at all times and under all conditions is obvious, and a major objective of the NCS is to insure such availability. An NCS affords substantial opportunities for economies as well as improvements in day-to-day communications, and these are also important objectives of the NCS.

GAO's review showed that many of the issues and problems that are hampering accomplishment of the NCS objectives are of long standing and in need of early resolution. GAO's study also points out that the interest and concern expressed over the years by a number of congressional committees have not been dealt with in bringing about improvements in the policy formulation and direction of the Government's telecommunications resources.

In the more than 5 years that have elapsed since the President directed that a unified NCS be established, hundreds of millions of dollars have been expended annually in the procurement, construction, operation, and maintenance of component networks, with little effective centralized

direction and control. Some progress has been made (see ch. 5), but much remains to be done if the NCS is to properly achieve its objectives. (See ch. 6.)

Although NCS has provided a forum for the interchange of ideas between agency communications staffs, significant issues and problems exist within the NCS organizational structure and management arrangements, which appear to be impeding the timely achievement of its objectives and goals. (See ch. 9.)

Except for the President of the United States, there is no individual or organization in the Federal Government with the authority, stature, and resources to provide the essential policy, direction, and control required to establish a unified Government telecommunications system. Authority and responsibility for telecommunications decisions and activities are widely dispersed among the various departments and agencies involved. The basic planning and general design control are not carried out on a unified basis from a central source. These functions are performed largely in an agency-oriented environment rather than in an NCS frame of reference. (See ch. 9.)

Consequently, there is no basic plan or "blueprint" to chart the course of the NCS from its present confederation of agency networks to the goal of a unified system. Even if such a blueprint existed, there is no effective or authoritative overview to ensure that agency planning and funding would conform to the overall plan. (See ch. 9.)

As a result, the perpetuation, and even proliferation, of networks used largely for the accomplishment of individual agency missions continues. These networks are planned, designed, funded, operated, and maintained by the individual agencies.

Thus, there is little, if any, centralized direction and control over the development and improvement of the agency networks. (See ch. 10.) Also, there is no assurance that the broader national objectives of (1) reliable and effective communications capability and (2) economy of operation from a Government-wide standpoint are being effectively considered. (See chs. 7 and 8.)

RECOMMENDATIONS OR SUGGESTIONS

The President should give consideration to a major realignment of the existing NCS structure and organizational arrangements--a realignment which will establish an organization and give it stature, authority, and resources sufficient to provide a strong central telecommunications authority as the Government's central focal point in telecommunications matters.

In making the realignment, consideration should be given to:

--removing the Office of the Director of Telecommunications Management (DTM) as a component part of the Office of Emergency Preparedness (OEP) and reconstituting this office as the new organization or entity, and

--assigning the present roles and functions of the Executive Agent, NCS, and the Manager, NCS, to the proposed organization or entity.

AGENCY ACTIONS AND UNRESOLVED ISSUES

The Special Assistant to the President for Telecommunications (SAPT) assured GAO that its recommendations would be given thorough consideration, together with other recommendations that have been made, prior to any decision concerning the necessity for and manner of realigning the telecommunications organization within the executive branch. (See ch. 12.)

Comments from other executive branch agencies and offices showed that the need for a strengthened policy-making structure was clearly and widely recognized. There was, however, a diversity of opinion as to the organizational activity to which the Executive Agent and Manager roles and functions--such as planning, designing, and coordinating activities under the guidance of the SAPT--should be transferred, if at all. (See ch. 12.) GAO strongly believes that these functions are an integral part of a centralized telecommunications authority and should be clearly recognized as such.

The GAO also believes that the centralization of essential policy direction and control with the functions of planning, designing and coordinating would better enable more effective and objective consideration of the dual purposes of day-to-day communications as well as service in times of extreme national emergency.

Such an arrangement would also avoid any conflict of roles in the discharge of the functions as they now exist under the separation of these functions between OEP and the Department of Defense (DOD).

It would separate these functions from the parochial interest of any individual agency, including the emergency planning functions of OEP.

The departments and agencies would own and operate the component networks of the NCS under the guidance and direction of the centralized authority. However, the centralized authority would consult with departments and agencies concerned. In case of conflict, both the departments and agencies and the centralized authority would have access to the President.

GAO is also recommending, in addition to an organization realignment, that the President direct that early attention and appropriate action be taken to (1) clarify what a "unified" NCS is intended to be (see chs. 3 and 12), (2) resolve the question of the establishment of an integrated trunking system (see ch. 6), and (3) resolve the issue concerning the combination of the separate voice networks operated by DOD and the General Services Administration. (See ch. 7.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

Several committees of the Congress have had a keen interest in the Government's overall telecommunications policies and the organizational arrangements that exist for formulating policy and managing this function within the executive branch. This report is being furnished to the Congress to apprise it of GAO's findings and recommendations, for consideration of such action as may be taken on these recommendations by the President, and for such action as it or its committees may deem appropriate.

Reorg Pub TV Document/FCC

Budget memo

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- Gifford — PMF for Tues or Wed.

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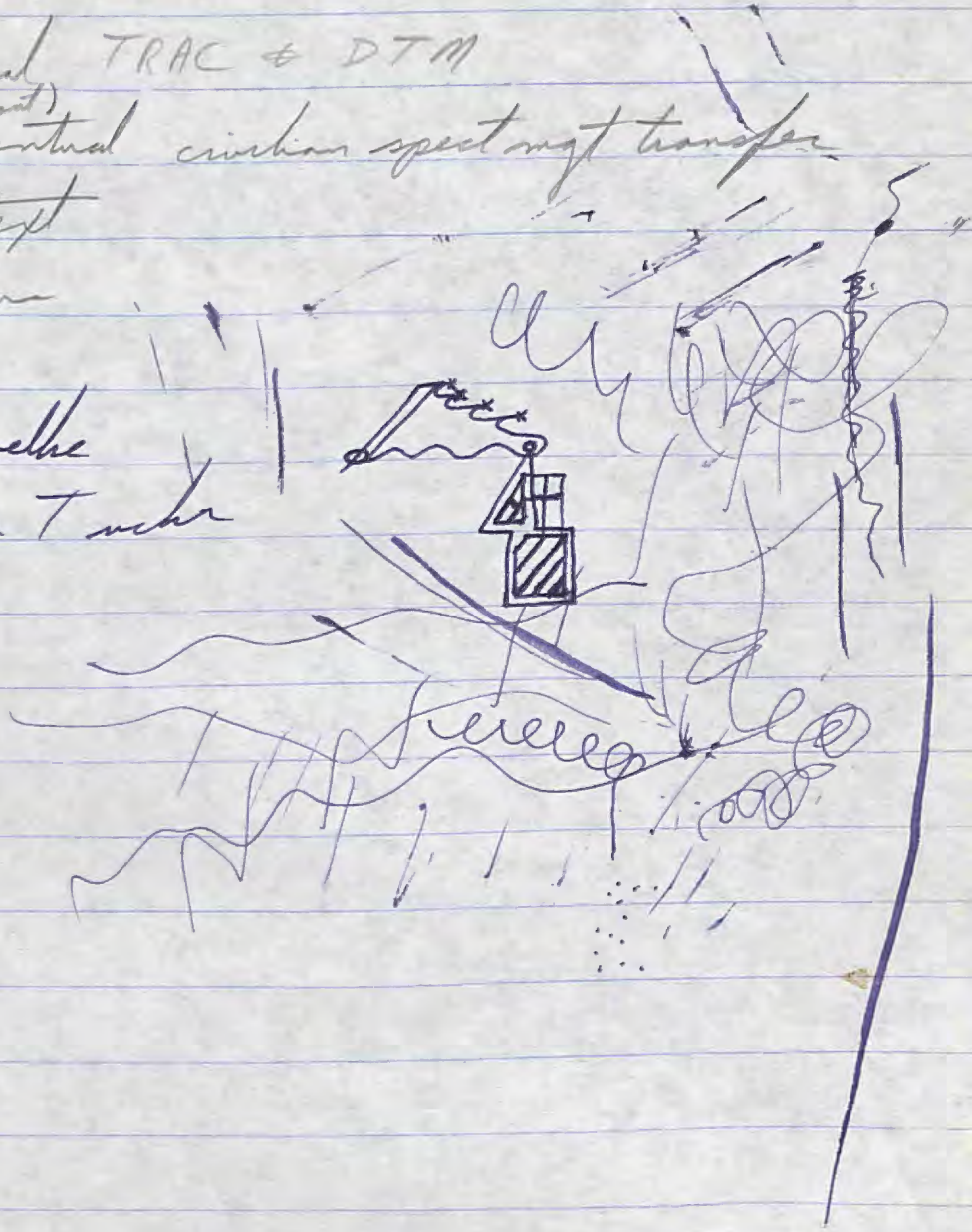

THE WHITE HOUSE

WASHINGTON

July 23, 1969

MEMORANDUM FOR

Dr. Lee A. DuBridge
Mr. Robert Mayo
General George Lincoln
General James O'Connell
Dr. Paul McCracken
Dr. Henry A. Kissinger

Attached is a draft memorandum ~~for the President~~ regarding organization in the Executive Branch for Telecommunications Policy and Management. Can we have your comments by Wednesday, July 30th.

It is important to reach a decision on this matter as soon as possible in view of the need to recruit a new Director of Telecommunications Management.

Clay T. Whitehead
Staff Assistant

Attachment

July 10 AM Mtg

Tom-
① Be sure I get shorter memo.
② How do you know these facts that determine your conclusions?
③ Harter & Trubow follow to DoD
④ Pg 1 ✓ 3 4 5 6 Attach 3-1 3

Thanks Pop

THE WHITE HOUSE

WASHINGTON

July 1969

MEMORANDUM ~~FOR THE PRESIDENT~~

There are a number of important problems with respect to Federal telecommunications policies that suggest reorganization or at least revision of our policy machinery:

1. The communications industry is heavily regulated by the FCC and is heavily affected by the communications activities of Federal agencies. However, neither the FCC nor the executive branch have a significant capability for systematic analysis of telecommunications policies and opportunities, their impact, their effectiveness, or their costs. The cooperation between the FCC and various parts of the executive branch appears to consist largely of gentlemen's compromises among competing interests and philosophies. The increasingly rapid rate of technological change and introduction of new services makes policy-by-precedent increasingly less relevant, more restrictive, or counterproductive.

2. The ~~shared~~ National Communications System remains a loose confederation af agency systems. In spite of the highly desirable interconnection capabilities that have been developed over the last few years, there has not been adequate specification of emergency capabilities, hardness, and priority override features necessary to permit informed decisions about the adequacy, performance, and cost of the system. No one seems to know whether a "unified" NCS is desirable, what it means, would cost, or would accomplish.

3. The extremely rapid rate at which communications are growing in the United States has brought about increasing conflicts over the use of various parts of the frequency spectrum and the beginnings of a spectrum shortage crisis.

Federal organization weaknesses:

Since World War II, there have been a number of studies of Federal communications organization and a number of reorganizations and shifts of responsibilities within the executive branch. None has

proved particularly satisfactory, and, indeed, there does not seem to be any neat solution to this problem. The lack of a good solution apparently is due in part to the quasi-independence of the FCC from the executive branch and in part to the conflicting requirements of Executive Office telecommunications coordination and individual agency mission responsibilities.

The study of the Federal Government communications organization completed in December 1968 by the Bureau of the Budget provides a good statement of the shortcomings of our current organization. The Bureau of the Budget reported a need for:

(1) a strengthened organization for policy planning, formulation and direction of Federal communications activities.

(2) a reorganized and strengthened National Communications System (NCS) within the Department of Defense.

(3) an improved procurement and technical assistance effort in communications on behalf of those Federal agencies which do not now have adequate resources in this field.

(4) unified frequency spectrum management process.

(5) a coordinated technical assistance program for State and local government in this area.

The recently released GAO report focused on the government's communications and particularly the progress toward establishment of unified National Communications System directed by the President in 1963. The GAO also found a need for stronger coordination of government telecommunications planning, and recommended a single entity responsible for both planning and operation of the Government's telecommunications activities. GAO also recommended clarification of what the unified NCS is intended to be.

Current organization for communications policymaking:

The Director of Telecommunications Management (DTM) in the Office of Emergency Preparedness is now charged by Executive

Order and Presidential memorandum with the responsibility for coordinating telecommunications activities in the executive branch. The DTM also is designated Special Assistant to the President for Telecommunications. However, the history of the organization reveals that attempts by the DTM to exercise leadership in communications policy have been largely ineffectual. This situation results from a number of factors such as organizational location, inadequate staff, and fragmentation of policy authority among half a dozen agencies with no one having overall responsibility. In view of its claimed responsibilities, the credibility of the DTM is questioned by agencies with operating responsibilities.

Not even DTM's Special Asst to Pres

There is now no office in the executive branch with the responsibility or the capability to review national telecommunications policies as expressed in legislation and in FCC policies. The antitrust division of Justice has occasionally filed briefs on competitive aspects of decisions before the FCC, but these derive largely from antitrust considerations rather than from systematic analysis of communications issues. The Council of Economic Advisers has shown almost no capability or interest in telecommunications, and OST is certainly not equipped for addressing the fundamental economic and institutional problems of the industry and its regulation by the FCC. The Administration is therefore largely unable to exert leadership or take initiatives in spite of vulnerability to criticism for FCC policies and national communications problems.

Executive branch responsibilities:

There are six major functions that are the responsibility of the executive branch in the telecommunications area:

1. Assignment of frequencies for Government communications.

2. Research and development.

3. Analysis of technological and economic alternatives and formulation of recommendations for national policy with respect to telecommunications.

4. Definition and assurance of emergency communications capabilities.

5. Policy planning responsibilities for Government communications activities.

6. Procurement of Government communications services and operation of Government communications facilities.

Some of these functions are now being performed by the DTM or various departments. The problem we now face is which of these functions should be assigned to what agency and how they should be interconnected.

Agency views:

The Budget Bureau study of Federal communications organization made a number of major recommendations (see attached summary) and was recently distributed to the concerned departments. Agency views on the Budget Bureau recommendations have been received (summary attached). These views share a common theme that (1) stronger coordination from the top is required in establishing Government policy for its own telecommunications requirements and that (2) the Federal Government should take a stronger role in the evolution of national telecommunications to deal with the increasingly rapid rate of technological change and industry growth. There is also agreement that a much stronger analytic capability within the executive branch is needed to achieve these goals.

There is, however, no consensus among the agencies about the extent to which the Bureau's specific organizational suggestions will actually advance the above objectives. The history of this area suggests strongly that it will be unprofitable to seek further agreement among the agencies. There is no solution that will represent a desirable compromise to all concerned, and no solution appears sufficiently strong on its merits that it looms out as the obvious choice.

Alternatives:

A number of organizational arrangements have been suggested in the Congress or the press. These include establishment of a Department of Communications, transfer of all DTM functions to an existing Cabinet department, and significant expansion within the Executive Office of the President by creation of a new Office.

Determination of emergency communications requirements clearly must remain in OEP. However, major involvement by the executive branch in nongovernmental communications policy matters could be centered in one of the Cabinet departments or in the Executive Offices.

There appear to be three feasible alternatives:

(1) Maintain essentially the status quo, but clarify and strengthen the conflicting Executive Orders through which the DTM derives his authority.

(2) Alter slightly the status quo by strengthening the DTM and including in addition a capability for analysis of non-Government policy issues that would enable the Administration to play an expanded role in that area. This alternative could lead toward considerable pressure for a separate independent office in the Executive Office in a few years.

(3) Create a new organizational unit in the Department of Commerce that would perform the needed analysis of major national communications issues, take an increasingly active role in advocating policy to the FCC and (through the President) to Congress, and eventually be responsible for unified management of spectrum resources for both Government and non-Government users. This alternative would require shifting of spectrum management responsibilities from the DTM, leaving only emergency communications requirements in OEP.

The first alternative would leave the Administration largely incapable of dealing with national communications policy problems. It also would do little to encourage straightening out of the acknowledged problems in the Government's own communications.

The third alternative is probably the best long-run solution. However, the Department of Defense has long taken the position that, for national security reasons, spectrum management responsibility for Government uses should remain in the Executive Office. There also would be opposition from the Congress and the FCC to moving non-Government spectrum management to the Executive Branch at this time since there is no demonstrated capability.

It is probable that the second alternative would permit almost as much to be accomplished over the next two or three years as would the third option, since such a significant upgrading of capabilities is required. Furthermore, it would avoid the political opposition that could be expected to the more sweeping proposal.

We therefore recommend the approach of the second alternative above. This is outlined in more detail in the attached recommendation.

Peter M. Flanigan
Assistant to the President

Attachments

Should not attachment 3 come in here. To what does it refer. after BoB comments.

Attachment 1

BOB recommendations concerning Federal communications organization

The Bureau of the Budget report recommended that:

1. The Federal Government should establish a new and strengthened central policy and long-range planning organization for communications in an existing executive branch agency -- either Commerce or Transportation.

2. The NCS staff should undertake implementing studies (a) to transfer the Federal Telecommunications System from the General Services Administration to the Department of Defense for merger with the military administrative communications systems to provide service for all Federal agencies and (b) to appropriately locate and combine the roles and functions of the Executive Agent and the Manager of the NCS within the Office of the Secretary of Defense to provide unified guidance to the NCS from within the Defense Department. An effective mechanism should be provided whereby the member agencies of the NCS can advise and be consulted by the Manager, NCS.

3. The National Communications System staff within the Department of Defense should provide a central source of procurement-related assistance for use by executive agencies.

4. The management of the Government's portion of the frequency spectrum should be a function of the new communications policy organization. If a single manager is provided for the entire spectrum, the total function should be placed in the new organization. The new organization should have a limited in-house research capability to support its frequency spectrum management and general policy development responsibilities.

5. The new communications policy organization should coordinate action on requests to Federal agencies from State and local governments for technical assistance in telecommunication and should provide such assistance to Federal agencies who lack in-house capability.

Agency views on Budget Bureau recommendations

The Bureau circulated its study report among those agencies having significant telecommunications responsibilities and requested their views. The following is a summary of the agency responses:

-- The Department of Commerce concurred in the report's major findings and recommendations. The Department specifically supported vesting overall management of the spectrum in one executive agency. Its comment on the report's major organizational recommendation -- "The establishment and location of such an agency in an existing Department will enable meaningful Executive Branch participation in the development of comprehensive national policies."

-- The Department of Defense (including the views of the Executive Agent of the National Communications Systems) agreed with the need for a new and strengthened policy and long range planning organization but believes that it should be constituted as a separate office outside OEP but in the Executive Office of the President. The DOD does not concur in the need for an implementing study to transfer the Federal Telecommunications System from GSA to Defense nor does it favor a combination of the roles and functions of the Executive Agent and Manager, NCS within the Department. Instead, it recommends an exploration in depth of the entire NCS structure and concept.

--- The Federal Communications Commission agrees that the role of the Federal Government in communications can and should be strengthened and made more effective but within the organizational framework presently prevailing. The FCC completely disagrees with the recommendation to establish a single radio spectrum manager in an executive agency in that it would adversely affect the Commission's functions.

--- The General Services Administration agrees with all of the study report recommendations except the one that a strengthened NCS should be located in DOD. GSA states that a merger of the civilian and military administrative networks has "obvious merit" but it should not be organized within Defense.

--- The Department of Justice agrees with the formulation of a new communications policy organization. The Department disagrees with the transfer of the Federal Telecommunications System to Defense and questions the feasibility of assigning responsibility for procurement and procurement-related assistance for agencies without in-house capabilities to Defense.

--- The National Aeronautics and Space Administration --- (views not yet received).

--- The Special Assistant for National Security Affairs agrees in general with the study conclusions but does not believe that "policy guidance with respect to the objectives, requirements and composition of the NCS" should be vested in Commerce or Transportation. Further, he believes a National Security Council study should be initiated to re-examine the objectives and alternative system concepts prior to any reorganization.

--- The Office of Emergency Preparedness (including the views of the Director of Telecommunications Management) points out that the study report does not focus adequately on the emergency preparedness aspects of telecommunications management. General Lincoln proposes that the Office of Telecommunications Management remain under OEP until the emergency preparedness implications of relocation are examined thoroughly.

--- The Office of Science and Technology --- (views not yet received).

--- The Department of State has no objection to the study report's proposals from the standpoint of foreign policy considerations and believes that "advantages would flow from a strengthened central policy formulation and planning organization."

--- The Department of Transportation agrees on the need for coordinated policy direction at departmental level, improved procurement and technical assistance, and the unification of radio frequency spectrum management. The Department differs with the study report in that it believes that the Executive Agent role provided by DOD for the National Communications System should not remain within Defence but should be transferred to the policy organization.

-- The Central Intelligence Agency aggrees with the need for a new and strengthened central policy organization but, since it should have direct access to the President, it should not be a subordinate function within a Department or Agency. CIA is opposed to relocating or reorganizing the Office of the Executive Agent, NCS before the policy organization is established and an assessment of its effectiveness completed.

Attachment 3

Recommendation

The Office of the Director of Telecommunications Management should be strengthened and expanded to enable the DTM to serve as the focal point for all executive branch telecommunications activities and to be the Administration spokesman on national telecommunications policy issues. The DTM would be expected to be the primary executive branch office for the analysis and formulation of recommendations for both national communications policy and Federal telecommunications procurement. These responsibilities would include:

-- economic, technical, and systems analysis of communications policies and opportunities;

-- taking an increasingly active role in advocating policy to the FCC and through the President to the Congress, to include specific recommendations on spectrum management for non-Government uses.

-- management and allocation of Government spectrum use, to include development of improved spectrum management techniques aimed toward eventual unified Government and non-Government spectrum management.

-- guidance and information to Federal, State, and local Government agencies in communications planning and procurement.

-- responsibility for policies and standards for procurement of Federal administrative telecommunications services and/or systems.

A Telecommunications Research and Analysis Center would be established in the Department of Commerce, reporting to the Assistant Secretary for Science and Technology. The Center would be responsible for both technical and economic analysis and research, responsive to the needs defined by the DTM. The TRAC would incorporate the current research program of the Institute for Telecommunications Sciences, as well as appropriate elements of other Commerce activities in telecommunications. Its specific functions would include:

-- establishment and operation of a national electromagnetic compatibility analysis facility.

-- research and analysis of improved spectrum utilization techniques to support the DTM in Government spectrum management and in making recommendations to the FCC on non-Government spectrum management policies.

-- research and analysis leading to the development by DTM of improved technical and operating standards.

-- continuation of basic telecommunication science research and provision of services to other Government agencies and industry.

The DTM should be raised immediately to executive pay level IV and authorized an expanded staff that would include a limited capability for economic, legal, technical, and systems analysis. He would be expected to contract for significant portions of the research and analysis required to support his responsibilities and also to draw heavily on the Commerce Telecommunications Research and Analysis Center.

A NSSM should be issued as soon as the new DTM is selected. This study should define appropriate NSC machinery for dealing with national security and emergency telecommunications issues and should provide general guidance to the DTM on emergency requirements and policies.

Implementation

This recommendation could be implemented almost immediately through the following actions:

A. By Executive Order

-- clarify and bolster DTM authority and eliminate existing patchwork of Presidential memoranda and conflicting Executive Orders. The Office of Telecommunications Management should be

institutionalized as a separate Office within OEP, eliminating the positions of Assistant Director and Special Assistant to the President for Telecommunications. The DTM should be raised to Level IV and should report to the President for all matters except emergency preparedness requirements, for which he would support the Director of OEP.

-- similarly clarify authority and responsibility of the Department of Commerce.

B. By Secretarial Order

-- establish a Telecommunications Research and Analysis Center under the Assistant Secretary of Commerce for Science and Technology.

C. Subsequent Action

Once sufficient capability in the analysis of national communications policy issues and the associated capability for improved Government and non-Government spectrum management is achieved, Government and non-Government spectrum management responsibilities should be consolidated. This almost certainly will require in a few years establishment of a new agency outside OEP, either in the Executive Office, in a Cabinet Department, or as an independent agency.

-- at an appropriate time, introduce legislation to establish a new agency and transfer non-Government spectrum management from the FCC to the new agency; emergency preparedness functions would remain in OEP.

-- at an appropriate later time, transfer to the new agency by Executive Order responsibility for procurement of Federal administrative telecommunications services and/or systems.

let's not discuss in detail now. It will lead to FCC's current opposition

THE RADIO SPECTRUM

ITS USE AND REGULATION

proceedings of a conference in September 1967
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reprinted from the Washington University Law Quarterly
Volume 1967 Number 4 and Volume 1968 Number 1

WASHINGTON, D.C. 1968

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The views expressed in these papers are those of the authors.

FOREWORD

In 1967 the Brookings Institution and Resources for the Future jointly sponsored a Conference on the Use and Regulation of the Radio Spectrum. This project was planned and organized by William M. Capron of Brookings and Hans H. Landsberg of RFF, who served as co-chairmen of the Conference.

With one exception, all of the papers reproduced in this volume were presented at the Conference, which was held at Airlie House, Warrenton, Virginia, on September 11 and 12, 1967. The final paper, by William K. Jones of Columbia University, constitutes a summary of the central themes of the discussion at the Conference, stimulated by the other papers.

An additional paper which was presented at the Conference—"The Radio Spectrum: Economic-Physical Character and Regulatory Framework," by Harvey J. Levin, Hofstra University—does not appear in this volume. This paper appears in the October 1968 issue of *The Journal of Law and Economics.*

We are grateful to the editors of the *Washington University Law Quarterly* for permission to reprint these papers, which originally appeared in two successive issues of that journal. Because of the lively current interest in the issues considered in these papers, we are making them available in this volume.

KERMIT GORDON
President
The Brookings Institution

JOSEPH L. FISHER
President
Resources for the Future

Washington D.C., 1968

WASHINGTON UNIVERSITY
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WASHINGTON UNIVERSITY
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Volume 1967 Fall, 1967 Number 4

COMMUNICATIONS AND THE FUTURE—PART I

Introduction

Communications is one of the few remaining frontiers where exploration and development of new technology can materially improve our way of life and accelerate our progress in other fields. In considering this topic, we are frequently interested less in the content of the communication, the voice or message transmitted over wire, "good" television programming versus "bad" programming, than we are in the type of communication device. The type of device is important in determining the extent and direction of our future progress because "the personal and social consequences of any medium—that is, of any extension of ourselves—result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology. . . . In terms of the ways in which the machine altered our relations to one another and to ourselves, it mattered not in the least whether it turned out cornflakes or Cadillacs."[1] Similarly, when one turns on his television, it ultimately matters less whether a talking horse or a professor appears on the screen than it does whether the program is transmitted from a ground station or a satellite. The possibilities inherent in the development of new methods of transmission force us to face not only the problems of regulating what programs to transmit, so as to improve quality and diversity, but also the problem of creating and using entire new channels and networks.

Communications' increasing importance in our daily lives requires that the law assume an increased duty in the supervision and regulation of media operation. For this reason, the *Washington University Law Quarterly* presents this two part symposium on communications in general, and television in particular. As satellites are placed in orbit and begin trans-

1. M. McLuhan, Understanding Media 7-8 (1964). McLuhan stresses that it is the "TV image," and not TV programming, that creates psychic and social disturbance, even so far as to alter our relations to the law and courts. *Id.* at 312.

mitting, as cable television reaches more and more homes, and as new tax and other economic incentives are sought to encourage creative programming, lawyers will have to focus on the various problems and possibilities so that the legal response to these developments will be a proper and adequate one. These articles seek to prepare the profession by presenting "non-legal" materials on the structure and economics of the television industry, the technology of communications, new proposals for FCC regulation, and the future evolution of the industry, including proposals for cable television, pay television, and the use of satellites, waveguides, laser pipes, and computer link-ups for transmission and programming.

In the first article, Federal Communications Commissioner Nicholas Johnson indicates the public's interest in broadcasting and the importance of the President's "Message on Communications Policy." He argues that it is critical at this stage of development to look at communications as a whole, not isolated segments. In the appendix, we reproduce the recently passed Public Broadcasting Act which creates a publicly financed corporation to produce television programs.

Following the Commissioner's article, Professor John McGowan provides a detailed description of the television industry's structure and the effects of competition on programming policy. In this article, McGowan offers ways in which FCC regulation of industry structure may promote diversity of programming without controlling the content of individual programs or broadcasters' programming policies.

In the last article in this issue (Part I), Mr. Leland Johnson describes some of the problems in using radio spectrum and ways in which new technologies may be utilized to relieve today's scarcity of usable spectrum. He discusses the enormous potentialities of non-spectrum transmission devices, particularly cable transmission.

The next issue (Part II) will contain three more articles. Professors Harold Barnett and Edward Greenberg propose a system for wired city television. Dean William Meckling discusses alternative criteria for the FCC's management of the frequency spectrum. Professor Sidney Alexander, using public television as a case in point, analyzes how we can rationally decide what *should* be done.

These six articles are derived from the major papers and discussions at the Conference on the Use and Regulation of the Radio Spectrum, held September 11 and 12, 1967, at Airlie House, Warrenton, Virginia. The Conference was generated by President Johnson's "Message on Communications Policy," sent to Congress on August 14, and was sponsored by The Brookings Institution and Resources for the Future, Inc., both of Washing-

ton, D.C. Of the five major papers, four (J. McGowan, L. Johnson, W. Meckling, S. Alexander) are reprinted here. The fifth paper, "The Radio Spectrum Resources," delivered by Professor Harvey Levin of Hofstra University, will appear in the October 1968 issue of the *Journal of Law and Economics*. Nicholas Johnson's article was part of the discussion following Sidney Alexander's presentation; Barnett and Greenberg's piece was part of the discussion following Leland Johnson's paper.

We wish to thank Mr. Hans Landsberg of Resources for the Future, Inc., and Mr. William Capron of The Brookings Institution, for their help and guidance in publishing these articles; Professor Warren Lehman for aiding in procuring the material; and Terence Russell, *Law Quarterly* Articles Editor, for the editorial work necessary to prepare the papers for publication. We are equally indebted to all the authors for their enthusiasm and cooperation in aiding and allowing us to prepare the articles as a unit soon after the Conference at Airlie House.

THE PUBLIC INTEREST AND PUBLIC BROADCASTING: LOOKING AT COMMUNICATIONS AS A WHOLE

NICHOLAS JOHNSON*

Early Monday morning, August 14, 1967, President Johnson signed and sent to Congress a document headed simply, "Message on Communications Policy."[1] None of us should mistake its significance, for it gives to these deliberations at Airlie House a focus and a promise of historical relevance which no gathering of scholars and officials concerned with communications has ever enjoyed.

Plainly, the path-breaking importance of the President's communications message was not lost on others. The 88th, 89th, and 90th Congresses have received and responded to Presidential messages in greater number and of more substantial social impact than those serving any other President, with the possible exception of the seven Congresses that served during the terms of President Roosevelt. Few messages have received a warmer response than this one.

The President of the United States had, for the first time in the history of the country to my knowledge, personally endorsed and put the full power of his Office behind the proposition that, "*The United States must review its past activities in this field and formulate a national communications policy.*"[2] He spoke not alone of the telephone and telegraph and local broadcasting stations—or even satellites—but of "a revolution in the communications system of our nation."[3]

To give this unprecedented commitment concrete expression, the President simultaneously appointed a Task Force made up of able high-level officials from across the broad range of the executive branch of the government—13 agencies plus his own Budget Director, Chairman of the Council of Economic Advisers, and Scientific Adviser. To chair the Task Force the President selected Eugene V. Rostow, formerly Dean of the Yale Law School and currently serving with distinction as Under Secretary of State for Political Affairs. Secretary Rostow has boldly characterized the creation of the Task Force as an opportunity to "rear back and look at communica-

* Commissioner, Federal Communications Commission.

1. Message from President Lyndon B. Johnson to Congress, *Communications Policy*, 3 WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, No. 33, 1135, 1146 (Aug. 14, 1967).

2. *Id.* at 1147 (italics in original).

3. *Id.* at 1153.

tions as a whole."[4] With this perspective in mind, I would like to turn to the subject of this paper.

I. The Public Interest in Broadcasting

Few of us would question the proposition that television broadcasting is our most significant use of the valuable national resource we call spectrum space. Economically, it represents one-half billion dollars in tangible assets on the part of the broadcasting industry that produces approximately a 100% return in annual gross profits. And this return is made possible by the consumers who pay $2.2 billion more for products each year to sustain the "free television" which comes to them on the approximately $15 billion worth of equipment they have bought to receive it. Clearly the largest proportion of the radio spectrum allocated to civilian use is used for commercial broadcasting. And broadcasting represents that facet of frequency usage which interests most of the public, the press, the Congress, and even the FCC. Acquaintances are far more likely to ask me what I can do about those "lousy, blaring commercials" than they are to ask what I am doing to increase the multi-billion dollar return in gross national product from our use of mobile radio.

Most important, broadcasting happens to be one of the most powerful social forces man has ever unleashed upon himself. It shapes our minds and our morals, elects our candidates, and motivates our selection of the commodities with which we surround ourselves. It tells us most of what we know about the world we live in (and decides what we are not going to know). The average American child, before he enters the first grade, has already received twice as many hours of "instruction" from his home television set as he will receive in class during the entire four years of his college education.

It is unlikely that the value of what those children are receiving from their endless hours before the TV screen matches the enormous investment of national resources that brought the programs to their homes. Few of us would dare assert that we are exploiting our investment in broadcasting to its full potential to serve the public interest.

But change is in the air. Dissatisfaction seems about to make its first significant imprint on public policy since TV aerials began to dominate the American skyline two decades ago. Soon, it appears, Congress will give life to the exciting concept of public broadcasting. We must plan, as we have not to date, for public broadcasting in the public interest. What is needed is a survey of the broadcasting landscape of the present, and

4. Broadcasting, Aug. 28, 1967, at 46.

especially, of the next technological generation. To paraphrase Secretary Rostow, we must take a look at public broadcasting in the context of communications as a whole. (I would like to consider this paper as some notes toward such a comprehensive inquiry.)

II. Public Broadcasting and the American Tradition

The importance and power of broadcasting is clear. Is it not, then, altogether puzzling that the nation is just now readying itself to commit public funds to ensure that the power of broadcasting is used to enrich as well as to entertain? The only reason we have not provided more support for public broadcasting up to now is that it always takes us a decade or more to be very reflective about what is going on all around us—and what has been going on all around us since 1950 has been television.

Certainly the precedents for a Public Broadcasting Act were as easy to find in 1947 as in 1967. This nation was founded on a commitment to an educated and informed people. In 1787 our forefathers gave us the command, "The means of education shall forever be encouraged."[5] Since that time our government has supported with public funds a variety of programs to fulfill this national commitment. The Land Grant College Act of 1862 provided over eleven million acres of public lands in support of higher education in the states. Special postal rates for books, magazines and newspapers have been in effect since 1792. Students are deferred from military service while they complete their college education. Recently the Congress established the National Foundation on the Arts and Humanities to foster the creative and performing arts and encourage research in the humanities. Last year alone $52.2 billion in public monies from all levels of government was spent on formal public education. Nor is this commitment solely governmental. We in the United States take peculiar delight in deprecating our popular culture. And yet the fact is that far more Americans attend concerts every year than all major and minor league baseball games, World Series included. In short, there is nothing more American than mass popular support of education, information and culture. We have held fast and found new ways to meet this commitment since the beginnings of our nation. We have never hesitated to use public monies, in substantial quantities, to help us reach these national goals.

For me, then, there is no real question about the inherent validity of the use of public money in support of a Public Broadcasting Corporation. When our grandchildren look back upon President Johnson and the Congresses of the 1960's, they will remember the Public Broadcasting Act of

5. Ordinance of 1787, § 14, Art. III (1 Stat. 51).

1967 as one of the proudest achievements of the decade. Thomas Jefferson could well have been speaking of the Public Broadcasting Act when he said in 1786, "The most important bill . . . is that for the diffusion of knowledge among the people. No other sure foundation can be devised for the preservation of freedom and happiness."[6] This should be a proposal beyond controversy, not only for the social dreamer but for the social accountant as well. The Public Broadcasting Corporation could wisely spend far more money than it is apt to have available.

III. Public Broadcasting in Context: Planning for the Seventies

To embrace the legislation now pending before the House is not to rule out careful scrutiny of the "public interest in public broadcasting." Public broadcasting is not, after all, an end in itself. It is a means and not an exclusive one, to ends which can, and should, be frankly and clearly identified.

For perhaps the single most significant focus is to realize that we must be planning for the 1970's and 80's—not for the 1950's and 60's. Public broadcasting is, historically speaking, a response to the defects of our present mass communications system. But that system is not immutable. Indeed, technical advance is now poised to shake and reshape the social institution we know as television right down to its end-product.[7]

Let us look at the realities of public broadcasting. Let us measure its utility as a servant of the public interest.

A. *Noncommercial Programming and the Goals of Public Broadcasting*

What is public broadcasting? It is bricks and mortar, cameras and receiving sets, and people. It is writers and producers and camera crews. It is management and money. It is many things. But mostly, and above all else, it is programs. And the best operational definition I could provide would be to wheel in a television set and show some illustrative video tapes.

What would a review of the programming product of the present pioneers in noncommercial broadcasting reveal? What goals would it reflect, and what degree of success in serving those goals? What promise does it hold for the product of a more adequate public broadcasting endeavor?

Educational television is often used for education, in the strict sense of the word. Contrary to popular suspicion, the "E" in "ETV" is not

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6. Letter from Thomas Jefferson to George Wythe, Aug. 13, 1786, in 10 The Papers of Thomas Jefferson 243, 244 (J. Boyd ed. 1954).

7. *See* Johnson, *New Technology: Its Effect on Use and Management of the Radio Spectrum*, 1967 Wash. U.L.Q. 521.

there merely for the benefit of the Internal Revenue Service. For example, during the daytime, WETA, Washington, D. C.'s NET affiliate, programs for schools and universities in its viewing area instructional or supplementary courses on art, music, literature and science.

In the evening hours, the predecessors of public broadcasting aim to reach broader audiences, striving toward what might be characterized as the following goals: (1) to make television a medium for cultural enrichment through the provision of refined and sophisticated entertainment; (2) to exploit the potential of electronic journalism with probing and illuminating documentaries and commentaries on public affairs; (3) to realize the objectives set for the mass media by the 1947 Commission on the Freedom of the Press, making the airwaves common carriers of opinion, and ensuring that all sectors of community opinion have a chance to speak.

In pursuit of these demanding objectives, the pioneers of noncommercial broadcasting have been dogged at every step by what has been termed desperate poverty throughout educational television. The use of the term "poverty" is no hyperbole here. Witness, for example, the chilling statistic that a sponsor who purchases four one-minute spots on "Batman" has paid almost enough for a full year of *programming* on the typical noncommercial station.

But despite their shoe-string budgets, noncommercial broadcasters have brought into viewers' homes such brilliant productions of quality entertainment as NET Playhouse's weekly showings of drama by Tennessee Williams, Arthur Miller, and other contemporary playwrights; "The Age of Kings"—a distinctive series of eight of Shakespeare's plays; "The Master Classes" of Casals, Heifetz, and Segovia; "A Roomful of Music" with Pete Seeger and Joan Baez.

If the record of ETV is any indication, PTV will enrich while it entertains. It will also inform. The network that has already produced such substantial documentaries as "The History of the Negro People," "Foreign Assessments of U.S. Foreign Policy," "The Death Penalty," and "Head Start in Mississippi," will this year explore the precarious position of privacy in contemporary society, justice and the poor, the revolt in welfare, and the Negro middle class. Those of us who were inspired by the remarkable live special "Our World," the first globe-girdling live telecast in history, originated from locations in 14 countries on five continents, look forward eagerly to the experiments of the Public Broadcasting Laboratory in creating a visual magazine of the air.

It is not, of course, enough that public broadcasting be a "good thing." It, like any other human endeavor, must withstand the rigors of articula-

tion of goals and quantifiable standards for evaluation of performance against those goals. At the very least, some such evaluation is essential to a meaningful budgeting process.

To say that a mission of "cultural enrichment" is imprecise is not to say that it is unworthy; it is only to say that it is not very useful as a statement of goals. Where is this land of "cultural enrichment," and how are we going to know when we get there? And if we don't know where the road is, or what actions propel us forward, or how to recognize our destination when we arrive, the odds are very high that confusion, violent disagreement, and considerable demoralization are going to reign if we care very much about whether we have been "successful," which presumably we do.

To what extent are audiences relevant? Although not in the rating game, and not appealing for large mass audiences, one measure of public broadcasting's impact is clearly the number of people who watch and listen. If a program is designed to appeal to 10% of the American people (20 million), it is unfortunate if it only reaches 0.01%. This raises questions of interconnection, simultaneous programming, and promotion expenses. To spend $100,000 on a show and get an audience of 500,000 may be extravagant compared with $100,000 for the show, $100,000 for promotion and an audience of 5,000,000.

Such cost-effectiveness analysis may be useful for someone in the broadcasting business, but the goals of public broadcasting seem to have been more generally defined. The Carnegie Commission has talked in terms of greater opportunity for individual expression, the availability of a greater diversity of views to the individual, a fuller range of information and opinion, and more educational experiences.[8] And it is in regard to these goals that I must return once again to my earlier characterization of "the single most significant focus": that we must think in terms of the 1970's and 80's.

B. *Future Alternatives in Information-Entertainment*

There are a number of trends in the home information-entertainment business that promise impact upon all of broadcasting, including public broadcasting. The established commercial side of the business will struggle for continued economic viability and adaptability, using political and economic pressure to resist some forms of competition, and joining with the others. Public broadcasting, on the other hand, is just being established, or is at least about to be significantly expanded. It need not be cast solely from the mold of broadcasting in the 1950's.

8. Carnegie Commission on Educational Television, PUBLIC TELEVISION: A PROGRAM FOR ACTION (1967).

Broadcasting, in simplest terms, is a means of bringing into the home information and entertainment in aural and visual form, to be amplified through loudspeakers and displayed visually. The recipient's choice is limited to the programming offered by the individual stations he is capable of receiving at the time he is able to listen or watch. It happens to involve program creators, commercial sponsors, network distributors, telephone system interconnection of stations, and the "broadcasting" through the air of electromagnetic energy.

But this elaborate and technologically marvelous system known as broadcasting is really totally irrelevant from the standpoint of the desires of the recipient of the programming, and its effect upon him, if alternatives are available. The programs could as well come to him through cable as over the air so far as he is concerned. Indeed, although there are differences which we will address a little later on, there is little difference between a motion picture seen at home over television, and the same film seen from a home movie projector. There is little difference between hearing a prerecorded musical selection from a loudspeaker connected to a radio and one connected to a phonograph or tape cartridge player. There is even reason for considering television news in the context of total home information, including newspapers and magazines. Reading is still considered by some people a trade-off for television entertainment. Colored slides or picture books may be thought of as similar to a television travelogue. Most conversation over the radio is comparable to material that could be read.

It is in the context of the total home information-entertainment environment of the 1970's that public broadcasting must find its niche. What are the major trends and potential developments that will affect its role?

First, UHF, which has fought a trying uphill struggle for the past fifteen years, appears, like the little engine that could, to be climbing steadily toward the top of the mountain. The all-channel law, proposed by a farsighted FCC and passed by Congress in 1962,[9] is beginning to produce its intended effect. Large metropolitan areas are benefiting from a doubling of the options available to viewers. Since 1961, three UHF stations have offered diverse sectors of the public in Washington, D.C., program offerings unavailable from the network-linked VHF's. WETA beams to Washington area residents the products of its NET affiliation as well as many cultural and informational programs of local origin. WDCA offers movies and drama. WOOK devotes much of its prime time to public affairs programs of special interest to the city's Negro population. In two years,

9. 47 U.S.C. § 303(s) (1964). The all-channel law itself is Pub. L. No. 87-529, § 1, 76 Stat. 150 (July 10, 1962).

two more UHF channels, one educational and one commercial, will be serving the nation's capital, bringing the total number of viewer choices to nine.

The second development now eroding the foundations of "broadcasting" is the explosive growth of cable technology. Cable television (CATV) systems are now carrying up to twelve (soon to be twenty) channels to more than two million homes in towns and suburban communities on the fringe of metropolitan areas all over the nation, and even in the heart of cities where tall buildings make broadcast reception difficult. Presently, the cablemen forswear any intention to originate programs on their own. They limit themselves to picking broadcasters' signals out of the air and transporting them through cables to their customers. But of course there is no inherent reason why CATV cannot in the future enter the programming market. After Congress resolves the question of the cablemen's copyright obligations to the broadcasters, and after the FCC replaces its temporary quasi-ban on the growth of CATV in major market areas with a permanent policy, the cable operators might even make good on Teleprompter president Irving Kahn's promise to wire up 85% of the nation's homes.

The third big change in television is the development of the synchronous communications satellite. Now that a single satellite can be "parked" 22,000 miles over the equator, and from that vantage point "see" one-third of the globe, it is clear that satellites will soon be, if they are not already, efficient instruments of domestic broadcast transmission. Leland Johnson of RAND,[10] a participant in this conference, has observed that the combination of cable and satellite technology (broadcasting direct from satellites to cable systems for distribution; technologically easier than direct satellite-to-home broadcasting) may alter "the fundamental structure of incentives that determine program variety and content, and indeed the whole way that the industry operates."[11] The possibility of significantly lower costs for nationwide distribution of programs, plus the appearance of a greater number of points of program origination (with mobile ground stations) may make it profitable to appeal to smaller audiences than present industry structure will permit. Johnson even predicts that repeat programming will come into vogue, and make television programming more like the cinema. This prospect, which may spell a radical increase in program variety for home viewers, perhaps without significant public financial support, may also have a substantial impact on local broadcast stations, both VHF and

10. [Ed. note: Leland Johnson is now the Research Director for the President's Task Force on Communications.]

11. L. JOHNSON, THE IMPACT OF COMMUNICATIONS SATELLITES ON THE TELEVISION INDUSTRY 7 (RAND paper P-3572, 1967).

UHF, since it will be technically possible, and economically profitable, to bypass any local origination point and broadcast from satellite directly to the viewer by means of cable systems.

Fourth, CBS laboratories have discovered how to convert television sets into visual phonographs—at "popular prices." Home video tape recorders, and video cameras, are already becoming cheap enough to open to amateurs and semi-pros an art practiced until now in network studios alone. Indeed, the first "Underground TV" system is already operating in Greenwich Village. Such cameras, recorders and players promise eventually to multiply almost infinitely the variety of items and kinds of information, visual, aural, and print, which will be available on the home console a few decades hence.

The fifth innovation, though technologically possible, is not yet upon us: a cable-video tape library-computer retrieval-closed circuit television combination. Such a system would make it possible for a television viewer to select his own programming, when he wanted to see it, from a tape library perhaps hundreds of miles distant. He would make connection with the "library" by "telephone," using the proper number code on his "touch-tone" computer connector-telephone. He would identify himself, by number, to the library's computer. He would either select the number of the video tape he wished to see from a printed catalogue or, more likely, ask for a visual display on his home screen of a sampling of titles. The automatic library would then select the designated tape, and send it to his home screen by cable instantaneously, or at some viewer-designated future time. Perhaps the viewer would simply record it on his home video tape recorder while watching, and keep his own copy of the tape. He could indicate a preference for a tape with or without advertising. If he selected the tape without advertising the library's computer would notify the computers at the "banks" of the viewer and the library owner, adjusting their accounts appropriately. Each of the components to which I referred is now marketed widely and used. "Touch tone" telephones are today "talking" to computers; computers are connected to remote terminal equipment by communications lines; they are capable of displaying information visually; "automatic radio stations" are simply computer programmed tape retrieval libraries; home video tape recorders are being marketed; automatic electronic customer billing (such as for long distance calls) is common; and, of course, television programming is today being supplied to homes by cable. All that is new is the suggested combination of present technologies. I am not suggesting that such a scheme will come into existence, or that it ought to; I simply pose it as one rather conservative illustration of the range of possibilities.

C. *The Implications of Changes for Public Broadcasting*

What are the implications of these five seemingly isolated developments for public broadcasting? Simply that the needs of the environment in which it will be functioning will be different from those in which it was formulated.

Let us review briefly the premises of public broadcasting. Home information and entertainment is provided in greatest part by three commercial, advertiser-supported television networks, the programming of which is designed to reach the largest possible audience. Minority views are not adequately presented to the mass audience. Minority tastes are not adequately served by three networks competing for mass audience. There is limited opportunity for new talent, controversial programming, and experimentation on commercial television. Educational opportunities from network programming are few. More networks will produce proportionately greater opportunity for serving minority tastes, diversity of programming, and for new talent and minority views. A noncommercial, public broadcasting corporation, would have the added advantage of the lack of advertiser, mass market constraints. The public would be more benefited by having the corporation's programming available to it by way of a competing network of local stations, broadcasting over the air, without viewer selection, the local station's product and that of a national network (brought in by microwave relay tower, or perhaps satellite microwave relay). There is no economically viable way to support these needs without the support of foundations or the government.

Obviously, many of these needs and assumptions change with the technological innovations described in the previous section. In particular, impending technological advances appear likely to individualize the present market for home information and entertainment.

The longplaying record is one of the most democratizing elements in our culture. Any group of musicians with money to rent a recording studio can sell their records at the supermarkets. There are few, if any, worthy groups unable to cut a record. Home tape recorders abound. The modestly-priced video camera and tape playback (or CBS' video "record") hold the same potential for television. The performer is no longer shut out. He can record. He can sell. He has a market. New talent, controversial programming, and experimentation in television are limited only by the imagination and taste of those who would like to be in television.

Moreover, the diversity of programming substantially eliminates the problem of lack of viewer choice. He can buy video records to satisfy his off-beat tastes. He can watch his favorite educational station, along with

the imported signals of its competitors, on his 20-channel cable television system. Or he can select his favorite programming from libraries of the best ever produced. To the extent additional education is desired, it may be better provided by computer-cable-fed home teaching machines.

In no event is the viewer bound to watch whatever the commercial networks want to present when they want to run it. He can always video tape from his home television screen for later viewing.

And of greatest significance, the market has now provided an alternative to public and philanthropic funding. Video tapes and records can be sold. Cable television is now sold (about $5 a month), though never under the name of "pay television." Pay television in the more conventional sense would permit payment by viewers, as would the library retrieval and billing system I described.

Conclusion

There is no doubt in my mind about the worth of public broadcasting; we should have had it sooner, hopefully we will have it this year. However much it is funded it will not be enough; but we will be rewarded for our investment many times over. That does not mean we should not think about its goals (with precision) and measure its achievements (mathematically). It is too great a responsibilty, too grand a public undertaking, not to receive the ablest of our analytical capabilities. As we think about its goals in general terms we realize that developments in UHF, cable television, satellites, video recording equipment, and library retrieval affect many of them: potential audiences for the budding artist and minority view, vastly expanded choice for the viewer, and means of funding.

Why public broadcasting? Because I am convinced that broadcasting is here to stay, retaining the most important characteristics we associate with it today: nationally acquired and distributed information and entertainment programming purveyed by local outlets to homeowners without viewer choice, funded by advertising. The only difference will be that it will be available as one of many more options to the homeowner than he has now, a matter of choice rather than compulsion.

Moreover, although a splintered market will assure minorities that their interest and problems will be aired, it will not assure that anyone outside of their group will hear. Let me emphasize that point: a communications system which caters very well to minority views may be to that extent *less* capable of getting those views across to the public. Take, for example, America's system for communication by printed matter. Dozens and dozens of journals fill the newsstands of a small number of urban and educational centers. Yet most people in America have, in fact, meaningful access to

no more than one or two newspapers and perhaps two or three mass circulation magazines. One set of readers comes to speak a language foreign to the other set. Much of television's greatness has been its capacity to speak to all of us at once. That greatness is to be encouraged, and public broadcasting's voice must be heard.

Television, like the telephone or a tugging child, says, "Pay attention to me now or you'll be sorry." Maybe that's its distinguishing feature. Each of us is standing in hip boots, casting into a river of words: memoranda, newspapers and magazines, books, television channels, radio stations, live theater and assorted entertainment, billboards, and mail. Print can be put aside without deciding never to read it. Television cannot. That's a competitive advantage very hard to beat. Maybe we need disappearing ink on books—or a closed circuit television camera looking over the author's shoulder: either you read it when he writes it or you forever forego the opportunity.

I am not so sure we want choice. How often do you, or your neighbors, borrow records from your neighborhood library (most now have them)? Have you ever just turned on the radio rather than put a stack of records on the record player? How often have you obtained and shown movies in your home? How long has it been since you looked at your home movies, or slides? No, the fact is that very large numbers of Americans prefer not to have to make choices.

That being the case, commercial broadcasting is probably going to stay with us, however plentiful and cheap the alternative supplies of programming become. And if it does it is highly likely that the commercials will stay, too, and that the programs will have to be selected by the networks to attract the largest possible audience to watch the commercials. That being the case we have come full circle, back once again to the arguments of President Johnson, Congress, the Ford Foundation, Carnegie Commission and others, arguments that have convinced me of the substantial "public interest in public broadcasting."

It may very well be that the most significant conclusion for us to draw is the President's and Secretary Rostow's: the need to look at communications as a whole. Certainly we have seen that in the case of public broadcasting. One simply cannot plan wisely for public broadcasting without seeing its goals in the broadest terms and plotting alternative paths to their attainment. And the same point could be made in the context of domestic satellites, cable communications, frequency management or communications common carrier regulation.

My thesis is simple. It is a necessity, an imperative—not merely an intellectual luxury—that any issue of communications policy be considered in its broadest interdisciplinary context, with the full sense of its interrelationship and impact on all other communications policy issues. You simply cannot consider separately "hardware problems" and "software problems," or technological problems and social problems, or economic issues alone, or carve out the problems of mass communications and treat them separately from the problems of a private communications system. To do so is not even a very respectable, taxing, or enjoyable intellectual exercise. In no event is it more than that.

APPENDIX

THE PUBLIC BROADCASTING ACT
47 U. S. C. A. § 396 (1968)

§ 396. Corporation for Public Broadcasting—Congressional declaration of policy

(a) The Congress hereby finds and declares—

(1) that it is in the public interest to encourage the growth and development of noncommercial educational radio and television broadcasting, including the use of such media for instructional purposes;

(2) that expansion and development of noncommercial educational radio and television broadcasting and of diversity of its programing depend on freedom, imagination, and initiative on both the local and national levels;

(3) that the encouragement and support of noncommercial educational radio and television broadcasting, while matters of importance for private and local development, are also of appropriate and important concern to the Federal Government;

(4) that it furthers the general welfare to encourge noncommercial educational radio and television broadcast programing which will be responsive to the interests of people both in particular localities and throughout the United States, and which will constitute an expression of diversity and excellence;

(5) that it is necessary and appropriate for the Federal Government to complement, assist, and support a national policy that will most effectively make noncommercial educational radio and television service available to all the citizens of the United States;

(6) that a private corporation should be created to facilitate the development of educational radio and television broadcasting and to afford maximum protection to such broadcasting from extraneous interference and control.

Establishment of Corporation; application of District of Columbia Nonprofit Corporation Act

(b) There is authorized to be established a nonprofit corporation, to be known as the "Corporation for Public Broadcasting", which will not be an agency or establishment of the United States Government. The Corporation shall be subject to the provisions of this section, and, to the extent consistent with this section, to the District of Columbia Nonprofit Corporation Act.

Board of Directors; number of members; appointment; political party affiliation; qualifications; representation of interests; term of office; vacancies

(c) (1) The Corporation shall have a Board of Directors (hereinafter in this section referred to as the "Board"), consisting of fifteen members

appointed by the President, by and with the advice and consent of the Senate. Not more than eight members of the Board may be members of the same political party.

(2) The members of the Board (A) shall be selected from among citizens of the United States (not regular fulltime employees of the United States) who are eminent in such fields as education, cultural and civic affairs, or the arts, including radio and television; (B) shall be selected so as to provide as nearly as practicable a broad representation of various regions of the country, various professions and occupations, and various kinds of talent and experience appropriate to the functions and responsibilities of the Corporation.

(3) The members of the initial Board of Directors shall serve as incorporators and shall take whatever actions are necessary to establish the Corporation under the District of Columbia Nonprofit Corporation Act.

(4) The term of office of each member of the Board shall be six years; except that (A) any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed for the remainder of such term; and (B) the terms of office of members first taking office shall begin on the date of incorporation and shall expire, as designated at the time of their appointment, five at the end of two years, five at the end of four years, and five at the end of six years. No member shall be eligible to serve in excess of two consecutive terms of six years each. Notwithstanding the preceding provisions of this paragraph, a member whose term has expired may serve until his successor has qualified.

(5) Any vacancy in the Board shall not affect its power, but shall be filled in the manner in which the original appointments were made.

Election of Chairman and Vice Chairman or Vice Chairmen; nonfederal employment status of members; compensation and travel expenses

(d) (1) The President shall designate one of the members first appointed to the Board as Chairman; thereafter the members of the Board shall annually elect one of their number as Chairman. The members of the Board shall also elect one or more of them as a Vice Chairman or Vice Chairmen.

(2) The members of the Board shall not, by reason of such membership, be deemed to be employees of the United States. They shall, while attending meetings of the Board or while engaged in duties related to such meetings or in other activities of the Board pursuant to this subpart be entitled to receive compensation at the rate of $100 per day including travel time, and while away from their homes or regular places of business they may be allowed travel expenses, including per diem in lieu of subsistence, equal to that authorized by law (section 5703 of Title 5) for persons in the Government service employed intermittently.

Officers and employees; term of office, compensation, qualifications, and removal; political party affiliation, political test or qualification when taking personnel actions

(e) (1) The Corporation shall have a President, and such other officers as may be named and appointed by the Board for terms and at rates of compensation fixed by the Board. No individual other than a citizen of the United States may be an officer of the Corporation. No officer of the Corporation, other than the Chairman and any Vice Chairman, may receive any salary or other compensation from any source other than the Corporation during the period of his employment by the Corporation. All officers shall serve at the pleasure of the Board.

(2) Except as provided in the second sentence of subsection (c) (1) of this section, no political test or qualification shall be used in selecting, appointing, promoting, or taking other personnel actions with respect to officers, agents, and employees of the Corporation.

Nonprofit and nonpolitical nature of the Corporation

(f) (1) The Corporation shall have no power to issue any shares of stock, or to declare or pay any dividends.

(2) No part of the income or assets of the Corporation shall inure to the benefit of any director, officer, employee, or any other individual except as salary or reasonable compensation for services.

(3) The Corporation may not contribute to or otherwise support any political party or candidate for elective public office.

Purposes and activities of the Corporation; powers under the District of Columbia Nonprofit Corporation Act

(g) (1) In order to achieve the objectives and to carry out the purposes of this subpart, as set out in subsection (a) of this section, the Corporation is authorized to—

(A) facilitate the full development of educational broadcasting in which programs of high quality, obtained from diverse sources, will be made available to noncommercial educational television or radio broadcast stations, with strict adherence to objectivity and balance in all programs or series of programs of a controversial nature;

(B) assist in the establishment and development of one or more systems of interconnection to be used for the distribution of educational television or radio programs so that all noncommercial educational television or radio broadcast stations that wish to may broadcast the programs at times chosen by the stations;

(C) assist in the establishment and development of one or more systems of noncommercial educational television or radio broadcast stations throughout the United States;

(D) carry out its purposes and functions and engage in its activities in ways that will most effectively assure the maximum freedom

of the noncommercial educational television or radio broadcast systems and local stations from interference with or control of program content or other activities.

(2) Included in the activities of the Corporation authorized for accomplishment of the purposes set forth in subsection (a) of this section, are, among others not specifically named—

(A) to obtain grants from and to make contracts with individuals and with private, State, and Federal agencies, organizations, and institutions;

(B) to contract with or make grants to program production entities, individuals, and selected noncommercial educational broadcast stations for the production of, and otherwise to procure, educational television or radio programs for national or regional distribution to noncommercial educational broadcast stations;

(C) to make payments to existing and new noncommercial educational broadcast stations to aid in financing local educational television or radio programing costs of such stations, particularly innovative approaches thereto, and other costs of operation of such stations;

(D) to establish and maintain a library and archives of noncommercial educational television or radio programs and related materials and develop public awareness of and disseminate information about noncommercial educational television or radio broadcasting by various means, including the publication of a journal;

(E) to arrange, by grant or contract with appropriate public or private agencies, organizations, or institutions, for interconnection facilities suitable for distribution and transmission of educational television or radio programs to noncommercial educational broadcast stations;

(F) to hire or accept the voluntary services of consultants, experts, advisory boards, and panels to aid the Corporation in carrying out the purposes of this section;

(G) to encourage the creation of new noncommercial educational broadcast stations in order to enhance such service on a local, State, regional, and national basis;

(H) conduct (directly or through grants or contracts) research, demonstrations, or training in matters related to noncommercial educational television or radio broadcasting.

(3) To carry out the foregoing purposes and engage in the foregoing activities, the Corporation shall have the usual powers conferred upon a nonprofit corporation by the District of Columbia Nonprofit Corporation Act, except that the Corporation may not own or operate any television or radio broadcast station, system, or network, community antenna television system, or interconnection or program production facility.

Authorization for free or reduced rate interconnection service

(h) Nothing in this chapter or in any other provision of law shall be construed to prevent United States communications common carriers from rendering free or reduced rate communications interconnection services for noncommercial educational television or radio services, subject to such rules and regulations as the Federal Communications Commission may prescribe.

Report to Congress

(i) The Corporation shall submit an annual report for the preceding fiscal year ending June 30 to the President for transmittal to the Congress on or before the 31st day of December of each year. The report shall include a comprehensive and detailed report of the Corporation's operations, activities, financial condition, and accomplishments under this section and may include such recommendations as the Corporation deems appropriate.

Repeal, alteration, or amendment

(j) The right to repeal, alter, or amend this section at any time is expressly reserved.

Financing

(k) (1) There are authorized to be appropriated for expenses of the Corporation for the fiscal year ending June 30, 1968, the sum of $9,000,000, to remain available until expended.

(2) Nothwithstanding the preceding provisions of this section, no grant or contract pursuant to this section may provide for payment from the appropriation for the fiscal year ending June 30, 1968, for any one project or to any one station of more than $250,000.

Records and audit of the Corporation and the recipients of assistance

(*l*) (1) (A) The accounts of the Corporation shall be audited annually in accordance with generally accepted auditing standards by independent certified public accountants or independent licensed public accountants certified or licensed by a regulatory authority of a State or other political subdivision of the United States. The audits shall be conducted at the place or places where the accounts of the Corporation are normally kept. All books, accounts, financial records, reports, files, and all other papers, things, or property belonging to or in use by the Corporation and necessary to facilitate the audits shall be made available to the person or persons conducting the audits; and full facilities for verifying transactions with the balances or securities held by depositories, fiscal agents and custodians shall be afforded to such person or persons.

(B) The report of each such independent audit shall be included in the annual report required by subsection (i) of this section. The audit report shall set forth the scope of the audit and include such statements as are necessary to present fairly the Corporation's assets and liabilities,

surplus or deficit, with an analysis of the changes therein during the year, supplemented in reasonable detail by a statement of the Corporation's income and expenses during the year, and a statement of the sources and application of funds, together with the independent auditor's opinion of those statements.

(2) (A) The financial transactions of the Corporation for any fiscal year during which Federal funds are available to finance any portion of its operations may be audited by the General Accounting Office in accordance with the principles and procedures applicable to commercial corporate transactions and under such rules and regulations as may be prescribed by the Comptroller General of the United States. Any such audit shall be conducted at the place or places where accounts of the Corporation are normally kept. The representative of the General Accounting Office shall have access to all books, accounts, records, reports, files, and all other papers, things, or property belonging to or in use by the Corporation pertaining to its financial transactions and necessary to facilitate the audit, and they shall be afforded full facilities for verifying transactions with the balances or securities held by depositories, fiscal agents, and custodians. All such books, accounts, records, reports, files, papers and property of the Corporation shall remain in possession and custody of the Corporation.

(B) A report of each such audit shall be made by the Comptroller General to the Congress. The report to the Congress shall contain such comments and information as the Comptroller General may deem necessary to inform Congress of the financial operations and condition of the Corporation, together with such recommendations with respect thereto as he may deem advisable. The report shall also show specifically any program, expenditure, or other financial transaction or undertaking observed in the course of the audit, which, in the opinion of the Comptroller General, has been carried on or made without authority of law. A copy of each report shall be furnished to the President, to the Secretary, and to the Corporation at the time submitted to the Congress.

(3) (A) Each recipient of assistance by grant or contract, other than a fixed price contract awarded pursuant to competitive bidding procedures, under this section shall keep such records as may be reasonably necessary to fully disclose the amount and the disposition by such recipient of the proceeds of such assistance, the total cost of the project or undertaking in connection with which such assistance is given or used, and the amount and nature of that portion of the cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit.

(B) The Corporation or any of its duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records of the recipient that are pertinent to assistance received under this section. The Comptroller General of the United States or any of his duly authorized representatives shall also have access thereto for such purpose during any fiscal year for which Federal funds are available to the Corporation.

COMPETITION, REGULATION, AND PERFORMANCE IN TELEVISION BROADCASTING*

JOHN J. McGOWAN**

Commercial television, like the weather, is one of those institutions about which there is much talk and little action. As with all such institutions, opinions as to what should be done about television are as diverse as the population itself. However, television at least has the advantage of being the product of human endeavor and should, therefore, be tractable to human efforts to induce change if a change is in fact desired. But the reader should be forewarned that he will find no panacea in these pages.

The more limited aim of this paper is attempting to portray the relationships between industry structure and regulatory policy on the one hand, and industry performance on the other. We begin with a brief description of the salient features of the present structure of the commercial television industry. This is followed by an economic analysis of the determinants of broadcasters' program policies. Finally, we discuss some of the problems with alternative policies to improve the quality and diversity of television broadcasting. This paper concentrates throughout on privately owned and operated television broadcast facilities and does not deal with issues surrounding public television.

I. Industry Structure

While falling under the regulatory purview of the Federal Communications Commission, the commercial television industry resembles the unregulated industries more than it does the traditional regulated industries, such as transportation.[1] Entry into the industry is controlled by the FCC, which

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The author is grateful to those institutions for supporting the preparation of the paper and to several participants in the conference whose comments led to significant modifications of the earlier analysis. The present version was written during the author's tenure of a Social Science Research Council faculty research grant.

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1. For more detailed discussions of industry structure, its development and the development of regulatory policy, see Senate Comm. On Interstate and Foreign

also has authority to impose restraints on broadcasters' behavior to insure that competition between them is not impaired. But broadcasters have, *de facto*, wide latitude to operate their stations in order to maximize their rate of return on investment in broadcast facilities.

More than six hundred commercial television stations have been licensed by the FCC and are currently in operation. Over ninety percent of these stations are affiliated, either by contract or by ownership, with one or more of the three national television networks.[2] The commercial television system is supported through the sale of time to advertisers for the broadcast of commercial messages. Indeed, since the operation of local stations and the networks is undertaken by profit-motivated individuals and organizations, and since time sales to advertisers constitute almost their only source of revenue, it does little injustice to reality and aids considerably in understanding the functioning of the system to recognize that broadcasters conceive themselves to be in the business of providing an attractive advertising medium.

Individual stations sell time to local advertisers as well as to national or regional advertisers. Sales of the latter type take place in the national spot market. The buyers in this market are national advertisers who use national spot time as a supplement to, or as a substitute for, network time. Time sales take place at a price known as the station rate which tends broadly to reflect differences in the size of the potential audience for a station and the share of this audience which the station normally attracts.

Network time sales are made to national advertisers, except that the networks may act as sales agents in the national spot market for the stations which they own.[3] Time sales by a network are, in fact, sales of broadcast time over their affiliated stations.[4] The advertiser may specify which of a

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COMMERCE, TELEVISION INQUIRY, 8 volumes, 84th Cong., 2d Sess. (1956); HOUSE COMM. ON THE JUDICIARY, THE TELEVISION BROADCASTING INDUSTRY, H. R. REP. NO. 607, 85th Cong., 1st Sess. (1957); HOUSE COMM. ON THE JUDICIARY, HEARINGS ON MONOPOLY PROBLEMS IN REGULATED INDUSTRIES, PART 2, TELEVISION, 4 volumes, 84th Cong., 2d Sess. (1956); F.C.C. OFFICE OF NETWORK STUDY, SECOND INTERIM REPORT: TELEVISION NETWORK PROGRAM PROCUREMENT, PART 2, 88th Cong., 1st Sess. (1965).

2. Each network owns five VHF stations, the maximum under an FCC regulation which limits multiple ownership of stations to a total of seven, no more than five of which may be VHF stations.

3. Networks are prohibited from acting as national spot representatives for stations which they do not own.

4. At one time networks sold primarily time for the broadcast of programs provided by sponsors. Presently, however, most network sales are sales of spots for the broadcast of commercial messages within programs supplied by the network. This practice allows advertisers to spread their messages throughout the program schedule and reduce risks.

network's affiliates he wishes to utilize and the network, in turn, attempts to gain agreement from the stations ordered to carry the network originated program and associated commercial messages.[5] Such an agreement constitutes clearance of the network program by the affiliate. Affiliates which the advertiser has ordered and which clear the network program are compensated by the network at a percentage of their station rates.[6]

Sales to national advertisers thus constitute the sole outlet for network time sales and, after deducting compensation to affiliates, such sales currently account for slightly more than 21 percent of total time sales by television broadcasters. Local stations, on the other hand, have three sources of revenue from time sales. As Table 1 shows, the predominant source of revenue both for the network-owned stations and the other stations is from time sales to national spot advertisers. Such sales account for well over half the total revenue from time sales by broadcasters. Sales to local advertisers are also an important source of revenue. Compensation from the networks constitutes a relatively minor source of revenue for broadcasters.

TABLE 1
SOURCES OF BROADCAST REVENUE OF COMMERCIAL TELEVISION STATIONS[7]

	15 Network Owned Stations	*Affiliates and Others*	*Total*
National Spot	66.0%	56.0%	58.2%
Local	19.9%	26.0%	24.6%
Network Compensation	14.1%	18.0%	17.2%
	100.0%	100.0%	100.0%

It would be quite incorrect, however, to infer that network affiliation is a minor factor in the operation of television stations. The value of network affiliation lies not in the direct compensation received from the network but in the access which an affiliate has to network originated programming. The station rate which a broadcaster commands and the demand for time on his station are functions of the size of the audiences attracted to his station. Audience size is in turn a function of programming.

5. This is the procedure which currently prevails. Until recently, network affiliation contracts granted to networks the right to option time over the facilities of affiliates on relatively short notice and with limited objection rights by the affiliate. In addition, networks used to require all national advertisers to order time on a group of affiliates which constituted the network's "must-buy" list. This practice has been replaced by a minimum dollar amount that the advertiser must order. For further details, see HOUSE COMM. ON THE JUDICIARY, THE TELEVISION BROADCASTING INDUSTRY, H.R. REP. No. 607, 85th Cong., 1st Sess. Chapters II and III (1957).

6. The percentage varies among networks and among the affiliates of a given network but is generally between 30 and 35 percent.

7. F.C.C. ANNUAL REPORT, 1966, at 125.

There are essentially four sources or types of programming available to broadcasters but by far the most important single source for network affiliates is the network. Programs can be obtained from the network on two bases. First, the affiliate can clear a network program during which the network will originate commercial messages, the time for which it has sold to national advertisers. As noted above, for such clearances the station will be compensated at some percentage of its station rate. In addition, it will have the opportunity to sell national spot or local time during the station breaks adjacent to the network program. Secondly, if the national advertiser to whom the network has sold time does not select a particular affiliate, that affiliate may nevertheless clear the program. The affiliate will then receive no compensation from the network but will be free to sell time within, as well as adjacent to, the program to local or national spot advertisers. Overall, clearance of network programs accounts for well over 50 percent of total programming by affiliates as the data in Table 2 demonstrate. In the prime evening hours (6:00-11:00 P.M.) network clearances account for over 90 percent of programming.[8] Feature films, syndications, and locally produced programs share more or less equally as alternatives to network originated programming for local stations.[9]

TABLE 2
SOURCES OF PROGRAMMING BY LOCAL STATIONS, 1964-66[10]

Program Source	*Percent of Total Program Hours*		
	1964	*1965*	*1966*
Network	54.3	58.0	58.0
Syndications	13.4	12.4	12.1
Feature Films	13.7	12.9	14.2
Locally Produced	15.5	14.7	15.6

Network programming itself is procured predominantly from independent producing companies known as program packagers. In recent years networks have procured about 73 percent of their prime time program hours directly from packagers. Programs produced by the networks have accounted for another 20 percent with the balance supplied by advertisers who have themselves purchased programs from the packagers. Thus, the

8. F.C.C., OFFICE OF NETWORK STUDY, SECOND INTERIM REPORT: TELEVISION NETWORK PROGRAM PROCUREMENT, PART 2, 88th Cong., 1st Sess. 43 (1965).

9. Syndications are primarily programs, purchased from distributors, which have been broadcast by the networks in previous seasons (second-run syndications), but also include programs which have not previously had a network run (first-run syndications).

10. TELEVISION MAGAZINE, August 1966, at 104. Figures are based on analysis of a sample of over 200 stations and cover more than 25,000 hours of programming.

program packagers supply a total of 80 percent of prime-time program hours.[11]

Local stations and the networks with which they are affiliated thus complement each other and each is largely dependent upon the other. Networks supply the bulk of programming to the local stations and enable the latter to attract viewers which creates a demand for time for commercial messages on these stations by local and national spot advertisers. Affiliates of the network provide the facilities which enable them to broadcast programs and gain access to wide audiences which creates a demand by national advertisers for network time sales.

II. Competition and Performance in Television Broadcasting

Low quality and lack of diversity are the chief points upon which television programming has been criticized and there is no need to reiterate here the charges of the critics. Our objective is to develop a relationship between industry structure and the behavior of broadcasters on the one hand and industry performance, as measured by program diversity, on the other. In developing this relationship, we shall assume that profit maximization is the goal which broadcasters seek, and analyze first the determinants of optimal, *i.e.*, profit maximizing, program policy for a monopolist broadcaster.[12] This is followed by an analysis of the effect of competition on optimal program policies and hence on industry performance.

A. *The Economics of Monopoly in Broadcasting*

The product which broadcasters sell to advertisers is known as commercial minutes, that is, small blocks of time within or adjacent to programs, during which the advertiser's commercial message is broadcast. For our purposes, the most important determinant of demand for commercial minutes, and hence of broadcasters' revenue, is the cost of reaching prospective

11. Kroeger, *A Long Hard Look At the Genealogy of Network TV*, Television Magazine, April 1966, at 37. That article is a review of a report prepared by Arthur D. Little, Inc., on behalf of the television networks.

12. Although public service programming, such as coverage of important local, national, or international events; provision of emergency communications services; and network expenditures for regular news coverage may not conform well with profit maximizing behavior, an analysis of industry behavior based on the profit maximization hypothesis is, nevertheless useful. But these deviations from profit maximization imply that a certain degree of internal subsidization is prevalent in the broadcasting industry. Therefore, in evaluating the effects of proposed changes in industry structure or regulatory policy, it is important to be aware of the possible effects of the changes on broadcasters' willingness and ability to engage in internal subsidization of public interest programming.

buyers through television. This cost, which we shall refer to as cost per viewer (CPV), is simply the price of commercial minutes divided by the number of viewers or audience size at the time a commercial message is broadcast. The first step in our analysis is to state more explicitly the relationship between audience size and broadcasters' revenue, that is, the total revenue function for a television broadcaster.

To demonstrate the nature of the total revenue function, we introduce the concept of a *programming period*. Such a period is defined as a segment of time during which advertisers are indifferent as to the clock or calendar time at which their commercial messages are broadcast, provided that audience size is expected to be equal for all commercial minutes within the programming period. For example, it seems plausible that if audience size were constant throughout all the prime-time broadcast hours of every evening in any week, advertisers would have but slight preference as to the particular evening or particular hour in the evening at which their messages were broadcast. The fact that the audience is likely to vary from hour to hour and from evening to evening does not destroy the value of the concept of a programming period. Rather, audience variation coupled with advertisers' absence of preference for particular times within the period means that the prices of commercial minutes sold in the period must adjust so that the cost per viewer is the same for all commercial minutes offered during the program period.

Equalization of CPV for all commercial minutes within a programming period is simply demonstrated by noting what would happen if a broadcaster attempted to charge equal prices for all commercial minutes within a period when the audience size was not equal for all commercial minutes. Then the CPV of commercial minutes in and around some programs would be lower than in others. Since advertisers are indifferent as to the clock time at which their commercial messages are broadcast, they will attempt to acquire those commercial minutes with the largest audience and hence lowest CPV. This will create an excess demand for the high audience commercial minutes, thereby bidding up their price. At the same time, the broadcaster will find that buyers for the low audience commercial minutes can only be found by offering them at lower prices. This process of bidding up prices for high audience commercial minutes and bidding down prices for low audience commercial minutes will only terminate when prices have adjusted so that the CPV of all commercial minutes within a programming block are equalized, because only then will it not pay an advertiser to shift his demands for commercial minutes from low audience programs to high audience programs.

Because prices tend to adjust to equalize the CPV of all commercial minutes within a programming period, a broadcaster will face a different revenue function for each such period, but each total revenue function will depend solely upon the number of commercial minutes offered and the broadcaster's total audience during the program period. Figure 1 illustrates the typical form of a revenue function. For given audience size, total revenue first increases, reaches a maximum, and then declines as the number of commercial minutes offered increases. As audience size increases, the total revenue function is shifted upward as illustrated in Figure 1. Both of these properties reflect the fact that demand for commercial minutes is inversely related to cost per viewer.

Given audience size, the broadcaster will offer that number of commercial minutes which maximizes net revenue from their sale. Thus, corresponding to each audience size there is a unique profit maximizing number of commercial minutes to offer and a corresponding maximum revenue that will be earned by the broadcaster.[13] It is therefore possible to specify a direct relationship between net revenue and audience size as illustrated in Figure 2. From this relationship, we can derive the *marginal value of audience*, that is, the addition to net revenue which is generated by expanding total audience by a given amount. In Figure 2, the marginal value of audience is represented by the horizontal line labelled MVA.[14]

The final concept which we need to complete our analysis of the determination of optimal program policy is the *marginal profitability of a program type*. We assume that programs can be classified as to types, for example, situation comedy, adventure, westerns, etc. Furthermore, we assume that the program preferences of potential viewers during a programming period can be expressed in terms of program types.[15] More specifically, we

13. The profit maximizing number of commercial minutes for given audience size is of course determined by the requirement that marginal revenue from sale of commercial minutes equal the marginal cost of broadcasting them. If marginal cost is zero, then, of course, the maximum point on the total revenue function defines maximum revenue and the optimal number of commercial minutes to offer.

14. Portrayal of the total net revenue function and marginal value of audience as linear relationships is only an expositional convenience. No conclusion of the subsequent analysis depends upon this linearity assumption.

15. The reader may balk at this assumption, particularly if we were to maintain that the program typology currently used in the industry is a valid basis for characterizing viewers' preferences and measuring the extent of diversity. A group of programs nominally called "westerns" may have nothing more in common than the attire of the performers and the Rocky Mountains in the background. Yet it is clear that we all have some idea as to what we mean by program types and that we do have preferences as to how much of certain types we would like to consume (view). It is also clear that broadcasters must have some perception, however dim, of such a preference ordering,

Figure 1

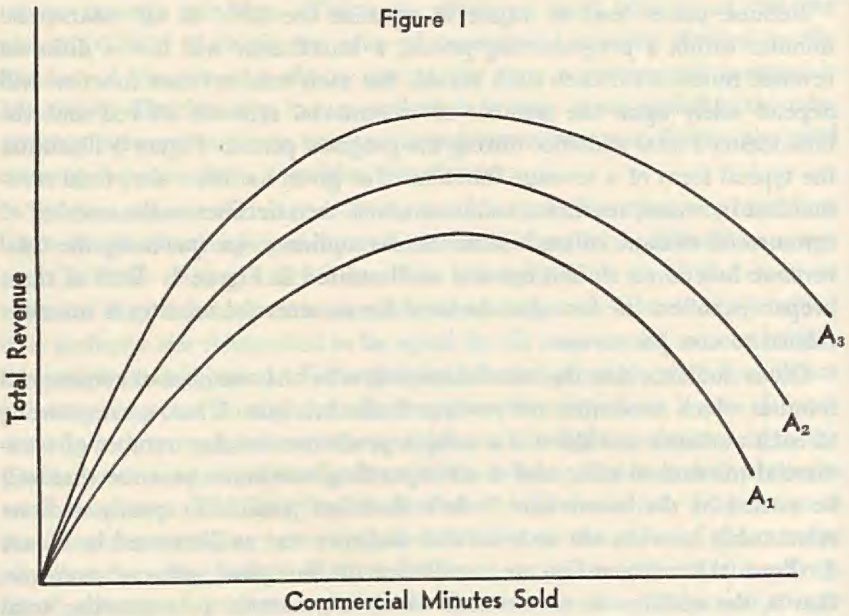
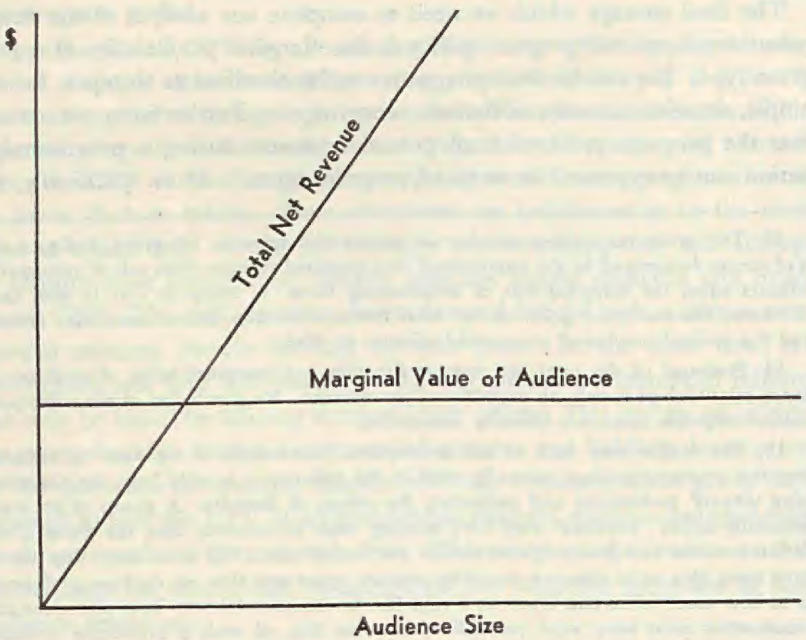


Figure 2



assume that repeated broadcast of programs of a given type will attract smaller and smaller *additions* to total audience for the program period. Thus, if seven hours of westerns were to be broadcast during a given programming period, we believe it reasonable to expect that the total audience for these seven hours of westerns will be less than seven times the audience which would be attracted to a single hour of westerns.[16] It is important to recognize that the foregoing assumption of decreasing additions to total audience for additional hours of broadcast of the same program type does not imply that the audience for the seventh hour broadcast will be smaller than that for any of the earlier hours broadcast. It may in fact be equal to, greater than, or less than the audience attracted to any of the previous six hours. It *is* implied that the average hourly audience for westerns will be decreased below what it was when six hours were broadcast by the broadcast of that seventh hour.

Now the addition to net revenue from the broadcast of an additional hour of a given program type is the addition to total audience thereby generated, multiplied by the marginal value of audience. But costs are incurred in the course of producing or purchasing and broadcasting the additional hour of programming. Subtracting these costs from the addition to net revenue gives the marginal profitability of an hour of programming of the given type. The marginal profitability of programs of given types is not constant but declines as additional hours of that program type are broadcast. Declining marginal profitability is a consequence of the fact that broadcast of additional hours of programs of a given type attract ever decreasing additions to total audience.[17]

We are now in a position to state the properties of an optimal program policy. For a given number of total hours of programming, the program types must be combined in such a way that the marginal profitabilities of all program types broadcast are equal. To demonstrate this, let us assume that a broadcaster chose a program policy for which the marginal profitabilities of two program types were unequal. Such a policy would not be

otherwise they would have no basis whatsoever on which to make their programming decisions. While it would be necessary to come to grips with the problem of defining an acceptable program typology if we were attempting to measure the extent of diversity in television broadcasting, this is not necessary for the present purposes. All that we are really asking is, given viewers' preferences for some goods which television broadcasters are capable of supplying, and given broadcasters' perception of these preferences, how will broadcasters allocate their resources?

16. The use of hours as the unit of programming is also of course arbitrary, but of no consequence to our analysis.

17. If the unit costs of programs increases as additional hours are demanded by the broadcaster, this will contribute further to the decline of marginal profitability of a program type.

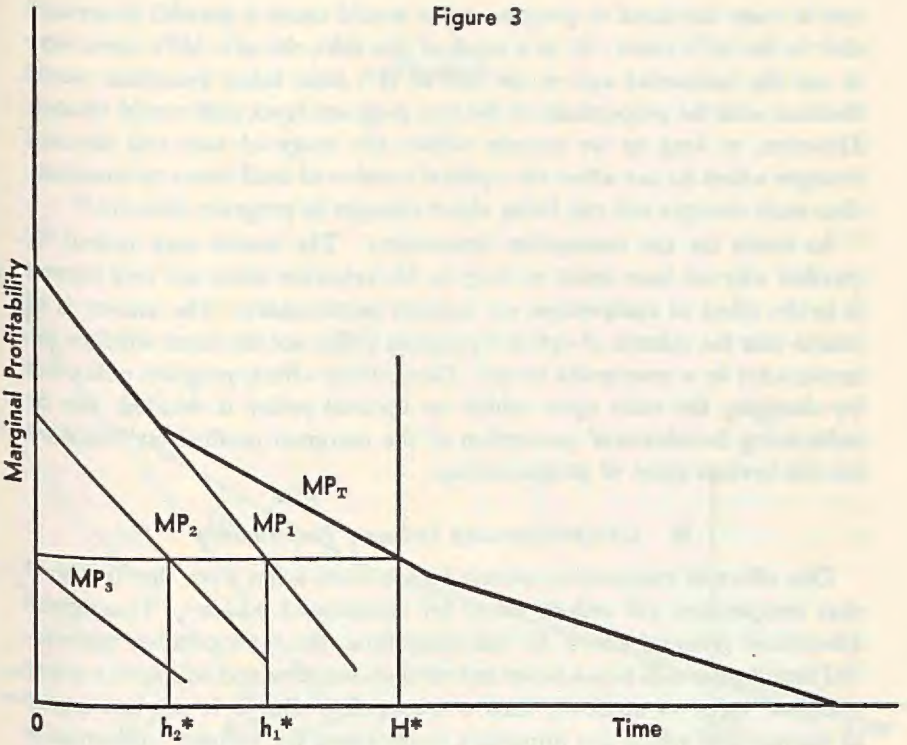
optimal because profits could be increased by increasing the hours broadcast of the program type with the higher marginal profitability and reducing the hours broadcast of the program type with lower marginal profitability. This switching process would increase profits because the addition to profit from increasing output of the high marginal profitability program type would outweigh the decrease in profits from reduced output of the low marginal profitability program type. However, because marginal profitability decreases as output of a given program type increases, the successive additions to output of the one program type will add decreasing amounts to total profits while successive reductions in output of the other program type will subtract increasing amounts from total profits. When the net change in total profits from switching an additional hour is zero, no further switching will take place and an optimal program policy will have been determined. Obviously, the net change in profits from switching between program types is zero only when the marginal profitabilities of the program types are equal.

It remains to determine the optimal total number of hours to broadcast during a programming period. Here two solutions are possible: either the broadcaster will broadcast that number of hours for which the marginal profitability of all programs is zero, or he will broadcast as many hours as the programming period contains. Which it will be depends on which comes first. That is, if he has filled the programming period before the marginal profitability of all programs is zero, then he obviously can broadcast no more in that period and it would be non-optimal to broadcast fewer hours. But if all marginal profitabilities become zero before he has filled the programming period, it is optimal to stop at that point.

Before turning to the evaluation of competition in broadcasting, it may be helpful to restate the foregoing argument in graphical terms. Suppose there are only three types of programs. We represent the marginal profitability functions of these program types by the curves MP_1, MP_2, MP_3 in Figure 3. The curve labelled MP_T is obtained by adding the three marginal profitability functions horizontally and represents the marginal profitability of broadcasting when any given number of broadcast hours are allocated optimally over the available program type. Assuming there are H* hours in the relevant programming period, the way the figure is drawn, the broadcaster will broadcast for the entire period and his program policy will contain h_1* hours of type one programs, h_2* hours of type two and zero hours of type three.

From this graphical analysis, it is clear that the diversity of the program policy which a broadcaster adopts for a given programming period, that is,

Figure 3



the number of program types which he uses and the proportion of total hours devoted to each depends upon two things: (1) the relative profitability of a single hour of the various program types, and (2) the relative rates at which the contribution to profitability of additional hours of the program types declines. In other words, diversity is determined by the relative values of the intercepts and slopes of the marginal profitability functions for the various program types. Diversity will tend to increase as the intercepts of these functions approach equality and as the functions become more steeply sloped.

An important consequence of these propositions concerning the factors influencing diversity is that diversity is not determined by the level of demand for commercial minutes or by the level of costs of broadcast operations which are insensitive to the type of program broadcast. These statements need to be modified slightly. First they are only true within the range of costs and demand for which the broadcaster finds it optimal to broadcast for the entire program period. In terms of Figure 3, a fall in demand or a

rise in costs unrelated to program types would cause a parallel downward shift in the MP_T curve. If, as a result of this shift, the new MP_T curve were to cut the horizontal axis to the left of H*, total hours broadcast would decrease and the proportions of the two program types used would change. However, so long as we remain within the range of cost and demand changes which do not affect the optimal number of total hours to broadcast, then such changes will not bring about changes in program diversity.[18]

So much for the monopolist broadcaster. The reader may indeed be puzzled why we have spent so long on his behavior when our real interest is in the effect of competition on industry performance. The answer is of course that the criteria of optimal program policy are the same whether the broadcaster be a monopolist or not. Competition affects program policy not by changing the rules upon which an optimal policy is decided, but by influencing broadcasters' perception of the marginal profitability functions for the various types of programming.

B. *Competition and Industry Performance*

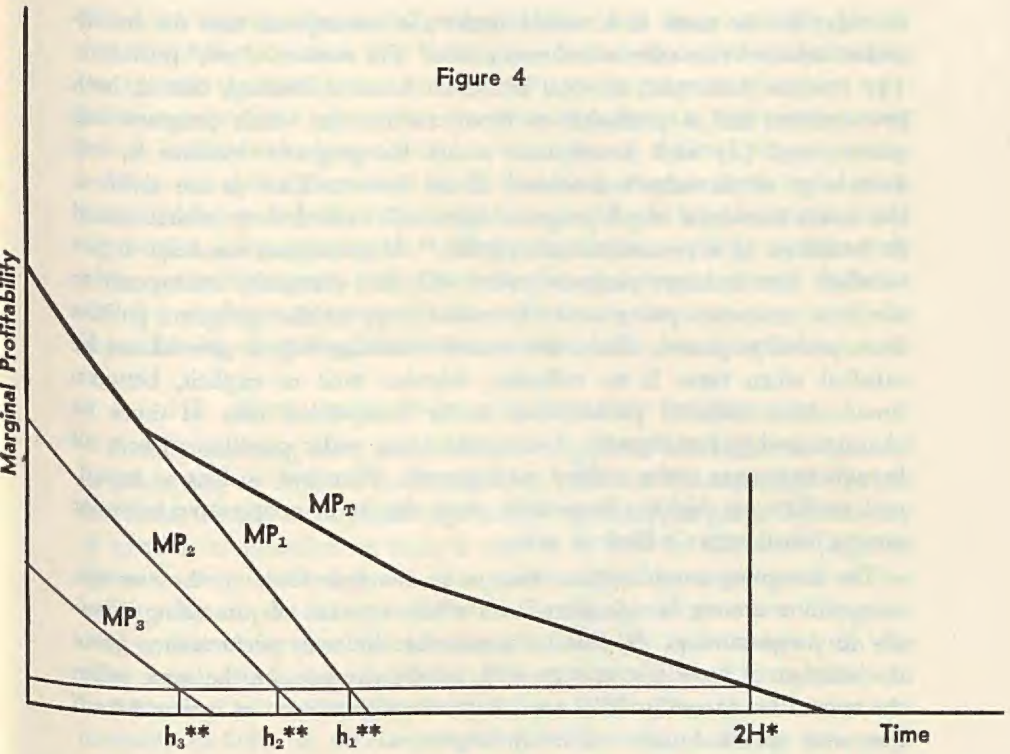
One effect of competition among broadcasters arises from the likelihood that competition will reduce prices for commercial minutes. Thus, given advertisers' demand curves for television time, the representative commercial broadcaster will face a lower net revenue function and will have a lower marginal value of audience than a monopolist. But it is not this aspect of competition which has important implications for industry performance as judged by program diversity. Rather, diversity is affected because with competition there is an expansion of resources devoted to the industry.

These effects of competition on broadcasting can be seen by first examining the effect which a doubling of available broadcast hours within a given programming period would have on a monopolist's optimal program policy. Reproducing the marginal profitability curves of Figure 3 in Figure 4 and assuming an expansion of available broadcast hours from H* to 2H*, the optimal program policy is then represented by h_1^{**}, h_2^{**}, h_3^{**}. This policy is obviously more diverse than in our earlier example because now programs of the third type are broadcast. We achieved this increase in diversity by doubling the monopolist's available broadcast hours essentially by allowing him to operate two broadcast stations instead of one.

Now let us ask whether the same allocation of time over the available program types will occur if we allow the second station to be operated by a

18. The reader should be reminded at this point that we are assuming broadcasters to be strict profit maximizers. If this assumption is not valid, cost and demand changes of the type mentioned may indeed have effects on program policy.

Figure 4



broadcaster other than our original monopolist. It is clear that if the two broadcasters behave in the same fashion as a two-station monopolist, that is, their individual program policies when added together give the same aggregate allocation of time over the available program types as does the two-station monopolist's optimal policy, then they will have chosen that program policy which maximizes total industry profit.[19] Thus, we can call the optimal program policy for the two station monopolist the joint maximum program policy for an industry consisting of two broadcasters. If it were possible for the broadcasters to get together and agree to maximize industry profits and arrange for a sharing of these profits, then the joint maximum program policy is the one they would adopt.

But let us suppose that neither joint determination of program policies, nor side payments from one broadcaster to the other, are allowed. Then each broadcaster is solely interested in his own profit and not at all interested in total industry profits. Our question then becomes, will program

19. The industry consists of the two broadcasters.

diversity be the same as it would under the assumption that the broadcasters behaved to maximize industry profits? The answer is "yes," provided: (1) that the constraint on total broadcast hours is binding, that is, both broadcasters find it profitable to broadcast for the whole programming period, and (2) each broadcaster makes his program decisions in full knowledge of the other's decisions. If the first condition is not satisfied, the hours broadcast of all program types will exceed those which would be broadcast by a two station monopolist.[20] If the second condition is not satisfied, then industry program policy will only eventually correspond to the joint maximum policy as the broadcasters revise their program policies from period to period. Since this second condition will in general not be satisfied when there is no collusion, whether tacit or explicit, between broadcasters, industry performance under competition may at times be characterized by less diversity than would occur under conditions where all broadcasters were under unified management. However, so long as broadcast markets are highly oligopolistic, some degree of cooperative behavior among broadcasters is likely to arise.

The foregoing considerations lead us to conclude that, on the average, competition among broadcasters is an efficient means of promoting diversity in programming. By this we mean that industry performance given the number of broadcast stations will, on the average, be the same when the several broadcast facilities are independently operated as it would be if they were operated under unified management.

One final comment on the efficiency of competition in broadcasting is in order. Reasoning from different models of broadcasters' behavior, other authors have concluded that competition is likely to lead to duplication, that is, the simultaneous broadcast of the same program type by two or more broadcasters.[21] In contrast, we conclude that duplication is unlikely to be so serious a problem as other writers have implied. The essential

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20. These propositions do not seem demonstrable without recourse to a mathematical argument. Readers familiar with Cournot models of oligopoly may find the proposition that in the duopoly case described in the text, the duopolists acting independently nevertheless arrive at the joint maximum program policy. The reason for this perhaps startling result lies in the assumption that the constraint on total broadcast hours is binding upon both broadcasters. Because of this, the reaction functions of both broadcasters for each program type coincide and the sum of the hours broadcast for each type is the same as the total hours of that type which a two-station monopolist would broadcast.

21. *See* Steiner, *Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting*, Q.J. Econ., May 1952, at 194-223; Rothenberg, *Consumer Sovereignty and the Economics of TV Programming*, Studies in Public Communication, Autumn 1962, at 45-54.

difference between the model presented here and those used by Steiner and Rothenberg is that they both assume the relevant decision-making period to be the time it takes to broadcast a single program of a given type. In contrast, we have argued that the relevant period, *i.e.*, the programming period, is likely to be longer, and as a consequence, optimal program policy is likely to require the use of more than one program type for a given programming period. So long as this is so, it will pay broadcasters to avoid duplication whenever possible.[22] Thus, duplication is likely to arise only when optimal program policy dictates the exclusive or almost exclusive use of a single program type.[23] For under such circumstances, it will be impossible for competing broadcasters to completely avoid duplication.

III. Regulatory Policy and Industry Performance

Broadly speaking, there are two classes of policies which can be followed in attempting to improve performance in television broadcasting. On the one hand, we may attempt, through public regulation, to guide the behavior of existing broadcasters in such a way as to lead to increased program diversity. In other words, we change the regulatory environment of the industry but do not take specific action to change the structure of the industry, that is, increase the number of competing broadcasters. On the other hand, we may in fact attempt to promote greater competition in broadcasting by encouraging new entry. While these policies are not mutually exclusive in practice, it will be convenient to discuss them separately.

A. *Changes in the Regulatory Environment*

If the performance of the commercial television industry fails to evoke pride in, and respect for, the wonders of the market place in guiding private behavior to serve the public interest, the fault does not lie in the perversity of broadcasters. For they seem only too well to have grasped and implemented the essential principles of efficient resource allocation. Disenchantment with market-generated results is, however, not uncommon. Indeed,

22. It does not pay to duplicate because the broadcaster is interested in total audience for the program period and because for a given program policy, total audience must be larger when there is no duplication.

23. An examination of network weekly program schedules in prime-time for 1966-67 with programs classified into broad categories used in the industry showed no instance of three-way duplication and ten instances where two networks were broadcasting the same program type in the same half-hour periods, accounting for 13.7 percent of total prime-time broadcasting. Duplication is much more prevalent during the daytime hours when audiences are likely to be small no matter what type of program is broadcast and there are few program types whose unit cost is low enough, given potential audience, to justify broadcasting at all.

the very foundation of industrial regulation is dissatisfaction with the results generated by profit maximization unhindered by externally imposed constraints. This is only to say that the failure of broadcast industry performance to measure up to expectations is due to the failure of regulatory policy to provide and enforce the proper constraints on broadcasters' behavior. But what scope is there for broader regulation of the industry?

Clearly, the problems posed by broadcast regulation are rather different from those posed by regulation of the classical public utility or natural monopoly. In transportation, electricity supply, banking, insurance, etc., regulatory determination of the classes of service to be provided and the setting of quality and safety standards is tolerable. Specific regulation or program content in broadcasting is not. Likewise, transference of the principles of rate of return regulation to commercial broadcasting is not a feasible method of influencing program policy. While rates of return do tend to be high in broadcasting, this is a reflection of the relative scarcity of the products purchased by advertisers, *i.e.*, commercial minutes. Regulating the rate of return by forcing reductions in the rate structure of television advertising would simply bring about an increase in broadcasters' output of commercial minutes which is, of course, not a result we want to promote.

What critics of industry performance are really asking is that broadcasters engage, to a greater degree than they do at present, in the broadcast of programs which are not in their own self interest to broadcast. The regulatory problem is to achieve this and at the same time refrain from an explicit specification of what is to be broadcast. In effect, current regulatory policy attempts to do this by requiring broadcasters to include a minimum number of hours of public interest programming in their weekly schedules and by interpreting liberally the concept of public interest programming. Predictably, the way in which most broadcasters fulfill this requirement accords with the principles of profit maximizing behavior. Public interest programming tends to be presented when potential audiences are small, so that foregone advertising revenues are minimized, and tends to consist of low cost programs. This behavior serves to minimize the cost of compliance with the regulatory requirement.

There is, however, an alternative formulation of the public interest programming concept which would limit broadcasters' ability to minimize the cost of compliance. Broadcasters might, for example, be required to broadcast a fixed number of hours of unsponsored programming during prime time. During these hours, no commercial minutes could be sold, but the broadcaster would have complete freedom to choose what types of programming to provide. Such a policy would do away with the need for regulators to evaluate programs to determine whether they qualify as public

interest programming and would constrain broadcasters' ability to minimize the cost of foregone advertising revenue. But because of these features of the policy, the incentive to economize on program costs would be even greater than under the present form of the public interest programming requirement.

For the networks, the cost minimizing adjustment to such a policy would be to go off the air during required public interest programming time; that is, they would advise their affiliates that no network programming would be provided at such times. Doing so would not only save them the costs of program production, but also avoid expenditures for network interconnection. For the affiliates, cost minimization would involve obtaining the lowest cost programs to broadcast during the public interest programming periods. In addition, they would attempt to economize further by reducing their voluntary broadcast of public interest programming in other time periods.

Yet it might be argued that such effective frustration of regulatory objectives could be prevented. For one thing, networks could easily be forced to provide programming during the public interest programming periods by requiring that no station licensee be permitted to be owned by or affiliated with a network which failed to do so. Then the networks would bear the major burden of responding to regulatory policy—they would be in the same position and have the same alternatives for cost minimization open to them as would be presented to station licensees if networks were not required to supply public interest programming.

It might be argued further, that public pressure on the networks exercised through the FCC and Congress would lead the networks to absorb most of the costs of such a policy. If this is true, then a significant improvement in industry performance might be gained. For it is probable under such circumstances that the choice of programs to comply with the public interest programming requirement would be made primarily on the grounds of artistic merit and appeal to those who are most strongly critical of present industry performance. On the other hand, there is no assurance that public sentiment would be so effective in inducing the networks to avoid making the cost minimizing response to such a regulatory policy. Certainly, the response of the broadcasting industry to the present public interest programming requirement and to criticism of its performance does not provide much ground for an optimistic view of industry response to a strengthened public interest programming requirement.

It is thus difficult to see how regulatory policy which would have a strong likelihood of effectively improving industry performance and which

would also avoid the explicit involvement of regulators in the determination of program content can be formulated. Not surprisingly, therefore, increased competition and other changes in the structure of the broadcasting industry have been looked upon as offering the greatest prospect for improved performance. It is to an evaluation of such policy which we now turn.

B. *Performance and Structural Change*

Scarcity of spectrum space constrains the use of competition in broadcasting to insure acceptable industry performance. Nevertheless, attempts to alter industry structure through the promotion of increased competition among commercial broadcasters and through promotion of alternative forms of television broadcasting have advanced on two fronts. On the one hand, the FCC has reserved part of the UHF spectrum for use by television broadcasters. At the same time, the Commission and Congress have sought to foster the economic development of UHF broadcasting by such means as the All Channel Receiver Act[24] and by constraining the development of Community Antenna Television Systems (CATV) which might impair profitability and retard development of UHF broadcasting.[25] On the other hand, regulatory policy has encouraged the growth of educational television by reserving television broadcast assignments for this service. Recent Congressional action on a bill to establish a Public Television Corporation is further evidence of a growing commitment to this alternative to commercial television.[26]

In sharp contrast, public policy has reflected little enthusiasm for pay television. Arguments by economists and others, that pay television would lead to vastly improved performance over that of commercial television, rest upon the superior ability of a price system to reflect viewer preferences and therefore to guide broadcasters toward maximization of viewers' satisfactions. Official resistance to pay television appears to be based upon doubts about the ability of commercial television to withstand competition from pay television. Since public policy appears already committed to increased competition in broadcasting, and since pay television would seem to be a desirable complement to the existing system, it is worth examining the probable impact of competition from pay television on commercial broadcasting.

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24. 47 U.S.C. § 303(s) (1964).

25. *See* CATV: Second Report and Order, 2 F.C.C.2d 725, 6 P. & F. Radio Reg. 2d 1717 (1966); CATV: Memorandum Opinion and Order, 1 F.C.C.2d 524, 5 P. & F. Radio Reg. 2d 1655 (1965).

26. 47 U.S.C. § 396 (1968).

Before proceeding, it will be well to make clear what we mean by "pay television," since that term is subject to numerous interpretations. We use the term "pay television" to refer to a system in which viewers are charged on an individual program basis, for it is only such a system which clearly provides a superior mechanism for reflecting viewer preferences and guiding resource allocation. We further require that program fees paid by viewers be the sole source of income for the pay television broadcaster. This concept of pay television thus rules out such variants as those in which viewers pay a flat subscription fee or those in which the broadcaster sells commercial minutes and also collects nominal program fees or a flat subscription fee from viewers.

The introduction of a system of pay television of the type described would obviously not confront existing commercial broadcasters with increased competition in the sale of commercial minutes. Therefore, its sole impact would be upon competition for viewers.

To the extent that pay television offered programs of the same types as competing commercial broadcasters, viewers would have some programming of these types available at a zero price (from commercial broadcasters) and some for which a positive price must be paid (from pay television). Only those viewers who wished to view more hours of programming of these types than are available at a zero price, or who estimate that the quality of pay television programs of these types justify it, would be willing to pay the price charged. Therefore, except to the extent that pay television provides higher quality programs of the same type than are available from commercial broadcasters, pay television audiences for these program types must represent additions to total viewing and not shifts from commercial to pay television. Furthermore, loss of viewers due to quality differences can be combatted by commercial broadcasters by improving the quality of their own programs. Indeed, this quality competition among broadcasters would in itself be desirable.

Likewise, the broadcast by pay television of program types unavailable from commercial broadcasters is likely to have little long run impact on the latter. Simply because these program types are not now available, the potential pay television audience for them must also represent an addition to total viewing rather than an erosion of commercial television audiences. There are two conditions under which audience erosion is a possibility, at least in the short run. First, commercial broadcasters may have inaccurately assessed viewer preferences. But to the extent that competition with pay television reveals this, commercial broadcasters can revise their own program policies in light of this new information. Second, part of the com-

mercial broadcasting audience for its programs may represent viewers who would really like to be seeing something else and would be willing to pay enough for the something else to make it profitable for the pay television broadcaster to provide it, but who, in the absence of this alternative, watch existing commercial television fare rather than watch nothing. Once again, it would seem that commercial broadcasters could adjust their program schedules to counteract audience loss from this phenomenon. The effect, of course, would be further to improve the performance of the commercial television industry.

On the basis of these considerations, it would be too much to say that competition from pay television will have no impact on commercial television audiences. But, both because commercial broadcasters have a price advantage in competing for viewers and because they can adapt their program policies when profitability considerations indicate that such changes are desirable, the bulk of the pay television audience in the long run must reflect additions to total viewing rather than erosion of commercial television audiences. There is, however, one major qualification to this argument.

A substantial portion of programming currently consists of television coverage of major productions in other fields of entertainment. The most notable example of this is the broadcast of major sports events. Another closely related example is first television runs of motion pictures which have generated wide interest among viewers as a result of their regular movie-house runs. Since large audiences seem virtually assured for this type of programming, competition among broadcasters for the television rights for major sports events and popular movies is extremely intense.

Because the profitability of a given program of this type may be quite different for a pay television broadcaster than it is for a commercial broadcaster, there exists the possibility that commercial broadcasters would be at a disadvantage relative to pay television in competing for broadcast rights. If commercial broadcasters were so disadvantaged, pay television might consistently win out in the competition for television rights. This would lead to large audience losses and, hence, to reduced profitability of commercial broadcasting.

Even though it might be doubtful that these losses would be large enough to jeopardize the viability of commercial television, there is a further consequence of the shifting of programs from commercial to pay television. This is that viewers would then have to pay to see certain events which were previously available free of charge. Therefore, to the extent that pay television successfully would bid away broadcast rights from commercial broadcasters, viewers would suffer a welfare loss.

The *possibility* of incurring such a welfare loss is, of course, not sufficient justification for resisting the development of a pay television system. A rational and omniscient policy-maker attempting to decide whether a given expansion in the resources devoted to private television broadcasting, *i.e.*, spectrum space, should be allocated to commercial or pay television, would choose in favor of that form which made the greatest contribution to viewer welfare. Thus, in determining the potential benefit from choosing pay television he would add together the increase in viewer welfare arising from the broadcast by pay television which is unavailable on commercial television at present and the improved quality of commercial television programs stemming from competition with a pay television system. From this, he would subtract the loss in viewer welfare arising from the switching of the broadcast of unique events from commercial to pay television. Finally, he would weigh the benefit so determined against the benefit generated by devoting the same increase in resources to commercial television and opt for the alternative with higher benefits.

While no one can relish the thought of attempting the estimation of benefits along the lines outlined above, looking only at the possibility of incurring some welfare loss by promoting pay television is surely a poor substitute for such an analysis and an inadequate basis for formulating public policy toward pay television. At the same time, the possibility of incurring a welfare loss should lead us to consider more carefully the advisability of promoting pay television as a complement to the existing system.

Conclusion

Unfortunately, no clear cut and simple policies for improving the performance of the commercial television broadcasting industry emerge from our analysis. Both the form of organization which the privately owned television broadcasting system in the United States has taken and the understandable desire to avoid a direct regulatory role in the determination of program policies impose severe constraints upon the scope for improvement in industry performance which regulatory policy can offer. In the face of these difficulties, public policy has perforce had to look primarily toward expansion in the alternatives available to viewers as the only feasible means of improving performance. Yet scarcity of spectrum space once again imposes limitations on the extent to which increased competition in broadcasting can be relied upon to bring about improved performance. Because of this limitation, it is important to ensure that whatever additional resources are devoted to private television broadcasting be used so that they

will make the greatest possible contribution to the performance of the industry.

To those schooled in the subtle workings of price systems and aware of their effectiveness in guiding resource allocation, it may seem clear that the public interest would be best served if any expansion of private television broadcasting were to take the form of pay television. But the reticence of policy makers to accept with alacrity the concept of pay television as a desirable complement to the present system of commercial television should not be lightly dismissed. So long as we fail to provide reasonably convincing evidence that their fears are misplaced, policy makers will continue to resist the development of pay television.

NEW TECHNOLOGY: ITS EFFECT ON USE AND MANAGEMENT OF THE RADIO SPECTRUM*

LELAND L. JOHNSON**

In view of the rapid technological advances occurring in the field of telecommunications,[1] pressing questions arise about the implications for the worrisome shortage of radio spectrum.[2] Introduction and assimilation of new technologies will have major significance for the future problems and prospects of using and managing the spectrum. Some advances will open up regions of spectrum now lying fallow and expand enormously the size of the usable portion; others will facilitate more intensive use of the available spectrum; still others will satisfy telecommunications needs without employing atmospheric transmission.

At the same time, these advances will reduce the cost of existing services and render economically feasible marketing of new kinds of services.[3] The responsiveness of telecommunications users to price reductions, combined with the spectrum-use characteristics of these advances, will determine the magnitude of additional demand imposed on the spectrum as a consequence of these advances.

In this paper I shall discuss a number of new technologies within the context of spectrum use and management. First is a discussion of opportunities that communications satellites present for employing unused portions of the spectrum. Then, drawing from evidence presented in a recent FCC inquiry, I shall disentangle and appraise issues relating to shared spectrum used by satellites and terrestrial systems.[4] The impli-

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1. Telecommunications—any communication of information in verbal, written, coded, or pictorial form by electrical means, whether by wire or radio.

2. Radio spectrum—the part of the spectrum of electromagnetic radiation lying between the frequency limits of approximately 10,000 and 100,000,000,000 cps (cycles per second).

3. For the sake of expository convenience, the term "cost," when appearing without qualification, will be employed in this paper to refer only to use of non-spectrum resources. Use of spectrum resources will be labeled appropriately.

4. Terrestrial systems—networks of transmitting and receiving points which are located on the earth, as opposed to such points which are located in space, as are satellites.

cations for spectrum use of a single satellite system versus multiple systems for domestic use, a central issue in an FCC inquiry, will receive special attention. Satellites broadcasting directly to home television receivers, and other technologies will be more briefly treated with respect to their prospects for employing the available spectrum more intensively. Finally, I must include the exciting prospects presented by non-atmospheric forms of transmission: waveguides, laser pipes, transistorized underseas cable, and cable television to the home.

In general, given the many attractive possibilities to be discussed, one may come away with the feeling that the spectrum problem is certainly not unmanageable—that the "silent crisis" surely need not escalate into anything catastrophic. However, the process of introducing, absorbing and adjusting to technological advances will strain the existing arrangements for managing the spectrum. To guide and promote research and development activities, to exploit trade-offs that arise between spectrum and non-spectrum resources, and to price telecommunications services to reflect both spectrum and non-spectrum resource cost, will require management practices far removed from those of today.

I. Expanding the Resource Base

A striking characteristic of our concern about spectrum shortage is that we are dealing with only a tiny portion of spectrum potentially usable for communications purposes. Virtually all present-day use is confined to frequencies below 15 Gc/s. Other regions stretching as high as 1,000,000 Gc/s would, if tapped, contribute enormously to the spectrum resource base.

To be sure, there are good reasons why these higher regions are not now being exploited. Signal attenuation[5] is generally severe through clear and dry atmosphere, as well as through rain, snow, fog and clouds. Variations in atmospheric temperature also create serious problems, particularly at frequencies near and in the visible range.[6] For transmission over long distances along the surface of the earth, these characteristics do not lead to appealing prospects.

However, the elevated beam angles of satellite ground transmitters and receivers, involving much shorter travel through the troublesome atmos-

5. Signal attenuation—the diminution of current, voltage, or power in an electrical communicating channel.

6. Visible spectrum—the range of frequencies manifesting itself as light, producing visual sensation in the normal eye. The range is from red light at 400 trillion cycles per second through orange, yellow, green, blue, and violet at about 700 trillion cycles per second.

phere, open up exciting new possibilities. Moreover, the higher frequencies carry an advantage over the lower regions in that their use permits narrower satellite beams to focus and concentrate more precisely electromagnetic energy over the area to be served. It is notable that both Comsat and AT&T have proposed satellite systems for domestic use in the 1970's, operating at frequencies in excess of 10 Gc/s, to supplement bands at 4 Gc/s and 6 Gc/s currently shared by satellite and terrestrial microwave[7] users.[8]

Exploring briefly the potential bandwidths[9] available for satellite operations, we find that the level of attenuation through the clear and dry atmosphere varies widely from one region to another within the range 15 Gc/s to 1,000,000 Gc/s. While the atmosphere is generally not very transparent at such high frequencies, even at elevated satellite beam angles,[10] regions of low attenuation (which might be thought of as "windows" into space) are wide and numerous enough to encompass thousands of times the total bandwidth now in use. The effects of rain, fog and the like also vary from one window to another. Taking these factors together, we find that windows in the single region 15 Gc/s to 100 Gc/s encompass a spectrum space

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7. Microwave—electromagnetic waves having wavelengths of less than 20 centimeters. Waveguides are conventionally used in this range of wavelength instead of conventional transmission lines.

8. AT&T, *An Integrated Space-Earth Communications System to Serve the U.S.*, & Communication Satellite Corporation, *Technical Submission of Communication Satellite Corporation*, both filed in connection with F.C.C. No. 16495 (Dec. 1966). AT&T mentions use specifically of the 18 and 30 Gc/s bands. That attenuation varies greatly as a function of beam elevation is shown graphically in Telecommunications Science Panel, Electromagnetic Spectrum Utilization—the Silent Crisis, 27 (Oct. 1966).

9. Bandwidth—the important range of frequencies in a given signal. A given electrical circuit can transmit only a certain limited range of frequencies; this frequency is called the bandwidth of the circuit. If a signal is sent that has frequency components outside the transmission band, some frequencies will be attenuated and lost along the way. Consequently, the received signal will not be a good replica of the signal which was sent. The received signal may even be unacceptable. To illustrate the point, suppose that there is a transmission link—an undersea cable—that can carry signals of a specified bandwidth. By using the appropriate electronic equipment, a signal having a narrow bandwidth may be sent. For the given cable, many narrow bandwidths may be used instead of a single broad bandwidth. Specifically, if the cable has a bandwidth capability of 4,000,000 cycles per second (*i.e.*, 4 megacycles), then at a given time, the cable could be used to transmit one television program, since 4 megacycles is the bandwidth required for a single television program. Instead of using the cable for a single television program, 400 speech signals could be sent (supposing that the required bandwidth is 10,000 cps).

10. Elevated beam angles—the change in the angle of the transmitting and receiving beam of energy caused by the variation in the height of the transmitting or receiving antenna.

roughly 100 times that now allocated to VHF[11] and UHF[12] television. In this region attenuation due to fog, clouds and snow appears to be mild, while rain has severe consequences.[13]

Several possibilities come to mind for employing satellites in this region: (1) confining ground stations to western desert areas and to other locations of low rainfall (this approach would be of dubious value insofar as the strongest demands for spectrum are concentrated around major urban areas where, by and large, annual rainfall is substantial); (2) locating ground stations widely and employing the system to satisfy peak load requirements[14] and to serve as emergency backup; (3) locating ground stations widely and employing additional resources to mitigate the rainfall problem. In their recent proposals both AT&T and Comsat mention use of dual interconnected ground stations separated by sufficient distance so that the probability of *both* simultaneously being out of operation due to heavy rain would be reduced to an acceptably low level. In addition, widening the bandwidth for each video and voice channel[15] and other practices that ordinarily would be considered "wasteful" of spectrum might be warranted in this case as a way to achieve greater protection against attenuation.

In any event, a substantial research and development effort will be required to bring this region into use. Among other things, much more knowledge is needed about the severity and time distribution of local rain storms and high-altitude precipitation by geographic region; transmission experiments will need to be conducted in a variety of atmospheric conditions to verify and supplement laboratory data; new kinds of power tubes and other hardware will have to be developed for use in these higher frequencies.

Questions immediately arise regarding the appropriate level and timing of research and development to exploit the higher regions of the spectrum. Among the reasons why no satisfactory answer can be given is simply the

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11. VHF band—very high frequency band lies approximately in the range of frequencies between 30 megacycles per second and 300 megacycles per second.

12. UHF band—the ultra high frequency band lies approximately between the range of frequencies of 300 megacycles per second and 3000 megacycles per second.

13. A good concise discussion of the problems and prospects of using frequencies above 10 Gc/s, from which I have drawn some of the above, is provided by R. Kompfner, *Windows to Space,* PROCEEDINGS OF THE AMERICAN ASTRONAUTICAL SOCIETY 67-94 (1967). Windows are defined as regions in which one-way attenuation upward through the clear and dry atmosphere is less than one-half, or 3 decibels.

14. Peak load requirements—the highest required signal output for a given system which is needed to satisfy a given need.

15. Channel—the range of frequencies occupied by a transmitted signal.

fact that existing arrangements for managing the spectrum provide little clue about the social cost of employing the lower frequency bands more intensively as an alternative to expanding into the higher regions. Present-day incentives for existing users of lower frequencies to engage in research and development in the frequencies above 15 Gc/s leave much to be desired. User C may feel great pressure to engage in research and development in the higher frequencies because continued expansion of C's services in the lower frequencies would lead to interference with the services provided by D and E. Yet, perhaps only at a small cost (relative to that involved in C's using the higher frequencies), D and E might be able to protect themselves from this added interference. But today there is no easy way by which C can compensate D and E for these added costs, or for C even to determine what the magnitude of costs would be. On the other hand, B might not feel under pressure because his allocations in the lower region are "adequate" for his needs. Yet F and G may be badly squeezed in their allocations; while they could not themselves employ the higher frequencies due to the very nature of their operations, they might find extremely valuable the spectrum allocation that B is now occupying if somehow B could be induced to move into the higher frequencies and vacate his existing allocation.

More specifically, since it is satellite systems that would use these higher frequencies, the value of moving into these higher frequencies would reflect the spectrum and non-spectrum costs that otherwise would be imposed on society if satellite services were confined to the lower, already congested bands. As a first approximation, these costs would arise out of expanding satellite services in the 4 Gc/s and 6 Gc/s bands presently shared with terrestrial microwave facilities. It is to the question of shared use that we now turn.

II. Shared Use

A. *Some General Considerations*

Clearly, the magnitude of future problems of spectrum use will depend substantially on the degree to which domestic satellite users are able to share spectrum with each other and with terrestrial systems. The issue of shared use is particularly urgent because near-term prospects for employing satellites domestically are bright. In response to an FCC inquiry regarding the desirability of establishing domestic communications satellites by nongovernmental entities, extensive debate has centered around questions of spectrum use. On one side, the Ford Foundation and the American Broadcasting Company have concluded that for purposes of distributing

television programming via satellite, interference[16] with terrestrial microwave facilities would not be serious, even with several satellites and a large number of ground stations. In contrast, AT&T feels that the interference problem is potentially so serious that satellite service might have to be denied to virtually the entire northeastern portion of the United States because of the heavy concentration of terrestrial microwave in that area.[17] While the debate has involved a multitude of factors far too complex to summarize here, I think it is fair to say that some technical dimensions of the interference problem are not well understood, especially the phenomenon of precipitation scatter,[18] and that a test and experimentation program is badly needed.

For our purpose one point is especially noteworthy. To say that a satellite system should not operate in a shared band if it interferes with terrestrial microwave, or vice versa, is clearly to miss the point: many trade-offs exist between cost and reductions in interference. Site shielding of ground antennae[19] and changes in relative locations of interfering stations immediately come to mind. Among other things, special equipment can be installed at one antenna site to cancel the sidelobe interference[20] emanating from another site. Quite conceivably, the added cost to either satellite users or to terrestrial microwave users of reducing interference to a tolerably low level would be less than the social value gained by conserving the spectrum through greater shared use. In such cases, society would benefit, on balance, by permitting the expanded shared use in combination with some means by which the cost of protection from interference would be appropriately borne. Unfortunately, current practice in spectrum management simply avoids this issue. In general, users of *existing* facilities are accorded assurance that new or proposed interfering facilities will not be permitted; little, if any, attention is directed to the possibilities of trade-offs between cost and interference protection. In the words of an FCC report:

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16. Interference—any signal, whether naturally generated, such as atmospherics, or generated by radio transmitters or electrical machinery, other than that to which it is intended that a radio receiver should respond.

17. The Ford Foundation, *Technical and Economic Data, Vol. III*, filed in connection with F.C.C. No. 16495 (Dec. 12, 1966); American Broadcasting Company, *Comments on FCC Inquiry*, filed in connection with F.C.C. No. 16495 (Aug. 1, 1966); AT&T, *supra* note 8, especially at 15-17.

18. Precipitation scatter—the general re-radiation of wave energy caused when the radiation is incident on particles of precipitation. The re-radiation may distort the signals and introduce unwanted frequency components.

19. Site shielding of ground antennae—a metallic shield surrounding an antenna situated on the ground in order to prevent its being influenced by external electric fields.

20. Sidelobe interference—the interference with the signal caused by the frequencies lying to either side of the bandwidth of the transmitted signal.

> We have also instituted a mandatory coordination procedure to ensure that once an [satellite] earth station is established its capacity will not be expanded in such a way as to cause harmful interference to existing microwave systems and conversely, that new microwave stations will not cause harmful interference to existing earth stations.[21]

Rather than asking whether satellites interfere with terrestrial microwave, a more general question is: to provide a *given* volume of service between given points by either satellite or by microwave, would use of satellite involve a higher or lower spectrum cost than use of microwave? On one hand, the elevated beam angles of satellite systems contribute an additional spatial dimension to enhance the prospects for sharing spectrum with microwave. In its study Comsat concluded that:

> . . . interference coordination of a satellite earth station within the existing microwave environment is much less problematic than that of microwave-to-microwave interference coordination. It would be possible in many cases to locate satisfactorily a satellite earth terminal for domestic communications services in an area which is saturated from the viewpoint that no further terrestrial microwave stations could be located in this area without interfering with other terrestrial microwave stations.[22]

On the other hand, the satellite designs postulated in the responses to the FCC inquiry employ a *wider* bandwidth per channel[23] than does terrestrial microwave. Given the very limited power output of satellites (at least in the near future), use of a wider bandwidth per channel is an appealing way to reduce the cost of ground station antennae and other components. In its system recommended for 1970, Comsat proposes a 40 Mc/s bandwidth per video channel in contrast to roughly a 6 Mc/s bandwidth per video channel used by terrestrial microwave.[24]

On *a priori* grounds we cannot say whether the broader bandwidth per satellite channel involves a greater or lesser spectrum cost than does the narrower bandwidth of microwave. While a 40 Mc/s bandwidth employed by a satellite would represent a lower spectrum cost than the same bandwidth employed by microwave, insofar as the additional spatial dimension afforded by satellite use involves a lower level of interference, it does not

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21. FCC, Report on the Technical Aspects or Considerations of Frequency Assignment 23 (1965).

22. Communications Satellite Corporation, *supra* note 8, at 73-76.

23. Bandwidth per channel—the range of frequencies occupied by a transmitted signal, measured in terms of the bandwidth. That is, the channel is defined in terms of the range of frequencies which compose the bandwidth of the transmitted signal.

24. The 40 Mc/s requirement is computed on the basis of a 12 video channel satellite transmitting or receiving over a 500 Mc/s total bandwidth. *See* Communications Satellite Corporation, *supra* note 8, at 28.

necessarily follow that a given number of video channels transmitted by satellite would involve a smaller spectrum cost than the same number of channels carried by microwave.

Clearly, in comparing the relative merits of satellite and terrestrial microwave systems for domestic use, the costs of spectrum should be taken into account. And in doing so it is not enough to say simply that a particular satellite system either will or will not interfere with the existing microwave system. Other factors of paramount importance include the cost of interference (in terms of living with it or designing against it) and the magnitude of the interference problem in the face of continued *growth* of facilities competing for spectrum space.

B. *Ownership, Operation and Spectrum Use*

Problems of interference and sharing cannot be examined independently of arrangements by which satellite systems are owned and operated. If the FCC were to permit several entities to establish satellite systems for domestic use, to what extent would additional demands be imposed on spectrum space in comparison with a system in which a single entity owns and operates the entire system? In examining questions about employment of satellites for domestic purposes the FCC has, for good reason, been concerned about the implications for spectrum use. In its recent inquiry the FCC asked specifically whether it would be in the public interest to authorize noncommon carriers to construct and operate domestic satellite facilities, considering "the amount of frequency spectrum now available for the communication satellite service under the Commission's rules." The subsequent debate has been confined largely to the pros and cons of a separate system for television distribution. However, several important issues extend far beyond considerations of television use. Moreover, some of the analysis presented in the FCC inquiry is subject to question. Treating separately the satellite portion and the ground environment, I shall attempt to untangle and to treat briefly a few points.

1. *The Satellite Portion*

One area of concern has been the so-called "orbital slot" problem. Satellites sharing the same frequencies cannot be placed less than some minimum distance from each other because ground transmitting and receiving stations are limited in their ability to discriminate between adjacent satellites;[25]

25. Discrimination by ground station to distinguish signals from adjacent satellites—the ability of a ground receiving station to distinguish from which of two adjacent satellites a given signal emanates. The closer the satellites, the more difficult is the task of determining which satellite is the source.

since synchronous satellites must remain in an equatorial orbital plane,[26] only a limited number of slots are available for satellites in the line-of-sight of the United States. For example, with 3 degree longitudinal spacing spread from 64° to 130° West, 22 slots would be available. Concern has been expressed in some quarters that a proliferation of "small" satellites would be wasteful of the potentially limited number of orbital slots.[27]

Actually, the orbital slot issue as it has been presented is misleading. Given a 500 Mc/s band to be shared between satellite and terrestrial facilities, a proliferation of small-capacity satellites would be no more wasteful of orbital slots than large ones so long as the *bandwidth per channel* remains constant for both. A large-capacity satellite having 12 channels each with 40 Mc/s requires no more orbital space than 12 closely packed satellites each with one channel. Expressed differently, a large satellite employing a dozen 40 Mc/s repeaters[28] could, so far as spectrum use is concerned, just as well be divided into a dozen satellites with one repeater each. Thus the 22 slots mentioned above could be divided into 22n slots with each appropriately sequenced satellite having 1/n of the total bandwidth. To be sure, there exists what might be called an orbital "plane" limitation, in the sense that if the multitude of system parameters are fixed (including a given spectrum allocation) the total capacity that can be wrung out of the equatorial plane is limited.[29] But all this says is that the larger the capacity (hence bandwidth used) of a satellite, the fewer can be put into orbit. This relationship by itself would not provide a basis to conclude that numerous satellites orbited by separate entities would be more wasteful of orbital space than fewer, larger satellites owned by a single entity.

One would question a proliferation of small satellites for other reasons. On a per-channel basis, larger satellites are less expensive to construct and to place in orbit than is the case with smaller units. But here we have the familiar economies of scale issue involving the relationship between cost per channel and total number of channels in the satellite. It is clear that economies of scale do exist over a substantial range of capacity. Based on the state-of-the-art predicated in responses to the FCC inquiry, a satellite having

26. Equatorial orbital plane—a satellite orbit which forms a plane perpendicular to the equator.

27. *See* Communications Satellite Corporation, *supra* note 8, at 77-81; Ford Foundation, *supra* note 17, at 31-32.

28. Repeater—a special type of amplifier which is inserted in a telephone circuit at intervals, the function of which is to overcome the loss in the signal which occurs as a result of the resistance, capacitance, and inductance inherent in any transmission line.

29. We must remember that the many parameters in the system are subject to great variation and to trade-offs among themselves; therefore this limitation must be interpreted as an extremely loose one.

12 television channels would clearly involve a cost less than 12 times that of a satellite with only one channel. But this relationship does not depend on any assumption that bandwidth per channel varies as a function of capacity.[30] In other words, economies of scale in terms of hardware costs may be strongly positive, while the economies of scale for spectrum use remain essentially zero.

In one dimension of economies of scale, however, spectrum considerations re-enter through the backdoor. If small-capacity satellites were owned and operated by separate non-cooperating entities, B and C, diseconomies would result insofar as excess capacity afforded by B's satellite during times of slack demand for B's service could not be employed to satisfy peak demands simultaneously imposed against C's service. At the same time that portions of demand for C's service might have to go unsatisfied (or supplied by C at additional cost), resources tied up in B's satellites (including B's allocation of spectrum) would be in excess supply.[31] In this sense separate non-cooperating satellite systems would be wasteful of spectrum space—but they would be wasteful of satellite hardware and other resources too; spectrum use would not involve a unique problem.

Finally, we must consider one potentially very important relationship between economies of scale and spectrum use: the larger a satellite both in physical size and capacity, the wider the latitude for designing it to reduce interference with terrestrial facilities or with other satellite systems sharing the same frequencies. Greater latitude would exist for equipping the satellite with a larger transmitting antenna and other equipment to narrow the beam and to focus it on the territory or specific ground stations to be served, perhaps a single time zone over the United States, rather than illuminating[32] the whole area of contiguous states. (This option would be especially attractive for television distribution where transmission tailored to each time zone would be desirable.) This would reduce, if not eliminate, the problem of interference with ground receivers located in the expanded non-illuminated areas.[33] Greater latitude would also exist for designing di-

30. This is not to imply that bandwidth per channel must remain fixed. In fact it too can be varied against other parameters of the system, as mentioned earlier. But this option exists for both small and large capacity satellites.

31. The severity of this problem depends, of course, on the degree to which the peak demands against B and C would be staggered over time. If peak demands against B and C tend to occur simultaneously the possibilities for trading capacity back and forth would be restricted.

32. Illuminated areas—geographic areas which receive transmitted signals.

33. In AT&T's proposal for satellite telephone service, the satellites would have a large number of very narrow beams, each focused on a specific ground station. The design for television use proposed by the Ford Foundation calls for seven-beam satellites to cover separately the four contiguous time zones, Hawaii, Alaska, and Puerto Rico.

rectional receiving antennae[34] on the satellite so that signals from terrestrial microwave transmitters outside the narrower satellite receiving beam would not feed into the satellite antenna. With smaller satellites, greater physical constraints would be encountered in designing large antennae and other hardware due, in part, to the smaller launch shrouds and boosters. More generally, the per-channel cost of including features to reduce interference with terrestrial microwave would tend to be higher than that for the larger capacity units.

2. *The Ground Environment*

Similar considerations would apply in the proliferation of small ground stations owned by separate entities. On one hand, the number of locations would be increased where interference would potentially be a problem. On the other, so long as smaller stations operated only a portion of the total allocated bandwidth in proportion to their capacities, the problem of interference would correspondingly be reduced. The larger the stations, the less is per-channel cost in reducing interference by designing and tailoring the antenna to reduce sidelobe radiations, installing equipment to cancel sidelobe interference from other locations, constructing shields to reduce radiation levels. Moreover, smaller ground terminals with smaller antennae and consequently wider beams would suffer a reduced capacity to discriminate between adjacent satellites; hence, satellite spacings would have to be increased, thereby reducing the number of orbital slots available to the United States for satellites sharing the same frequencies. Here, the orbital slot issue legitimately emerges, but not in terms of small-capacity versus large-capacity satellites in which the issue is irrelevant, but rather in terms of small-antenna versus large-antenna ground stations.

3. *Spectrum Management and Market Structure*

Is one to conclude from all this that the FCC should restrict ownership and operation to a single entity operating a domestic system essentially as a monopoly? Not at all! At least four more points need to be made.

(1) Quite possibly, several separate systems would each handle sufficiently large volumes of traffic so that each would be able to enjoy most of the economies of scale, including both spectrum and non-spectrum considerations. For example, on the basis of evidence submitted in the FCC

34. Directional receiving antenna—an antenna in which the receiving properties are concentrated along certain directions.

inquiry, I would judge that a separate system for television distribution would likely constitute such a case.

(2) One must distinguish between the structure of ownership and the structure of operation. Today, cases abound where separate competing entities undertake cooperative arrangements to exploit economies of scale. In the satellite business, too, opportunities would arise for joint ownership, leasing, and other cooperative arrangements to avoid some of the diseconomies of spectrum use mentioned above. For example, joint ownership of large ground stations, and satellite capacity leased back and forth to meet peak load and emergency requirements are possibilities.

(3) Even if operation of multiple domestic satellite systems were to enlarge the demand for spectrum, this would not necessarily mean that separate systems should be prohibited. We face again the question regarding the value of spectrum versus the value of other goals such as promotion of competition.

(4) Since current spectrum management does not include a satisfactory mechanism for isolating the cost of a given case of interference between users, or for providing a means by which the cost can appropriately be borne, one might argue in favor of a single entity owning *all* facilities within which interference is likely to arise. With all costs and benefits "internalized," the single entity would be better able to adjust use of the various facilities—install special interference-reducing equipment here, alter the location of an antenna there, tolerate interference situations elsewhere—in order to minimize cost for a given total output. In the hands of separate entities these adjustments would not so easily be made. Given the arbitrary character of existing practices, requests for frequency allocations for new facilities would likely be disapproved if this would lead to interference with existing facilities. Desirable trade-offs between spectrum conservation and interference protection would remain unexploited; and, more generally, the total cost to these separate users, and to society, would be greater than in the case of single ownership. Applying this reasoning to the satellite case, one might argue that the common carrier owning the terrestrial microwave networks in question should also own the satellite ground stations, and perhaps the satellites as well. An unfortunate characteristic of present-day spectrum management practice is the temptation to take the easy way out. Rather than coming to grips with the problem of achieving efficient allocation of spectrum in a competitive environment, current spectrum management practice encourages the kind of thinking described immediately above leading to spectrum allocations that block entry to new competitive users. This enhances the monopolistic or oligopolistic power of existing users.

C. *Television Broadcast Satellites*

There has been much talk, and some serious study, devoted to the possibilities of orbiting satellites sufficiently powerful to broadcast television programs *directly* to home receivers. Such systems must be carefully distinguished from the proposals made by the Ford Foundation and others in response to the FCC inquiry. In these proposals, satellites would be employed to distribute television programming from network centers to outlying local broadcasting stations; these stations would then broadcast the material in the conventional manner to home receivers. As such, "distribution" satellites would embody far more modest technological advance than would direct broadcast satellites. In addition to the implications for spectrum use of distribution satellites discussed above, we might also examine the implications of direct broadcast satellites—especially since most observers probably share the suspicion that this latter class of satellites would impose a severe strain on spectrum resources.

The degree to which a broadcast satellite would impose such a strain depends on what it is being compared with. Let us consider first a broadcast satellite system sharing spectrum with terrestrial microwave users, in comparison with a distribution satellite feeding into local broadcasting stations.

In this case the outcome is ambiguous. On one hand the small home antennae would have less ability to reject spurious terrestrial signals. Analogous to the earlier discussion about small versus large ground stations, designing special features into the home system to reduce interference from terrestrial microwave would involve relatively high cost. The small home terminals would also have less ability to discriminate between adjacent satellites on the same frequencies; either more orbital space would be required for a series of such satellites, or frequency bands could not be shared among adjacent satellites in the equatorial plane. Moreover, the broadest satellite would operate at a much higher power than the distribution satellite and would, therefore, be more likely to interfere with terrestrial microwave facilities in the illuminated area. Thus the prospects for sharing spectrum with terrestrial microwave appear less good than those for distribution satellites. On the other hand, by going directly to the home, the broadcast satellite would replace the local frequency assignments from local broadcasting stations to the home. On *a priori* grounds, it is not possible to determine whether the broadcast satellite would be inferior in terms of spectrum use to the distribution satellite-local rebroadcasting station combination.

A second relevant comparison, however, is between the broadcast satellite and a distribution satellite system feeding into the ground station con-

nected by *cable* rather than by conventional broadcast to the home. In this case the broadcast satellite would clearly be inferior to the distribution satellite-cable combination since spectrum for local rebroadcast would not be required in either case.

Actually, I doubt that we will need be concerned about broadcast satellites for a long time to come; for they seem unpromising on the basis of their economics, quite apart from considerations of spectrum use. A satellite sufficiently powerful to broadcast directly to home receivers would still require that each home owner invest an additional $50 to $100 for a preamplifier[35] and other equipment to boost the signals;[36] even then chances are that the signal would be no better than average. One can entertain serious doubts about how many viewers would be willing to spend that amount of money to receive one or several channels from a satellite—especially if they have access to a cable system in which, for a few dollars a month, they would have available 12 or more channels of excellent quality.[37] Moreover, broadcast satellites would involve a far higher cost than distribution satellites, and even that higher cost is predicated on technology far in advance of what we enjoy today. In contrast to a distribution satellite weighing perhaps 800 pounds boosted into orbit by an Atlas-Agena costing $6-7 million, one broadcast design calls for an 8000 pound satellite boosted into orbit by a Saturn-IB-Centaur combination costing about $50 million. In contrast to the fairly straightforward solar arrays required for distribution satellites, this particular broadcast design calls for more complicated deployable arrays[38] that would roll out like windowshades and have a total span in orbit of over 200 feet. Another broadcast design would include a nuclear reactor for power instead of solar cells, a phased-array antenna,[39] and gravity gradient stabilization[40]—all representing large if not enormous leaps beyond today's capabilities.[41]

35. Preamplifier—an amplifier which often immediately follows the output of a high-quality microphone, and sometimes is integral with it. The output power level of high-quality microphones is too low to be transmitted over a line, or to be mixed with other channels, induced noise or clicks being liable to occur.

36. Boost the signals—increase the power level of a signal by means of an amplifier.

37. For today's CATV systems, the viewer typically pays approximately $20 initially and $5 a month. Improved cable technology available in the time frame of broadcast satellites will probably afford substantially lower rates.

38. Deployable array—a broadcast satellite carries its own antenna array which can be opened, or deployed, for broadcast.

39. Phased array antenna—an antenna may be tuned in such a way that the phase of the transmitted signal may be varied by varying the frequency of the transmitted signal. When this change continuously occurs, the beam of the transmitted signal scans over a sector.

40. Gravity gradient stabilization—the gravity gradient of the earth marks the rate of change of the magnitude of the earth's gravity with increasing distance from the

D. *Other Possibilities for Sharing*

In addition to the latitude that satellite systems provide for sharing spectrum, other promising approaches exist for expanding use of existing allocations. I shall very briefly treat a couple of them.

One would entail shared use of existing TV bands with facsimile transmission into the home. RCA has requested authority from the FCC to test an experimental system to broadcast printed copy into the home along with standard television programming. The system would convert the copy into electromagnetic signals blended at the transmitter with those of regular TV programs. This would require no additional frequency allocation because the facsimile signals would be inserted during the vertical blanking intervals[42] that occur 60 times a second in a conventional TV signal. With present equipment four different messages can be transmitted simultaneously in this manner.[43]

Another possibility for sharing involves "spread spectrum" techniques for use by fixed and mobile radio. Each transmitter sharing the common band would hop rapidly from one frequency to another in a pattern to which only the receivers in the network of that particular transmitter would be keyed. With a unique time pattern of hopping for each transmitter-receiver network, the level of interference would be reduced to permit more use of a given frequency band than is now the case. Also, the fact that outsiders could not tune into the broadcasts would constitute an added advantage, especially for police radio. Spread spectrum techniques are attractive particularly as a means to conserve spectrum precisely in those bands serving mobile radio in which crowding is severe today, and so much concern is being expressed that vital future demands will not be met.[44]

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earth. The stabilization system will provide a means of correcting alterations in the orbit of the satellite caused by changes in the forces exerted on the satellite due to the orbit of the satellite through the gravitational field caused by the fact that the orbit may be elliptical, rather than circular.

41. *See, e.g.*, General Electric, Missile and Space Division, Direct TV Broadcast from Space; Gubin, *Direct Satellite Broadcast*, Proceedings of the American Astronautical Society 67-95 (1967).

42. Vertical blanking intervals—the time interval of a pulse which causes a blackening of the retrace pulse of a television scanning signal, which initially causes the images to appear on the screen.

43. Telecommunications Reports 34 (June 19, 1967).

44. One indication of this concern is the fact that two of the three examples of the potentially dire consequences of spectrum shortage enumerated in the Forward to the Telecommunications Science Panel Report, *supra* note 8, at iii, are drawn from the field of mobile radio.

However, these techniques would involve additional equipment, and they would probably require a frequency band to be cleared for exclusive use of spread spectrum transmissions.

III. Non-Atmospheric Transmission

A. *Waveguides and Laser Pipes*

Since it is the atmosphere, and precipitation and condensation in it, that presents the severe problems discussed earlier for using the frequencies above 15 Gc/s, the possibility comes to mind of confining the emissions to a pipe or tube, evacuated or filled with a gas transparent to the frequencies employed. Not only would it then be possible to exploit the enormous channel capacities of the wide bandwidths in these regions, but also this use would not conflict with simultaneous employment of the same frequency bands elsewhere. Waveguides[45] and laser pipes[46] would operate precisely in this fashion.

One particular waveguide described in the literature would consist of a tube about 2 inches in diameter consisting of a fine wire helix wound on a mandrel[47] and coated with glass fiber. Operating in range 50 Gc/s to 100 Gc/s (which is about 100 times the total bandwidth presently allocated to VHF and UHF television), the tube would have a capacity of about 100,000 voice circuits. The principal drawback is one of high total cost. The tube must be constructed to very close tolerances; it must be installed underground with no more than moderate bending; and it requires new kinds of elaborate terminal equipment and repeaters still in the development stage. On a *per-channel* basis, however, the cost may fall well below that of conventional systems. The basic problem is that telecommunications demand has not grown sufficiently, even in major metropolitan areas, to absorb such enormous capacities.[48]

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45. Waveguides—normally a waveguide consists of a hollow cylinder of an arbitrary cross-section which will propogate electromagnetic radiation. A waveguide offers lower attenuation, greater power-carrying capacity, and more mechanical simplicity than a transmission line.

46. Laser pipe—a hollow cylinder whose internal walls are coated with silver, the cylinder being about one inch in diameter. The tube furnishes a path for the laser beam to follow. Laser (Light Amplification by Stimulated Emission of Radiation) is a device producing a nearly parallel beam of light which is theoretically capable of being focused to a spot a few ten millionths of an inch in diameter, producing an enormous electric field over that spot.

47. Mandrel—a rod used to retain the cavity in hollow metal products during working.

48. A good description of waveguides and other transmission techniques, from which portions of this discussion are drawn, is presented by Kidner, *Telephone Transmission*

The laser pipe is in an earlier stage of development. Consisting of an internally-silvered tube[49] perhaps 1 inch in diameter, and operating in the region of 420,000 Gc/s, a laser pipe might have a capacity running as high as 100 million voice channels! Experimentation has been progressing rapidly since the construction of the first laser model in 1960. Among the many problems that remain, containing the laser light beam in such a narrow pipe over long distances and guiding it around curves requires a complicated series of focusing lenses not yet fully perfected. Extremely close tolerances are required in construction, and only future work will determine whether these requirements can be met at an attractive cost.

While waveguides and the laser pipes will not be operationally available in the very near future, they are strong candidates to satisfy the levels of needs we might envision to the end of the century. These technologies provide some basis for hope that regardless of how high the demand may grow for telecommunications between fixed points over land, the demand can be satisfied at a channel cost lower than today's, and without drawing spectrum away from other uses.

B. *Transistorized Cables*

A technology available today, in contrast to that of waveguides and laser pipes, is the recently developed transistorized repeater for use with underseas cable as a way to greatly increase capacity and reduce the cost per channel. The FCC has recently approved installation of a 1250-mile transistorized cable between Florida and the Virgin Islands. The cable, having a total cost of about $33 million, is designed for an ultimate capacity of 720 voice channels. It involves a per channel cost of only one-third that of existing trans-Atlantic cables.[50] Plans are also well underway to install a second such cable in the Caribbean and there is talk of yet other installations over high-traffic density routes.

Questions immediately arise about the extent to which cable construction ought to be emphasized, especially at the expense of satellites, on grounds of spectrum conservation. The answer depends in part on (a) the addi-

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Media—A Survey of Land, Sea and Space Systems, TELECOMMUNICATIONS 52-69 (No. 2, 1966).

49. Internally silvered tube—a tube which has been coated on its inside wall with a layer of either silver, or an amalgam, in order to enhance the conductive properties of the tube.

50. Useful tabulations of the cost and physical characteristics of existing and projected underseas cables is presented by R. NICHOLS, SUBMARINE TELEPHONE CABLES AND INTERNATIONAL TELECOMMUNICATIONS (RAND paper RM-3472-RC, 1963); R. NICHOLS, HIGH CAPACITY SUBMARINE TELEPHONE CABLES: IMPLICATIONS FOR COMMUNICATIONS SATELLITE RESEARCH AND DEVELOPMENT (RAND paper RM-3877-NASA, 1963).

tional cost entailed in operating satellites in the higher frequencies and (b) the spectrum and non-spectrum costs imposed by continued sharing between terrestrial microwave and satellites. Difficult choices may be required especially since, on other than spectrum grounds, satellites appear to have a substantial edge over transistorized cable. If we were concerned only with transoceanic communication between two major points, such a cable might involve no higher cost than a satellite. But satellites, together with a group of ground terminals scattered in countries in both sides of the Atlantic, would provide a whole network of links; and more than that, the capacity over each link could be adjusted within limits to conform to peak daily traffic demands over that link.[51]

At the same time, one must be careful not to over-estimate the spectrum saving afforded by cable; for much depends on where the cable is landed and, therefore, on where spectrum is actually saved. As a case in point, the two most recently constructed cables between the United States and Europe, TAT-3 and TAT-4, extend from Tuckerton, New Jersey (about 75 miles south of New York City) to isolated points respectively on the coasts of Cornwall in England and Brittany in France. Obviously, it does little good so far as spectrum is concerned to bring the cable across the Atlantic and then link it by conventional means to the already congested New York area. Or expressed differently, a satellite ground station could also be installed in the Tuckerton area which is far enough from New York City so that the interference between the station and land line microwave would probably not be serious. The most crucial factor is the *final* link into the badly congested areas.[52] The moral is clear: so far as spectrum conservation is concerned, any new cables built across the Atlantic ought to be brought directly into the major communication centers, or linked into other non-atmospheric transmission systems.

C. *Broadband Cable to the Home*

I have left to the end discussion of one of the most promising applications of all—the use of cable brought into the home to provide not only a dozen or so television channels of excellent technical quality, but also (in combina-

51. We must note on the other side that for telephone use satellite does suffer a quality handicap relative to cable due to the time delay problem.

52. In the same vein, it is sometimes said that shared spectrum use between satellite and terrestrial microwave would not give rise to serious interference, because even in the worst congested areas satellite ground stations could be located within one or two microwave hops of the central area. This ignores the problem of interference between these extension hops and existing microwave facilities—a problem perhaps even more severe than in the case where the satellite ground station is located in the central area in the first place.

tion with technological advances elsewhere) facsimile mail, shopping, instruction, video telephone and other services. Several factors combine to make cable systems extraordinarily attractive as a technique to conserve spectrum.

First, by substitution for atmospheric television broadcast, it would release frequency bands for alternative uses in the most congested regions of the spectrum. The 30 to 50 Mc/s band allocation for land mobile services lies just under the VHF television band; the 150.8 to 162 Mc/s mobile allocation lies between VHF channels 6 and 7; and the 450-470 Mc/s mobile allocation falls between the VHF and UHF television allocations. Transferring use from television to land mobile not only would permit operations in frequency regions for which present-day mobile radio equipment is designed, but it would also greatly expand the regions available to mobile radio. The 492 Mc/s total bandwidth allocated to television is nearly 10 times as great as that currently allocated to land mobile. A single 6 Mc/s television channel is equivalent to 200 mobile radio 30 Kc/s bands.

Second, expanded cable use is technically feasible here and now. The basic technology has been demonstrated and applied over a period of many years in CATV systems. We know that costs (if not prices) for cable television service are already attractively low, and we can be confident that with continuing technological advance in cable and repeater design (and with an increase in the density of subscribers per unit area) these costs will decline.

Third, cable television is growing rapidly in public acceptance. By early 1967, approximately 1700 CATVs, serving 8 million viewers, were in operation. An additional 1250 franchises had been granted, and franchise applications were under consideration in 1500 other towns and cities. In earlier years, CATVs were concentrated in small- and medium-sized cities (especially in hilly or mountain regions) where reception from even close-in broadcasting stations was poor. More recently it has become obvious that CATVs can be profitable, even in the largest urban areas. The freedom from interference caused by tall buildings, airplanes, and the like, and the additional variety in programming has strong appeal. By now we have abundant evidence of the willingness of many viewers to pay a charge for cable service, even if they already have access off the air to a number of local stations. Systems are now operating or under construction in New York, Los Angeles, and other major cities.

While cable television is one of the most promising examples of conserving the use of spectrum, it is also the best example I can recall to illustrate the following proposition: in many cases the greatest difficulties en-

countered in introducing and rapidly absorbing new technologies involve not questions of economic and technical feasibility, but rather questions of how uses of these technologies are to be promoted, restricted, and guided as a reflection of conscious choices and judgments about what constitutes the "public interest" and how it ought to be served. Issues of cable versus conventional television broadcast will surely rank among the most difficult and sensitive that will confront the FCC over the next decade. Without going into detail about these issues, I shall note the following.

(1) Ownership and regulation of cable systems. Expanded cable systems would include services in addition to television; some would compete directly with existing telephone service; to reduce overall cost, telephone channels should probably be brought in on the same cable. How then should cables be owned and regulated? If owned by existing telephone common carriers, by what procedures can existing CATVs be absorbed into the system? How should rates and conditions of access be set to television stations and other originators; especially, to what degree if any should local originators be protected from competition by "outsiders"?

(2) The position of commercial television networks and local broadcasters. By what means should local broadcasters be induced or required to switch from conventional atmospheric transmission to use of a cable network? How severe would be the increase in competition in their now-protected local markets? To what extent would cable networks encourage formation of new networks competing with existing ones? What are the implications for the quality and quantity of television, with the opening up of local markets to distant broadcasting stations, independent program producers, and new networks? To what extent would cable systems render less costly the operation of pay-TV?

(3) The position of the viewer. How should the welfare be weighted of those groups who would prefer today's "free" but limited off-the-air reception to cable service for which they, presumably, would be charged? What about rural viewers now served by over-the-air broadcast, but too far away to be served economically by cable?

IV. Some Notes on Demand

The preceding discussion focused on the implications of new technologies for the supply of spectrum resources. These technologies will, of course, affect demand as well. For example, if use of satellites reduces drastically the per-channel cost for domestic and international services, and if the cost reduction is reflected directly in prices, the price-induced response of consumers for additional service would impose additional loads on the spec-

trum. If, on the other hand, satellite development does not pan out so well, but waveguide technology does, additional telecommunications demand can be satisfied without drawing spectrum from alternative uses. Much will depend, of course, on FCC decisions with respect to cable television. The effects of technological advance on the demand for spectrum will rest, primarily, on the response of users to price reductions, the relative speed at which these technologies are developed, introduced, and absorbed into the economy, and the spectrum-using characteristics of these technologies.[53]

One basic point that merits emphasis is that some of the new services attracting publicity and attention can, with appropriate peakload pricing, be dovetailed with other demands to reduce the load on the spectrum as well as against other resources. As a leading example, facsimile mail transmission in both domestic and international markets has a very promising future. An especially attractive feature of facsimile mail is that much of it could be transmitted in the dead of night over otherwise idle facilities, without great loss of utility to users. For example a home facsimile machine might transmit information by cable to a central or local post office where it would be stored on tape for delayed transmission by a satellite or microwave in the evening. Of course, very high priority mail (hopefully at an appropriate higher price) would be transmitted during peak periods as well.[54]

The Telecommunications Science Panel noted in its report that investment in computers will nearly quadruple by 1975, and that commercial information processing networks will be required for high capacity storage, processing and transmission. "These capabilities will depend on *vastly increased communication capabilities, not now in general existence.*"[55] Much of this traffic would be generated during off-peak periods, given the widespread practice of round-the-clock computer operation. A pricing

53. At a second-order level, these technologies (along with technological advance in general) will contribute to growth of national income. The response of consumer demand for telecommunications services as a function of income constitutes an additional variable affecting the demand for spectrum.

54. One of the more startling uses of facsimile transmission is suggested by tests scheduled for August 28, 29 and September 6 in which facsimiles of documents for Trans-World Airlines Flight 709 departing from Frankfurt are to be transmitted via the Early Bird Satellite before the plane lands at Dulles. The aim is to expedite cargo and passenger handling. Documents will consist of cargo manifests and passenger data including Polaroid photos of passengers. AVIATION WEEK, Aug. 7, 1967, at 43.

55. TELECOMMUNICATIONS SCIENCE PANEL, *supra* note 8, at 18 (italics in original). An interesting discussion of the problems and prospects for computer communications networks is presented by P. BARAN, THE COMING COMPUTER UTILITY—LAISSEZ-FAIRE, LICENSING OR REGULATION? (RAND paper P-3466, 1967).

structure adequately reflecting both the low spectrum and non-spectrum cost would provide additional incentive to shift demand for communications facilities to off-peak periods.

Conclusion

So far as the technological possibilities are concerned, one has reason for optimism. Attractive trade-offs exist between spectrum resources and other resources; there are opportunities for greater sharing of frequency bands; improved non-atmospheric forms of transmission are available now and exciting developments are on the horizon. In the near-term, prospects are good that satellites will be able to share spectrum with microwave facilities without serious problems of interference; use of cable television as a substitute for atmospheric broadcast, even on a gradual basis, would give substantial immediate relief in the frequency regions now most congested. Through the 1970's use of higher frequency regions by satellites is promising. Depending in part on how these developments turn out, transistorized cable under water and on land could be employed as a supplement. In the more distant future, waveguides and laser pipes would meet any conceivable growth of point-to-point traffic over land.

The degree to which these technological possibilities will be exploited to make efficient use of both spectrum and non-spectrum resources is something else again. This will depend in good part on the nature of spectrum management. Ideally, a measure of the cost of spectrum varying by service, time, and place should be explicitly included with other resource costs to: (a) serve as a basis for pricing telecommunications services to reflect the scarcity and abundance of spectrum resources as well as non-spectrum resources, (b) stimulate and guide research and development activities in making more efficient use of the existing spectrum resource base and in expanding it, and (c) more generally, to serve as a criterion for weighing spectrum considerations against other factors in the policies and practices of the FCC and of the Office of Telecommunications Management. However, the difficulties of developing such a measure, and the widespread disruptive effects its application would have, provide no strong basis for optimism.

Communications and the Future—Part II

The rule of law, as here conceived, then, is concerned with regularizing and rationalizing the use of power. But it is concerned with power in both its faces—not only as an evil, to be restrained, but as a resource to be harnessed in the service of society. The creation of legal institutions which enlist the energies of men in the service of legitimate social purposes is the most important mode by which this dual end of the rule of law is approached.

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A PROPOSAL FOR WIRED CITY TELEVISION*

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The present television system could improve its service to the public. Its programs are not as diverse or numerous as books or magazines. There is virtually no pay-TV to serve consumers who would prefer to pay directly for specialized programs. Tax-supported public television is an emaciated industry. Network TV offerings tend, for good reason, to emphasize mass audiences. Commercial TV time is heavily laden with advertisements.

The reason for program deficiencies is not that those who run networks and stations are incompetent. The difficulty is that, under present arrangements, there are too few television signals being delivered to homes. In

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For the authors' earlier work relating to wired city television, see Barnett, *The Economics of Broadcasting and Advertising*, 56 AM. ECON. REV. 467 (1966); Greenberg, *Wire Television and the FCC's Second Report and Order on CATV Systems*, 10 J. LAW & ECON. 181 (1967). The authors wish to acknowledge that much of the work presented here also derives from the work of or discussion with RAND colleagues, particularly S. Alexander, P. Baran, N. Feldman, M. Greenberger, J. Goldson, J. Hult, L. Johnson, and A. Phillips. In addition to the growing literature on wire or cable television, important discussion may be found in the Airlie House Conference papers of Federal Communications Commissioner Nicholas Johnson and Leland Johnson, now Research Director of the President's Task Force on Communications. Both of these papers appear in this two part WASHINGTON UNIVERSITY LAW QUARTERLY symposium on communications. Finally, the authors have benefited from discussion with conferees—Federal Communications Commissioner K. Cox, and P. Gifford, H. Goldin, and others. Of course, none of the above is in any way responsible for this paper.

turn, this shortage is due to a combination of limited TV spectrum assignments to populated areas and the high fixed cost of television broadcasting. If more channels were available and the expense for transmitting and network connection of programs were less, and correspondingly more dollars were available for creating programs, then the number of programs and their diversity and range would be greater.

This article proposes that a national system of wired city television (WCTV), inexpensively interconnected, is the best avenue to more and more varied programs. Television would then have capacity and incentive to educate, inform, and entertain specialized interests as well as general interests and mass tastes.

The WCTV system has a number of desirable features: 1. The costs of wired cities would not be restrictive; 2. The improved offerings—volume and diversity—would come about without censorship or other government controls, within a relatively free market governed by individual consumer preferences and citizen group decisions, informed by experimentation and permitting wide choice; 3. Access to channels and costs for sending individual programs and series of programs would be extremely favorable; 4. Local programming would be encouraged because of the availability of channels for local expression and the low costs of broadcasting; 5. Without restricting advertiser-supported TV, there would be channels for pay-TV and for tax-supported stations and programs; 6. Television time for political campaigns would no longer be prohibitively expensive to candidates of moderate or small means; 7. A large quantity of desirable frequencies on the electromagnetic spectrum could be liberated for other uses; 8. The early arrival of a number of new and exciting communication activities would be fostered.

To put the matter as simply as possible, a system of wired city TV makes it possible to increase very greatly the number of operating channels available to almost all of the homes in the nation. The carriage of a television signal to the home from a local studio camera or tape machine then becomes far less expensive than now. Intercity connections would be accomplished as under present arrangements—microwave and cable—or could take advantage of the new satellite technology discussed by Leland Johnson.[1] We try to show below that the great increase in availablity of low-cost television channels would be a sufficient condition to insure significant increases in numbers of programs and diversity, and that other alternatives cannot accomplish this as well.

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1. Johnson, *New Technology: Its Effect on Use and Management of the Radio Spectrum*, 1967 WASH. U.L.Q. 521.

I. Limited Numbers of Commercial Television Stations

There are almost 700 stations in the United States. New York and Los Angeles have six stations each. About 100 or so other local markets in the United States have three, or occasionally four or five, stations. The remaining several hundred stations are in one or two station markets.

Network viability is limited by the number of primary affiliates available in local markets. This is because network revenues are less if affiliates are fewer, while the cost for programs, national microwave, and some other items is invariant. The third network today is disadvantaged by having only about 125 primary affiliates, as compared with about 170 in each of the other two networks. If a fourth network company were formed, it would find far less than 100 markets in which there were stations not already affiliated and only about 120 if all Federal Communications Commission (FCC) station assignments became operating stations.

The reasons for relatively few stations are several. One is the availability of frequency assignments from the FCC. Although the FCC has made a very liberal allocation to television from the entire available and useful electromagnetic spectrum, and then assigned these to individual population centers, the number of channels in each area is still very limited.

Second, the nature of station costs and revenues impedes entry. Much of the costs of any given operating station are fixed and large. With respect to revenues, stations in effect sell their viewing audience to advertisers. Other things equal, station revenues are proportionate to audience. There is a high threshold for profitability. Further, in the absence of a network affiliation the station has no revenues from network advertisers; and from lack of network programs, the station both incurs extra program costs and draws smaller audiences. In summary, because of high fixed charges, a substantial audience size is a necessary condition for profitability, and this limits numbers of stations. The limited number of stations then limits the number of viable networks, and this in turn further constrains station viability.[2] (Perhaps there is a similarity with full-coverage newspapers, which also may have a high threshold for entry and profitability related to scale; but we do not know this to be the case.)

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2. *See* Barnett, *Economic Markets in Television,* filed in connection with Plains Radio Broadcasting Co., 32 F.C.C. 811 (No. 14223, 1962) and *Hearings Before the House Committee on Interstate and Foreign Commerce,* 87th Cong., 2d Sess. (March 9, 1962); Greenberg, Television Station Profitability and FCC Regulatory Policy, 1967 (Unpublished Working Paper 6702, Dept. of Econ., Washington University); Steiner and Barnett, *Comments of Economic Consultants on the MPATI Petition,* filed in connection with F.C.C. Nos. 14229, 15201 (April 3, 1964).

II. Preference Patterns and Programs

It is argued, following Professor Steiner, that program diversity will be limited, given that numbers of stations and networks are limited and given significant costs of programs and operations.[3] Steiner postulates that consumer program preferences are characterized by clusters around certain types. In order to maximize profits, broadcasters attempt to reach the largest possible audience. The first broadcaster will attempt to satisfy the largest audience cluster. The second will aim for the second largest cluster or an expected value of about one-half of the largest cluster, whichever is larger. And so forth. Thus, minority-taste audiences—clusters with relatively small numbers—will not be served until a relatively large number of broadcasters are present. Of course, at some point there may be no frequency assignment or the revenues to be derived will be insufficient relative to the costs, so that some audiences will not be reached at all.

The foregoing is theoretical and only describes a tendency. In the facts of the case, viewer preferences in each of the major time periods (or at least broadcaster and rating-service measures of these) do aggregate into large clusters or mass preferences.[4] Given the relatively small numbers of stations in each local market and the small number of networks in the nation, television offerings in prime time, as is well known, center on successful types of programs. The result is that program diversity—range and variance of program types—is restricted. Contrary to some criticisms that the television business does not care about the public preferences, we think that networks and stations do strive for maximal audience viewing. The mass audience clusters are indeed served, although of course the number of programs for such audience is limited by the small number of stations and networks.

Evidence on the explanatory power of this model includes the fact that where the numbers of television stations are greater (for example, in New

3. *See* Steiner, *Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting*, 66 Q.J. of Econ. 194 (1952). The emphasis on product differentiation shows the influence of E. Chamberlain's Theory of Monopolistic Competition (1960). A similar model, which is less complete in some respects, is to be found in Hotelling, *Stability in Competition*, in Readings in Price Theory 467 (G. Stigler & K. Boulding eds. 1952); Rothenberg, *Consumer Sovereignty and the Economics of TV Programming*, 4 Studies in Pub. Communications 45 (1962); Wiles, *Pilkington and the Theory of Value*, 73 Econ. J. 183 (1963).

4. We do not believe John J. McGowan's comments refute this. *See* McGowan, *The Economics of Competition and Regulation in Commercial TV Broadcasting*, 1967 Wash. U.L.Q. 499. The clusters necessary for the application of the Steiner model should not be identified with such program types as Westerns or situation comedies. It is necessary to think in terms of audience clusters, which are sets of viewers attracted to sets of programs. *See* Lange, *Areas of Radio Preferences: A Preliminary Inquiry*, 41 J. of Applied Psych. 7 (1957).

York, Los Angeles, and Chicago) the diversity of programs available in each time period is also greater. The examples of AM and FM radio in large and moderate size cities suggest that a wider variety of program choice is made available to U.S. audiences as the number of radio broadcast stations increases. In another communications medium, magazines, we see publications which serve mass audiences, such as *Life, Reader's Digest,* and *Family Circle,* and also magazines which appeal to virtually every specialized interest which one can imagine. The 1967 edition of the *Standard Periodical Directory* lists 30,000 publications, including the *American Miniature Schnauzer Club News Letter, Table Tennis Topics, National Button Bulletin, National Swine Growers Council Newsletter,* and the *Hay Fever Bulletin.*

We conclude that the potentials of the marvelous television medium to entertain, inform, educate, and communicate could be better realized than today if there were more channels and operating stations. These could accommodate not only channels for commercial television supported by advertisers, but also channels for other commercial television forms, including commercial television supported by annual subscribers, commercial television sold to viewers as individual programs, and low-cost commercial television for politicians and others who wished to make speeches or perform. And there should be included low-cost channels for education television stations and possibly other tax-supported, public service broadcasting. Alternatively, if more operating stations are not possible, then some other solution is necessary, if greater program volume and diversity are to become available to the public.

III. Brief Discussion of Alternative Solutions

Assume continuation of a U.S. commercial television industry in which programming decisions are left to private enterprise motivated by a profit incentive, free from direct control by government. Then, if increased program volume and diversity is to be achieved, we need an increase in numbers of stations and networks or another solution. Some alternative reactions and proposed solutions will now be briefly examined. These are not "straw men." Each has been put forth by serious students of the problem. Most have virtues, but each has serious defects as compared to the wired cities television (WCTV) proposal which will be later discussed at length.

A. *Continue Present Policy: Pessimistic View*

As Commissioner Lee Loevinger has stated:

> The common man has every right to be common. A demand that popular entertainment conform to the taste standards of critical intellectuals is mere snobbishness. Television is a golden goose that

> lays scrambled eggs; and it is futile and probably fatal to beat it for not laying caviar. Anyway, more people like scrambled eggs than caviar.[5]

Within the two constraints of a severely limited number of stations and no government interference, Commissioner Loevinger's stated position may be valid. But E. B. White in his statement to the Carnegie Commission whets our appetite for the caviar:

> . . . I think television should be the visual counterpart of the literary essay, should arouse our dreams, satisfy our hunger for beauty, take us on journeys, enable us to participate in events, present great drama and music, explore the sea and the sky and the woods and the hills. It should be our Lyceum, our Chautauqua, our Minsky's and our Camelot. It should restate and clarify the social dilemma and the political pickle. Once in a while it does, and you get a quick glimpse of its potential.[6]

B. *Continue Present Policy: Optimistic View*

The majority of the FCC seems to subscribe to this position. The members contemplate moderate increase in numbers of local television stations, on UHF. The FCC would achieve this by continuing to reserve spectrum space for future entries, by preventing the further growth and development of CATV systems, and by licensing translators which might become ground satellites and eventually TV stations. While this program might be desirable on some counts, there are serious difficulties. First, even if all the UHF channel assignments became stations, there would not be a large number of signals available in major cities. Second, there is substantial doubt that all of the reserved channels could become operative in the near- or medium-term future because of profitability considerations. For example, a great many of these UHF stations are designed to provide second and third services to areas of rather small communities and populations where cost and revenue conditions for additional stations are quite unfavorable.[7] The possibilities of an increase in broadcast services to, say, AM and FM radio standards seem small or remote. Third, in this effort to foster entry and viability of advertiser supported UHF stations and because spectrum is limited, the FCC policy obstructs the advent and growth of pay-TV and CATV.[8] Fourth, the policy has the effect of continuing to tie up a large portion of the electromagnetic spectrum for television.

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5. Tobin, *Closing the TV Quality Gap*, SATURDAY REV., April 8, 1967, at 73.

6. Carnegie Commission on Educational Television, PUBLIC TELEVISION: A PROGRAM FOR ACTION 13 (1967).

7. *See* note 2 *supra* and sources cited therein.

8. *See* Greenberg, *Wire Television and the FCC's Second Report and Order on CATV Systems*, 10 J. LAW & ECON. 181 (1967).

C. *Increased Regulation, Particularly of Networks*

Perhaps the most likely victims of increased regulation would be the three major networks. There is considerable feeling within the Commission that the networks have too much power and are responsible for the lack of diversity in television broadcasting. One result of this view is the proposed rule-making of the FCC which would limit network production to 50 percent of prime-time programming. While the networks do indeed have very great social power, perhaps justifying this or similar restrictions, it does not appear to us that such a step will significantly increase diversity. It does not increase the number of stations or networks. We still expect advertisers to reward best those broadcasters which deliver the largest audiences to them. The networks' strong position is a result of strong program service to the mass audience. The limitation in numbers of networks is primarily a result of a limited number of stations available for affiliation. If we could increase that number, much of the oligopoly power of the present networks would disappear.

An interesting regulatory scheme has been proposed by John McGowan[9] —to tax additional programs of particular types to discourage their proliferation. However, he points out the difficulties in administering such a system; it might also be noted that putting programs into types is extremely difficult: not all Westerns appeal to the same audience, for example, so that what appears to be duplication under one assignment of programs to types may not be duplication under another assignment. Finally, we question a scheme which gives power differentially to destroy, shape, and coerce communications to those who determine the tax rates.

D. *Pay Television*

It has frequently been argued that pay television will make it possible for minority audiences to view the programs they desire. This argument is generally based on an analogy with other goods in the market system, where open entry and differential prices make it possible for varied tastes to be satisfied. However, as has been noted, an important distinction in the television case is the small number of stations, and obstacles to free entry from channel shortage or high fixed cost or too few networks.

It seems that a likely result of substituting a commercial pay-TV system for an advertiser-supported one in a market with few stations is that programming designed to appeal to mass audiences could then appear on the pay-TV channels to the extent permitted by the FCC. A commercial pay-TV system properly will aim for profits, and the greatest profits will still

9. *See* McGowan, *supra* note 4.

appear where the audience is largest, irrespective of whether audience or advertisers pay. In general, commercial pay-TV would contribute a solution to the problem of diversity and numbers of programs only to the extent it would provide additional stations.

In any event, the emasculated version of pay-TV which has been proposed by the Communications Commission seems unlikely to accomplish anything toward increased diversity. The FCC has been so concerned to protect the advertiser-supported stations from losing viewers or programs that its proposal makes pay-TV virtually noncompetitive and hardly viable.

E. *Ford and Carnegie Foundation Proposals to Aid ETV*

The recent proposals of these two influential foundations[10] differ with respect to details of financing and organization, but the aim of each is to support on a much greater scale the programming and facilities of non-commercial television stations. These proposals are imaginative and exciting, but in our view they make only a limited contribution to the central problem—the shortage of viable broadcasting outlets. If the proposals were adopted, we would, at a cost of about a quarter of a billion dollars per year, have a single additional, well-operated, non-commercial channel in most cities. Thus the Ford and Carnegie proposals would, if adopted, support with tax funds and some private gifts a network which would appeal to a small, but eloquent and outspoken minority of viewers. This would be a gain: in providing diversity as such; in experimenting with new programs which, if successful, would sometimes be followed by commercial TV stations; and in providing high-culture programs to improve society. These gains could also be realized in the wired cities system, described below, at lower cost. Of course, there are also hazards in providing so powerful a tax-supported communication tool whose function includes "upgrading" audience tastes, but this question occurs also in civic symphony orchestras, opera, and theatre, and in operation of colleges, museums, etc.

F. *Satellites*

What will be the effects of space satellites on the television industry? Satellites can significantly reduce the costs of long-distance transmission between stations. This reduces networking cost. But it could have only small effect on the present economic barrier to station entry (revenues vs.

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10. *See* Carnegie Commission on Educational Television, *supra* note 6; Ford Foundation, *Comments of the Ford Foundation,* in response to Commission request, *In re* the Establishment of Domestic Non-Common Carrier Communications-Satellite Facilities by Non-Governmental Entities, 2 F.C.C.2d 668 (1966) (filed Aug. 1, 1966).

costs) and thereby only very small effect in increasing station numbers.

What about the possibility of direct satellite-to-home broadcasting?[11] Leland Johnson[12] sees several problems with this. In the first place, such broadcasting will not increase the total number of signals available to homes; it thus does not overcome what is the main problem. Secondly, by substituting for the local stations, the possibilities for local broadcasting are very greatly diminished. Third, such satellites would require more powerful home receivers and antennas, additional costs which would have to be borne by the television set owner. Fourth, satellites designed to broadcast directly to homes would be more expensive than those designed to broadcast to ground stations.

Of course, using satellites for long-distance transmission to local stations is perfectly compatible with various systems of local television; can reduce the costs of such transmission significantly; and can thereby increase the number of networks, provided there are local station outlets.

G. *Community Antenna Television (CATV)*

CATV is a wire system which picks up near or distant broadcast signals and conveys them to homes, but does not originate programs. CATV has the desirable characteristic of providing its subscribers with signals originated in distant stations. A widespread development of CATV would increase diversity. It would provide, in effect, several networks for conveyance of programs originated in large stations, particularly unaffiliated ones, to other areas and regions. While the present diversity of the national array of U.S. television programs would not be greater, the diversity which already exists would become available more widely.

There are, however, several difficulties with CATV. So long as it does not undertake program origination on a substantial scale, it does not increase the diversity of the national array of programs, nor sponsor the growth of local programs. Second, CATV is not a common carrier, but a single private company with discretionary control of what it offers on its wire system. Third, for legal and institutional reasons, CATV's survival prospects are precarious. Federal courts have recently ruled that CATV pick-up and conveyance of TV broadcast signals beyond the immediate area of the station is infringement.[13] Moreover, the FCC has placed pun-

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11. Goldin, *The Economics of Broadcasting and Advertising*, 56 AM. ECON. REV. 470 (1966).

12. Johnson, *supra* note 1.

13. United Artists Television, Inc. v. Fortnightly Corp., 255 F. Supp. 177 (S.D.N.Y. 1966), *aff'd*, 377 F.2d 872 (2d Cir.), *cert. granted*, 88 S. Ct. 474 (1967) (No. 618); *cf.* United States v. Radio Corp. of America, 358 U.S. 334, 348-52 (1959); Cable

ishing restrictions on CATV entrance and expansion.[14] The Supreme Court is expected to decide cases in Spring, 1968, involving infringement and the FCC restrictions.[15] Finally, neither the present copyright law,[16] nor the copyright bill which passed the House of Representatives in April, 1967,[17] nor the bill now before the Senate provide for compulsory licensing,[18] without which it is extremely unlikely that CATV can operate satisfactorily.

H. *Wired Television*

This article proposes a national system of wired city television, interconnected with satellite or other relays. It is described in detail in the following section.

IV. Wired City Television (*WCTV*)

A. *Physical Description*

The great majority of homes in U.S. cities are served with both telephone and television systems. Within cities, telephone messages are carried on street or underground wires, with drop lines to subscribers' telephones. Television broadcasts, on the other hand, are radiated by each station from a tall tower and transmitter through the atmosphere to home antennae. For good color reception on all of a locality's stations, a roof antenna is generally used; the stronger stations can be received frequently with an in-house antenna.

Vision, Inc. v. KUTV, Inc., 211 F. Supp. 47, 56-58 (D. Idaho 1962), *rev'd on other grounds*, 335 F.2d 348 (9th Cir. 1964), *cert. denied sub nom.* Klix Corp. v. Cable Vision, Inc., 379 U.S. 989 (1965).

14. Philadelphia Television Broadcasting Co. v. FCC, 359 F.2d 282 (D.C. Cir. 1966) (holding that regulation of CATV was a necessary adjunct to the Commission's regulation of the nation's broadcasting system); CATV: Second Report and Order, 2 F.C.C.2d 725, 6 P. & F. Radio Reg. 2d 1717 (1966); CATV: Memorandum Opinion and Order, 1 F.C.C.2d 524, 5 P. & F. Radio Reg. 2d 1655 (1965); CATV: First Report and Order, 38 F.C.C. 683, 4 P. & F. Radio Reg. 2d 1725 (1965). *But see* Southwestern Cable Co. v. United States, 378 F.2d 118 (9th Cir.) (holding that the Commission could *not* regulate CATV programming in order to lessen competition between CATV systems and local broadcasters), *cert. granted*, 88 S. Ct. 235 (1967) (Nos. 363 & 428); *cf.* KAOK-CATV, Inc. v. Louisiana Cable T.V., Inc., 195 So. 2d 297 (La. App. 1967) (holding that transmission lines for CATV, utilizing existing telephone poles, were not subject to local franchising authority).

15. Southwestern Cable Co. v. United States, 378 F.2d 118 (9th Cir.), *cert. granted*, 88 S. Ct. 235 (1967) (Nos. 363 & 428) (extent of FCC authority over CATV systems); United Artists Television Inc. v. Fortnightly Corp., 255 F. Supp. 177 (S.D.N.Y. 1966), *aff'd*, 377 F.2d 872 (2d Cir.), *cert. granted*, 88 S. Ct. 474 (1967) (No. 618) (copyright infringement).

16. 17 U.S.C. § 1 *et seq.* (1964).

17. H.R. 2512, 90th Cong., 1st Sess. (1967).

18. S. Res. 597, 90th Cong., 1st Sess. (pending before Judiciary Committee) (1967).

The wired city television systems would carry programs to homes the way telephone calls are carried—on wires. It would thus eliminate television towers and broadcast transmitters; home antennas and leads; the portion of the TV set which relates to the weakness of over-the-air signals; and the use of electromagnetic spectrum which the signal occupies over the city. At the same time that it permits these savings, however, the proposed system requires street or underground wires and leads to the homes.

Table 1 summarizes the physical character of the present system and the proposed one.

TABLE 1

COMPARISON OF SYSTEMS

Present Electronic Systems	*Proposed Wired City Electronic System*
(1) Capacities: 1 to 6 or 8 TV channels per city; telephone grid; no extra capacity	(1) Capacities: initially, 20 TV channels per city; telephone grid; several of the TV channels (each equals 1,000 voice channels) could be extra capacity for other and future uses
(2) Television occupancy of electromagnetic spectrum (1 TV channel per station)	(2) None
(3) Television station towers (usually 1 tower per station)	(3) None
(4) Television transmitters (1 transmitter per station)	(4) None
(5) Home television antennae and leads for color sets (usually 1 per home)	(5) None
(6) Home TV sets with tuners for over-the-air reception	(6) Home TV sets with selectors for off-the-wire selection
(7) Picture quality: fair to good to excellent	(7) Picture quality: uniformly excellent
(8) Multiple studios with TV cameras, tape recorders, and players	(8) Multiple studios with TV cameras, tape recorders, and players
(9) Poles or conduits carrying telephone wires, with a drop line to each home	(9) Same; but add or substitute a 20 channel coaxial wire
(10) Telephone exchange and switching stations	(10) Same; but add an input switch so that each studio can put a signal onto the coaxial wire
(11) Intercity relays to other cities and foreign nations	(11) Intercity relays to other cities and foreign nations

B. *Some Observations*

We may observe several implications in the above table, relative to the concern for increasing the number of stations. First, note lines (1) and (2). By shifting off of the electromagnetic spectrum to wire, the limited availability of assigned TV channels no longer constrains station numbers or offerings. Spectrum is released for other purposes. And there could be extra wire capacity—for incorporating telephone signals, FM, public announcements, shopping service, and other future developments.

Second, note lines (3) and (4). A station need not invest half a million dollars in a transmitter to send its signal, nor experience an additional $50,000 annual cost for operating. Divisibility and access are greatly improved; indeed, if the coaxial wire system exists as a common carrier, then any individual offerer of an individual program—an opera company or a politician or a department store—may offer its program merely by paying the common carrier charge for that time period.

Third, note lines (5), (6), and (7). Present sets and pictures are constrained by weak atmospheric signals; wire carries a stronger signal. With wire, the pictures would be uniformly better; antennae and leads are not needed; and TV sets could more easily be redesigned to permit larger, finer grain pictures and/or lower cost.

Fourth, note lines (1) and (11): the wired city proposal provides a very large increase in local transmission capacity for possible carriage of network company or other signals originated elsewhere.

But, finally, note lines (9) and (10): there is a cost. This is for addition of the coaxial cable to the city's existing wire systems.

C. *An Illustrative Economic System*

Let us now imagine that the Federal Communications Commission, after appropriate proceedings, determined that the conception of a national system of wired cities for television was a good one, and authorized private enterprise and/or municipalities to proceed. Then we would expect various companies—existing ones and newly formed ones—to apply to the common carrier authorities of municipal and state governments for franchises to wire up the cities with 20-TV channel coaxial cable. Rival firms would propose to do this in prospect of profits from charging for the use of the facilities; while municipal or other governmental utility corporations might propose to extend their utility services already provided—electricity, telephone, transit, water, etc. Among private companies, CATV firms are already in the business of wiring up cities; so are telephone and electric companies; gas and water companies might be interested, and other firms would be happy to enter if they saw prospects for profits appropriate to

their appraisal of risks. Let us assume for simplification that a common carrier firm is selected by the governmental authority, and that it is the electric company or a CATV company or another firm, but *not* the telephone company. We so specify so that we can initially contemplate addition of a complete new system. We later consider the possibility of adding to the phone system.

The physical design is kept simple. The 20-TV channel coaxial wire is the same kind as CATV systems are now installing in their 12-TV channel systems. One wire is carried throughout the city. There is a drop line to each home which is willing to pay $1.00 to $1.50 per month. This is equivalent to 15 to 20 percent for annual capital and operating charges on an investment of $50 to $75 per home for the street wire and drop wire system. Initially, the coaxial dropline terminals are compatible with present TV tuners. Almost all homes accept a dropline. As now, free TV guides are available with newspapers, or by subscription from a publisher. In addition to the wires, the common carrier system also provides optional rental studios, with or without cameras, tape recorders and players, and studio personnel. Similarly, switching facilities are available for receiving microwave or satellite or wire or wave guide relays from elsewhere and putting them onto the wire.

The system is now open for operation. As a common carrier, it will put any sender's signals on the wire, according to published tariffs approved by the regulatory commission. Customers may lease a TV channel by the year, by the month, by the day, by the hour; or by the half hour per week, for a year; or in any other way, subject to availability and tariff. In the same way as businesses or politicians or others now buy access to common carriers or to people—plane tickets or mail or bill boards or concerts or broadcasts—so they would in this case. Senders could use their own studios and merely rent access to the wire channel. Or they could also rent studios, cameras and crews, etc., in addition. If more channels are required, they will be provided in due time, according to usual common carrier franchise. Senders would pay. There would be no additional charge to the homes.

Let us consider the various ways in which television programs may be put onto the 20 TV channels of the wire.

Television stations with advertiser sponsors. These would operate the same as present stations, except that their programs would be sent by wire. New stations would save an investment of about $500,000 for tower and transmitter, on which the annual cost is about $50,000 for amortization and $50,000 for operating expense. Existing stations would save less because they have a sunk investment. Of course, the stations would have

to pay an annual lease charge for use of the wire, but this cost would be far smaller.

Pay TV. This could be provided by entertainment companies which, for an annual subscription fee, would provide programs. The public now buys season or series tickets for plays, concerts, and ball games; subscribes to magazines and to book-of-the-month; etc. Presumably, some of us would subscribe to pay TV. The entertainment company would lease a channel from the common carrier for the appropriate period. The lease would not necessarily be for 24 hours per day, 365 days; it could be for, say, Sunday afternoons, during winter months. Or there could be several series—subscription A, subscription B, etc. To prevent non-subscribers from viewing, a coding or scramble device could be used; or the common carrier, for a fee, could operate a device to interdict the program at the drop line; or a meter could be installed which recorded the time spent viewing the pay TV channels. In addition to the possibility of annual or season or series subscriptions, there could also be pay TV by the program, just as we now buy tickets to single concerts or ball games or buy single books.

Politicians would seek access to a TV channel for individual time periods. They could buy time from the commercial stations, above. Or it is possible that other business enterprises would develop whose specialty was political and other one-shot broadcasts. These companies would lease a channel for a period and retail time to individual politicians. Or political parties could lease for periods; or the politician could simply rent time and studio facilities directly from the common carrier. Further, his coverage could be limited to his own constituency.

Educational TV is of two types: instructional, such as French or history lessons, primarily for schools; and non-instructional, primarily in the form af public affairs or culture broadcasts, such as Congressional hearings and Shakespeare's *Age of Kings*. It is probable that a number of the wire channels would be available for instructional TV, on a part-time or full-time basis; preschool children would undoubtedly be offered instructional programs as would students confined to their homes.

Concerning non-instructional ETV, the Carnegie Report on Public Television recommends that the United States have about 380 such stations, connected by intercity relays. An investment of about $200 million would be required for signal transmission facilities. This amount would be saved in the wired city television proposal. The annual operating cost of transmission would also be saved, but this saving could be partly offset by costs to lease or share a lease of a channel on the wire.

Network programs. Networks could continue to operate as now,

through their affiliated stations, which then share in the network revenue received from advertisers. Or, subject to FCC rules, it would be possible for networks to lease their own channels on the wire. There would be opportunity for more networks because of the increase in local channel outlets and the lower cost to reach the audiences. Supplementing the multiplication of local channels and the reduction in cost to use them is the fact that intercity relay charges—and, indeed, intercontinental relay charges—will decline steeply with development of satellite communications and wave guide. It is likely that a large increase in network programs would develop. Many more foreign programs could be sent in also.

Competition for viewer time. With up to 20 low-cost channels available for very low-cost rentals, there will be a great increase in programs. Competition for viewer time will greatly increase. One of the results will be a very large increase in numbers of home TV sets and home TV viewing, as the various members of the family each find more and more diverse programs of better picture quality. That is, additional audience will develop. Another result will be diffusion of the audience over the large number of offerings. Each television "station" will have more local competitors, and more network competitors as well. Total advertising volume will increase, but concentration will be less. With channels costing much less to lease or share-lease, we think local stations will not only survive but will increase in numbers. As now, the mass audiences in prime time will watch the more lavishly produced network programs. The situation would become highly competitive, and very desirable to viewers. As is now the case with printed matter, in which the public chooses over a wide variety of books, magazines, and newspapers, the consumer would choose from among the large array of national and local program offerings. Or, as in the case of present radio, the consumer will choose from the large array of programs originated nationally and locally. Compare also the case of movie theaters, in which consumers have access to news theaters, foreign films and art movies as well as more lavish Hollywood productions. And compare also live theatre, where consumers have not only Broadway but also off-Broadway, summer theater, repertory companies, and school performances. This increase in television program offerings—numbers of programs and diversity—is, of course, the objective of the proposed innovation.

What would be the effects of this increase in programming on an hour of programming costs? While for some types of programming these might rise, there are a number of forces which would tend to reduce average programming costs: 1. The availability of channels would encourage repeat programming, as is the case with motion pictures in theaters and

book anthologies. A viewer would not have to wait an indefinite time or never have the opportunity to view a program which he missed on its initial appearance. 2. By appealing to minority audiences, new categories of talent which are presently not in great demand would be utilized, allowing lower production costs than at present. 3. Again, by aiming for smaller audiences, some broadcasters would not be induced to spend lavishly to attract increments of the mass audience. 4. By opening up competition, network control of studios and other elements of cost which tend to inflate programming costs would be broken.

D. *Costs*

We now examine the costs of providing TV channels to the home by wiring the city, and compare this with broadcasting from a TV transmitter. Since intercity connections as well as studios per channel are common to the present system and the new one, we leave out consideration of these. Table 1 showed the following information:

Item	*Present System*	*Proposed WCTV*
Spectrum	Uses 1 TV channel per station	Doesn't use
Transmitter and tower	Uses 1 per station	Doesn't use
Home antenna	Uses 1 per home	Doesn't use
Home sets	One or several per home	One or several per home; some cost saving in the chassis
Poles, conduits, droplines	Doesn't use for TV	One coaxial wire on pole or in conduit, plus 1 drop wire per home

The proposed system is advantageous on the first four lines. It has a cost disadvantage on the last line.

What is the magnitude of the cost of wiring the city—the item on the last line? The cost figures are closely related to: (1) the numbers of homes, and (2) the density of homes per street mile. For most cities we estimate a cost averaging between $30 and $80 per home. At 15 percent per annum for capital charges and maintenance, this would calculate to $1.00 per month or less. Allowing for contingencies and uncertainty, a figure of $1.50 is possible. These figures are very rough.

Table 2 presents data on estimated capital costs for CATV systems in sixteen Connecticut communities.[19] The average of these figues is $55 investment per home to wire the city. The data apparently include the tower and community antenna and some amplifying and control facilities, which should be excluded for our purposes since we are interested in substituting a wired city for over-the-air broadcasting. In at least two cases, lower estimates were reported by different franchise applicants—Torrington at $208,000 and Winstead at $116,000. However, all of these estimates are presumably for 12-channel wire, whereas the plan advocated by this article contemplates a 20-channel wire. Note also that the average of $55 per home assumes that all the homes connect. If only 90 percent do, costs per home would be about 10 percent higher.

TABLE 2

ESTIMATED CAPITAL COSTS FOR CATV SYSTEMS IN 16 CONNECTICUT COMMUNITIES[20]

Town	*Total Number Homes*	*Street Miles*	*Approximate Investment*[21]	*Cost Per Home*[22]
Waterbury	31,700	246	$ 984,000	$31
Naugatuck	6,400	76	304,000	48
Thomaston	1,800	33	132,000	73
Watertown	4,800	104	416,000	87
Middlebury	1,500	55	220,000	147
Prospect	1,500	35	140,000	93
Wolcott	3,000	70	280,000	93
Torrington	8,300	134	536,000	65
Winsted	3,230	80	320,000	99
Ansonia	5,700	51	204,000	36
Derby	3,400	36	144,000	42
Shelton	5,400	117	468,000	87
Bristol	12,300	154	616,000	50
Plainville	3,650	45	180,000	49
Farmington	3,500	72	288,000	80
Southington	7,000	107	428,000	61
	103,180		$5,660,000	$55

19. M. Seiden, REPORT TO THE FEDERAL COMMUNICATIONS COMMISSION, AN ECONOMIC ANALYSIS OF COMMUNITY ANTENNA TELEVISION SYSTEMS AND THE TELEVISION BROADCASTING INDUSTRY 24 (1965).

20. Source: CATV Hearings, Public Utility Commission of Connecticut, Docket 10318 (Nov. 1964, unpublished).

21. The approximate investment is based on a figure of $4,000 per mile which includes the total construction costs and the total anticipated losses from initial stage of operation.

22. Based on an assumption of 100 percent penetration. The variation among systems in cost per home would be the same regardless of the degree of penetration provided the percent of penetration is the same for all communities.

Another piece of cost evidence is the estimated capital cost per CATV subscriber from the financial statements of 24 operating CATV systems. These appear in Table 3. It is difficult to estimate a cost per home for our wired city TV, since the table relates to subscribers, and the number of homes in each area is not known. Seiden states that for established CATV systems, such as these, the number of subscribers is usually less than 50 percent. In that case, we should divide these figures by about 2 or 3 to estimate cost per home in wired cities; if we divide by 2, then 20 of the above 24 cities would have costs of less than $75 per home. These figures apparently include the tower and community antenna and perhaps other equipment unrelated to our concern; but the cables are 12 channels or less, rather than 20.

TABLE 3

TOTAL CAPITAL COST AND CAPITAL COST PER CATV SUBSCRIBER BY SIZE OF OPERATING SYSTEM[23]

Number of Subscribers	*Dollars of Capital per Subscriber*[24]	*Total Cost of Fixed Equipment*
10,500	$ 72	$ 759,917
8,300	140	1,162,870
7,900	96	758,221
6,800	92	627,391
6,000	132	793,611
5,300	58	305,864
4,900	92	451,716
4,100	92	376,885
3,600	106	382,650
3,400	152	517,643
2,800	101	282,290
2,300	117	268,767
2,200	202	444,817
2,100	134	281,211
2,000	144	288,913
1,800	104	187,872
1,800	124	222,577
1,400	120	168,593
1,300	128	166,146
1,300	397	516,718
700	130	90,841
700	50	34,882
600[25]	766	459,700
500[26]	361	180,749

23. Source: Seiden, *supra* note 19.
24. "Capital" is here defined as the cost of fixed equipment before depreciation.
25. In operation less than one year.
26. In operation less than one year.

Another set of estimates may be derived by using the CATV investment estimate of $3,500 to $4,000 per street mile. These figures are also for 12-channel wire. If connected homes average 100 per mile, then the figure is $35 to $40; if 200 per mile, then $20 or under.

Another set of data may be inferred from CATV rates. These run about $5.00 per home. In 1963 the $5.00 was sufficient to permit average profits of 57 percent (before interest, depreciation, and Federal tax) for a group of 28 CATV systems. This was also after payment of intercity microwave charges, which ranged from 2 to 23 percent for a group of 12 systems. There may have been other expenses irrelevant to our interest in cost of wiring the city, such as payment of salaries to the CATV manager and owners. We don't know the density of homes *served* per mile, but apparently it was usually less than half of actual home density. In addition, it is said that most CATV subscribers paid a connection and installation charge.

Further data are available in the tariffs which five Bell telephone companies filed in 14 states. In these the Bell company offered to provide CATV companies with a complete wire system for the following charges:

$ 75 to more than $100 per month per street mile; plus

$.35 to $.50 per month per dropline; plus

$ 10 to $ 25 as a one-time installation charge for droplines.

If we assume 100 homes per street mile, this gives a figure of $1.10 to $1.50 per month per home, plus installation charge. It is stated that CATV companies find these charges much higher than their own costs to wire up the community, and no CATV was a Bell customer for this type of service.[27]

Still another figure could be estimated from the minimum telephone rates for telephone service. These, of course, include much more than only the street wires and droplines; they include major switching and exchange facilities, operators, instruments, etc.

A tentative guess is that the investment cost of the wired city poles, conduits, wire, droplines, and installation would be between $30 and $100, probably between $50 and $75. If cost for capital charges and maintenance is expressed as an annual rate relative to investment, it would be about 15 percent or 20 percent. The figures need further research, particularly on density of homes and on the costs of underground installations, but these data will suffice for present purposes. In a city of 100,000 homes (in the

27. Seiden, *supra* note 19, at 35 states: "Since a CATV operator can construct a modern 12-channel system for approximately $4,000 per mile, he is naturally reluctant to pay the telephone companies one-quarter to one-third that amount each year for each mile of cable." However, the relatively higher price charged by Bell could be wholly or partly due to higher quality specifications.

neighborhood of half a million people), the estimated investment cost would be $6,000,000 to set up the wired city with service to all the homes. These are the costs if a company other than the telephone company built a new wire system, separate from the telephone company grid.

But if, contrary to the foregoing, the telephone company in each area were given the common carrier franchise to wire up the city with 20-TV channel wire, substantial cost savings would be possible. Many of the facilities which the telephone company already has in place could be used for the WCTV system—poles, conduits, dropline equipment, etc. It would probably be sensible to merge the present telephone system into the WCTV system. In such event, there could be available substantial economies in installation, maintenance, and operation of the WCTV system. The fact is rather obvious that the WCTV common carrier wire system which is proposed could be merged with the telephone common carrier wire system which already exists, with considerable saving.

A less obvious fact must be noted. It is possible that in some cases, the local telephone companies would respond unsatisfactorily—in timing, alertness, rates, franchise and user equipment conditions, design—to a community decision to move to WCTV. In such event, communities do have access to alternative common carriers. Some of them, such as electric utilities and CATV firms, are already experienced in wiring cities. It is *their* cost to create a new wire system, not the telephone companies' cost to add to the present system, which we tried to estimate above.

E. *Benefits*

What are the benefits which might justify the investment cost of approximately $60 per home for wiring the city? These have been touched on already, but a more systematic discussion is here presented, under the following topics:

1. Number of channels;
2. Cost, numbers, and diversity of offerings;
3. Picture quality;
4. Cost savings;
5. Spectrum saving;
6. Flexibility for further innovations.

Number of channels. The plan calls for initial installation of a coaxial wire with capacity for 20 TV channels. This is a very large increase in potential service. As noted earlier, most TV markets are now served with about three commercial and educational TV signals, and even if all the new UHF assignments were activated, the figure would average only

five or less. The WCTV proposal breaks through the present limitation on TV channels due to limited spectrum assignments for television.

Cost, numbers, and diversity of offerings. The cost to carry a signal to the home would become extremely low under the WCTV proposal. Recall that the investment cost in wiring a city of 100,000 was estimated above at $6,000,000. Homes were assumed to be paying 15 to 20 percent of this per year for the wired city, including droplines. Assume that, *in addition,* the common carrier were to charge the *senders* of signals a rental of 5 percent of the cost of wired city each year; then the cost to senders of TV signals for the city would be $300,000 per year. If all 20 channels are used, the rental is $15,000 per channel per year. This is less than $50 per day per channel. For a broadcast day of 10 hours, this is less than $5.00 per broadcast hour. If senders desire only half as much time as this—either 10 hours a day on 10 channels or 5 hours a day on 20 channels—the cost would be under $10 per broadcast hour, for delivery of the signal.

At these low costs, we think it extremely likely that there will be a sizeable increase in number and diversity of programs offered. These would occur on advertiser-supported TV; pay TV; network and other imported TV; educational TV; political campaign TV; governmental TV; and possibly other forms of TV.

At these low costs and with open time available, minority-taste audiences could be served with the specialized TV fare they desired, either because they would pay for it themselves or because someone else was willing to pay in order to deliver the program or its related messages. The objective of diversity and wider consumer choice would be met. Opportunities to watch programs with less or no advertising would develop, for those with this preference. Television time for politicians would no longer be restricted to candidates with large financial means or rich sponsors. Moreover, these favorable results for communication freedom would occur without governmental controls on programs or scrutiny of political speakers.

Picture quality. While the present quality of the best pictures on TV is excellent, the average quality for all the pictures in a locality is at best only good, and some of the pictures are poor. Improvements require special antennae or more costly sets. The wire system would serve uniformly excellent pictures on all channels on sets of present quality, because the signal would be stronger and interference negligible.

Beyond this considerable improvement from coaxial wire of a type which is in use on present CATV systems, there would be opportunity for vastly greater improvements in picture quality—size, resolution, definition, colors—from use of improved wire and completely redesigned and improved TV sets. These would, however, involve additional costs.

Cost savings for homes and broadcasters. Operating to offset the cost of creating the wire system, estimated at $6,000,000 for a city of 100,000 homes, are cost reductions to homes and broadcasters.

One saving to homes would be in elimination of need for antennae. If we assume that all the homes have antennae for color sets, this saving is approximately equal to the entire cost of wiring the city! The fact is that an outside antenna for color TV and UHF costs as much or more per home as the cost per home of the wired city.

In addition, new color sets and possibly new black and white sets for wire TV would be cheaper because they eliminate the TV set elements which are related to picking up and handling the weaker, less clean, over-the-air signals. The saving on sets for 100,000 homes might be half as much as the $6,000,000 cost of wiring the city, or possibly as much as that cost. About $30,000,000 or more of TV sets are involved! There would be, in addition, savings in annual maintenance charges due to the elimination of these elements.

For broadcasters there would be a saving in transmission facilities. The investment cost is about $500,000 per station, and the annual capital and operating charges are about $100,000. Assume the city of 100,000 homes would have, say, 6 TV stations in the absence of the wire system. Then the investment saving (overlooking the fact that capital is partly sunk in the stations already in being) would be $3,000,000, offsetting in part the $6,000,000 investment required to wire the city. As compared with $100,000 or more annual cost per channel for transmission over-the-air, it was estimated above that the annual charge by the common carrier per channel might be $15,000.

In summary, savings to offset the $6,000,000 capital cost of wiring a city of 100,000 homes are considerable:

	Savings in Capital Cost
Home antennae for colors sets, at $60 per home	$ 6,000,000
Home sets, saving of 10% on 100,000 color sets, at $300 each	3,000,000
Transmitters and towers, 6 at $500,000 each	3,000,000

Spectrum saving. We have already discussed the fact that limitation of spectrum allocated to TV limits numbers of stations and thereby programs. It is generally believed that there is a shortage of spectrum for other purposes as well. If this is true, then one of the very important savings of WCTV could be in permitting some of the spectrum now allocated to TV to be assigned to other valuable purposes, such as use by land and marine mobiles and in satellite relays.

Flexibility. Finally, a virtue of the wired city is that it provides flexibility for further communication innovations. The initial coaxial wire can

provide extra channels, which could be made available at nil or nominal charge to sponsor innovations. These could include, ultimately, shopping services, credit purchases, facsimile mail, data processing, bookkeeping, reference services, etc. A wire system is, of course, indefinitely expandable.

V. Problems and Prospects of Wired City Television

In previous sections it was argued that wire television has a number of advantages over the present system. In this section we discuss some questions concerning WCTV and the positions which may be taken by several interested parties.

What if supply and demand conditions for programming are such that, despite increased volume of offerings, little or no increase in diversity takes place after moving to a wire television system? In that case, the wire system would allow something like the present programming, an increase in number of services, an improvement in picture quality and the release of some radio spectrum for other uses. But we are very optimistic about the possibilities of increased diversity in view of television's great power to create tastes. This has been evidenced by the public's interest in roller derby, professional football, automobiles that talk, wives who are witches, and a nun that flies. Who dares to predict what we will learn to like under conditions of extremely easy access to channels?

Rural television service is an important issue. Our data concern television service to urban and rural *communities*—cities, suburbs, towns and townships, villages, and the like. The proposal and the cost and benefit data related thereto are, therefore, valid for the great bulk of American homes, but not for all. The question of television service in very sparsely settled regions, where homes are very substantial distances from each other, has not been considered, but further study is planned. Meantime, the following very preliminary comments are offered.

First, it seems that the proposal for wire television is in general appropriate wherever we observe the *fact* of telephone, electricity, or CATV service. Wherever telephone and electricity wires and their services are offered at reasonable prices, then a coaxial wire for common carrier television service can also be offered at a reasonable price. The same circumstances under which rural customers are or are not provided telephone and electricity services tend to govern provision of a common carrier television wire to them.

Second, there will be cases where television cannot be economically provided by wire. In such cases, it is possible that television service to rural areas would be provided over the air—by direct broadcasts, translaters,

boosters, or other means. In such cases we assume that the FCC will continue to provide for this purpose some of the electromagnetic spectrum now allocated to television. We should not underestimate the ingenuity of private enterprise in devising methods to reach rural customers, nor the willingness of government to sponsor public goods, public utility services, and subsidies for the rural population in order that they may share in the nation's gains and technical advances.

Is it likely that there will be adverse effects on local television broadcasting? Rather than harm local broadcasting, wire television can greatly increase the extent of local programming, especially in prime time, by providing outlets for such programming. At present, the opportunity cost of a local program in prime time is a popular network program and the large advertising revenue foregone. But the opportunity cost for at least some of the channels becomes very much lower in the wired city. Further, local areas which are contained within the viewing area of large cities—"overshadowed" markets—would have channels available for their own local programming. For example, viewers in the small communities of northern New Jersey might find it possible to view programming relevant to their local interests rather than being limited to programs carried all over the viewing area of the New York City stations.

A number of quite powerful economic groups would not be pleased with the advent of a WCTV system because it would mean increased competition: (1) Television stations now enjoy oligopoly positions in their markets. WCTV would provide an increase in program offerings to the public, and competition for viewers and for advertiser dollars. (2) The present three television networks each own five of the most profitable big-city stations, and would resist the entrance of WCTV on this account. In addition they would view as unfavorable the prospect of competition from additional networks and additional local programming. (3) Other enterprises engaged in providing communication services would find increased competition from wire television. These would include such entertainment media as motion picture exhibitors, concert halls, newspapers, and magazines; and such advertising media as newspapers and magazines, bill boards, and direct mail.

The foregoing oversimplifies. For example, the present broadcasters and networks have important advantages: large libraries of program material, experience in broadcasting, established connections with advertisers, and close relations with program producers and sources. Newspapers and magazines might find ways to utilize the increased availability of television channels to extend their service to their readers.

There are also industrial groups which would benefit from the advent of wired city television. These include companies with expertise in wire communications; users and suppliers of land mobile radio equipment, who would gain from the release to them of spectrum space now devoted to television; and producers of electronic equipment for an enlarged television industry.

Crucial to the question of wire television is the FCC. At times this agency exhibits a tendency to act as protector of over-the-air, commercial television interests against wire television innovations.[28] Statutory authority for such preference cannot be found. It is hoped that the Commission will seriously consider a wire television system of the type described here as an alternative to present arrangements: the 1934 Communications Act created the FCC to regulate ". . . interstate and foreign commerce in communication *by wire and radio*. . . ."[29]

28. *See* Greenberg, *supra* note 8.
29. 47 U.S.C. § 301 (1964) (emphasis added).

MANAGEMENT OF THE FREQUENCY SPECTRUM*

WILLIAM H. MECKLING**

The most striking feature of the history of domestic and international frequency spectrum management has been the general failure to recognize the fundamental nature of the problem. The wellspring of the confusion has been the belief that interference is a technical problem peculiar to the use of frequency spectrum. In fact, interference is simply a manifestation of scarcity. It is not possible for all those who would like to use the spectrum to do so without affecting the amount of the resource available to others. The analogy to other resources, land, labor, and capital, is so obvious as not to require elaboration.

Any effort to improve frequency management must be built on a recognition that frequency spectrum is an economic resource in no significant way different from the mass of other resources available to society. By the same token, the central function of any frequency management system must be to resolve the conflict among competing potential uses for the resource. From the standpoint of social action, the central question is what institutional framework should be promulgated to resolve this conflict.

While this paper is directed primarily to discussing alternative systems for managing frequency spectrum, the choice of such a system is not the important barrier to improvement in the existing situation. The real barrier to progress is the problem of provoking political action. Frequency spectrum is managed today in much the same manner as the commons were on feudal estates in the Middle Ages; while we may not be able to prescribe the optimal management system, we can improve substantially on that state of affairs.

Frequency spectrum is the only resource of any consequence for which:

(1) All use rights are defined by government and then given away;

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(2) Recipients of rights are not permitted to sell all or any portion of their rights, hence, no rights holder has any incentive to economize on the use thereof or transfer his rights to someone who values them more highly;

(3) The total amount of the resource available is subdivided, with each piece alloted to specific services (*e.g.*, land mobile) and no transfer permitted among services;

(4) Significant portions of the resource are allocated to specific services, but the number of individuals who can use the resource is unlimited, *i.e.*, within certain service categories spectrum is treated as a free good;

(5) Because the government completely controls use rights, government agencies get first consideration in their distribution—again, at no cost;

(6) Potential current users have no incentive to take into account future value, *i.e.*, of withholding use today in favor of more valuable possible future uses.

There is no resource for which the misuse, in economic terms, is more dramatic. Frank H. Knight summarized the dilemma very nicely when he said,

> . . . the problem of social action, from the economic standpoint, is chiefly that of getting people—those in control of social policy, which in a democracy ultimately means the electorate—to act in accord with principles which when stated in simple and set terms are trite even to the man in the street.[1]

I. Reforming The Present System

The basic policy choice we have with respect to institutional frameworks is between piece-meal improvements in the existing system and abandonment of it in favor of a market system. The crucial factor that distinguishes these two alternatives is whether the rights which individuals acquire can be bought and sold. The introduction of a market system has been discussed in various papers, especially in the work of Professor Ronald Coase.[2]

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1. Knight, *Socialism: The Nature of the Problem*, in Freedom and Reform 130 (F. Knight ed. 1957).

2. Coase, *The Federal Communications Commission*, 2 J. Law & Econ. 1 (1959).

There has been less systematic analysis of more modest changes to the existing framework.

A. *The Criterion Problem*

A modified version of the present system which does not use prices as a means of allocating frequencies, must immediately face the criterion problem.

Neither Congress nor any of the frequency management authorities have ever seriously addressed this question. They have never given serious explicit consideration to what criterion or criteria ought to be used in deciding how frequencies will be allocated or assigned. They do, of course, consciously take into account questions of the technological appropriateness of various portions of the spectrum for different uses. But such considerations by themselves do not constitute a criterion on the basis of which the conflict can be resolved.

An examination of the literature reveals two answers commonly advanced to the question of what it is the central frequency management authority is trying to do or should be trying to do. The goal cited most frequently is to minimize interference. An alternative goal often proposed is maximizing utilization of the frequencies. Statements of this type illustrate the perils involved in viewing the problem as a technical one. Aside from the fact that these goals are in direct conflict, taken literally neither seems very attractive. The way to minimize interference is to prohibit all but one individual from radiating. The way to maximize utilization is to let every one radiate. The most generous interpretation one can give to such proposals is to say that they are not meant to be taken literally. If they cannot be taken literally, however, they have no real meaning, and we are left with the question of what criterion the frequency management authority should employ in making decisions.

The balance of this article accepts as given the notion that we want to use frequency spectrum efficiently: that is, market value will be accepted as the important criterion in deciding how the spectrum ought to be used. This is a normative judgment, and a variety of rationales for sacrificing efficiency to other goals have been proposed. These include the hackneyed allegation that radio communications is an industry in which there is a special public interest, an argument that has always seemed to be at least as applicable to printing presses as to the frequency spectrum.

B. *Market Simulation by Government Authority*

Conceptually, at least, one reform that might be introduced would be to induce the government agencies responsible for spectrum utilization de-

cisions to make those decisions on the basis of the market value of frequencies. The Federal Communications Commission and the Interdepartmental Radio Advisory Committee could move in this direction without legislation, but it seems unlikely that they will do so, at least without strong pressures from the Executive and Congress.

The one advantage of this suggestion is its salability. General dissatisfaction with the present state of affairs, combined with the pressure from economic quarters to have frequencies sold, has persuaded some that "economic factors are important;" and while they are not prepared to accept a market system, they are quite willing to accept the market criterion.

One fundamental difficulty with this suggestion is pointed up by recent discussions and recommendations for the creation of a research agency to undertake economic studies of the spectrum. If the FCC is to assign frequencies in accord with potential price, it must know how much prospective users would be willing to bid for rights. In practice, it is virtually impossible to elicit that information without actually forcing the competing claimants to incur the relevant costs. Otherwise, it takes little imagination to visualize the exaggerated nature of the claims that would be made by competitors for rights to use the frequencies, and of the painful task the judges would have in deciding whose claim was valid. On the other hand, that kind of a contest in exaggeration is probably no worse than what happens under current procedures.

Another fundamental difficulty with the proposal that spectrum authorities adopt market value as a criterion, is the problem of what to do about rights that have already been granted. Much has been said about the government never giving away this great natural heritage, but the fact is that individuals and businesses have been given rights to use spectrum—rights which are valuable, and which they would not forego lightly. If we now institute a system of allocation according to willingness to pay, there is no doubt that the list of those possessing rights would be substantially revised. Is it reasonable to suppose that any frequency authority would take rights away from a large number of those who now have them to reassign them to other individuals who value them more highly? Given the history of the FCC's inability to reclaim rights, an adjustment of that magnitude is hard to imagine.

The problem is magnified for frequency allocations. Effective use of the market value criterion would imply wholesale changes in the frequency allocation tables. Is it reasonable to suppose that any frequency authority would take entire frequency allocations or significant portions thereof away from one service and give them to another?

One of the most serious implications of this inflexibility is the hopeless outlook for inducing present rights holders to economize on spectrum. Technologically, there are many ways other resources can be substituted for frequency spectrum in producing a given signal output, and many others could be and would be developed if the possessors of rights could capture the gains that would ensue from economizing on frequency utilization. Moreover, systems which don't use spectrum, *e.g.*, commercial broadcasting by wire or coaxial cable, can be substituted for those that do. Unless frequency authorities are willing to ruthlessly apply the market criteria, such measures for economizing on frequency will not even be considered much less put into effect, and the development of technology for further economizing will be stifled.

A second interesting possibility for reform of the current management system revolves about the way use rights are defined. In order to control interference, the FCC now generally specifies the rights of individual users in terms of production inputs, like the size and shape of the antenna, power level at the transmitter, etc. This means of control has two disadvantages: first, it makes it difficult for the user to make input substitutions, *e.g.*, of transmitter power for antenna size; secondly, it results in different levels of interference as a function of time of day, day of the year, sun spot cycle, etc.

Basically, the interference problem is one of energy levels on the same frequencies at the same time, in the same geographic area. Despite the fact that many engineers and physical scientists protest, it seems clear that we could improve the use of frequency spectrum by defining rights in terms of energy level along geographic contours. Instead of specifying the physical inputs users can employ, it is suggested that it would be desirable to specify energy levels they are permitted to impose at various geographic points. From an interference standpoint there is no reason why we should be concerned about how those energy levels are created.

Our knowledge of the relationship between inputs and the power levels that result at various geographic points is uncertain, so that rights would have to be defined in probabilistic terms, *e.g.*, power levels cannot exceed a specified amount more than one percent of the time at specific geographic points, but that problem exists whether we define rights in terms of inputs or in terms of outputs. The latter practice overcomes the two disadvantages mentioned above. Spectrum users would be enabled to make alterations to their physical plants whenever they found it economic to do so, without consulting the FCC. In addition, spectrum users would be held responsible for changing their operations as a function of time of day, month of year,

sun spot cycle, etc., so that they stay within the transmitted power levels which they have the right to create. It is also reasonable to conjecture that defining rights in this way would encourage the development of a more effective system of detection and enforcement of rights than currently exists. Finally, it is worth noting that the inauguration of this reform is independent of whether market value is accepted as the criterion for distributing use rights.

The third modification of present practice which appears attractive is that of limiting the number of rights in those portions of the spectrum where such limitations do not now exist. Currently certain segments of the frequency spectrum are set aside for use by specific services, and any qualified user engaged in that service is authorized to operate thereon. From an economic standpoint, this practice is a perfect parallel to the problem of the good road and the bad road raised by A. C. Pigou in 1920 in "The Economics of Welfare." Individual users will not take into account the interference (congestion) costs which they impose on others when they use the spectrum. As Professor Knight pointed out in 1924 in his article, "Fallacies in the Interpretation of Social Cost," the crux of this problem lies in the character of the rights individuals have in the resource.[3] (In Pigou's example, the road was not owned.) If we are not to have a market for frequencies, the solution lies in the FCC's limiting the number of assignments in these segments of the spectrum just as it does for broadcasting. Here again, however, the criterion problem arises. If there are to be a limited number of such assignments, how is the FCC to decide how many there ought to be, and to whom they will be granted?

The above is by no means a complete catalogue or adequate discussion of steps that might be taken to patch up the existing frequency management system. It is a sketchy outline of the steps which appear to promise the most in increased effectiveness, but even if all of those steps were taken, it is doubtful that they would significantly improve spectrum utilization.

II. A Market System for Frequencies

It is neither necessary nor appropriate to discuss in detail how a market system for frequencies would operate: the one big difference between it and what we have now is simply that individual frequency rights would be transferable in whole or in part, and in terms of the three dimensions of bandwidth, geographic location, and time. Taking that single step of conferring the right to sell spectrum would go far toward correcting the

3. Knight, *Fallacies in the Interpretation of Social Cost*, in The Ethics of Competition 217 (2d ed. 1936).

deficiencies enumerated in the early pages of this article. The resultant system might not be optimal, but it would certainly be a significant improvement over either the present system or the present system modified as outlined above.

There is, however, enormous resistance to that change. Aside from the vested interests, which one would expect to be opposed to a market system, many are suspicious of the idea largely because it seems to them to be a radical change. In truth, as Professor Coase has pointed out, this "novel theory" was novel with Adam Smith.[4]

From a political action standpoint, making existing rights transferable has the advantage that present holders thereof would tend to favor the change since the effect will be to increase the value of their rights. Making rights transferable, however, would not correct all the deficiencies mentioned above. For example, it would not correct the "congestion" problem in those portions of the spectrum where assignments are now essentially unlimited, and rights would still be defined in terms of inputs rather than outputs. However, these problems could be resolved in the context of a market system at least as well or better than outside that context. In those portions of the spectrum that are overused (congested) some users would buy out others, reducing the level of interference. Professor Coase has presented substantial evidence to support the view that, left alone, the courts will develop reasonable definitions of rights. In particular they would in the end define rights in terms of outputs, if that definition proves to be the most efficient. Most important of all, of course, making rights transferable would provide incentives to owners of those rights to use them economically.

The objections which have been advanced to using prices to allocate frequencies generally do not dispute these advantages. The exception to this is the question sometimes raised of whether the extent of monopoly in broadcasting and the communications industries would thereby be increased. Fear that a single firm might buy up all of the frequency spectrum is the extreme expression of this question. There is no reason to believe that a market for frequencies would be any more susceptible to monopoly. It is doubtful that AT&T, NBC, ABC and CBS will be the major sponsors of legislation designed to create a market for frequencies. In any case, we have anti-trust laws specifically designed to handle the problem of monopoly, and there is no reason why frequency monopoly problems can't be handled under those laws just as is the case for other resources.

A second source of objection to using prices stems from the urge to pro-

4. Coase, *supra* note 2, at 18.

tect and subsidize activities which particular individuals or groups regard as important. In the case of the frequency spectrum, the most sacred of all cows is perhaps the hydrogen line. If you would like to make yourself *persona non grata* among your physical science friends, just suggest that you think those who wish to use the hydrogen line for research should pay for it.

The next most sacred cow is the amateur bands, followed closely by the forest service, the fire departments, police departments, *et al.* The vehemence with which the various protagonists defend the view that these agencies or services ought to have frequencies free is impressive, to say the least, and they are not disturbed from their position by the point that police departments are not given cars or radios—fire departments are not given fire engines or radios—the forest service is not given fire-fighting equipment—amateurs must buy their radios and antennae. Even the radio telescopes that are given to the physicists must first be bought by the government. In truth, there is no reason why the agencies shouldn't be forced to take into account the opportunity costs of frequency spectrum just as they are forced to take into account other costs.

The last objection to the use of markets for frequencies has serious social implications outside the realm of economics. There are many who argue that the government should retain control of frequency spectrum in order to control the quality of broadcasting, both TV and radio. One can sympathize with those who judge the character of our television as a vast wasteland. On the other hand, one despairs of looking to the Federal Communications Commission, which created this wasteland, or to any other government agency, as the instrumentality for converting it to a garden. More importantly, there is a potential for censorship implied by using government control over frequencies as a lever for enforcing higher standards on broadcasters.

The allegations about the quality of TV and the character of the TV industry apply *a fortiori* to the newspaper industry. There are more TV stations broadcasting in New York City than there are newspapers, and more competition as a result. Moreover, newspaper content, including advertisements (to say nothing of magazines and books) is at least as lurid and inane on the average as what appears on television. Would anyone seriously suggest that printing presses or newsprint should be controlled by the government in order to control the quality of newspapers?

Conclusion

Of the two courses of action open to us for improving the utilization of frequency spectrum, the one which promises significant improvements is

the introduction of a market system. On the other hand, it seems highly improbable that the political support necessary for such a reform will be forthcoming in the near future. Short of that action, there are steps that could be taken to improve the existing framework, but these cannot be realized easily either, and even if they are, significant improvements in spectrum utilization are not likely to ensue. In brief, we should not be optimistic that much can be done to undo the mistakes we have made in the past.

PUBLIC TELEVISION AND THE "OUGHT" OF PUBLIC POLICY*

SIDNEY S. ALEXANDER**

> If, to please the people, we offer what we ourselves disapprove, how can we afterwards defend our work? Let us raise a standard to which the wise and honest can repair.
>
> George Washington, Speech to the Constitutional Convention of 1787

Will the American people find happiness in Public Television? Is Public Television in the public interest? "This subject," I want to argue, "is within the cognizance of the rational faculty; and neither does that faculty deal with it solely in the way of intuition. Considerations may be presented capable of determining the intellect either to give or withhold its assent to the doctrine."[1]

By "Public Television," I refer specifically to the proposal, made by the Carnegie Commission for Educational Television, to build with federal support a system of public broadcasting based upon our present educational television system.[2] The proposed system would consist of 380 local television stations, enough to bring at least one public television signal of grade B quality to about 94 percent of the population of the United States, and at least one of grade A quality to about 68 percent. While all stations would produce material of local interest, many would also produce material of regional and national interest as well. To make available to each other programs of more than local interest, and to permit the broadcast of programs produced for nationwide distribution, the stations would be interconnected by cable or microwave. The entire system would cost about 270

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1. Mill, *Utilitarianism*, in THE ENGLISH PHILOSOPHERS FROM BACON TO MILL 898 (E. Burtt ed. 1939).

2. Carnegie Commission on Educational Television, PUBLIC TELEVISON: A PROGRAM FOR ACTION (1967).

million dollars a year. Of this total, some 54 million a year is to be spent on the production of national programs for broadcast by local stations.

The commercial television system is under pressure to produce the *most popular* programs that can be produced. The public television proposal is made in the belief that a public television system, supported largely by the government, but operating autonomously, would be motivated to produce the *best* programs that can be produced. The essential fact for this paper is that the proposed public television system will require the use of substantial resources for the production and distribution of television programs that are deemed by public officials to be the best for the American people. The assertion that public television is in the public interest is therefore the assertion that it is in the public interest to devote some 270 million dollars a year to provide the public with programs produced and distributed by an independently operated, though publicly supported, television system, whose policy is to produce and exhibit the best rather than the most popular programs. Whether or not one can rationally assent to that proposition raises the question—with which the next sections of this paper are concerned—whether one can rationally assent to any normative judgment. In the final section of this paper, I shall return to the examination of public television in the light of the conclusions on normative judgments.

I. The Argument Ad Hominem and to the Scientist

> Woe unto you, lawyers! for ye have taken away the key of knowledge: ye entered not in yourselves, and them that were entering in ye hindered. Luke 11: 52

The question I am raising in this paper is: what rational arguments can be made in support of public television? Social scientists believe, as a matter of faith, positivists as a matter of logic, that a normative question is not subject to rational inquiry. Rationality is taken to be a matter of means, not of ends, and to attempt to evaluate ends rationally is simply to be confused. The social sciences, like the natural sciences, can at most aspire to the discovery of that which *is*. That which *ought to be* cannot be found with the most powerful of microscopes. How then can I assert a public interest in public television?

The Carnegie Commission on Educational Television supported the public television proposal in a manner completely different from those today considered permissible. The difference remains large even if we allow

for the fact that the report is addressed to the general public rather than social scientists. The Commission took as a theme for one part of its report, the views of E. B. White:

> Noncommercial television should address itself to the ideal of excellence, not the idea of acceptability—which is what keeps commercial television from climbing the staircase. I think television should be the visual counterpart of the literary essay, should arouse our dreams, satisfy our hunger for beauty, take us on journeys, enable us to participate in events, present great drama and music, explore the sea and the sky and the woods and the hills. It should be our Lyceum, our Chautauqua, our Minsky's, and our Camelot. It should restate and clarify the social dilemma and the political pickle. Once in a while it does, and you get a quick glimpse of its potential.[3]

That excellence, and not acceptability, is to be the ideal directly challenges the standard of want satisfaction, or egoistic utilitarianism that underlies the normative analysis of economists and political scientists. The desired need not be the desirable. Even if people are willing to pay a lot less for public television than it would cost, it may well be desirable. For it may be that public television can help make better people of us, and a better country for us. That could well be worth more than the things we would otherwise buy with the $270,000,000 a year. That argument, however, I shall defer until I am in a better position to make it. In the meantime, I should like to build a basis for bringing this question, and questions like it—questions of good or bad, desirable or not—into the range of discourse of social scientists.

I claim that it is particularly suitable for those engaged in the study of our social institutions to attend to the possibility of their improvement; that the belief that there is in the social sciences no room for the normative is an error; that that error is the root of much evil. It foists upon economics and political science mistaken standards of the good, and closes the door to inquiry into rival standards. The result is a conservative bias in the social sciences, a bias that whatever exists is good, or at least, that there is no possible basis for saying that a condition that does not exist is better than the one that does.

The economist, in the face of a normative problem, has, in different moods, three reactions. The first is to claim that notions of better or worse are strictly personal.[4] When he suspends that tenet for purposes of public

3. *Id.* at 13.

4. Talk of ends is called ideology (the perjorative for other peoples' ideals), and an ideological proposition treated in a logical manner, "dissolves into a completely meaningless noise or turns out to be . . . circular. . . . Take the proposition: all men are created equal . . . [A]re all men the same weight?" J. Robinson, Economic Philosophy 2 (1964). But surely it is not meaningless to say that all men are created equal and few

policy discussion, he still believes that any judgment of better or worse can appropriately be made only as a function of incommensurate individual preferences and so is led to Pareto optimality.[5] If he is very daring, he assumes commensurability of utilities as measured by money, and undertakes a cost-benefit analysis.[6]

These three forms of egoistic hedonism are all in violent opposition to the notion of excellence, for that notion implies that some wants are better than others, and indeed that what is not preferred may be better than what is preferred. The issue is posed particularly sharply by Public Television, since we already have commercial broadcasting, an institution that can give the public just about what it wants, at least as far as the majority is concerned, and even as far as very large minorities are concerned.

It is true that an economist can point out, as Wiles has, that programming television solely on the basis of aggregate popularity might fall short of the optimum that would be indicated by a cost-benefit analysis. Suppose that there should be an intense desire on the part of a small minority for cultural television programs, of which opera and the ballet are usually given as prime examples. If given the opportunity they would, let us assume, be willing to pay more for such programs than the viewers of the displaced programs would be willing to pay for the difference between their current program fare and the closest substitute to which they would be shifted if opera and ballet were to replace what they are now watching. Then a cost-benefit analysis would support, distribution considerations aside, programming other than the most popular program. Essentially this implies an interpersonal measure of utility.

The argument for excellence goes well beyond such cost-benefit analysis, however. It claims that some programs are better than others; that the

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could have misunderstood it as requiring anthropological measurement, though many might differ over what that equality implies. That all men are created equal is a somewhat figurative expression of the normative truth that all men are rightly to be accorded equal rights under the law. Far from being a meaningless noise, this is a truth that we scorn at our peril.

5. We may consider one state of the world better than another if nobody concerned prefers the second to the first, and at least one person prefers the first.

6. An economist will allow that a proposal like public television can be evaluated by a cost-benefit comparison—whether potential viewers would be willing to pay for the programs the total cost of providing them. If income distribution effects are not adverse, the decision is then to be governed by whether the value of the benefits exceeds the costs. Otherwise, if the distributional effects are adverse, the decision would have to be made by an authorized policy maker referred to in the trade as "superman," who has to decide whether the net excess of benefits over the costs outweighs the adverse distributional effects. I. LITTLE, A CRITIQUE OF WELFARE ECONOMICS 87 (1950). In the case of British television policy, we have an actual sample of this sort of analysis skillfully applied. Wiles, *Pilkington and the Theory of Value*, 73 ECON. J. 183-260 (1963).

incentives of the present commercial arrangements in television work in favor of the production of the most popular programs and against the production of the best. If, however, a special organization were created for the express purpose of producing the best programs that could be produced, the programs so produced would be better than those that are now produced. Better programs, it is usually assumed rather than argued, would be better for those who watched them.

A presupposition of this argument is that it is not meaningless to say that one program is better than another, or that one experience of program viewing is better than another, or that it is better to be one kind of man than another. If we are to deal with these contentions, we need to understand them and to determine their truth, both of which we are told, are impossible to do.

Three reasons are offered for the impossibilities of these undertakings. First, we are told that words like "should" and "better" are meaningless noises. Second, even if some sort of meaning can be assigned a normative sentence, it is still not capable of being true or false. Third, a normative sentence is a device, not for stating something, but only for expressing personal approval or disapproval, based only on the speaker's conscience. These three statements characterize respectively, semantic positivism, epistemological positivism, and personalism. To support the contention that the proposition that public television is in the public interest can be rationally assessed, one must show these three viewpoints to be mistaken.

The mansion of philosophy that we must build to house the normative has four levels. The first gives the least trouble. It is the level of a particular normative judgment, one that issues in a statement of the form "A should be done," where A stands for some specified act. The principal information required to support a particular normative judgment, given the rest of the structure, is the positive fact that A has those empirically verifiable characteristics that make it what should be done.

Only positive facts are usually required because there is presumably already at hand a judgment at the second, or universal normative, level of the form "if anything has the positive characteristics of A and its consequences in its context, it should be done." A universal normative judgment expresses a normative commitment. In order to establish its truth, we have to use whatever methods are appropriate for so doing, and those methods are the concern of the third level, the epistemology of the normative. In the first instance that subject deals with the methods appropriate for testing the truth of a normative statement. Fundamentally, it concerns how we find out what we are committed to. Whether a universal normative state-

ment is true or not then depends upon two things. First, it depends upon the general values to which we are committed. Given our general substantive commitments, the determination of whether we are committed to a given *statement* of a universal normative character depends upon what that statement means, a matter of language. The fourth level is, accordingly, that of meta-ethics, or the language of the normative.

These four levels together constitute an apparatus for exploring our commitments, and our ways of judging how our commitments bear upon a particular action that lies before us. In short, if I want to argue that public television is a good thing, I find that I have to exhibit a language in which that statement is meaningful, an epistemology that offers impersonal conditions for the truth of such a statement, a set of ideals which govern what is good, and a set of positive facts sufficient to show that public television satisfies those ideals. It is my object to show that if this can be done it can be done rationally.

II. Normspeak

> "When *I* use a word," Humpty Dumpty said in rather a scornful tone, "it means just what I choose it to mean—neither more nor less."
>
> "The question is," said Alice, "whether you *can* make words mean so many different things."
>
> "The question is," said Humpty Dumpty, "which is to be master—that's all."
>
> Through the Looking Glass

Our first task at the meta-ethical level of the language of the normative is to respond to the positivist's question: "What do you mean, 'should'?" by clarifying the meaning of normative terms. There is a great deal to be clarified, so much indeed that some of the leading contemporary moral philosophers regard the clarification of ethical language as the central task of ethics. R. M. Hare, in an encyclopaedia article, refers to ethics proper as dealing with the meanings of moral words or the nature of the concepts to which these words refer.[7] What I call ethics proper, the substantive study of what things should be done or what things are good, he calls morality. Normative epistemology is not even given a separate name

7. Hare, *Ethics*, in The Concise Encyclopaedia of Western Philosophy and Philosophers 341 (J. Urmson ed. 1960) (unsigned but acknowledged).

by Hare, but in practice he regards it as part of the language of ethics, so adding to the general confusion.

What then, is meant, in a given context by a sentence of the form: "A should be done?"[8]

As a starter, we may suggest that the expression means, "A is rightly to be done." But the positivist will have as much trouble with *rightly* as with *should,* and if we define *rightly* as *appropriately, properly,* etc., he will be no less troubled. His difficulty, accordingly, lies with the normative no matter what verbal form it takes. He understands what we are doing—we are speaking from a viewpoint that it is right to do certain things and not right to do others, or that it is better to do some things than others. That is part of a way of life, and anyone who shares that kind of a way of life can understand the general use of *should,* even though, his way of life possibly being different from ours, he may think that different things should be done. The positivist understands all this, so he really does understand the meaning of the expression "A should be done" at least up to a semantic level of meaning.

That a positivist can recognize that "A should be done" is a normative expression immediately reveals that the expression is not semantically meaningless. Given a set of semantically meaningless sounds, it is not possible to clarify them as positive, normative, or anything else; they are just meaningless sounds. To recognize a statement to be normative is to understand it to refer, semantically, to something rightly to be done, or worthy of commendation or condemnation, etc. That is to understand the normative at the semantic level.

In order better to come to grips with our differences with the positivist, we need to distinguish different levels of meaning and of the correlative concepts of understanding and definition. We shall take it as agreed that an expression may properly be said to be meaningful if it can be understood, and the meaning of an expression is what we understand when we understand it.

One meaning of "meaning" might then be "that which is given in a definition," but just as we have to inquire into the meaning of meaning, we must inquire into the concept of definition, and indeed, much of the confusion in ethical theory for the past 60 years and possibly for the past 2500 years proceeds from confusion over the nature of definition. A great deal

8. This is a formula rather than a sentence, but here and in subsequent discussion we will take it for granted that when we talk about a formula using "A" in this manner, we are talking about the corresponding sentence to be formed by substituting for "A" the name of a particular act.

of modern philosophy, ranging far beyond ethics, has been generated in the attempt to clarify that confusion as it occurred in ethics.

When a man asks for a definition, there are at least three different things he may be asking for, which we may call a verbal equivalent, a specification, or an explication, respectively. As the term "definition" is defined in logic texts it is taken as a statement of symbolic equivalence.[9] A new symbol is introduced, usually for the purpose of abbreviation, and is declared to be equivalent to a certain arrangement of symbols already in use. The statement declaring that equivalence is a definition. We may refer to this type of definition as a verbal definition and use a subscript 1 to denote it in any otherwise ambiguous case.

The definition$_1$ of "A should be done" that I propose is then "A is rightly to be done." This implies that the expressions "rightly" and "is to be done" have previously been introduced, but not necessarily previously defined. For any chain of definitions must end in a set of primitive terms. This simple fact of the logic of a system of discourse is frequently ignored by those who demand the impossible, that all terms be defined before they are used. The most important terms of any subject must remain undefined in the sense of definition$_1$.

Clearly, the positivist isn't interested in a definition$_1$ of our normative terms. If we give him one, he will have as much trouble with the definiens as with the definiendum. We might just as well, then, take the terms *rightly* and *is to be done* to be primitive in our system of normative discourse and use the above definition$_1$ for "A should be done."

The positivists and those close to them offer an alternative, emotivist, definition$_1$: "A should be done" means "I approve of A, do so as well." The trouble with this emotivist concept of *should* is that it just doesn't do the job we want it to do. If I say "A should be done" and you say, "You mean you approve of doing A and want me to do so as well," I simply reply, "No, that is not what I *mean,* though I do approve of doing A, and think that you would do well to approve it also. What I *mean* is that A is *rightly* to be done. The act and its consequences have those positive characteristics that qualify it as the best thing to do under the circumstances. I am not just venting my emotions. I am offering you a particular normative judgment based, first, on my positive judgment of the nature and consequences of A, and second, on my universal normative judgment of what sort of thing it is right to do. And that normative judgment is not a matter of preference but one of belief. It does not refer to my personal taste, but to a standard to which I, rightly or wrongly, believe the wise and hon-

9. *See* A. CHURCH, INTRODUCTION TO MATHEMATICAL LOGIC 76 (1956).

est can repair. I am making a public and not a private claim. If your definition of 'should' were accepted, I would have to use other language to say what I want to say, namely that A is rightly to be done, not because I approve of it, but because it is right."

At this point the positivist asks if I believe, then, in absolute truth. My answer is no, but the question is one of epistemology and not of language. When I say A should be done, I am implicitly claiming that other reasonable, moral men should agree with me—i.e., they would be right to agree with me. I am, accordingly, taking on a heavy epistemological burden. If I claim that something is the right thing to do, I must be able to justify my claim. Under the emotivist interpretation, no justification is necessary—I approve of what I approve. But under the interpretation I propose, a normative judgment must be defended, for it claims interpersonal validity. How that claim is to be defended is the subject of the epistemology of the normative.

A second type of statement that might be wanted when a definition is requested is what I call a specification, or definition. An example in the field of policy is Bentham's principle of utility according to which A should be done if it increases human happiness.

For the purpose of analysis of this principle, let us assume that we have positive criteria, previously agreed upon, to test whether something increases human happiness. On this assumption, Bentham's principle has been held up as an example of the so-called naturalistic fallacy. The fallacy, it is claimed, occurs in defining$_1$ "A should be done" so as to mean "A increases human happiness," then it can't be used to tell us that A is to be done, nor that A is *rightly* to be done. It does not, then, give us any of the normative force that "should be done" usually supplies. The expression simply ceases to be normative, and becomes strictly descriptive. Therefore, it is claimed, Bentham committed the naturalistic fallacy, by defining$_1$ "should be done" in positive terms, so robbing it of its normative force.

Bentham, and most of the "naturalists" after him, can be acquitted of the charge, however, if the principle of utility is interpreted as a specification, or definition$_2$, instead of a statement of verbal equivalence, or definition$_1$. A specification is to be taken as a statement of life rather than of language or logic, something that we find or judge, rather than something that we arbitrarily define as a symbolic equivalence. That Bentham actually meant his utilitarian principle as a specification is completely clear from his defense of it. If he meant it to be a statement of verbal equivalence, a definition$_1$, he could have defended it merely by saying, "That is the very

meaning of the term 'should be done.' " But that was not his defense. He defended the principle by challenging the reader to judge whether in deciding whether something should be done or not, he did not actually use the principle of utility.[10]

The widespread belief that Bentham adopted his utilitarian principle as a definition$_1$ is unfounded and completely contrary to the spirit of Bentham's approach. This point is stressed, not just to set the history straight, but because we have something to learn from the distinction between a definition$_1$, a verbal equivalence, and a specification, or definition$_2$, a substantive statement which can be true or false, depending on the way the world is, or what our commitments are. A definition$_1$ is an arbitrary act of language, while a definition$_2$, which we really shouldn't call a definition at all, but something else, say a specification, is a statement of a normative or positive judgment. It is perfectly proper to *specify* a normative concept in terms of descriptive characteristics, if what we are trying to do is to express a normative commitment. In the particular example given, the normative commitment is to utilitarianism, the use of the happiness of those affected as the test of the rightness of an action.

Similarly, when the inquiry in *The Republic* was characterized as a search for the definition of the good, what was sought was hardly a verbal equivalent. The argument of *The Republic* clearly reveals, just as did Bentham's defense of the principle of utility, that what is sought is a specification, and not a definition in the logical sense. The inquiry is called definitional because the findings can be summarized in a statement that looks like a definition, but can sensibly be interpreted as a definition$_2$, a specification.

Similarly, when we are told by Schubert that the trouble with the concept of the public interest is that it is not, or cannot be, defined operationally, the complaint is not of the lack of verbal equivalents which are ready to hand, but of the lack of a suitable specification of the public interest in operational terms.[11] If we take Schubert's term "definition" to mean a definition$_1$, his complaint is an invitation to commit the naturalistic fallacy. For "the public interest" is a normative term, and he would then be complaining that there is no positive verbal equivalent of a normative term. If we take his "definition" to mean a definition$_2$, he is then asserting a positivist epistemological principle which I shall later challenge.

There is a third thing that might be wanted when a definition is demanded. That is the *meaning* of the expression in question. It is not easy

10. Bentham, *An Introduction to the Principles of Morals and Legislation*, in THE ENGLISH PHILOSOPHERS FROM BACON TO MILL 794 (E. Burtt ed. 1939).

11. G. SCHUBERT, THE PUBLIC INTEREST (1960).

to give the meaning of an expression, but what I call an explication or definition$_3$, may be offered in the attempt. An explication consists of a discursive description of the use of the term, consistent with the slogan of the ordinary language philosophers: "Don't ask for the meaning—ask for the use."

Normative language is used to say that something is to be done because something else is the case. The term *should* is used in recommending action in a context in which we have reasons for doing things, and the expression "A should be done" usually refers to such reasons implicitly, although it does not explicitly state what they are. In a context in which there is no particular reason for doing one thing rather than another, the notion of *should* has no application.

While "should" usually implies that there are reasons for doing the act in question, there is a sort of terminal or ultimate use of "should" in a context in which there is no question of giving further reasons. Thus, if we say "public policy should be directed toward increasing human welfare" or "all men should be given equal consideration in normative judgments" it is hard to think of any further reasons for these judgments but, rather, these are the ideals that furnish the reasons for other normative judgments. The use of "should" in such statements indicates, then, that it is not *primarily* used to give a reason, but to point out what is rightly to be done. The notion of *should* is, in a certain sense, logically prior to the notion of a reason. A reason becomes a reason because something should be done on its account. While the commonest use of "should" is in a context where reasons are taken to govern what is to be done, "should" is used to set up the reasons as well as to refer to them. More neutrally expressed, if we believe that certain things are to be done if they have certain characteristics, then the expression "A should be done" is used to state that A has those characteristics that qualify it as what is rightly to be done.

It may accordingly be recognized that a normative term in general, and "should" in particular, faces two ways.[12] That is its function. It has a normative aspect, from which it may be understood to say that something is rightly to be done. That normative aspect, by a principle somewhat pretentiously called universalization, contextually implies a positive aspect, namely, that A has those characteristics which qualify it for being the right thing to do.

If you are told that this is a good apple, you can infer many positive features of the apple: that it is ripe, juicy, has the sort of flavor that most

12. This "Janus principle" has been emphasized in P. Nowell-Smith, Ethics (1954).

people like, is larger than a certain minimum size, and is free of worms and other imperfections. In this way, normative terms take on descriptive meaning in the contexts of their use. We use the word "good" to commend something, and if I hear you say that something is good, but I don't know what that something is, I know only that you are claiming for it those (to me unknown) properties which constitute excellence in a thing of its kind. This is the primary meaning of "good." But if I know that it is an apple you are calling good, and if I know anything at all about apples and what is generally found to be commendable in apples, then I know a good deal about the positive characteristics you are ascribing to the apple.

In its everyday use, normative language accordingly carries a heavy load of derivative positive meaning. It is this fact which has led, and I think misled, the instrumentalists, Dewey and his followers, to insist that normative expressions are empirical. They are right in the sense that in a typical problematic situation the question, "is this a good apple or isn't it" is a request for empirical information, because we are operating with accepted standards of quality. Indeed, as an empirical generalization we may observe that most normative issues center on the empirical considerations involved, so that the question, *"Should A be done?"* usually poses the empirical question, what are the consequences of A? The relevant norms are usually clearly enough recognized so that whether A should be done depends only on the empirical facts.

The instrumentalists, then, have their point. From a practical viewpoint, most normative problems *are* empirical. But that does not mean that a normative statement is an empirical one. Quite the contrary. A normative statement does not report on a positive state of the world; it says that something is worthy of being done. When viewed from what the statement *says,* the normative aspect is the most important. When viewed from the grounds for saying it, the positive aspect is usually what is at issue. Thus, when you tell me this is a good apple, the important information you are *giving* me is that it is an apple worthy of commendation and presumably suitable for eating. The information which you have to *have* in order to justify that judgment is empirical. So the controversy over whether normative statements are empirical or not may be resolved in that they do indeed contextually imply empirical criteria, but these empirical criteria are implied as the basis of rightful action rather than conveyed as description for its own sake. Along these lines there have been centuries of confusion.

While, then, a normative term may be thought of as being primarily normative, it will usually have, in use, positive implications. Some even go so far as to consider both as parts of the meaning of the term, though it

seems better to me to consider the normative aspect the meaning of the term, while the criteria of appropriate application are to be determined as a judgment of life and not of lexicography, and so are not part of the meaning. A specification of a normative term can then be understood as attaching the normative force of the term to certain positive criteria. If we say a good apple is one that is ripe and juicy and has a flavor of a certain sort, we are affirming the commitment that this is the set of positive characteristics that make an apple worthy of commendation. A commitment is involved because we have already made semantic and behavioral commitments to the commendatory aspect of "good." In applying the term to an apple, we are recommending to someone that he would be wise to prefer this apple to one which was not good. The term "good" is, accordingly, empirical only relative to what has been found to be commendable in the given context, and its primary meaning is given by its use in commending.

I will spare you further details of how *should* and *good* are used—you all know how to use them. It suffices to say that they are used in the very activity for which we want to use them—the recommendation of policy. And as so used, "A should be done," or "A is the best thing to do," means that A is rightly to be done.

The above discussion of the use of good and should, will I hope, serve double duty, explicitly as an example of definition$_3$ or explication of the normative, and implicitly as an explication of "explication."

As previously noted, the positivist has no trouble understanding our various definitions$_1$, statements of verbal equivalence; he could have offered them himself. And he was familiar with the general structure of usage referred to in definition$_3$, the explication. His problem lies with definition$_2$, a statement citing a normative commitment, in that he believes it is not possible meaningfully to specify an operational criterion of a normative expression.

The positivist's difficulty with the normative is encountered at two levels—the semantic and the epistemological, respectively. At the semantic level the complaint is that while "the cat is on the mat" has a very definite referent which can be pictured as a cat on a mat, there is no corresponding picture for the alleged pseudo-statement "the cat should be on the mat." Lacking a referent it cannot be either true or false. For if the cat is not on the mat, the statement "the cat is on the mat" is false, but whether the cat is on the mat or not surely does not affect the truth of the pseudo-statement that the cat should be on the mat.

The answer to the positivist semantic argument is that to be understandable is to be meaningful, and there are ways of understanding other than

by picturing a referent. We may, following R. M. Hare,[13] distinguish two components of the meanings of the two sentences quoted in the preceding paragraph, which may be called, in terminology different from his, the referential component and the assertorial component, respectively. The two sentences have a common referential component, *cat on mat,* while their assertorial components are different, being respectively, *is* and *should be.* Consequently, the same referent or picture, that of cat on mat, will serve for both sentences. They differ in what they *assert* about the referent. Many other sentences, such as "the cat will be on the mat," or "it is odd for the cat to be on the mat," could have the same picture as referent, while *asserting* different things about that referent. Since we are willing to accept, with the positivist, the picture as the referent, any difficulty that remains must be with the assertorial component. That we can understand the whole meaning, including the assertorial component, derives from our understanding of the activities of describing, prescribing, recommending, commending, being puzzled, etc., for to each of these activities there corresponds an appropriate form of assertion. And if we understand these activities, we can understand the corresponding assertions.

If we wanted to picture the assertorial as well as the referential components of various statements about the cat on the mat, we should need, in addition to the picture of the cat on the mat, a deck of pictures showing the speaker engaged in various linguistic performances. Figurative imagination is required to convey the assertorial force of a statement by a picture, but it could be done once the convention was recognized. Thus, the speaker might be pictured as pointing at the referent picture in order to illustrate the "is" of description, looking into a crystal ball for the "will be" of prediction, wearing a halo for the "should be" of the normative or recommendation, a pleased expression for the "is good" of commendation. By means of the assertorial a linguistic performance is accomplished, and we might, at least figuratively, identify each performance by a suitably chosen pictorial convention. But we find it more convenient to use verbs.

We need not, accordingly, share the positivist's semantic difficulties with the normative. His epistemological difficulties are more serious, however. But what we learned from dealing with the semantic difficulty does not leave the epistemological issue where it was. Different assertions may require different verifications. The appropriate way of finding out whether the cat *should be* on the mat, or whether *it is odd for* the cat to be on the mat, may differ in some essential respects from the appropriate way of finding out whether the cat *is* on the mat. And in his epistemology, the positivist

13. R. Hare, The Language of Morals (1952).

claims that there is one and only one right way of verifying statements that are not analytically true, and that is operationally. Once we note that operational verification is by its nature confined to the verification of positive, descriptive statements, we need not be inclined to seek operational verification of sentences which make other than descriptive assertions. So the epistemological challenge to the normative is at last clearly posed: is there an appropriate mode of verification of a normative statement? Without such a mode of verification, what sense is to be made of a normative statement?

III. The Epistemology of the Normative

> Before I encountered Zen, I thought a river was only a river and a mountain was only a mountain.
> As I studied Zen I came to realize that a river is not only a river and a mountain is not only a mountain.
> But, now that I have mastered Zen, I know that a river is only a river and a mountain is only a mountain.
>
> Zen *Mondo*

If I say "A should be done," meaning that A is rightly to be done, not as my personal judgment but as a judgment that is claimed to be right for any reasonable moral person, how can I know whether I have spoken truly? When faced with similar problems in positive inquiry, we can fall back on the power to predict, with some help from the principle of Occam's razor. But in normative inquiry we do not have that line of defense, although the power to achieve the good life might play a role in the normative comparable to that of prediction in the positive. But we are in much better agreement over what it is to predict successfully than over what constitutes the good life. It is here that the positivist charge that we do not know what we are talking about when we speak normatively comes closest to the mark. We must now take up the positivist's challenges by showing how to determine the truth of statements to which the empirical verification principle does not apply.

Positivism starts out from the presumably self-evident normative principle that we should not believe that which we cannot operationally verify. Our rejection of positivism proceeds from a contrary belief. If the positivist's belief is dogma, our contrary belief must be counter-dogma. We *should* believe some things that cannot be operationally verified. It is not easy to furnish a reason for so fundamental a belief, but it may help to consider

that we *do,* and must, believe things that are not operationally verifiable. Some of us, if we are positivists, even believe that we should believe only what can be operationally verified, which is, of course, a belief that cannot be operationally verified. Since we do believe such things as that human institutions should serve human welfare, or that it is evil to inflict unnecessary pain on another man, or indeed on any sentient being, then we must inquire whether those principles are worthy of belief, or in a word, true. The only basis we have for making that judgment is another belief for which there is no operational verification. So, we find that we are bound, not by logic but by life, to believe many things we cannot verify empirically. How shall we judge which of these things are worthy of belief?

Our answer is simply that we have our ways. That may disappoint you, but it is a lot better than if we had no way, or if I had my way and you had your way, as the positivists claim. The question still remains whether the ways that we have are any good. Are they valid? That normative question, how is *it* to be answered? Once again we must content ourselves with the rather lame reply that we have our second-level ways of judging whether those other first-level ways of judging the truth of a normative statement are good and valid.

By now the pattern should be clear. If, with respect to the second-level ways of judging we ask how we can tell whether *they* are good or bad, we can answer that we have our ways of making a third-level judgment. As Spinoza put it, and others since, thinking is the only test for thought.

What are these ways we have of judging non-operational truth? Is there any name for them? We may call them the methods of reason, of rational inquiry, or of reasonable judgment. The operation of these methods is best illustrated by the Socratic dialectic. Given a question before us, we consider the interaction of our normative and positive beliefs bearing on the question. Our first considerations reveal what additional positive facts or normative principles we need to deal with the question. Each missing piece, each issue of fact or of norm, becomes a question in its own right, to be dealt with in the same manner, in a sort of open spiral.

If this process of inquiry were to be described as collating our positive and our normative beliefs that together will settle the question before us, the description would fail to catch the sense of exploration, discovery and creation characteristic of the process. It isn't as if we had, at any time, a clearly recorded set of beliefs, so that determining our belief on a particular question was merely a matter of data retrieval. We don't have a huge book of beliefs, with each inscribed on the proper line. What we have rather is a certain predisposition at any time to generate and modify beliefs out of

the state of our selves, or should we say our souls or our intellects. This process of the Socratic dialectic may not seem very satisfactory as compared with the procedures of natural scientists in their white jackets, but it is still the best we have for this purpose, and very much better than the alternative of nihilism or personalism which is usually offered in its stead.

We do well, as C. S. Peirce has said, to proceed from where we are, and we are someplace. Or, to use a figure of Neurath's frequently quoted by Quine, we are like sailors who must rebuild our boat as we sail in it. We are prepared, upon inquiry, to believe certain things, including our principles for testing and modifying those beliefs. All these belief potentialities may be thought of as constituting a system of beliefs provided the word system is not taken so seriously as to imply consistency or order. To call them a heap or a jumble of belief possibilities might be a better figure of speech.

There are a number of our beliefs which appear, upon inquiry, to be self-evident, not in the profound sense that no reasonable man can deny them, for many would, but simply that we do believe them and have no further evidence for them other than that we have come to believe them. The classic example of such a self-evident belief is our belief in equal consideration for all men in valid normative judgments, or in brief, our belief in equality. To those who say that such a belief is incapable of being true or false, we can reply that they are using an unsuitable standard of capability of being true or false, namely amenability to empirical verification, and this is a normative and not an empirical belief.

This mysterious capability of being true or false does not, upon examination, come to very much. We need not stand appalled at the depth of Pilate's question. In fact, we don't have to work with the concept of truth at all, although we may, for convenience, continue to use it. We may simply use the adjective "true," but not the noun "truth." What we need to know is not what truth is, but what statements are true, and that is a much more humdrum question. It is a question to be answered in each context according to the standards appropriate to that context. We use the word "true" to claim that statements which we believe are worthy of belief, and we use "truth" to impute a common abstract quality to all true statements. Our belief in a statement does not *constitute* its truth, it does not *make* it true, although we sometimes say that we believe it *because* it is true. That's hardly a proper use of "because" in that there is no substantial difference between our believing the statement and our judging it to be true, or worthy of belief. That we do believe it leads us to call it true. What would make it *really* true? Nothing more than that which would *justify* our belief in it.

This manner of speaking permits us to state our beliefs while still allowing for the possibility that we may be wrong. We ascribe to those things we believe the character of truth, but should we find one of them to be no longer worthy of belief we can say "we believed it, but it wasn't true." We even use the word "know" if our belief is strong enough, though that is an especially odd verb, to be conjugated, "I know, you believe, he believes."

We can, accordingly, quite properly speak of a normative sentence as being true if we really believe it to be worthy of belief. For a sentence to be a statement, namely to be capable of being true or false, requires nothing more than our willingness to consider it eligible for being worthy or unworthy of belief.

If, for example, we regard the principle that all men should be given equal consideration under the law as something that some men can believe, we can then appropriately speak of it as being true or false. To say that it is true is to say more than that we believe it, for it implies that it is *worthy* of belief. It is some sort of inconsistency to say "I believe that all men should be given equal consideration, but the sentence 'all men should be given equal consideration' is not capable of being true or false." Since we do believe some such normative principles, we might as well grant their capability of being true or false, worthy or unworthy of belief.

What then, is to be the test of a normative truth? How are normative statements that are worthy of belief to be distinguished from those that are not? This is a question of life rather than of language, since what we should actually *do* is specified by the set of true statements involving "should." It is sometimes suggested as an answer, that we must each one of us consult his own conscience. But that is no answer, just a restatement of the problem, since conscience is merely the name, in the jargon of an antiquated theory of human faculties, for the process we are investigating.

How then are we to judge what we should do? The three principal modes of ethical judgment recently proffered are, respectively, the intuitionist, the decisionist, and one that I shall call the neopragmatic.[14]

The intuitionists are impressed by the apparently inescapable self-evidence of our basic normative beliefs. They accordingly argue that, upon careful examination of the case we just *see* that one thing is good and another bad, one thing obligatory and another immoral. If someone disagrees, we can only request him to look once again, being sure to view the matter cooly, clearly and free of bias. The intuitionists usually regard goodness and badness as somehow inherent in the nature of things and not rela-

14. The discussion of these three ethical viewpoints draws heavily on D. POLE, CONDITIONS OF RATIONAL INQUIRY (1961).

tive to human interests. This, said Santayana, was like claiming that whiskey stands dead drunk in the bottle, an image that Bertrand Russell admitted, divorced him from the intuitionist point of view, though one may suspect that he was already ripe for the separation.[15]

On the wave of positivism and its aftermath came the decisionist theory of ethical judgment. The decisionists said that normative standards are not found in nature but are conventional, matters for human decision.[16] An operational test of that proposition seems hard to frame however. Even if we accept it as a fact that standards are not found in nature, it does not necessarily follow that our normative principles are matters for *decision*. We have them, it is true, not from nature it is agreed, but need we have *decided* to have them in order to have them? We may have come to have them by a process other than decision. Furthermore, it is not a question of how we came to have them, for to rest their truth or falsehood on their genesis would be to commit the famous genetic fallacy, which consists of using the way a man came upon a belief as a test of its validity. We may stumble upon a truth in all sorts of odd ways.

I suggest, after David Pole and the neo-pragmatists, that we call that *faculty* by which we adopt and reconsider our norms simply by the name of judgment. The *process* by which we form and reform our norms through rational consideration might appropriately be called rational inquiry, or the dialectic. "Reason" may then be used to denote the methods we have, and regard as the right methods, for making that sort of inquiry we call rational. To eliminate circularity of terminology, we may say that we have certain methods of inquiry which we have come to regard as appropriate for certain questions, and we have certain methods of evaluating those methods of inquiry in turn. These ways of proceeding we may call rational methods of inquiry. It would indeed be better if we were entirely to abandon this faculty language that assigns certain of our ways of doing things to reason, others to will, others to judgment and so on. If we do so, we merely come to recognize that we do things in certain ways, most of them without knowing how we do them.[17]

At first sight it might seem that there is little to choose between judgment, on the one hand, or intuition or decision on the other, as the basis of recognition of our norms. But there are, in my opinion, the strongest reasons for preferring judgment. The trouble with both intuition and decision is that

15. Santayana, *Winds of Doctrine*, in W. SELLARS & J. HOSPERS, READINGS IN ETHICAL THEORY 257 (1952).

16. K. POPPER, THE OPEN SOCIETY AND ITS ENEMIES ch. 5 (1950).

17. See M. POLANYI, PERSONAL KNOWLEDGE (1958) for a discussion of the nature of our tacit knowledge.

they yield results which are incorrigible and indisputable, and what we need most in normative judgments is the possibility of correction and discussion. If Brown intuits that A should be done, and Jones intuits that B should be done, both having looked at the same complete set of positive facts, that would seem to be the end of it. They just see things differently, as we say. Similarly, if, under the same circumstances, Brown decides that A is to be done and Jones, B, with no particular grounds for either decision other than each man's will, there is nothing further to be done. But if Brown judges that A should be done, and Smith judges otherwise, there is just that room for argument that we need. The method of inquiry appropriate to intuition is to look and see; to decision it is to look and decide; to judgment it is to look and discuss.

The intuitive interpretation regards the normative judgment as the outcome of a human constitution, partly congenital and partly imposed by previous experience of culture and personal history. There is no reason, however, why men should then agree in their intuitions, and yet each is to take his intuition as infallible. The intuitionists do assume, as a matter of empirical fact, that men will intuit similarly, even though there seems to be much evidence to the contrary.

Those who base norms on decision need not be fazed by any failure of different men to agree, for why should they? The weakness in their position, however, is what value or importance should we attach to decisions so arbitrarily made? If there is some *reason* for deciding, then we are no longer grounding the normative judgment on a decision, but rather on the reason for the decision. But that is not the way the decisionists have proposed decision as the basis for normative judgment. Their argument runs to the effect that there are no standards in nature, so normative judgments are conventional, and conventions are matters of decision, possibly not arbitrary decision, but decision nonetheless.[18] It is not usually made clear what saves these decisions from being arbitrary. Hare who most conspicuously, along with Popper, adopted this decisionist point of view (though he may not have stuck to it), claimed that if the decision is made in contemplation of an entire way of life, it is anything but arbitrary since it has, by assumption, taken into account all the considerations that can be taken into account.[19] A man must decide how he wants to live, and the way of life which he chooses will imply, as a corollary, whether any particular thing should be done or not.

An arbitrary decision is not rendered less arbitrary by governing a whole

18. K. Popper, *supra* note 16.

19. R. Hare, *supra* note 13, at 69.

way of life rather than a single act. A judge in a law suit who examines the facts ever so comprehensively can still decide the case arbitrarily if he decides by his will and not according to the law. What saves a judgment from being arbitrary is its being in accordance with some rightful principle. If then I simply decide between two ways of life, without any further basis than my own willful preference, it is an arbitrary decision, even if, according to Hare's assumption, I have considered the alternatives in the most complete detail. For if the decision is of that sort, I need not be concerned with defending it, and it would have validity only for me.

But, in the normative, we are judging for all reasonable, moral men, and I am accordingly bound to judge in the way that a reasonable, moral man should judge. We claim interpersonal validity for our judgment, and we must then conform that judgment to those standards that can reasonably be applied to judgments claimed to be impersonal by a man claiming to be reasonable and moral. These claims entail responsibilities. Our language of the normative commits us to judge impersonally. We have our standards for the methods of impersonal judgment. If we have sincerely applied those standards we are subjectively justified in offering the resulting judgment impersonally. Whether we are objectively justified is a judgment for a third party to make using methods he is subjectively justified in making. Whether his judgment is objectively justified is for a fourth party to judge, etc.

As we proceed with normative inquiry, we try to make normative judgments impersonally, basing them on those of our commitments which are ours not as personal taste, but in our capacities as reasonable moral men. We must be prepared then to work for a convergence of our normative views with those of other reasonable moral men.

We have now reached a critical point in our reply to the positivist where his thrust was deepest. We did not need to worry about his claim that the normative was non-referential, for we could establish the role of the assertorial alongside the referential. We are concerned, however, to meet his contention that there is no basis for impersonality in normative judgments. The claim of impersonality, I am maintaining, is justified if the judgment is actually made in an impersonal way. That does not mean that it is made in such a way that all men *will* agree with it, for there is no such way. It must, however, be made in such a way that all reasonable, moral men *should* agree with it. As such, a normative statement is addressed to other men who share not only our language and our standards of natural scientific inquiry, but also some of our moral beliefs. If then comes one Hitler and says, not equality of human dignity but the supremacy of the German people is to be the basis of social institutions, I cannot convince him he is

wrong, and I would waste my time addressing my normative statements to him, but I know what to think of him as he knows what to think of me. And my normative language is, indeed, addressed, as Murphy frequently put it, to whom it may concern.[20]

What I mean by judgment is no more nor less than the faculty which you are exercising as you listen to me now. I am calling to your attention considerations which support a viewpoint from which it will be appropriate to make interpersonally valid normative statements. You are taking these considerations into account and collating them with your beliefs in the very process I am talking about. I am not proposing that you make, out of this process, an empirical inference or a strict logical deduction, but I do hope that it will lead you to a *viewpoint* from which you will be prepared to make a judgment which agrees with mine. I expect this because I do not believe that there is anything particularly personal in the judgment I have made, but rather that I have come to it from a position which I think you share, using methods which I think you are prepared to use. It is that notion of the convergence of views and viewpoints that come out of rational inquiry that is the basic concept I am trying to present.

Sometimes to avoid the rather harsh claim of intuitive self-evidence, we use the somewhat gentler term "natural" to describe those of our beliefs for which we do not have further evidence, but which we judge to be worthy of acceptance. For example, Arrow, in proposing the conditions that a system of voting could reasonably be required to satisfy, if only they weren't contradictory, calls them "natural" conditions.[21] So we may say of the condition that all men should be given equal consideration, it is a natural one to impose. For most of the millennia man has been on earth this principle of equality was found to be anything but natural. Only within the past two or three centuries has it come to be judged as natural or intuited as self-evident.

We may use the words reasonable or natural to describe both the methods which we have come to judge appropriate for the conduct of normative inquiry, and the findings of that inquiry. Thus the utilitarians start from the recognition that the natural reason to give for doing something is that you enjoy doing it. They may even claim that it is a natural step from that to say that a social arrangement is justified if people are, on some net balance, suitably determined, happier under that arrangement than under any available alternative. So too we may come to regard the demands of

20. A. Murphy, The Uses of Reason (1943); A. Murphy, The Theory of Practical Reason (1965).

21. K. Arrow, Social Choice and Individual Values 2 (1951).

justice as in some way natural. The psychologists may be able to explain what sort of unnatural conditioning has led us to hold that these are natural viewpoints, but such explanations do not concern us here.

What does concern us is that we do hold these viewpoints, whether they are natural or not. We hold them jointly, so we can, in our joint inquiry into what we should do, use these jointly-held viewpoints as fulcrums on which to rest our levers. Where we differ we may seek for some common ground to start our inquiry as to whether we can resolve the difference.

The presupposition which makes sense of the impersonality of the normative is that each of us is trying to apply a standard that is not conditioned upon his own temperament or the accidents of his personality or his personal history but is valid for all men who are reasonable and moral. We may grant, as a matter of psychology, that we are biased by our culture, by our personalities and our experience, but however biased we may be, we are still trying the best we can to form an unbiased judgment. Our discourse and our mode of inquiry must be fitted to that purpose.

That we can presuppose a tendency toward agreement as a consequence of our joint attempt to judge policy questions not from our personal points of view, but from the impersonal point of view of a reasonable moral man, comes close to a doctrine of truth propounded by Charles S. Peirce. He held that "human opinion universally tends in the long run to a definite form, which is the truth."[22] While he had in mind opinion on descriptive matters, the doctrine applies as well to the normative.

Suppose it to be true, as Peirce maintained, that human opinion, even of the normative, tends to converge in the long run. This, if it is true, is a descriptive fact. How can we derive from it a normative conclusion that the judgment toward which opinion converges is worthy of acceptance? Would this not be another example of the naturalistic fallacy? We can accept the convergence as pointing toward the truth only because we have already made the normative judgment that we should accept what reasonable men would come to accept—that we should follow the argument. The process of inquiry is central in neo-pragmatic thought.

Possibly there might be different lines of convergence, each starting from a different initial position. One might lead to a race of pigs, one to a race of tigers, one to a race of philosophers. Would we not judge that of the philosophers to be best? Perhaps that would reflect our particular cultural bias. Would we not accept as better a judgment which transcended that bias? The answer between tigers and philosophers may be in doubt,

22. C. PEIRCE, VALUES IN A UNIVERSE OF CHANCE (P. Wiener ed. 1958); Peirce, *The Works of George Berkeley, D.D.*, NORTH AMERICAN REV., Oct. 1871, at 455.

but the question is not senseless. The answer is in doubt because a reasonable man's preference may be in doubt. But starting from where we are, if there is convergence from where we are, should we not be prepared to follow that path? It does not seem to me that this empirical question of whether there is to be ultimate convergence of opinion on the normative need greatly influence our judgments of policy. For right now we do believe certain things, such as the equality of rights, the happiness of mankind as a test for policy, and the validity of the claims of justice, and we can proceed from these beliefs on the presumption that we are judging not in our individual personal interests, but as rational moral men. This is not a circular argument because we have very definite ideas as to what it is to be moral. We also have modes of inquiry on the basis of which we may come to change those ideas as we gain new experience and insight.

The Peircian notion that there is a normative truth to which reasonable moral men would eventually come if they considered the matter carefully and thought clearly is nothing other than Washington's standard to which the brave and honest can repair, a standard that appeals to what is right against what is popular. This is also the essence of the argument for public television. It is a claim of a present minority in behalf of a future majority.

IV. The Public Interest and the Humanist Criterion

We are now in a position to specify the positive criterion of serving the public interest. First, however, let me offer some statements of verbal equivalence. "Serves the public interest" may be defined$_1$ as "serves the general welfare," or "advances the general good" or "is to the net benefit of the public," and so may be recognized as a thoroughly normative expression. Like all normatives it serves as a link between what is rightly to be done and what is the case. Consequently, viewed from the descriptive side, it appears to be normative, and viewed from the normative side, it appears to be descriptive, once our normative commitments are recognized.

If we are asking the normative question what we, as a social body, should do, we may look to the public interest to furnish a link to the positive, even though "serves the public interest" is, as generally used, itself a normative term. For it, in turn, has descriptive criteria, embodying our normative commitments.

I propose that we consider for acceptance as consistent with our normative commitments the following pair of specifications or definitions$_2$:

If A serves the public interest, A should be done.

A serves the public interest if it has certain positive characteristics, B.

I shall assume without further argument that we accept the first of these

specifications, and that the only question worth discussing is what characteristic, B, of an Act, A, justifies the judgment that A serves the public interest. In short, how shall we specify (define$_2$) "serves the public interest?"

We might do worse than to follow Bentham and say "A serves the public interest if A best serves the happiness of all concerned." But the right-hand side of this expression may be regarded as too highly tinged with the normative to be operational. We may specify, as a more clearly operational criterion, that A serves the public interest if a certain sort of man who had to take an equal chance of being anyone concerned would rather be in the state of the world consequent on A than in any other state consequent on any alternative in view. This criterion we may briefly refer to as the Humanist Criterion. By this device we can specify the normative expression "serves the public interest" in terms of a positive expression "satisfies the Humanist Criterion."

The Humanist Criterion, as proposed, is positive because it depends only on the potentially "revealed" preference of a particular sort of man from among specified states of the world. We may then specify the characteristics of the test-man in whatever detail is required for our normative purposes to be satisfied. Thus, to transcend cultural bias we require that he be a reasonable man perfectly informed as to what it is like to live in any one of a number of different cultures. To transcend personal bias he must also be perfectly well informed as to the nature of different human temperaments, because in making his decision he is presumed to face with equal probability the chance that he might be anyone in the community affected by the action contemplated. In taking anyone's place he is presumed to take that place not with his own congenital nature and acquired preferences, but those of the person whose place he takes. The device is an analytic device only, but its intent and workings should be clear. It reduces the notion of "serves the public interest" to a matter of human preference, and so permits us to work out a positive criterion for that normative notion.

Our defense of the Humanist Criterion must be along the same lines as Bentham's defense of the principle of utility. We must ask anyone who doubts the Criterion whether he would not, upon fuller consideration, use it as the test of serving the public interest. Ethical inquiry in general, and policy inquiry in particular, is essentially an exploration of our commitments. The Humanist Criterion implies that we are committed to the principle that human institutions are to serve human welfare. Our randomization of the test-man over all concerned with equal probability of being anyone affected is an embodiment in the test of our commitment to the principle that all men are to get equal consideration. In general, as we recog-

nize our normative commitments we can usually impose corresponding constraints on the Humanist Criterion so that it will remain the positive specification of our normative commitments to the public interest.

There is an objection to the Humanist Criterion that is so clearly beside the point that I would hesitate to mention it if it had not been repeatedly raised by some of my most distinguished colleagues. That objection is that there is no such person as our test-man. The positive content of this objection is undoubtedly true. No perfectly informed man exists. Does that render conceptually non-operational what was advanced as an operational condition? I did not specify that the test-man was to be existent. This whole device is only to clarify what we are talking about when we say better or worse. A conceivable though non-existent test-man is enough for such clarification. Even though we do not know what a perfectly informed man woud prefer, that concept is enough to guide our inquiry aimed at improving that knowledge.

Schubert found three different views of the public interest current in the literature of political science, which he called rationalist, idealist, and realist respectively.[23] The differences can be briefly characterized by the definition of the public interest that each would propose. The rationalists, who regard the voice of the people as the voice of God would propose the definition "A is in the public interest if it is desired by a majority of the people." The idealists would advance the definition, "A is in the public interest if A is good for the public." The realists would offer the definition that "A is in the public interest if it is the outcome of the appropriate political process."

I cannot go into the relative merits of these viewpoints, other than briefly to state, rather than to defend, the reasons why I find the so-called rationalist and realist positions untenable. The defense of the "idealist" point of view is, of course, the subject of this paper up to this point, although I would not call it idealist.

It is not clear whether the proposed definitions should be taken as definitions$_1$ or definitions$_2$. If they were offered as definitions$_1$, I would simply say of the rationalist and realist proposals, "that's not what we mean by the public interest." To accept either one of them as a verbal equivalent of "public interest" would be to commit the so-called naturalistic fallacy. Whether that is a fallacy or not, the argument against defining$_1$ a normative term, like the public interest, in positive terms would apply to the rationalist and realist proposals.

If, alternatively, the rationalist and realist proposals are interpreted as specifications, they must be rejected on normative grounds. The majority

23. G. SCHUBERT, *supra* note 11, *passim*.

may want something that is not good for the public at large, and so contrary to the public interest. Similarly, what comes out of the political process may not be in the public interest, it may simply not serve the public welfare. The realist specification is like specifying a good apple as one purchased from grocer Brown. He may sell you, on the average, the best apples you can get, but he may sometimes sell you a bad apple. What comes out of the political process is legally binding, and presumably the best we can do, but it need not be in the public interest.

After the most exhaustive study of the concept of the public interest known to me, Schubert concluded that

> . . . our investigation has failed to reveal a statement of public interest theory that offers much promise either as a guide to public officials who are supposed to make decisions in the public interest or to research scholars who might wish to investigate the extent to which governmental decisions are empirically made in the public interest. For either of the latter purposes, it woud be necessary to have operational definitions of the public interest concept; and neither my analysis nor that of other contemporary critics suggest that the public interest theory prevalent in America today either is or is readily capable of being made operational.[24]

The Humanist Criterion is proposed to meet this requirement of operationality. But it is not so new that Schubert could not find earlier examples of the "idealist" viewpoint that could offer an operational specification of the public interest.

> But what does idealism have to offer, other than moralistic exhortations to do good? It leaves the decision-maker to rely upon his own best lights, whether these are conceived of as a Platonic soul, a Calvinistic conscience, or as Catholic natural law. It may be that any one of these provides the best standards available for guiding some decision-makers in some situations; but labeling as "the public interest" either such a process or the result that it produces adds nothing to what we would have—except from the point of view of the engineering of consent—if there were no such phrase as public interest. With or without the label we must rely upon the prior political socialization and the ethical preconditioning of the individual decision-maker for whatever kind or degree of responsibility that ensues in such circumstances.[25]

There is a confusion here. What is to be expected from a label? It should certainly surprise no one that a label cannot provide the basis for a substantive judgment of policy. The label "serves the public interest" cannot do

24. *Id.* at 220.

25. *Id.* at 221.

anything for us, but the specification of "serves the public interest" as "satisfies the Humanist Criterion" can do a great deal for us. What it can do for us is the job that normative judgments normally do. They connect something that is rightly to be done with the criteria for its rightly being done. It would certainly be odd if a concept like the public interest which is so liberally sprinkled through our political discourse should have no function to perform. The function it has to perform is the function of a normative term: to state that something is to be done because something is the case. More precisely, as we are construing the expression "is in the public interest," it says that a favorable normative quality adheres to a particular situation by virtue of that situation having cerain descriptive qualities. The normative quality is that of being in the public interest. That is associated with, but by no means the same as, the normative concept "should be done." The association is through a normative judgment, in this case a specification of one normative in terms of another, that whatever is, on net balance, in the public interest should be done. The normative notion of the public interest is also associated with a descriptive quality or criterion, for which I have been nominating the Humanist Criterion, such that something serves the public interest if it meets that criterion.

More serious than the confusion over the difference between the function of a label and of a normative concept is the assumption that in order to determine what is right a man must rely upon *his own* best lights. Why not *our* best lights? My earlier arguments against personalism, whether right or wrong, were certainly not beside the point. Is the Humanist Criterion merely *my* best light, or is there not some reason to judge that it should be acceptable (possibly with further qualifications) to any reasonable moral man? The political scientist's rejection of the so-called idealist concept of the public interest proceeds both from positivist epistemology and from the doctrine of personalism of the normative. If the Humanist Criterion, or anything like it, is accepted, the concept of the public interest is given operational significance, not by its verbal definition, but by its specification.

V. The Public Interest in Public Television

> But to others in parables; that seeing they might not see and hearing they might not understand.
>
> Luke 8: 10

Would a reasonable man, perfectly informed about the alternatives, and randomized over all concerned, rather live in a state of the world in which there was public television, or one in which there was available

$1.15 more per capita to be spent annually on consumption or investment? If he would prefer the former, our argument runs, public television is in the public interest.

From this point on, our problem is not with the normative but with the positive, and we must face our real difficulty—our ignorance of the facts. We don't know how public television would work in our political and social framework, nor how television programs affect us, nor what a well informed man would prefer. These are matters of fact in the behavioral sciences, so our real trouble with the normative turns out to be our ignorance of the positive. Once again we must have recourse to judgment, but this time we need judgment of what *is* rather than of what *ought to be.*

The facts that, if they were facts, would support the argument for public television may be simply stated. First, television can do great things. Second, our present system of commercial television is not achieving that potentiality. Third, a publicly supported television system, properly insulated from governmental interference, could more nearly achieve that potential.

The great things that television can achieve are not limited to the provision of better information, though that is certainly one important opportunity for improvement. Commercial network television already does a truly remarkable job in bringing important events into the homes of the American people with a vividness unmatched in history. But, great as are the feats of the network news and public affairs programs, which take us into the very foxholes of Vietnam, there remains a gap between seeing something and understanding it. And commercial television has not, in the opinion of men expert in this field, bridged that gap as well as it can be done. Sometimes it does, and so reveals how much remains to be done.

The principal complaint of those involved in the production of news and public affairs programs for commercial television is the timidity imposed by the ownership of the television networks.[26] It will be interesting to see whether public television can escape that timidity. It is said that nothing is so timid as a million dollars, but I would guess that a bureaucrat dependent on a Congressional appropriation can offer a million dollars a lesson in timidity. How far a Public Television Corporation can be insulated from this timidity is a question of fact for political science. The best way to find out is to try.

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26. *See, e.g.,* Murrow, *Address to the Radio and Television News Directors' Association Convention,* in H. Skornia, Television and Society 227-38 (1965), or the testimony of Fred Friendly, almost anywhere.

Next to timidity, the biggest subject of complaint from the public affairs fraternity in television is the limited amount of broadcast time allocated to their programs. Here we should expect Public Television to do better. Broadcast time is so valuable in dollars and cents to commercial television that not much can be spared for treatment of the news in depth. On the other hand, at those local stations where more time can be spared, the broadcasts are given such meager support that the time is wasted. An extra half hour of news bulletins off the wire read from an invisible projector by a personable announcer is of rather dubious value, other than to afford an opportunity to hear the news at a time different from that of the regular network broadcast, an opportunity usually available over radio in any case. The networks spend large amounts of money on news and public affairs, but accord it limited broadcast time. The local stations that grant it more time begrudge it the money.

Ideally, Public Television could be expected to devote a great deal of broadcast time to public affairs programs that will furnish the basis of a deeper understanding of our world. When I say it could be expected, I mean if, by some miracle of political science, it were run by a responsible management free to program the way it thought most in the public interest. If, however, the institutional arrangements are such that an appropriate deference to the sensitivity of Congress is required, all bets are off. It is one of the greatest threats to Public Television that what is good is not likely to be welcomed by important sectors of our governmental establishment, or by influential groups outside of government. This is, in my opinion, likely to furnish a counter-example to the "realist" viewpoint that whatever comes out of the process of government is in the public interest. There is no reason to expect a high degree of congruence between the sensitivities and values of Congressmen, bureaucrats, or interest groups, and what is in the public interest in public television programming.

In any case, the need for programming in news and public affairs different from what now appears on the commercial networks is partly the result of spectrum limitation. Because the spectrum is limited, there is simply not enough opportunity, after more lucrative entertainment demands are met, for the extensive treatment of our public problems that those problems deserve.

But it is not only the limitation of time that blocks the way to understanding. The pressure common to all commercial journalism to deliver that which titillates rather than that which illuminates is also felt in television, though somewhat more successfully resisted there than elsewhere. The great opportunity for Public Television in public affairs programming,

if it is not inhibited by bureaucratic timidity, is the achievement of deeper understanding on the part of the viewer. The information communicated by the extensive news coverage of the networks, vivid and concrete as it is, very seldom generates understanding. Sometimes it does and it is wonderful to experience, but not nearly as often as it could if that were more clearly recognized as the object of the game.

There is a bias imposed on the marketing of news in this country by the necessity of selling the carrying medium, whether it be a newspaper or a commercial program. Consequently, there is a premium for any reporter to make a great scoop, to provoke an incident, or to capitalize on an incident provoked by others, in order to provide excitement. The need to excite gets in the way of the need to inform. Reporters who are skillful in digging up and creating a good story should not be expected to be profound analysts of what is happening.

For news reporters, in general, to develop understanding in the American public would be for water to run uphill. When, for example, Krushchev visited the United States and submitted to questions at the Overseas Press Club, the questioning reporters, instead of trying to elicit from him answers that would illuminate the problems of Soviet-American relationships, tried the impossible, to embarrass Krushchev. They failed to do so, and even more seriously they failed to seize an opportunity to create for the American public a television program of transcendent importance for developing an understanding of a crucial problem.

This should not be taken as a personal criticism of the fine men who are American news reporters. They too are responding to the demands of their environment. Understanding does not make headlines, and they are dealers in headlines. But neither do headlines make for understanding. So if it is the function of the American news media to make headlines, some other agency is required to make for understanding. The fault lies with us, the American public, in that we demand headlines rather than understanding, but we too are responding to our environment.

But it hardly pays to argue over who is at fault. The question is, what is to be done about it? What is proposed is to construct an institutional arrangement whose operating goal would be to generate understanding rather than to make headlines and capitalize on them. It may very well be that our society and our form of government is incapable of that task. There may be no way to escape the fate of headline journalism. Our experience to date need not be conclusive, even though it is unequivocal. That experience reflects the institutions so far used. Whether it is possible within our political framework to give governmental support to a non-govern-

mental agency dedicated to the development of understanding, rather than of headlines, in its treatment of news and public affairs remains to be seen. The proposal before us is designed to that end, and it is worth trying to find out whether it can be done. Its failure would not necessarily prove that it can't be done, but we certainly will never know whether it can be done if we don't try. My own judgment, for what it is worth, is that it hangs in a delicate balance, depending on the nature of the people who come to manage the process and their skill in withstanding the onslaughts of those powers and those interests that would destroy the freedom of public television to do what it might and should do if it were only free.

Even in entertainment programs, especially in entertainment programs, there are potentialities which are unrealized in commercial telvision, that must remain unrealized so long as it is commercial. These potentialities arise from the nature of art and the creative performance. Commercial television, in meeting its commercial requirements, finds itself constrained to produce that which pleases the majority and offends nobody, and this is a completely different incentive from what has been found in art to be the basis of great artistic performance: the will of the performer. We have no formula by which great art can be produced to order; what has been found most effective in the past is to give those who are driven by their own compulsions to the production of great art the opportunity to do what they feel compelled to do. This applies as much to public affairs programs as to entertainment programs, and indeed we risk misconceiving the nature and function of a program when we call it entertainment. It is entertainment from the point of view of the viewer, but art transforms us as it entertains us. It enhances our experience and is itself a part of our experience. It helps make us what we are. So, while we may be impelled to watch a television program by our desire to be entertaind, entertainment does much more than give us pleasure. A program must hold our attention if it is to do anything to us at all, and whether it holds our attention through entertainment or through excitement or edification is less important than what becomes of us because of our experiencing the program.

Commercial television is reproached by its critics for not doing more to make us as good men as we might be. The very words we use become so distorted as to be misleading. The critics certainly do not mean that public television should have the duty of making us obey the regnant sexual code more faithfully. There is another and deeper meaning of a good man, one capable of participating in the good life, and that is the sort of man which television might help make. Nor do they mean, heaven forbid, that television program producers should sanctimoniously strive to make better

men of us. What a sorry mess that would be! They do mean that, in manufacturing programs for the popular market, the producers are not letting the best artists follow their own standards of what makes a good work of art. And the effect of good works of art, they hold, is to make better men of us; the effect of bad art is to degrade.

In Randall Jarrell's twist on Oscar Wilde's epigram, human nature copies art,[27] and the art of the commercial television program is not a model which we should prefer for human nature. The complaint of critics like Jarrell is that while "Art lies to tell us the (sometimes disquieting) truth; the Medium tells us truths, facts, in order to make us believe some reassurring or entertaining lie or half truth."[28] The main objection then to popular television programs from the point of view of their intrinsic artistic value is that they transmit false values, values known by their authors to be false, because they are found to be the values that will make the product sell. It is this distinction between the true and the contrived that is most important basis of adverse criticism of television production by the intellectual critics.

Perhaps it is too much to ask that television make better men of us, but we might hope for it to tend in that direction. Such a hope is currently not as well realized as it might be, not for any lack of good will and moral responsibility on the part of those in the television industry, for I think that the moral responsibility and integrity of those in the television industry will, in spite of the quiz scandals, stand comparison with those in any other industry. The trouble is not that this is an immoral industry, but that it is an *industry,* that it is the economics of advertising which provides the environmental stimulus to which television programming responds. If the business and legal responsibility to the stockholder for making profit is set on one side of the scale, and the moral responsibility to the public for great art on the other, even though the responsibility to the public may be felt more heavily in this industry than in any other, it must be outweighed by commercial considerations. There is room for moral responsibility only within the non-competitive interstices of the commercial television structure. The commercial networks do sacrifice each year, in their public affairs programming, millions of dollars of potential profits to their moral standards of responsibility. Some may view this cynically, or as they would say, realistically, as the tribute the networks pay, on behalf of their owned and affiliated stations, to the responsibility for serving the public interest that is the legal presumption of the station licenses, a long-run cost of maintaining their

27. Jarrell, *A Sad Heart at the Supermarket,* DAEDALUS, Spring 1960, at 366.
28. *Id.* at 368.

favored positions. But such, in my judgment, is not the case, or, at least, not the whole story. I think that the good opinion of the community, and more especially of the elite of the community, as well as their own integrity, is highly valued by those who govern the network treatment of news and public affairs, so that the extra expenditures for high-quality programming are made in spite of the profit motive rather than from the profit motive.

The desire for programming distinction has become a motive alongside the profit motive, so that there will be some tradeoff between the quest for distinction and the quest for profits, not only in news and public affairs but in entertainment programming as well. But, granting all this, the quest for profits is dominant. It is only within the extra freedom afforded by its higher-than-normal profitability that television can afford to trade profits for distinction. The higher profitability results partly from spectrum limitations, and the consequently restricted numbers of competing stations. It partly also proceeds from the pattern of audience flows. It is more profitable to place a new program, whatever it may be, on a network which leads in the ratings than on a network that is behind. There is a certain inertia of the public in tending to leave the dial turned to the station to which it was last tuned unless there is a positive reason for switching. There is indeed a great deal of switching, but nevertheless there is a certain residual probability of a higher rating for a given program if it follows a popular program than if it follows an unpopular one. It is for this reason that a low-audience public affairs program may be costly not only in failing to get full sponsorship, but also in endangering the sponsorship of adjacent programs. This "Dustman Doolittle" theory that morality is a luxury good might be given an empirical test by a comparison of the revealed moral standards in the programming of the third network as compared with the first.

We, the American people, are in a poor position to reproach the television industry for the immorality of giving us what we want. There is, however, another reason why, if commercial television does not program in the public interest, we should reproach ourselves and not those in the industry. It is up to us to structure our institutions so that they work in the public interest even if we depend on private interests to serve that end. As Adam Smith observed long ago, one need not pay much attention to the claims of businessmen that they trade in the public interest.

Television programming is mass culture, designed to please majority tastes rather than to realize what the artist feels is best. What is wrong with mass culture? When Dorothy Parker prefers a positive Wasserman test to a poem by Eddy Guest, is that simply snobbery? Undoubtedly snob-

bery plays a part in the complaints of the long-haired intellectuals against the mass media, but we must not fall into the genetic fallacy. There may be something in the complaint, whatever its motive. The principal shortcoming of a work that is produced to meet a market requirement is that it is likely to lack sincerity, and those critics who turn most strongly against mass culture object principally to the insincerity of the product. They distinguish between popular art and folk art largely on this basis.

Sincerity has long been recognized as a fundamental characteristic of a great work of art.[29] The power of an artist derives from his ability to communicate more than he can understand, and if he produces a product for market, he loses that power, as Robert Sherwood demonstrated when he wrote for television. In one sense, an artist cannot produce for the market, for then he ceases to be an artist and becomes a manufacturer, a producer. And this is not a tautology, but the entailment of a substantive specification of the nature of true art.

Dwight McDonald claims that "there are theoretical reasons why mass culture is not and can never be any good."[30] Culture, he claims, can only be produced by and for human beings and the mass is not a human being. This argument I take to be nonsense. Popular television programs are produced for beings that are all too human. The trouble is that they are being *used* as human beings. McDonald comes closer to the point when he complains that the "technicians of our mass culture" treat people as things just as do the "questionnaire-sociologists" and other social scientists. They violate Kant's categorical imperative in its second form, in which it commands us to treat people as ends and not means. But, as a social scientist, however heretical, I must object to putting manipulation and investigation on the same moral plane. And even the manipulation has the defense of consumer sovereignty; it is demanded by the subject, not imposed upon him. The charge against mass culture in general, and commercial television in particular then comes down to this: it is wrong to give the public what it wants if what the public wants is not good for it, and if you give the public what it wants rather than what you believe in, that is not likely to be good for the public.

James Baldwin claims that the only method by which the mind can be improved is by disturbing the peace.[31] And, clearly the man who wants the greatest possible audience is not interested in disturbing the peace.

29. See in particular Tolstoy, *What is Art?*, in AESTHETICS AND THE PHILOSOPHY OF CRITICISM (M. Levich ed. 1963).

30. McDonald, *A Theory of Mass Culture*, DIOGENES, Summer 1953, at 1-17, reprinted in B. ROSENBERG & D. WHITE, MASS CULTURE 59-73 (1957).

31. Baldwin, *Mass Culture and the Creative Artist*, DAEDALUS, Spring 1960, at 374.

Baldwin's complaint that the "movies are designed not to trouble, but to reassure; they do not reflect reality, they merely rearrange its elements into something we can bear. They also weaken our ability to deal with the world as it is, ourselves as we are,"[32] may be misplaced, even if the media do what he says they do. We clearly do not really know the relationship of the content of a piece of literature to its effect on our lives. It appears to the serious artist that escapist literature, literature that transforms reality so that it is more bearable, is in some sense a weakening of the moral fiber or at least tends to deteriorate the quality of life. But anesthesia is not always without value. Possibly life as it is is too horrible to contemplate and a literature which transforms it into something that seems more pleasant may have a function. If the role of popular art is to confirm and validate values, and the role of high art is to disturb, challenge and transform values, there may be a place for each. For most of the time on commercial television and for much of the time on public television it would seem to be appropriate to confirm the existing values. But some of the time it is valuable to challenge them and to help transform them. It is that process which disturbs the peace, and a disturbance of the peace is not welcome on commercial television. How welcome it will be on Public Television is an important question. I can hardly believe that Congress will willingly support an institution that, either in news and public affairs or in entertainment programs, seriously challenges generaly accepted values. The problem may be too deep for remedy within our institutional arrangements. The Philistines may so constrain Public Television as to defeat that true art that upsets the viewer to his advantage. This is a dangerous business. Whether it can be done or not is a matter of fact which nobody can estimate reliably. The best we can do is try and see, even though the odds are against the maker.

If, then, excellence rather than acceptability is a worthy ideal for television, may it not be an ideal for our other activities as well? As the perceptive reader may well have suspected, I am after bigger game than public television. In all social policy, is it not excellence that is to be achieved rather than want satisfaction? Is it only in television that we should raise a standard to which the wise and honest can repair?

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32. *Id.* at 375.

USE AND REGULATION OF THE RADIO SPECTRUM: REPORT ON A CONFERENCE*

WILLIAM K. JONES**

This paper begins by briefly outlining the present mode of determining access to the radio spectrum. The second section reviews the attack upon this method by some of the academic economists, and states their proposal for establishing a market in transferable spectrum rights. The next two sections consider the problems presented by such a market system and a number of alternative proposals for revision of spectrum management practices. The impact on spectrum use of a number of recent technological developments is briefly reviewed in Section V. A few concluding observations are appended in Section VI.[1]

I. Background to the Conference: The Radio Spectrum and its Management

Radio waves are a species of electromagnetic waves. Produced by the acceleration or oscillation of an electric charge, they transmit energy, by

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* This article is a summary piece to the Symposium on Communications and the Future, published in two parts in this issue and the previous issue of the *Washington University Law Quarterly*. The article reports the substance and proposals of the major papers delivered at the Conference on the Use and Regulation of the Radio Spectrum, held Sept. 11 and 12, 1967, at Airlie House, Warrenton, Virginia. The article also reviews the statements and reactions of the other participants, which are unrecorded elsewhere.

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1. This discussion does not encompass all the topics covered at the conference. However, as to the topics discussed, an effort is made—in Sections II through V—to report the various points of view expressed and to give some indication of the major difficulties encountered. Sections I and VI are the contributions of the author, who also has interjected comments in the other sections where they appeared necessary for organizational or analytical purposes.

Four papers provided focal points for discussion at the conference: H. J. Barnett and E. Greenberg, *A Proposal for Wired City Television* (printed in 1968 Wash. U.L.Q. 1); L. J. Johnson, *New Technology: Its Effect on Use and Management of the Radio Spectrum* (printed in 1967 Wash. U.L.Q. 521); H. J. Levin, *The Radio Spectrum; Economic-Physical Character and Regulatory Framework* (to be printed in the October 1968 issue of the Journal of Law & Economics); and W. H. Meckling, *Management of the Frequency Spectrum* (printed in 1968 Wash. U.L.Q. 26). Two other papers, delivered at the conference but not covered in this summary, are: S. S. Alexander, *The Public Interest In Public Television* (printed as *Public Television and the "Ought" of Public Policy*, 1968 Wash. U.L.Q. 35); and J. J. McGowan, *The Economics of Competition and Regulation in Commercial Television Broadcasting* (printed as *Competition, Regulation, and Performance in Television Broadcasting*, 1967 Wash. U.L.Q. 499).

wave-like disturbances of electromagnetic fields, as they pass through space or air or some other medium. Radio waves have frequencies ranging from 10 kilohertz (KHz) (10,000 cycles per second) to 300,000 Gigahertz (GHz) (300,000,000,000,000 cycles per second). However, the higher frequencies are not of any practical use at the present time, and the internationally recognized radio spectrum does not extend beyond 40 Gigahertz.

The radio spectrum is used for a wide variety of purposes, most of them involving some form of communications: military and defense facilities; space technology; air and maritime navigation; radio and television broadcasting; communications common carriers; business and industrial radio; police, fire and other local emergency services; air, maritime, rail, taxi and other transportation services; atmospheric and geodetic exploration; and citizens and amateur radio. As these uses have expanded in volume, and as new applications of radio technology have been developed, questions have arisen as to the capacity of the radio spectrum to accommodate the substantial increase in radio wave propagation.

A major limitation on the ability to make effective use of the radio spectrum is the phenomenon of electronic interference. In general, if two or more radio signals are transmitted to the same area at the same time on the same frequency, they will so interfere with one another as to render some or all of the signals unintelligible. Several outcomes are possible: (1) a very powerful signal might override a weaker one so that the latter is excluded for all practical purposes; (2) the several signals may be so similar in intensity as to cancel one another out in a confusion of "noise"; or (3) an intermediate condition might prevail in which the weaker signal is rendered unintelligible and the stronger one is not, but the quality of the stronger signal is appreciably reduced by the presence of the weaker one. To eliminate or minimize electronic interference, it is necessary to separate the multiple signals by one or a combination of three techniques: (1) separating the signals in space, *i.e.*, altering the location or direction of one or more signals so that they do not present multiple strong signals in the areas where reception is desired; (2) separating the signals in time, which may include the transmission of one signal during silent intervals in the transmission of another; and (3) separating the signals in frequency so that the same, adjacent or related frequencies are not employed in transmitting multiple signals to the same area at the same time. The interference phenomenon, and the modes of eliminating or minimizing interference, are more complex than this, but the main dimensions of the problem can be stated in these terms.[2]

2. The tendency of radio signals to interfere with one another is affected, *inter alia*,

Another aspect of the radio spectrum which affects its use is the variation in the propagation characteristics of different frequencies. At some frequencies, radio waves carry for long distances, either because they bend and follow the curvature of the earth or because they reach distant points via reflections from the ionosphere. At other frequencies, these characteristics are lacking and transmission is limited by the horizon or other physical impediments. Some frequencies are influenced more by the weather, or by physical obstructions, than are others; and, apart from these external factors, the tendency of signals to fade varies from one frequency to another. Thus, the range and reliability of signals is partly an attribute of the frequency. In a large variety of ways, the different parts of the radio spectrum manifest distinctive properties, making various of the frequencies more suitable for some purposes than for others.[3]

Over the years, radio spectrum utilization has moved progressively from the lower frequencies to higher and higher ranges. About 1918, the useful portion of the spectrum appeared to extend only to 1.5 Megahertz (MHz) (1,500 KHz); the upper limit of effective utilization was extended to 25 MHz by 1927, to 300 MHz by 1938, and to 40 GHz during World War II.[4] Thus, the capacity of the radio spectrum has expanded substantially over time as advances in technology have opened higher frequencies to exploitation. Another, and equally important, expansion in capacity has occurred as a result of more intensive use of radio frequencies. By limiting more narrowly the geographical area covered by a given radio signal, by improving the capacity of receiving devices to distinguish desired signals from those on adjacent frequencies, and by other advances in the art (particularly as regards modulation), it has been possible to transmit a larger number of usable signals within a limited band of radio frequencies.

Nothwithstanding these increases in the capacity of the radio spectrum, at any given time there are likely to be more persons desiring to use the spectrum, or particular portions of it, than the spectrum (or those particular portions) can accommodate. In the absence of some mechanism for limiting access, multiple users would create levels of electronic interference that would substantially reduce the utility of all radio wave propagation in the frequencies affected. And since radio waves do not respect national

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by modulation techniques; by weather; by temporal, seasonal and solar variations; and by receiver sensitivity.

3. For further discussion of the physical properties of the spectrum, see JOINT TECHNICAL ADVISORY COMMITTEE, RADIO SPECTRUM UTILIZATION (1964); JOINT TECHNICAL ADVISORY COMMITTEE, RADIO SPECTRUM CONSERVATION (1952).

4. However, the upper ranges of the spectrum are not extensively utilized. Even today, most activities employ frequencies of less than 15 GHz.

borders, and some of them travel long distances, there is an obvious need for international coordination so that the radio signals emanating from different countries will not produce intolerable levels of electronic interference.

What are the means by which access to the radio spectrum is controlled? The basic institutional framework for radio spectrum utilization was shaped in 1927. The international Washington Radio Conference undertook to allocate among the various classes of radio service all of the radio spectrum then in use, and establish a procedure for recording frequency uses by individual stations in different countries with the International Telecommunication Union (ITU).[5] Contemporaneously, Congress enacted the Radio Act of 1927 establishing a Federal Radio Commission to regulate radio transmissions by most classes of stations within the United States;[6] radio transmissions of agencies of the United States government continued to be regulated by the President and subordinates in the executive department. In 1934, the Radio Act's provisions were incorporated into a more comprehensive Communications Act and the Federal Communications Commission (FCC) succeeded to the functions of the Federal Radio Commission.[7] The President's responsibilities over federal government stations were subsequently delegated to the Director of Telecommunications Management (DTM), who is assisted by the Interdepartment Radio Advisory Committee (IRAC).[8]

The outer limits on use of the radio spectrum are fixed by international agreements to which the United States is a party. Under the Radio Regulations of the ITU,[9] frequencies from 10 KHz to 40 GHz are allocated to radio services of different kinds. However, the services are stated in very broad terms, and frequently multiple uses are permitted. Moreover, the Radio Regulations are limited in two important respects: they do not apply to services which do not cause harmful interference to the stations of another country;[10] and they have only a limited application to the radio installations of military forces.[11] On the other hand, the broader outlines of the Radio Regulations are supplemented by regional and bilateral treaties,

5. In 1947, the recording procedure was considerably expanded, for administration by a new body, the International Frequency Registration Board of the ITU. *See generally* G. CODDING, THE INTERNATIONAL TELECOMMUNICATION UNION (1952).

6. 44 Stat. 1162 (1927), *repealed*, 48 Stat. 1102 (1934).

7. 48 Stat. 1064 (1934), 47 U.S.C. § 151 (1962).

8. 47 U.S.C. § 305 (1962); Exec. Order No. 10,995, 27 Fed. Reg. 1519 (1962), *as amended*, Exec. Order No. 11,084, 28 Fed. Reg. 1531 (1963).

9. T.I.A.S. 4892 & 4893 (1961), 5603 (1964).

10. T.I.A.S. 4892 & 4893 (1961); *cf.* T.I.A.S. 5603 (1964).

11. T.I.A.S. 4892 (1961).

and compliance with those to which the United States is a party is a prerequisite to radio frequency usage in this country.[12]

Within the limits fixed by these international arrangements, access to the radio spectrum is controlled by the DTM in the case of federal government stations, and by the FCC in all other instances. The division of the spectrum between the federal government and other uses is determined jointly by the DTM and the FCC: some frequencies are reserved for government use; others are reserved for nongovernment use; and some frequencies are shared between the two types of service. Any conflicts between the two classes of use, and claims for adjustment of the boundary lines, are resolved by negotiations between the two agencies.[13]

With respect to frequencies reserved for federal government use, the DTM authorizes operations by particular agencies and installations and establishes standards for such operations. Applications for new operating authority are processed initially by the Interdepartment Radio Advisory Committee, consisting of representatives of the government agencies making major use of the spectrum (and an FCC official serving in a liaison capacity); prospective interference problems are attempted to be resolved by negotiations among the affected agencies. However, the DTM has the authority to grant or withhold authorizations, and to establish the conditions under which these authorizations must be exercised. The processes by which the DTM and IRAC consider applications for government frequency use are not open to public inspection; only the interested government agencies are privy to those proceedings.[14]

With respect to frequency users other than the federal government, the FCC controls access to the spectrum. It exercises this control in three stages.

First, within the limits prescribed by international treaties and its arrangements with DTM, the FCC allocates the spectrum among different broad classes of use—television broadcasting, fixed common carrier communications, maritime navigation, police mobile radio, etc.[15] Any pro-

12. *See, e.g.*, the North American Regional Broadcasting Agreement, T.I.A.S. 4460 (1950).

13. *See, e.g.*, Bendix Aviation Corp. v. FCC, 272 F.2d 533 (D.C. Cir. 1959), *cert. denied*, 361 U.S. 965 (1960).

14. On the procedures employed by the DTM, see MAC QUIVEY, FREQUENCY ASSIGNMENT ADMINISTRATIVE CONTROL (1956); Coase, *The Interdepartment Radio Advisory Committee*, 5 J. LAW & ECON. 17 (1962); Metzger & Burrus, *Radio Frequency Allocation in the Public Interest: Federal Government and Civilian Use*, 4 DUQUESNE U.L. REV. 1 (1965); Rosenblum, *Low Visibility Decision-Making by Administrative Agencies: The Problem of Radio Spectrum Allocation*, 18 ADMIN. L. REV. 19 (1965). *See also* Schiller, *The Increasing Military Influence in the Governmental Sector of Communications in the United States*, 19 ADMIN. L. REV. 303 (1967).

15. 47 C.F.R. § 2.106 (1968).

spective user of the spectrum must select a frequency which conforms to this allocation. However, several diverse uses are permitted in the case of some frequency bands, and in exceptional cases the Commission may authorize ad hoc departures from the general allocation pattern.

Second, the Commission by general rule establishes standards for operation of different classes of service, specifying allowable power, antenna height, equipment and the like.[16] In the case of some services, the FCC also establishes a geographical distribution of stations by general rule. Thus, a Table of Assignments governs the distribution of television and FM outlets, specifying the channels available in each of a large number of communities.[17] Once again, the Commission must proceed within the boundaries marked by international treaties and its arrangements with DTM.

Finally, the Commission authorizes particular persons to use the spectrum in individual licensing proceedings. For most classes of users, little more is required than compliance with the general standards established in the first two stages. However, the license which is granted in such a case is not an exclusive one and the licensee may find that it is sharing a frequency with a great many other licensees and experiencing difficulties in obtaining access to the congested airwaves. This is true, for example, of the land mobile services, where licensees operate on a party line basis and must wait for an opening in the traffic of other licensees in order to transmit their messages.[18] In the case of other services, such as common carrier communications and broadcasting, the Commission's authorization carries with it the *exclusive* right to use the frequency in the designated area. But this creates a problem if the number of applicants in an area exceeds the number of available frequencies. The Commission must then hold a comparative proceeding in order to select the applicant best qualified.[19] Licenses are issued for limited periods—three or five years depending on the nature of the license—but they are renewable over an indefinite number of limited license terms.

Authorizations which create a potentiality of interference with stations of other nations are registered with the International Frequency Registration Board. Registration is conditioned on conformity with international requirements, including the avoidance of harmful interference with other

16. *E.g.*, 47 C.F.R. §§ 73.39-.50, .188 (1968).

17. 47 C.F.R. §§ 73.202, .205-.207 (FM), 73.606 (television) (1968).

18. Industry coordinating committees seek to facilitate improved usage of the channels available for land mobile services.

19. On the need for a comparative proceeding, see Ashbacker Radio Corp. v. FCC, 326 U.S. 327 (1945); Johnston Broadcasting Co. v. FCC, 175 F.2d 351 (D.C. Cir. 1949). On the standards employed, see W. Jones, Cases and Materials on Regulated Industries 1080-90, 1121-25 (1967).

stations having a prior claim on use of the frequency. There is a procedure for adjudicating disputes among diverse claimants to the same frequency rights, and in such controversies weight is given to priority in registration and use of the frequency, continuity of frequency usage, and, to some extent, the importance of the use.[20]

The proceedings of the FCC are open to the public. Determinations relating to allocation of spectrum among different uses, technical standards, and most geographical assignments, are made in rule-making proceedings. A proposed rule is publicly promulgated, interested parties are permitted to comment, and a decision is reached on the basis of the comments submitted and the recommendations of the Commission's staff. Individual licenses issued in accordance with the rules normally involve no more than routine administrative processing. But if an issue of fact is presented, or if a comparative proceeding must be held, then an adjudicatory proceeding is required. This involves notice of issues, opportunity for affected parties to participate, presentation of evidence on a formal record with the right of confrontation and cross examination, and an agency decision based upon that record.[21]

In making its decisions, the FCC is guided by the most general statutory directions. Thus, the general standard applicable to issuance of licenses is "whether the public interest, convenience and necessity will be served."[22] On the geographical distribution of authorizations, the FCC is instructed "to provide a fair, efficient, and equitable distribution of radio service to each of the several States and communities."[23] And the Commission is directed to "generally encourage the larger and more effective use of radio in the public interest."[24] While the legislation contains many detailed provisions concerned with specific problems, these are almost the only standards which bear on the allocation of the spectrum among different classes of use.

20. For further discussion of international frequency control, see G. Codding, *supra* note 5. *See also* Glazer, *The Law-Making Treaties of the International Telecommunications Union Through Time and Space*, 60 Mich. L. Rev. 269 (1962); *Miles, International Radiofrequency Management*, 31 Telecommunication J. 170 (1954); Nicotera, *The Structure of the ITU*, Telecommunication J. 160 (1964); Plosz, *The International Telecommunications Union*, 31 Sask. Bar Rev. 41 (1966); Note, *The Master Radio Frequency Record*, Telecommunication J. 216 (1955).

21. For a more detailed discussion of FCC procedures see W. Jones, Licensing of Major Broadcast Facilities by the Federal Communications Commission (1962), reprinted in *Hearings on Federal Communication Commission, Part I, Before Subcomm. No. 6 of House Select Comm. on Small Business*, 89th Cong., 2d Sess. (1966); Metzger & Burrus, *supra* note 14.

22. 47 U.S.C. § 309 (1962).

23. 47 U.S.C. § 307(b) (1962).

24. 47 U.S.C. § 303(g) (1962)

The DTM operates without statutory standards of any kind. And the executive order delegating authority to the DTM is as vague and general as the Communications Act.[25]

In making decisions on radio spectrum allocation, the FCC and DTM are not concerned exclusively, or even primarily, with technical considerations. To be sure, the end result is a determination assigning a service to a particular portion of the spectrum, with prescriptions as to bandwidth, antenna height, operating power, and the like. But among the policy considerations underlying the decision are such factors as the scope of the economically feasible service area; the expense of the equipment and how such costs should be divided among transmitting and receiving units; the importance of the service to the economy or to the functioning of society (*e.g.*, public safety); and the availability of alternative means of providing the same service. These factors must be weighed in conjunction with the technical characteristics of the proposed spectrum use.

In recent years, the problem of radio spectrum congestion has become increasingly acute.[26] While advances in technology have greatly expanded the capacity of the spectrum, demand for spectrum space has increased at an even faster rate. Among the major problem areas are the following.

(1) Land mobile services. Business firms have been making increasing use of mobile radio facilities to communicate with trains, taxis, repair services, delivery trucks, automated machinery, and other mobile facilities. State and local governments also have been making more use of mobile radio in the conduct of police, fire and other emergency and governmental functions. The frequencies allocated to the land mobile services are being sorely taxed in the major urban areas, as more and more licensees are added to the limited channels assigned to these services. The consequent congestion in their party lines leads to delays in gaining access to the airwaves and diminishes the usefulness of the radio facilities involved. Land mobile users have been pressing for the allocation of additional frequencies to their service, with particular attention to the possibility of obtaining frequencies from the relatively lavish authorizations of television broadcasting and the federal government.[27]

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25. See note 8 *supra*.

26. *See generally* TELECOMMUNICATIONS SCIENCE PANEL OF THE COMMERCE TECHNICAL ADVISORY BOARD, ELECTROMAGNETIC SPECTRUM UTILIZATION—THE SILENT CRISIS (1966); OFFICE OF TELECOMMUNICATIONS MANAGEMENT, A REPORT OF FREQUENCY MANAGEMENT WITHIN THE EXECUTIVE BRANCH OF THE GOVERNMENT (1966).

27. On the land mobile problem, see FCC, REPORT OF THE ADVISORY COMMITTEE FOR THE LAND MOBILE RADIO SERVICES (1967); Courtney, *The Double Standard*, 20 FED. COM. B.J. 152 (1966); Courtney & Blooston, *Development of Mobile Radio Com-*

(2) Communications common carriers. Following World War II, the long-distance cables employed by the Bell system were supplemented by microwave relays, narrow beams of radio waves between fixed points; microwave is now the dominant mode of intercity communcation. Microwave also has been employed extensively by many private businesses. With the advent of satellite communications, which also depend on microwave transmissions, a problem of accommodation has arisen between the terrestrial and satellite services. At the present time, the Communications Satellite Corporation (Comsat) is providing international telecommunication service on bands in the 4 and 6 GHz range which it shares with the terrestrial microwave relays of the common carriers, principally the Bell system. Proposals have been made using satellite communications for domestic as well as international traffic. The terrestrial carriers fear that their microwave transmissions will be impaired by interference resulting from extensive domestic use of satellite communications, and Comsat is concerned that the development of satellite communications may be retarded by limitations on its access to the spectrum.[28]

(3) Television. The spectrum allocated to television broadcasting is quite extensive as compared with most other services. However, because of the size of the individual television channel (6 MHz) and the problems of co-channel and adjacent channel interference among stations in different communities (requiring separations of up to 220 miles in some instances), the number of channels available in any given community is severely limited. Thus, the FCC's most recent geographical distribution involved some

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munications—The "Work Horse" Radio Services, 22 LAW & CONTEMP. PROB. 626 (1957).

28. On the potential and problems of domestic satellites, see HUGHES AIRCRAFT CO., THE POSSIBLE FUTURE OF SATELLITE COMMUNICATION (DTM Report 1967); SYSTEM SCIENCES CORP., EVALUATION OF DOMESTIC USES OF SATELLITE SYSTEMS (DTM Report 1967); HULT, SATELLITES AND FUTURE COMMUNICATIONS INCLUDING BROADCAST (RAND paper P-3477, 1967); JOHNSON, THE IMPACT OF COMMUNICATIONS SATELLITES ON THE TELEVISION INDUSTRY (RAND paper P-3572, 1967); Dirlam & Kahn, *The Merits of Reserving Cost-Savings from Domestic Communications Satellites for Support of Educational Television,* 77 YALE L.J. (1968); Pierce, *"Communication" in Toward the Year 2000,* DAEDALUS, *Summer* 1967, at 909; Schiller, *Communications Satellites: A New Institutional Setting,* BULL. OF ATOMIC SCIENTISTS, April 1967, at 4; Schiller, *New or Last Chance in Space Communications,* ILL. BUS. REV., Dec. 1966, at 6; Silberman, *The Little Bird That Casts a Big Shadow,* FORTUNE, Feb. 1967, at 108; Note, *The Future of Domestic Satellite Communications,* 19 STAN. L. REV. 1058 (1967).

Problems pertaining to domestic communications satellites were among those raised by the President in establishing a Task Force on Communication Policy on August 14, 1967. *See* PRESIDENT'S RECOMMENDATIONS RELATIVE TO WORLD COMMUNICATIONS, H.R. Doc. No. 157, 90th Cong., 1st Sess. (1967). The message also inquired: "Are we making the best use of the electromagnetic frequency spectrum?" *Id.* at 8.

1,756 television channel assignments in the contiguous United States; but only 40 of the top 100 markets have six or more commercial television assignments; 31 have five assignments; and most of the remaining markets in the top 100 have only four commercial assignments. Markets of smaller size have fewer channels on the average.[29] While not all of these channels have been occupied by stations, there is concern that a medium of expression as important as television should be so restricted by spectrum considerations as to severely limit the number of outlets in a large number of communities.[30]

(4) New uses of the spectrum. There are a number of technological developments which are expected to create additional demands upon the radio spectrum: automated equipment with requirements for remote control; expansions in computer operations and in the volume of data transmissions; radio devices to reduce the incidence of highway accidents; networks to exchange documents, data and other information among libraries, universities, and other research centers; and personal mobile telephones to permit individuals to engage in telephonic communications without regard to location. Some of these developments may be prevented or delayed if the necessary spectrum space is not available on economically practicable terms.[31]

At the same time, other technological developments suggest that it may be possible to employ communications techniques which *do not* involve

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29. *See Fifth Report on Fostering Expanded Use of UHF Television Channels*, 6 P. & F. Radio Reg. 2d 1643, 1667-68 (1966).

30. The major problems of broadcast regulation are reviewed in W. Jones, *supra* note 19, at 1050-64 (geographical distribution of stations), 1091-1105 (economic injury to existing broadcasters), 1105-35 (concentration of control of mass media), 1135-75 (network practices), 1175-1232 (station programming), 1233-73 (subscription and supplemental services, including CATV).

The impact of channel scarcity on programming practices is discussed in McGowan, *supra* note 1; Rothenberg, *Consumer Sovereignty and the Economics of Television Programming*, 4 University of Chicago Studies in Public Communication 45 (1962); Steiner, *Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting*, 66 *Q.J.* Econ. 194 (1952); Wiles, *Pilkington and the Theory of Value*, 73 Econ. J. 183 (1963). *See also* Coase, *The Economics of Broadcasting and Government Policy*, 56 Am. Econ. Rev. 440 (1966); G. Steiner, The People Look at Television (1963).

On the alternative of noncommercial television, see Carnegie Commission on Educational Television, Public Television: Program for Action (1967); W. Schramm, J. Lyle & I. Pool, The People Look at Educational Television (1963); Stanford Institute for Communication Research, Educational Television—The Next Ten Years (1962). *See also* Public Broadcasting Act of 1967, 76 Stat. 64 (1967), 47 U.S.C. § 396 (1968).

31. *See* Telecommunications Science Panel of the Commerce Technical Advisory Board, *supra* note 26.

atmospheric propagation of radio signals to replace methods currently making use of the spectrum. Thus, television signals might be carried by cable rather than radiated through the atmosphere; and data transmission might utilize waveguides or other enclosed conduits instead of atmospheric microwave transmissions.

This, then, is the background against which the Airlie House conference was held. The question was whether better ways might be developed to cope with growing problems of spectrum scarcity.

II. The Critique of the Academic Economists and the Proposal for a Market System

The basic problem of the present system, as identified by one group of critics, is the absence of transferable property rights in the spectrum. As one economist observed:

> Frequency spectrum is the only resource of any consequence for which:
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> 1) All use rights are defined by government and then given away;
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> 2) Recipients of rights are not permitted to sell all or any portion of their rights, hence, no rights holder has any incentive to economize on the use thereof or transfer his rights to someone who values them more highly;
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> 3) The total amount of the resource available is subdivided, with each piece alloted to specific services ,(e.g., land mobile) and no transfer permitted among services;
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> 4) Significant portions of the resource are allocated to specific services, but the number of individuals who can use the resource is unlimited i.e., within certain service categories spectrum is treated as a free good;
>
> 5) Because the government completely controls use rights, government agencies get first consideration in their distribution—again, at no cost;
>
> 6) Potential current users have no incentive to take into account future value, i.e., of withholding use today in favor of more valuable possible future use.[32]

A number of speakers commented on the relatively inflexible nature of spectrum allocations: the tendency of the FCC and the DTM to continue existing allocations in effect despite changing circumstances, and to protect existing users from interference by newcomers.

> . . . [I]t's a lot harder to get government agencies to reallocate spectrum and to adapt to rapidly changing conditions than it would be for

32. Meckling, *supra* note 1.

people with property interests to buy and sell them back and forth between one another.

In general, users of *existing* facilities are accorded assurance that new or proposed interfering facilities will not be permitted; little if any attention is directed to the possibilities of trade-offs between cost and interference protection.

[Y]our favored incumbent is the chap who is unaware of spectrum costs and opportunity costs. He is shielded from these unpleasant facts of life. He may well use more spectrum than he would in an organized frequency market. He may stockpile much longer than he would in a market.[33]

The consequences of this pattern for research and development were elaborated by a hypothetical example:

Present-day incentives for existing users of lower frequencies to engage in research and development in the frequencies above 15 [GHz] leave much to be desired: A user "C" may feel great pressure to engage in research and development in the higher frequencies because continued expansion of C's services in the lower frequencies would lead to interference with the services provided by D and E. Yet, perhaps only at a small cost (relative to that involved in C's using the higher frequencies) D and E might be able to protect themselves from this added interference. But today there is no easy way by which C can compensate D and E for these added costs, or for C even to determine what the magnitude of costs would be. On the other hand, B might not feel under pressure because his allocations in the lower region are "adequate" for his needs. Yet F and G may be badly squeezed in their allocations; while they could not themselves employ the higher frequencies due to the very nature of their operations, they might find extremely valuable the spectrum allocation that B is now occupying if somehow B could be induced to move into the higher frequencies and vacate his existing allocation.[34]

As another speaker observed:

. . . [T]here [is] a lot of discussion of the extensive and intensive development of the spectrum and R & D expenditures, . . . with the general presumption that those expenditures are desirable, as there is a tendency to think that any increased use of the spectrum—in the extensive sense for example—is obviously desirable. And, of course, this is not true. . . . The question is whether the cost of the R & D is recaptured in the gain in terms of the value of the spectrum. And no one knows that . . . until we find out what the value of the spectrum really is.[35]

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33. Johnson, *supra* note 1.

34. *Id.*

35. Levin, *supra* note 1.

The distortion of R & D expenditures was emphasized by comparing the motivations of spectrum users having ample allocations and those with inadequate assignments. "[S]ome innovations will fail to occur (in services with unusually lush assignments); whereas other congested areas may experience innovations which would never have occurred in a free market."[36] Also, there may be a need for public investment in telecommunications research because of "uncertainties, time period before return, [and] indiscriminate benefits."

Apart from the tendency of the regulatory agencies to perpetuate existing allocations, their decisions on spectrum matters were criticized for failing to articulate any meaningful criteria for spectrum allocation. A participant stated:

> . . . one of the most frustrating things about trying to function . . . in this area is what seems to me to be the total absence of any standard. And with all respect I really find the "public convenience and necessity" more a charade—somewhere between a charade and criminal fraud—more than I do a useful standard. I mean it is absolutely devoid of meaning so far as I am concerned.[37]

As a means for remedying these deficiencies, it was urged that the present system of administrative allocation be replaced by a market system for frequencies: "the one big difference between it and what we have now is simply that individual frequency rights would be transferable in whole or in part and, in terms of three dimensions of band-width, geographic locations, and time."[38] Under this proposal, it was envisaged that all holders of existing authorizations would become owners of the spectrum rights represented by those authorizations, without payment to the government, and would be free to transfer them for a consideration to any other user. "In those portions of the spectrum which are overused (congested) some users would buy out others, reducing the level of interference." Moreover, "making rights transferable would provide incentives to owners of those rights to use them economically." And it would introduce needed flexibility into the system by providing a means of taking "rights away from existing users and [giving] them to new users if it turns out that the value of the spectrum to the new user exceeds the value to the present user." Finally, research and development would be stimulated in areas where present incentives are low. "[T]he present holders of broadcast bands, for example, are not interested in suggestions that they could send their signal on a much smaller chunk of frequency unless they are allowed to somehow capture some of

36. *Id.*

37. Meckling, *supra* note 1.

the gain from that."[39] Under a market system, the broadcasters could sell off part of their rights if they so decided.

There was some discussion of the extent to which property rights in the spectrum are recognized under the present system of administrative allocation. The Communications Act states that its purpose is "to maintain the control of the United States over all the channels of . . . radio transmission; and to provide for the use of such channels, but not the ownership thereof by persons for limited periods of time, under licenses granted by Federal authority;"[40] and every licensee is required to sign "a waiver of any claim to the use of any particular frequency or of the ether as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise."[41] But the FCC rarely displaces existing licensees, so there is considerable security of tenure in fact, if not in law. And at least one kind of licensee—the broadcaster—can sell his operating authority along with his station facilities as long as FCC approval is obtained.[42] There is therefore a recognizable market in broadcast authorizations—in fact, once again, if not in law. However, it was recognized that neither of these phenomena provided the kind of flexibility and incentive implicit in a market system, which would have as its central feature the *transferability* of spectrum authorizations among *different* uses.

The basic theme of the proponents of a market system was that the radio spectrum is a scarce resource not materially different, in its economic aspects, from other scarce resources:

> The wellspring of . . . confusion has been the belief that interference is a technical problem peculiar to the use of frequency spectrum. In fact, interference is simply a manifestation of scarcity. It is not possible for all those who would like to use the spectrum to do so without affecting the amount of the resource available to others. The analogy to other resources, land, labor and capital, is so obvious as not to require elaboration.
>
> Any effort to improve frequency management must be built on a recognition that frequency spectrum is an economic resource in no significant way different from the mass of other resources available to society. . . .[43]

Much of the remaining discussion was concerned with the soundness of this premise.

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38. *Id.*
39. *Id.*
40. 47 U.S.C. § 301 (1962).
41. 47 U.S.C. § 304 (1962).
42. 47 U.S.C. § 310(b) (1962).
43. Meckling, *supra* note 1. For an earlier exposition in the same vein, see Coase,

III. Problems Raised by the Proposal for a Market System

A. *Definition of Proprietary Interests*

A market system for spectrum rights requires that there be rights which can be sold and exchanged, *i.e.*, that property interests in the spectrum can be defined with sufficient clarity to make them marketable. Proponents of the market system idea did not undertake to explain how spectrum rights would be defined.[44] For the most part, they assumed that the courts would be capable of developing the necessary standards once a decision had been made to adopt a market system, in much the same way that courts had defined various interests in land. Indeed, some of them suggested that such a system would have developed out of the unregulated electronic interference of the twenties—through the recognition of "squatters' rights" in the spectrum—if Congress had not intervened with the Federal Radio Act and the system of administrative authorization.

Others were more skeptical. They recalled the great confusion which resulted when federal regulation broke down in the twenties. One official opined that, without federal regulation, "you would simply have had squatters on top of squatters, to the end that you got ultimate chaos."[45] There was considerable doubt that the courts would move with sufficient speed and clarity in developing a body of law to deal with newly created rights in the radio spectrum. Some of the problems may be briefly summarized.

(1) Under the existing system of administrative authorization, radiation rights are defined largely in terms of inputs: the use of particular equipment at a particular location, with prescribed limits on power, antenna height, and the like. Simply confirming these rights in the present licensees would not create a market system with transferability among different uses, since the prescribed limitations on inputs would limit each right to a particular use (*i.e.*, the one for which it had been initially licensed). It would be necessary, as a minimum, to redefine radiation rights as outputs: the ability to radiate signals of defined strength over particular areas at par-

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The Federal Communications Commission, 2 J. Law & Econ. 1 (1959). *See also* Note, *The Crisis in Electromagnetic Frequency Spectrum Allocation: Abatement Through Market Distribution*, 53 Iowa L. Rev. 437 (1967).

44. See, however, the related proposal to modify the method by which radiation rights are defined under regulation, note 64 *infra*.

45. On the background and legislative history of the Radio Act of 1927, see W. Jones, *supra* note 19, at 1022-28.

ticular times. There was no discussion by the proponents of a market system of the ease or difficulty of this kind of redefinition of rights.

(2) The technology of radio spectrum utilization is not static, and some cited the danger that a mode of definition rooted in contemporary technical concepts would prove to be a hindrance as technology developed. If, however, radiation rights are defined in terms of inputs—equipment, power, antenna height, and the like—it is difficult to see how a market system could be developed which would permit transferability of rights among different uses, since it would be most unusual for different types of use to involve the same inputs.

(3) One mode of specifying property rights in the spectrum would be to define them in negative terms, as the right to exclude signals of a certain strength and designated frequency from a particular area, or to exclude any signals which would interfere with a protected existing use of the spectrum. This definitional approach was implicit in a number of comments relating to the uncertainties involved in buying and selling spectrum rights.

> . . . The problem here is that many of the people who want to buy spectrum . . . are going to want to use it for a [purpose different from its present use]. Let me give you two examples.
>
> A satellite operator wants to operate a satellite on a shared frequency, and he knows ahead of time that he is going to interfere with the local landline microwave. So he says, "Okay, I'll buy you out." And he does. He operates a satellite, and, in fact, ex-post, there is some interference in other parts of the system. And it was very hard for him to predict what that level of interference was going to be. It isn't like the guy who buys a house on a piece of land where he sort of knows what he is getting and there aren't strong external effects which cannot be easily predicted.
>
> Another example. A bunch of mobile operators finally get up enough of a coalition so they buy out a local broadcasting station's right to radiate, and they use the frequency for their mobile operation. But now you have this number of mobile operations running around the countryside, and the kind of interference likely to be generated by that may be different from the kind of interference generated from the central TV station from the fixed point, and kinds of interference which are simply hard to predict.
>
> Now, this simply raises the level of uncertainty, and businessmen are used to coping with uncertainty. But to the extent that there is a high level of uncertainty this reduces the values of a market mechanism. . . .

The problem of uncertainty was raised in connection with an interference phenomenon known as intermodulation—the interference created

by the interaction of several signals, which individually do not create interference.

> I am given a right to [transmit from] a mountaintop. . . . I move up. . . . And B moves up after me with his right. And he doesn't do anything to me. Now, C comes up with his right, and he doesn't do anything to me either. But when he enters the mountaintop, B now starts doing something to me.
>
> [W]ho shall pay for the filter that has to go into B? B is now causing interference to me through no fault of his own because C comes on the scene.
>
> When I am given a right, to what extent can I be given something that I can in fact know about with a degree of certainty so that I am not surprised, if I am going to buy this right and make a judgment about its value to me?

Such interference is difficult to predict.

The proponents of a market system in spectrum rights did not attempt to respond to these problems with specific definitions of the rights proposed. They simply expressed confidence that the courts would develop a body of law to deal with property interests in the spectrum if such interests were permitted. However, others doubted that the courts would respond in a way that would produce an efficient system of spectrum rights.

> If the rights are not clearly defined, then the courts have to come in and mediate and decide. . . . And the courts do not always decide things in ways which lead to economic efficiency. Now, if we begin with the premise that efficiency is good, . . . then we would be much better off to define very clearly what these rights are. . . . [S]o that they lead to efficiency, we must be sure that the definition . . . facilitates the least cost transferability, the least cost enforcement of rights and policing of rights, and identification of who is interfering with those rights.

One participant suggested that federal legislation might be revised so that the FCC's primary function was stating what it is that is being sold, *i.e.*, defining the pertinent transferable units of spectrum space.

B. *Interference Problems of Disparate Uses: The Zoning Analogy*

Closely related to some of these definitional problems is the challenge presented by the zoning analogy: perhaps efficient use of the radio spectrum depends upon minimizing the variety of spectrum uses in a given spectral region. In the discussion, the problem was expressed in different ways. At one point, a government official observed:

> In the area of frequency utilization there are some very real technological problems, I think, in having mobile radio frequencies that use a very limited amount of frequency space in a very limited geographical area competing in the same frequency range where a television station is broadcasting a signal.

Subsequently, an economist conceded that there were "zoning problems" involved in spectrum transactions. To this, another government official responded:

> There is nothing in the area of zoning and the odors that may emanate from a mis-zoned plant that as far as I know is equal to the problems of intermodulation that you are going to get with people operating on adjacent portions of the spectrum.

A question was raised as to whether the land zoning problem was "like that of a land mobile user down in the middle of the television bandwidth," and, more specifically, "what would happen if a land mobile user bought out Channel 5 in Washington?" The response, from an engineer, was that the land mobile user probably would be restricted in its operations because of interference with stations operating on Channel 5 in other cities. "The point is the land mobile cannot just operate anywhere within a TV band just because he owns Channel 5 in Washington. He has got problems of either causing extreme interference" to TV stations on Channel 5 in other cities or of "being interfered with" by such stations. This led a lawyer to express the view that

> if you want more space for land mobile, what you are going to have to do is move land mobile as a group rather than having individual land mobile operators bid for spaces here, there, and everywhere they can get hold of them. That is, the nature of the service is such that there are efficiencies in having all the land mobile people operating near one another rather than at different spots.

An engineer agreed that "by keeping the users of a particular type together you eliminate these problems of cross-operations," and that "when you get interference between different types of users, you have a more difficult case to solve than when you have interference between similar users."

The zoning problem was not fully explored in the discussion. But its implications are significant. If it is important that similar users be kept in the same area of the spectrum, it is difficult to see how a conventional market system can provide for free transferability of spectrum from one use to another.

C. *Special Problems of Television*

Since television frequencies occupy a substantial portion of a desirable segment of the radio spectrum (about 50% of the frequencies below 1 GHz), there was considerable discussion of the impact a market system might have on television. In this connection, it was noted that the television service is characterized by two dichotomies: (1) transmitting and receiving equipment are owned by different persons, the latter being in the hands of the general public; and (2) the financial support for television programs is not furnished directly by viewers, but comes instead from advertisers.

The first point is important in relation to the idea that television broadcasters are using unnecessarily large bandwidths to transmit their programs (6MHz). With the incentives of a market system, broadcasters might economize on bandwidth (reducing channels, for example, to 3 MHz) and sell the excess to others for different spectrum uses. The question, however, is how you can do this without rendering obsolete the billions of dollars worth of receiving equipment in the hands of the public. Some suggestions were forthcoming, but they all involved regulatory action rather than the operation of market forces, *i.e.*, the announcement of mandatory conversion to transmission techniques involving narrower bandwidths at some future date, possibly coupled with the requirement that new sets be capable of receiving both the present wide bandwidth signals and the narrower bandwith signals projected for the future. There was no suggestion as to how a market system might resolve the problem of obsolescense of television receivers.

The second point is important in the context of a market system in which television would have to bid against other prospective users for access to the spectrum. Would the interests of viewers be adequately represented by the bids of the broadcasters? One economist argued that there was no necessary relation:

> . . . [T]he value [of television time], to the advertisers is reflected in what he is willing to pay for the time, and the value to the broadcaster of having that time to sell to the advertiser is reflected in what he is willing to pay for the spectrum if it were put up for bid. But it is not true . . . that the value of the viewing opportunities thereby afforded the viewer is reflected in those prices. Very indirectly this may be true in the sense that what the viewer is going to pay for advertised products may depend on how much he likes the program, but I sure wouldn't want to push that argument very far.
>
> In this circumstance [it cannot be presumed that willingness to pay more for spectrum use reflects a higher social use. The presumption] falls to the ground when there are a group of people bigger than any

other whose interests cannot be, or at least are not under present arrangements, represented in the prices anybody is willing to pay.

In response to this argument, three points were made. First, it is possible that advertisers do adequately represent viewers, since program success results in product success and the latter increases the revenues of the advertiser. This possibility was discussed, but no one was prepared to urge it strongly. Second, it was noted that "no one has suggested that because TV is supported by advertising that we ought to give them antennae. . . . That is to say, we *do* require that the TV stations buy the resources which they use even if they are supported by advertised TV." Finally, it was urged that a market mechanism would facilitate the growth of subscription television if the interests of viewers proved to be inadequately represented by advertisers.

The original spokesman observed that pay television was not necessarily the best solution because "it takes some resource use to internalize the benefits to reflect them in the prices viewers pay. And there is no presumption, although it may well be true, that that resource cost is worth incurring." In short, the allocational and other advantages of pay television may be offset by the costs incurred in establishing a system for tabulating the programs watched, computing the amounts payable, and effecting collections of those amounts.[46]

D. *Special Problems of Public Services*

A similar point was made with respect to frequencies employed by government agencies for police protection and the like: that such frequencies were not used in producing goods or services to be sold for a profit, and that the government's bids for such services might not reflect their value in augmenting police protection for the public. The opposition to this line of reasoning was summed up in the query: "Is this factor input any dif-

46. On subscription television, see Blank, *The Quest for Quality and Diversity in Television Programming*, 56 AM. ECON. REV. 448 (1965); Minasian, *Television Pricing and the Theory of Public Goods*, 7 J. LAW & ECON. 71 (1964); Suelflow, *Subscription Television*, PUB. UTIL. FORT., June 22, 1967, at 25, & July 6, 1967, at 23; Comment, *Aspects of Pay Television: Regulation, Constitutional Law, Antitrust*, 53 CALIF. L. REV. 1378 (1965). A Committee of the FCC recently advanced a proposal for a national subscription television service. 10 P. & F. Radio Reg. 2d 1617 (1967). However, the House Committee on Interstate and Foreign Commerce has expressed the view that the FCC should not approve national television for a year or until the Act is amended to affirmatively authorize such a service. 7 Television Digest, Nov. 20, 1967, at 5.

On the economics of commercially supported television, see authorities cited note 30 *supra*. *See also* Lees & Yang, *The Redistribution Effect of Television Advertising*, 76 ECON. J. 328 (1966).

ferent than any other that the police or land mobile user has to use and bid for?" A government official responded:

> I would think there is a very great difference. I would think when the police department in the City of Los Angeles needs spectrum, they need it. And they need cars. They can go out and buy cars [and pay for them]. Because the public never owned the cars. But the public does own the spectrum.
>
> Now, the police feel . . . that it would be a great anomaly to say to the police in Los Angeles that they should bid in competition with businessmen to get back some part of what started out in the public domain. . . .

At least some of the economists were unpersuaded:

> . . . [W]hile the police themselves and public safety . . . are a public good, spectrum is in essence no different . . .than any other factor of input. And the fact that the public happened to own the spectrum and may choose . . . to buy it from themselves and give it to the police is a matter of conscious public decision and a perfectly appropriate one.
>
> It is not at all clear that giving away frequency . . . is the sensible way to subsidize police. [It may be desirable] to give the police money instead of frequencies, since it is quite possible that there is a misallocation of resources as a consequence of the fact we do this, because if they had the money they would buy other things than frequencies.

The discussion of governmental functions focused on police operations at the local level. At the national level, government payments for spectrum use would involve, in the first instance at least, payments back into the federal treasury. While the payment here would be a transfer from one pocket to another, the process would not be pointless since presumably there would be budgetary review of spectrum expenditures as well as other expenditures. In the case of state and local governments, there would be a transfer of funds to the national government in the event of a lease or purchase of spectrum rights from a federal authority.

With respect to public service uses of the spectrum, some participants thought that the place to intervene was in the bidding process rather than through allocation of the spectrum to particular uses: "if educational TV is so important and we want to be sure we have some spectrum use for it, . . . the educational TV entity [should] bid enough to make sure that it has that spectrum."

E. *Monopoly and Concentration of Ownership*

One of the objections to a market system in spectrum rights is that monopoly in the broadcasting and communications industries might be

increased thereby. "Fear that a single firm might buy up all of the frequency spectrum is the extreme expression of this question." To this, it was said that "there is no reason to believe that a market for frequencies would be [particularly] susceptible to monopoly. . . . [W]e have anti-trust laws specifically designed to handle the problem of monopoly, and there is no reason why frequency monopoly problems can't be handled under those laws just as is the case for other resources."[47]

The problem was not discussed at any length at the conference, but the following dialogue, between a lawyer and a government official on the related problem of disposing of user rights by competitive bidding, sheds some light on the issue:

> Official: One consequence of that . . . would be just as one consequence of sale of television franchises through auction rather than through the admittedly imperfect comparative process—that the biggest, richest people would end up owning the spectrum.
>
> And unless you now put on some other constraints—and it has to be short of anti-trust, because you would have a fellow owning an awful lot of television stations but you could not prove he had such a segment of the market that he violates the anti-trust law.
>
> Lawyer: I don't object to your multiple ownership rule [restricting the number of stations a television broadcaster may control].
>
> Official: . . . [I]f you are going to say to the existing land mobile users, "Well, if you want to continue here we are going to make you bid to rent it, and not all of you can win even if you are willing to spend some money, because only those people who spend the most money will win," I think you will find that the biggest ready mixed concrete companies, the biggest trucking companies, the biggest delivery companies, the biggest manufacturing concerns would end up with the spectrum. . . .
>
> Lawyer: . . . I have the feeling that you are confusing ability to pay with willingness to pay. And the willingness to pay for something depends upon the profitability of its use to you. . . .
>
> Official: . . . I would expect that [the big company] may be in a position to realize greater efficiencies from this added use of the spectrum than the little fellow. . . .
>
> Lawyer: I should say it should go to the fellow who could get the more efficient use of the spectrum.[48]

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47. Meckling, *supra* note 1.

48. The Commission's multiple ownership rules are set forth at 47 C.F.R. §§ 73.35 (AM), 73.240 (FM), 73.636 (television) (1968). The antitrust laws also apply to the acquisition of broadcast facilities. 47 U.S.C. § 313 (1962); United States v. RCA, 358 U.S. 334 (1959); Comment, *Corporate Acquisition of Broadcast Facilities: The "Public Interest" and the Antitrust Laws*, 8 B.C. IND. & COM. L. REV. 903 (1967). Finally, the FCC has made some rather feeble efforts to limit concentration of control of mass media in comparative proceedings—preferring applicants not affiliated with

F. *Private Stockpiling of Frequencies*

A somewhat related issue is manifested by the concern that private parties would acquire frequency rights for stockpiling rather than current use.

> The radio spectrum is not consumed through use. . . . When a frequency band ceases to be used, it is just as available and it is just as fresh as it ever was. . . . I think this is a significant distinction, because it relates to this question of stockpiling. . . . Should frequency rights include the right to non-use, to non-reception?

This led to a proposal that spectrum rights should have a time dimension and be shared among users with low traffic volume "to prevent the rights from being stockpiled." For this, an effective switching and accounting system would be required. Alternatively, it was proposed that the rights could be sold or leased with a specification of the time within which they must be used.

On the other hand, an economist stated that the value of a spectrum right is

> the present value of the future services that will be rendered by that right, not just this year's services, but all of the potential useful services of that right in the future.
>
> Now, if it turns out that it pays to withhold a piece of frequency spectrum now . . . someone will . . . keep that piece of spectrum vacant for future uses. There is a rationale for not using . . . all of the frequency spectrum. . . [I]nvestments that will be made in equipment [in exploiting particular] frequencies will later become a sunk cost. Then, once [that investment has been made,] the question of the alternative uses will change.

These were the only comments directed to the economics of private stockpiling, although public stockpiling of frequencies was discussed in another context.[49]

G. *The Public Interest in Communications*

There was some suggestion that the public interest in the spectrum might be related to its distinctive usefulness for communications purposes.

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other mass media over those who are so affiliated. *See* W. JONES, *supra* note 19, at 1118-25.

See also H. LEVIN, BROADCAST REGULATION AND JOINT OWNERSHIP OF MEDIA (1960); UNITED RESEARCH, INC., THE IMPLICATIONS OF LIMITING MULTIPLE OWNERSHIP OF TELEVISION STATIONS (1966); Toohey, *Newspaper Ownership of Broadcast Facilities*, 20 FED. COM. B.J. 44 (1966). The FCC recently has terminated a proceeding that would have imposed additional restrictions on ownership of multiple television stations in the major markets. Television Multiple Ownership Rules, 12 P.&F. RADIO REG. 2d 1501 (1968).

49. See *infra Part IV*, Section A.

> . . . [T]he spectrum may not be a unique resource, but communications are a unique product for society. . . . Communications make us. . . . [I]f we can think of a different society, or people being in some sense better, or society as being somewhat better, the avenue of communication will be used in a sense that the avenue of transportation or food or clothing or other goods might not be. Communications we sense have a very great leverage for society, and in this sense it is a good that is unique, even though the spectrum might not be.

Other participants recalled the long-standing public concern with the use of the spectrum for communications purposes.

In opposition, it was urged that the utility of the spectrum for communications purposes should point in the direction of less, rather than more, government intervention.

> There are many who argue that the government should retain control of frequency spectrum in order to control the quality of broadcasting. . . . I am very uneasy about the potential for censorship implied by using government control over frequencies as a lever for enforcing higher standards on broadcasters. . . . Would anyone seriously suggest that printing presses or newsprint should be controlled by the government in order to control the quality of newspapers?[50]

This issue was not developed fully, but perhaps governmental intervention in respect of broadcasting might not take the form of censorship. Without seeking to exclude any specific material from the airwaves, the government might endeavor to spread broadcast services geographically, so that all portions of the nation receive services from a number of stations; and to achieve diversity in broadcast offerings, the government might license some stations to educational and other noncommercial institutions.[51] Because of the scarcity of the resource, the effort to include some of these broadcast offerings may lead to the exclusion of others (in terms of reducing the volume of certain types of offerings at certain locations). But neither the motivation nor the effect would resemble censorship in the classical sense.[52]

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50. Meckling, *supra* note 1.

51. *See* Sixth Report and Order, 17 Fed. Reg. 3905 (1952).

52. A sizable literature has developed on the question of government control of program content. *E.g.*, COONS, FREEDOM AND RESPONSIBILITY IN BROADCASTING (1961); N. MINNOW, EQUAL TIME: THE PRIVATE BROADCASTER AND THE PUBLIC INTEREST (1964); E. SMEAD, FREEDOM OF SPEECH BY RADIO AND TELEVISION (1959); *The Attainment of Balanced Program Service in Television*, 52 VA. L. REV. 633 (1966); Kalven, *Broadcasting, Public Policy and the First Amendment*, 10 J. LAW & ECON. 15 (1967); Loevinger, *The Issues in Program Regulation*, 20 FED. COM. B.J. 3 (1966); Pierson, *The Need for Modification of Section 326*, 18 FED. COM. B.J. 15 (1963); Robinson, *The FCC and the First Amendment: Observations on 40 Years of Radio and*

There are at least two issues: (1) What forms of government intervention are appropriate in the case of television and other electronic mass media? (2) To what extent are the appropriate forms of government intervention dependent upon administrative allocation of the spectrum (in contrast to a market system)?

H. *International Constraints*

It was recognized by all participants, proponents of a market system as well as critics of the idea, that any new system of spectrum ownership would have to be consistent with international agreements. It was not clear from the discussion, however, just how significant this constraint might be. Thus, one participant noted:

> Rights are conferred to countries in terms of protection from harmful interference and on the basis of present and prior registration for quite specific transmitting and receiving uses, combinations, within the table of allocations. . . .
>
> Now at one time the international concept of the spectrum had its greatest significance below 30 Megahertz or near borders. But the fact of satellites makes the entire spectrum technologically international. The only protection for national uses derives from international agreement and regulations. . . .

Another participant observed that "there are real property rights that have been developed through the registration of frequencies [particularly in the high-frequency band] with the International Telecommunication Union, and these rest outside this country. So if you were going to change any property rights relating to high frequency use, you would run into problems there."

But there was dissent from the idea that the radio spectrum was wholly international:

> . . . [R]adiocommunication transmitted and received wholly within this country's territorial boundaries, and posing no interferences to any other nation's communications, occupies spectrum that for all practical purposes "belongs" to us under present international arrangements. But we are also free to use frequencies beyond our boundaries (or within them) when potential conflicts with foreign countries are in fact precluded (or resolved) through priorities recorded in the IFRB's Master Frequency Register in Geneva. Such international recognition of priority rights . . . can indeed be construed as having

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Television Regulation, 52 MINN. L. REV. 67 (1967); Note, *Regulation of Program Content by the FCC*, 77 HARV. L. REV. 701 (1964). The pertinent official pronouncements are collected in W. JONES, *supra note* 19, at 1175-1232.

established a kind of national property right system in spectrum even where national discretion is *not* unlimited initially because emissions are liable to cross national boundaries.[53]

However, after recognizing that there are these broad areas where national policy can be implemented free of international interference problems, the same commentator noted two other constraints of an international character: "(i) the economic and security advantages of internationally-standardized equipment; and (ii) the mutual advantages to all nations in using the same frequencies to do the same things domestically, not withstanding the technical interchangeability of spectrum among alternative uses."

> Many nations stand to benefit from almost any international standardization of communications equipment. The equipment producing nations may better enjoy greater economies of large-scale production. The non-producing buyer-nation benefits from the greater number of supplier options he can choose among and the greater likelihood of competitive pricing where hardware is standardized internationally. . . .
>
> Another factor which operates to limit national discretion in all frequency utilization is the so-called rule of "common use of common frequencies." This practice has emerged historically for administrative convenience in the accommodation of new services. . . .
>
> In the case of space communication, e.g., the question was whether to place it in a band then occupied by our radar (and by the Soviet Union's terrestrial microwave), or vice versa (their radar and our microwave). Both nations had placed these two *domestic* services in different bands during the wartime hiatus in the rule of common usage, between the ITU Conferences of 1938 and 1947. Furthermore, space communication could be kept compatible with domestic microwave at a small cost, but not easily with radar. Hence, depending on where space communication was lodged substantial displacement or conversion costs would have been placed on the U.S. or the USSR. . . .
>
> The rule of common usage would clearly have precluded any such eventuality and acted to distribute the displacement or conversion costs more equitably on the several parties involved, and without having to determine first whose incompatible usage had priority over whose. . . .[54]

It is important to distinguish between international constraints based upon the prospect of interference and those that are related to the considerations last mentioned. The former constraints leave ample room for transfers of spectrum rights, since most domestic uses of the radio spectrum do not produce interference beyond our borders. The latter considerations,

53. Levin, *The Radio Spectrum: Economic-Physical Character and Regulatory Framework*, to be printed in the Oct. 1968 issue of the JOURNAL OF LAW & ECONOMICS.

54. *Id.*

by contrast, are more pervasive in their impact. If accepted as controlling, they would preclude the major advantage of the proposed market system in spectrum rights—the unhampered transferability of spectrum from one use to another.[55]

I. *Political Opposition*

A principal proponent of the creation of a market in spectrum rights concluded that the "real barrier to progress is the problem of provoking political action," and that "it seems highly unlikely that the political support necessary for such a reform will be forthcoming in the near future."[56] A government official, skeptical of the virtues of a market system, observed:

> As far as I can tell, probably a majority of the people in this country who are unhappy with the absence of [a] market in the allocation of spectrum are in this room. I think the public is very happy thus far with the way spectrum has been allocated. They have a lot of free television, and they would like some more of it.
>
> [Land mobile interests are not] happy with the allocation, but [they have not] suggested that the way to help them was to create property rights and start auctioning them off. . . .
>
> If you are proposing that the market is to be made applicable, I submit to you first you are going to have to get a change in the law. And I also submit to you that you won't get the change in the law . . . [U]nless things really get desparate, you are never going to get Congressional action to make [a] market apply to this reallocation process.

The reality of political opposition to a market system appeared to be generally conceded. It was unclear, however, to what extent this opposition is simply a rational conclusion from the factors previously noted, and to what extent it is an irrational adherence to the status quo, aided and abetted by those with vested interests in present frequency arrangements.

IV. Other Proposals for Reform of the Frequency Management System

In addition to the proposal that a market system be instituted for distributing spectrum rights, other more modest suggestions were made concerning possible revisions in arrangements governing frequency allocations. Some of these are more radical than others.

A. *Market Simulation by Regulatory Agencies Through Use of Shadow Pricing*

One proposal proceeded on the assumption that there would be no change in the governmental structure for allocating frequencies, and in-

55. *See also* authorities cited note 20 *supra.*

56. Meckling, *Management of the Frequency Spectrum,* 1968 Wash. U.L.Q. 26.

quired whether the decisions of the regulatory agencies could be made to conform more closely to the kinds of allocations that would be made by a competitive market.

> Optimal allocation of spectral rights would theoretically be reached through trial and error when no further reallocation among competing claimants would increase the aggregate net value output from spectral inputs among others. If user A generates less output per dollar's worth of spectral input than alternative user B could derive were he granted the radiation rights, then it would pay A to sell and B to buy the input in question. The upshot would be greater production for B and, by substituting some lower-cost input for the frequency he sells (or more of some input of comparable cost), A would also produce more in the event of a reallocation of spectrum from A to B.[57]

In the absence of a market in which transfers from A to B can take place, a regulatory agency could seek to determine the value of spectrum rights to various claimants and award the rights to the claimant able to establish the highest value.

Thus, the value of spectrum to a terrestrial communications common carrier could be estimated by comparing the cost of microwave links (employing such spectrum) with the higher cost of substitute cable connections (not employing any spectrum); the difference would indicate the maximum value of spectrum to the carrier. The value of spectrum to a satellite communications carrier could be estimated by comparing the cost of a low power, wide bandwidth mode of transmission (employing large amounts of spectrum) with the increased cost of a high power, narrow bandwidth means accomplishing the same transmission (using smaller amounts of spectrum); the difference in costs would indicate the maximum value of the incremental spectrum to the satellite carrier.

> These imputed values of spectrum can be said to set maxima on conjectural price bids. . . . In that sense they are related to but obviously not identical with the shadow prices which would result if the spectrum were bought and sold in a competitive market. . . .
>
> The cost savings enjoyed by both microwave and satellites, over their next-best . . . alternatives, can be viewed as a first approximation of the value of spectrum to either user. Hence it is broadly indicative of what each user would in fact be willing to pay for spectrum in a competitive market. . . . These two conjectural price-bids . . . can help us infer the party for whom the spectrum has greater economic value absolutely, and at the margin.[58]

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57. Levin, *supra* note 53.

58. *Id.*

Similarly, the value of spectrum to land mobile users could be estimated by calculating the capital and labor costs incurred in doing the same job with and without mobile radio. Thus, if three trucks and drivers equipped with radio can do the work of four not equipped with radio, the maximum value of spectrum to land mobile users is the saving in costs represented by the extra truck and driver (less the costs of the radio equipment itself). And the value of spectrum to broadcasters could be estimated by comparing the costs of delivering programs to homes via cables as compared to the costs of conventional over-the-air transmission. However, before making any reallocation from one service to another on the basis of such findings, it would be necessary to determine the value of the spectrum at the margin, rather than its total value for each service. The land mobile interests have pressed for an approach analogous to market simulation, urging that the contributions of various spectrum uses to Gross National Product be considered in making allocations.

In addition to assisting in the efficient allocation of the scarce spectrum resource, market simulation also might prove valuable in furnishing data affecting decisions on R & D expenditures devoted to development of the spectrum.

Regulatory simulation of market transactions differs from the market system previously proposed in several important respects. First, since the simulation proposal functions within the framework of existing regulatory institutions, it could be implemented without new legislation. If the principal obstacle is irrational opposition on the part of Congress and the general public, this might be an important consideration.

Second, the regulatory agency need not be controlled in its ultimate decision by the market simulation data showing the value of the spectrum for different uses. If some important social consideration presented a compelling case (*e.g.*, the advancement of education through the reservation of channels for educational television) the agency could prefer the claimant showing lower economic value but greater social importance. In this case, however, the agency making the choice would have an awareness of, and presumably could be called upon to justify, the economic sacrifices implicit in its decision.

> To recognize these economic consequences is not necessarily to deny that they may be worth incurring. But to ignore them is to perpetuate a subterfuge in deciding without full knowledge and divulgence of all the facts.[59]

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59. *Id.*

Moreover, the allocation of spectrum to one user on social grounds (*e.g.*, the broadcaster or common carrier), despite the ability of another to make better economic use of the resource (*eg.*, land mobile), suggests that some attention be directed to whether the social purposes are in fact achieved.

Third, market simulation does not require any payments by users. While there were suggestions that such a system might usefully be coupled with user charges or rents for spectrum rights, the presence of payments is not intrinsic to the system. This might be of importance in the case of users like local governments, which might be able to show great value in both an economic and social sense but find it difficult to raise funds.[60]

A question was raised as to how far this approach departs from present regulatory practice. A former government official observed that the FCC "does ask for and receive testimony about the economic and social value of a proposed decision," and "that the Commission does have a conception of alternative use, although it may be very rudimentary, and it suffers from imperfect knowledge and imperfect techniques." Probably most of the participants considered that the Commission's decisional processes were far removed from market simulation.

In attempting to illustrate how the market simulation approach might work in the context of overriding public values, a proponent of the approach turned to the FCC decision reserving extensive frequencies for educational television (in a spectum area now coveted by land mobile users):

> [T]he political decision that came out on the ETV reservation . . . would have been [more] intellectually satisfying . . . if I felt that opportunity costs had been taken into account in some specific way.

A former official commented:

> [W]hen the original decision [on the ETV reservation] was made, the alternative was not mobile at all. . . . Nobody came for mobile for those frequencies. . . . The alternative was between educational and more commercial [television] applications. And that was the only argument that was raised.

A representative of the land mobile interests objected to the "stockpiling" of the ETV frequencies:

> [T]he tendency is to allow for [ETV's] possible growth in the future and to allocate or allot or stockpile substantial amounts of spectrum. [The spectrum requirements of ETV are uncertain.] I am not against educational television per se. I am only against the stockpiling of large amounts of frequencies in anticipation of something happening which may well never occur. And, therefore, because of

60. *See also* Levin, *New Technology and the Old Regulation in Radio Spectrum Management*, 56 Am. Econ. Rev. 339 (1966).

> the inflexibility of the reallocation of that spectrum, it ends up being unused for long periods of time. Therein lies the crux of the problem . . . —the inflexibility of changing the allocation.

Thus the criticisms of the FCC's processes are actually twofold: (a) failure to give adequate weight to market conditions in making the initial allocation; and (b) failure to reallocate in light of changed market conditions.

There were, however, two major objections to the market simulation approach. First, an objection was raised by a number of economists: that "shadow prices" or estimates of "market value" are very hard to compute.

> If the FCC is to assign frequencies in accord with potential price, it must know how much prospective users would be willing to bid for rights. In practice, it is virtually impossible to elicit that information without actually forcing the competing claimants to incur the relevant costs. Otherwise, it takes little imagination to visualize the exaggerated nature of the claims that would be made by competitors for rights to use the frequencies, and of the painful task the judges would have in deciding whose claim was valid.[61]
>
> . . . [I]n looking at the value of the spectrum, economists can work from now till doomsday looking at shadow prices and imputed value of spectrum, and at best they will only get a very crude indication of the value of spectrum. . . . [W]hatever decisions are made are going to have to involve a large arbitrary content, although research will help to reduce that and to make a wise course of action a little clearer. But at best we aren't going to have [a] nice balancing of marginal benefits and marginal costs as economists would like to see in theory.

It was emphasized, however, by an advocate of shadow prices, that the pertinent question is: "Can I capitalize on hardware costs in a sufficiently sophisticated way to get an insight not by what the man tells me but in terms of what I see past closed transactions are with regard to what a chunk of spectrum is worth to a man—as inferred from what he in fact would have to do in terms of hardware input if he didn't have it, or, in fact, the adjustment he could make if he did have more?"

The second objection to the market simulation approach was concerned with the impact on existing spectrum rights.

> [I]ndividuals and businesses have been given rights to use spectrum—rights which are valuable, and which they would not forgo lightly. . . . Effective use of the market value criterion would, I suspect, imply wholesale changes in the frequency allocation tables. Is it reasonable to suppose that any frequency authority would take entire frequency allocations or significant portions thereof away from one service and give them to another?[62]

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61. Meckling, *supra* note 36.
62. *Id.*

Both a market system and a market simulation approach are designed to improve the allocation of frequencies. But the market system begins by confirming the rights of existing users and making them transferable. The status quo is disturbed only to the extent that existing users voluntarily transfer their rights in exchange for considerations deemed to be satisfactory by each of them. In the market simulation approach, the status quo is altered directly by government reallocations, which may rest on market value criteria but involve no compensation to the user who is excluded or displaced.

B. *User Charges*

While the idea generally was not advanced independently of other proposals, there were comments on the desirability of imposing user charges or rents on persons making use of the radio spectrum. The charges might be fixed in relation to the spectrum value found under the market simulation approach just discussed; or they might be determined by some form of competitive bidding among competing users. In either event, the user charge was thought to have four advantages:

(1) The payment would remove any element of "subsidy" inhering in the present system of granting spectrum rights without charge. Spectrum users would have to compensate the public, by payments into the treasury, for their use of the public's property.

(2) User charges also would provide an incentive to economize on use of the radio spectrum, an incentive now lacking in many circumstances. If the charges were sufficiently substantial, licensees would be induced to seek modes of operation involving no spectrum, or less spectrum than the amount presently employed; in the absence of a rental fee (or some other kind of pressure), there is no reason for a licensee to seek substitute techniques, or to incur expenses, in order to reduce its use of spectrum space.

(3) A system of user charges might make it easier to transfer spectrum from one use to another. At the present time, the regulatory agencies are extremely reluctant to require a user to give up spectrum space; and, recognizing their own reticence in this regard, they are reluctant to permit new uses of the spectrum in a spectral region if it is likely that more important demands will be made in the foreseeable future. If, however, a system of user charges were employed—one under which charges could be adjusted in relation to the demand for the particular portion of the spectrum—users could be authorized at low rentals when there was no great demand for the space and then displaced, by force of higher user charges, as and when other demands made the space more valuable for other uses.

(4) User charges might provide a means for relieving congestion in

those areas, as land mobile, where licenses have been freely granted on a nonexclusive basis. While the charges would not, in themselves, make more spectrum space available, they could function to ration the existing space by forcing out the users least willing to pay. Those that remained would then be in a position to realize the potential of the spectrum resource unhampered by the deterioration accompanying its treatment as a free good, *i.e.*, at present, "[i]ndividual users will not take into account the interference (congestion) costs which they impose on others when they use the spectrum."

Since most of the remarks about user charges were made in connection with the next proposal, they will be considered in that context. Suffice it to say that the principal objection to this suggestion relates to its impact on the status quo. Licensees who now pay nothing for spectrum rights would be compelled to pay rental fees; those not in a position to make the payments would be displaced by those who were prepared to do so. Thus, like the market simulation approach and unlike the full-fledged market system, existing licensees would be adversely affected by the change.

C. *Competitive Bidding Within Zones*

Building upon the two previous suggestions, a proposal was made late in the proceedings that spectrum rights, zoned as to use, be auctioned off at competitive bidding. It was observed, preliminarily, that some spectrum rights, such as those of the broadcasters, are exclusive—only one broadcaster is authorized to transmit on a particular channel in a particular city; in the event of competing applications, the licensee is selected by a comparative proceeding. Other spectrum rights, such as those of land mobile operators, are nonexclusive; those meeting the eligibility requirements are permitted to enter without limit no matter how badly the party-line congestion degrades the quality of service. The proposal was:

> First, that all of the non-exclusive rights be subjected to limitations at the point of saturation. Decide how many land mobiles you are going to allow in at any given service and stop . . .
>
> [Second,] you have . . . a problem of rationing. You have . . . more land mobile operators than there are channels. You have more broadcast applicants than there are broadcast spots. You have to ration the spots. . . . It seems to me that the sensible way to ration these spots is to auction them off. Sell them to the highest bidder.
>
> Now, this will do several things. [First,] it will get rid of the party-line congestion in land mobile and . . . the comparative proceeding in broadcasting. And I can't think of two things that it would be better to get rid of in FCC administration of the spectrum.

> The second thing that will happen is [that] you will have bidders for these scarce frequencies. And this ought to tell you something about the relative values [of the uses to which these frequencies are being put]. Now, it is true [that] a land mobile operator can't come in and bid for channel 2 in the VHF band, but he can bid against other land mobile operators for the scarce land mobile [slots. This] will give you some idea of the relative value of these uses of the spectrum in an economic sense and facilitate the transfer of spectrum from [uses] where the bids [are low] to [uses] where the bids are very high. . . .
>
> Now, this does two things. First, of all, it permits you to move services as a group and eliminate some of the technical problems that exist if one land mobile operator gets one frequency in one isolated part of the country and starts doing all sorts of weird things with all the other services in that area. You can move in a sort of zoned way a whole group of frequencies into the areas of short supply.
>
> Secondly, it permits you to introduce into the process those non-economic considerations which some people think are important. That is, [the agency is] not a slave to the bidding system. [It] may say, "Well, yes, it is true that land mobile is willing to pay more for these frequencies than UHF broadcasting, but we think UHF broadcasting is more important."
>
> But I would urge that the mere statement of that conclusion is not enough, that the reasons [the agency thinks] UHF broadcasting should have [these] frequencies, despite the fact that other people by bidding for land mobile slots have shown that there is a great shortage elsewhere, have to be articulated more fully than they have been articulated. . . .

It was noted that the zones would not have to be fixed any more firmly than technical considerations required, and that variances could be permitted where technical obstacles were not a problem.

There were a number of objections to the proposal, some of them reminiscent of comments made in connection with other proposals.

First, it was observed that this proposal, in its initial bidding phase, would not make more frequencies available for the congested land mobile services, but would exclude some operators from the spectrum and require the remainder to pay a fee for what formerly they had received without charge. As previously noted, there was concern that all the frequencies would go to the largest and richest bidders, and that police and public safety users would be disadvantaged. There also was concern that land mobile users would be forced to bid for spectrum space which, in the short run at least, could not be expanded:

> . . . [T]he idea of people bidding against each other when they are faced with . . . a perfectly inelastic supply curve . . . has a parallel, at least in the short run, to price ceilings, price control and rationing

> during wartime, when there is a certain supply on the market and we choose not to allocate according to people's ability and willingness to pay. We do make judgments about people who ought to have a share regardless of their ability to pay, or in this case police and public safety users whose value to the community is not reflected very well in their ability to pay.
>
> [By contrast,] police cars can be built, . . . and there is a cost of production. The supply curve for police cars is fairly horizontal, and the police at least are assured that what they are paying sort of reflects the cost of production. . . .

Second, the prospect of abolishing the comparative proceeding met with considerable approval. A frequent participant in such cases described the comparative hearing as "an absolute masterpiece in chaos and frustration . . . where there essentially are no standards for selecting between equally qualified [applicants]. So you resolve it in a long hearing in the hopes they will all buy each other out or faint of exhaustion." However, another participant felt that in some comparative cases "you can make a rational judgment" and select a winner who would not necessarily have prevailed if competitive bidding were employed. He also asked whether licenses would be subject to renewal at three-year intervals so that "every broadcaster operates subject to the fact if [he is outbid] at the end of that three years . . . he can be displaced?"[63]

Finally, on the zoning aspect, an analogy was made to the zoning of land.

> [I]n land use if you want to bid on a factory site you have to bid in the area that is zoned for factories. You can't bid on land in a residential section and build a factory. . . . And the relative prices in the two areas then suggest the need for the planning board to reallocate land perhaps from one use to another.

Some, however, found the analogy to land zoning unappealing because informed "people—those who don't know communications problems—think that land zoning . . . is the world's greatest abomination of governmental activity," peculiarly susceptible to "the leverage of people with money . . . who know how to use . . . courts and lawyers." Thus, like land zoning, the proposed system "could be conceived to work decently" and yet not work out in practice.

D. *Other Proposals*

There were a number of other proposals more limited in scope.

One suggestion was that an unused portion of the spectrum be set aside for experimentation in the development of transferable spectrum rights:

63. On the comparative proceeding, see authorities cited *supra* note 19.

> . . . Why don't we take a portion of the spectrum which is at present not used by anyone, . . . and that if used in any way by the market would not create any problem internationally, . . . and attempt to define the rights and distribute them in some way. . . . Why don't we try this and see what the costs of policing are, see what the costs of transactions are . . . ?

The proposal attracted both favorable and unfavorable comments. One of the critics said:

> I . . . wonder how much you would really learn from [experimenting with some unused portion of the spectrum.] What portions of the band are unused, and why are they not used? . . . [O]ne of the answers is because they are not very useful to anybody. And if you simply said, 'Well, let's take the 20 Gigahertz band and throw it open,' the question is: . . . who would actually use it? Would we really get much information about the kind of problems that mobile users would face in a market system in the portions of the band which are not only used but very heavily used? That's where we really need the information, and that's where the experiment should be conducted.

A second suggestion concerned the FCC's method of allocating spectrum space in blocks, so that the same frequencies are used for the same purposes in all parts of the country. This means that "in Nebraska or Utah, for example, you can't use the bands which are allocated for marine use, . . . [o]r you can't use the Forestry Service band in New York City. . . . [O]ne doesn't have to have a very sophisticated notion of marginal cost and marginal benefit to know that somehow using those bands in Utah and Nebraska would be somehow contributing to the social welfare."

Several FCC officials indicated that the problem was under consideration at the Commission, and noted: (a) there is no shortage of bands in Utah and Nebraska, (b) the forestry bands in New York used by officials who run the public parks, and (c) 40 of the forestry frequencies in New York were given to the New York City police. There was a general feeling that greater flexibility in the block allocation of frequencies would be desirable.

A third suggestion was that the FCC define spectrum rights in terms of outputs (energy levels along geographic contours) rather than inputs (size and shape of antenna, power level at the transmitter). The present system of controlling inputs was said to have two disadvantages: "first, it makes it difficult for the user to make input substitutions, *e.g.*, of transmitter power for antenna size; secondly, it results in different levels of interference as a function of time of day, day of the year, sun spot cycle, etc." To overcome these disadvantages "it would be desirable to specify energy levels that [licensees] would be able to impose at various geographic points." The "rights would have to be defined in probabilistic terms, *e.g.*, power levels

cannot exceed a specified amount more than one percent of the time at specific geographic points." "From an interference standpoint there is no reason why we should be concerned about how these energy levels are created."[64]

This proposal was not discussed. However, as previously noted, it probably would be necessary to redefine spectrum rights in terms of outputs if a system permitting transfers among different users were to be instituted.

V. Technological Developments Affecting Use of the Spectrum

A number of proposals and projections at the conference concerned the use of the radio spectrum to provide specific services. Of particular significance are: use of cables to transmit television programs to the home, and developments pertaining to communications satellites.

A. *Wire Television*

Most members of the television audience receive their programming from over-the-air transmissions of stations in their immediate vicinity. There are, however, some two million homes which rely on community antenna television (CATV) systems as the sole, or a supplementary, source of television programming. CATV systems pick up signals at points remote from the community they serve, transmit them via microwave relay (or cable) to the particular community, and deliver them by wire to the homes of subscribers; these systems also may deliver local signals, either as a matter of convenience or as a means of providing improved reception for their subscribers. By and large, CATV systems do not originate programming; they perform a distributive function for those prepared to pay for it. Their phenomenal growth in recent years has raised questions as to the prospect for distributing all television signals by wire.[65]

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64. Meckling, *supra* note 56.

65. On CATV developments, see M. Seiden, An Economic Analysis of Community Antenna TV Systems and the TV Broadcasting Industry (1965); Cole, *Community Antenna Television, The Broadcaster Establishment, and the Federal Regulator*, 14 Am. U.L. Rev. 124 (1965); Fisher, *Community Antenna Television Systems and the Regulation of Television Broadcasting*, 56 Am. Econ. Rev. 320 (1965); Fisher & Ferral, *Community Antenna Systems and Local Television Station Audience*, 80 Q.J. Econ. 227 (1966); Greenberg, *Wire Television and the FCC's Second Report and Order on CATV Systems*, 10 J. Law & Econ. 181 (1967); Huntley & Phillips, *Community Antenna Television: A Regulatory Dilemma*, 18 Ala. L. Rev. 64 (1965) & 18 Ala. L. Rev. 296 (1966); Nester, *Is CATV Infringing Proprietary Rights in Television Broadcasts?*, 15 Copyright Law Symposium 153 (1967); Note, *CATV and Copyright Liability*, 80 Harv. L. Rev. 1514 (1967); Note, *The Wire Mire: The FCC and*

At the conference, several economists proposed that the present mode of transmitting television programs via the airwaves be replaced by a system of wire transmission.[66] Their thesis was that contemporary television is severely hampered by the limited number of channels in most markets (averaging about three per city); that under the present system, spectrum scarcity would preclude any substantial increase in the number of channels (the maximum would average less than five per city); and that even this increase would be impeded by the high fixed costs of over-the-air transmission. With so few channels, broadcasters tend to concentrate on mass appeal programming to the detriment of diversity; and there is difficulty in obtaining access for pay television, educational television and political programs. Under the wire system proposed each community would have 20 channels available, and the number of channels could be expanded still further if warranted by demand.

With a wire system, it would be possible to eliminate television transmitters and towers, home antennae, and the portion of the television receiver required for amplifying weak over-the-air transmissions. However, a grid of 20-channel coaxial cable, linking all television sets to the station, would have to be added. It was estimated that the capital costs of the segments eliminated would more than offset the wiring costs. It also was estimated that, with substantially complete coverage in a city, the cost of wired television would run in the neighborhood of $1.00 to $1.50 per home per month (current CATV charges for more costly operations are about $5.00 per month). With the elimination of expensive transmitting equipment, transmission costs would be greatly reduced—so much so that broadcast time could sell for $5 to $10 per hour. And with these reduced costs, it was anticipated that the volume and diversity of programming would greatly increase.

While the major purpose of the proposal was not to conserve spectrum, it is clear that considerable spectrum would be released for other purposes if the proposal were put into effect. And the spectrum space involved is in a particularly congested frequency range, adjacent to the land mobile frequencies among others. A system of wire television also would improve picture quality; would remove the need for government supervision of programming (with the threat of censorship this implies); and would pro-

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CATV, 79 HARV. L. REV. 366 (1965); Note, *Federal, State, and Local Regulations of CATV—After You, Alphonse . . .*, 29 U. PITT. L. REV. 109 (1967).

A number of important CATV cases are currently pending before the United States Supreme Court.

66. Barnett & Greenberg, *A Proposal for Wired City Television*, 1968 WASH. U.L.Q. 1.

vide extra capacity for other electronic services to the home such as data processing, facsimile reproduction, and electronic shopping and credit services.[67]

Some doubts were expressed about the political feasibility of the proposal. In particular, there was the problem of service to rural areas and the need to collect monthly charges from members of the public now receiving television programs without charge.

> . . . [W]hen you come along and suggest . . . getting service to most people, if not to the rural people, with a wire system, before you are halfway through explaining to the public . . . that as a condition to [getting 20 channels of service] you are going to have to take away the frequencies of the fellow who now gives it to them free, he closes his mind at that point. . . .
>
> Now, you can sell CATV, which is a variant of this, because that still leaves the free choice. That is, [the viewer] can either subscribe or he doesn't have to subscribe. But [under the proposed wire system] he has to subscribe. . . . There is going to be nothing to get off the air.

Another participant observed that the critical question is the extent of viewer choice to be afforded:

> . . . I see the basic drive in TV is to provide more choices in the home. . . . Once you cross this point from 7 to 10 channels, quit thinking radio. The economics just by themselves flip right over to wire. If you are going to have ten [channels] in every home now, you can pay for the wire system. . . .

This speaker also pointed out that, even with a wire system, some spectrum would still be required for broadcasting to rural audiences.

In judging the merits of the wire system, it would be illuminating to know what the cost of television reception would be if the radio spectrum were rented for the purpose at its true economic value rather than provided free of charge by the government. Is this a case where technological progress is blocked by a government subsidy to the existing mode of program distribution?

B. *Satellite Communications*

At present, Comsat is operating as middle man for the conventional communications carriers in transmitting message traffic between the United States and other nations of the world.[68] To perform this function, a number

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67. *See also* Johnson, *New Technology: Its Effect on Use and Management of the Radio Spectrum*, 1967 WASH. U.L.Q. 521; Pierce, *supra* note 28.

68. On the organization and status of Comsat, see Boskey, *Monopoly and Antitrust Aspects of Satellite Operations*, 58 Nw. U.L. REV. 266 (1963); Kirkpatrick, *Antitrust in Orbit*, 33 GEO. WASH. L. REV. 89 (1964); Levin, *Organization and Control of*

of earth stations are required in the United States—about six in all—and Comsat shares frequency bands at 4 and 6 GHz with terrestrial microwave systems. While this frequency sharing has created some potential for interference, the arrangement is generally considered to be workable. There are, however, proposals pending to extend satellite communcations to domestic traffic, including the networking of television programming, and this would greatly increase the number of earth stations required, the volume of satellite traffic, and the potential interference. These proposals pose a question of availability of spectrum space.[69]

Comsat and some other proponents of a domestic satellite system believe that such a system could be instituted at 4 and 6 GHz without creating undue interference between satellite and terrestrial services. The Bell System contends that the interference problem is so acute that the domestic service should not be instituted at 4 and 6 GHz at any substantial level, but should be transferred to frequencies above 10 GHz which are presently undeveloped. From a scientific point of view, the prospects for using the higher frequencies are encouraging, but additional expense will be required, both for the research and development needed and for the additional operating equipment required to cope with the physical characteristics of the higher frequencies.

One of the difficulties presented by the existing system of spectrum management is the lack of guidance it affords as to whether emphasis should be placed on achieving compatibility at 4 and 6 GHz or on developing frequencies above 10 GHz. In the former instance, cooperation between Comsat and the Bell System would be required; but minimization of the costs of achieving compatibility is impeded by FCC policies imposing the burden on newcomers not to interfere with existing users. One observer commented:

> Quite conceivably, the added cost to either satellite users or to terrestrial microwave users of reducing interference to a tolerably low level [at 4 and 6 GHz] would be less than the social value gained by

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Communications Satellites, 113 U. Pa. L. Rev. 315 (1965); Mansbach, *The "Authorized Entity"—"Authorized User" Question in the Communications Satellite Act of 1962,* 20 Fed. Com. B.J. 117 (1966); Rosenblum, *Regulation in Orbit: Administrative Aspects of the Communications Satellite Act of 1962,* 58 Nw. U.L. Rev. 216 (1963); Schwartz, *Governmentally Appointed Directors in a Private Corporation—The Communications Satellite Act of 1962,* 79 Harv. L. Rev. 350 (1965); Schwartz, *Comsat, The Carriers, and the Earth Stations: Some Problems with "Melding Variegated Interests,"* 76 Yale L.J. 441 (1967); Note, *Communications Satellite Act of 1962,* 76 Harv. L. Rev. 388 (1962). *See also* the President's Recommendations Relative to World Communications, *supra* note 28.

69. See authorities cited note 28 *supra.*

> conserving the spectrum through greater shared use. In such cases, society would benefit, on balance, by permitting the expanded shared use in combination with some means by which the cost of protection from interference would be appropriately borne. Unfortunately, current practice in spectrum management simply avoids this issue. In general, users of *existing* facilities are accorded assurance that new or proposed interfering facilities will not be permitted; little if any attention is directed to the possibilities of trade-offs between cost and interference protection. . . .
>
> Questions . . . arise regarding the appropriate level and timing of research and development to exploit the higher regions of the spectrum. Among the reasons why no satisfactory answer can be given is simply the fact that existing arrangements for managing the spectrum provide little clue about the social cost of employing the lower frequency bands more intensively as an alternative to expanding into higher regions.[70]

In discussing this problem, it was pointed out that incumbent users, such as the Bell System, tend to be pessimistic about the prospect of achieving compatibility and minimizing interference, while newcomers, such as Comsat, tend to be optimistic about accomplishing these objectives. It also was noted that the projected demands for satellite communications are so large that there is no possibility of accommodating the traffic in the 4 and 6 GHz bands; thus the need to exploit the higher frequencies is unavoidable, and the only question is the level and timing of the research and development program. Finally, government officials indicated that, for a large number of earth stations, the uncertainties surrounding terrestrial-satellite interference at 4 and 6 GHz are so troublesome that extensive technical experimentation is required to determine the scope of the anticipated interference.

Many of the problems relating to a domestic satellite system involve questions as to the ownership and organization of the communications satellites. Difficult problems are presented, for example, in deciding whether one or several domestic systems should be authorized: the number of orbital slots available at the equator for synchronous satellites are limited; there are economies of scale in constructing and operating satellites and earth stations of different sizes; multiple systems would make demands upon the spectrum different from the demands of a single system; and important issues of competition and monopoly are implicit in such a choice.[71] In addition, a domestic system would use international space—including orbital positions above other nations—presenting issues for international negotiations.[72]

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70. Johnson, *supra* note 67.

71 See authorities cited note 28 *supra.*

72. On the international framework of satellite operations, see Doyle, *Communication Satellites, International Organization for Development and Control,* 55 CALIF. L.

Another important possibility is the prospect that communications satellites may be employed to broadcast television programs directly to the home. The proposals previously discussed all envisage Comsat or some other owner-manager of the satellite as a middleman in the networking process, *i.e.*, distributing programs from production centers to local stations, which the latter would then broadcast to local audiences. Direct satellite broadcasting is seen as a more remote development, and one that will present serious problems pertaining to spectrum use, cost of transmitting and receiving equipment, and impact on the local broadcaster.[73]

C. *Other Developments*

Other technological developments bearing upon use of the spectrum may be briefly summarized:[74]

(1) Facsimile transmission. Use of the television bands, on a shared basis, for the transmission of printed copy into the home, raises the possibility that newspapers and mail may be transmitted electronically. Experimental operations are in progress.

(2) Spread spectrum techniques. By pooling a number of frequencies, and transmitting messages that hop rapidly from one frequency to another in accordance with predetermined time patterns, the capacity of the spectrum for some types of land mobile services may be increased substantially.

REV. 431 (1967); Doyle, *International Satellite Communications and the Law*, 11 MCGILL L. REV. 137 (1965); Estep, *International Lawmakers in a Technological World: Space Communications and Nuclear Energy*, 33 GEO. WASH. L. REV. 162 (1964); Estep, *Some International Aspects of Communications Satellite Systems*, 58 NW. U.L. REV. 237 (1963); Estep & Kearse, *Space Communications and the Law: Adequate International Control After 1963?*, 60 MICH. L. REV. 873 (1962); Glazer, *Infelix ITU—The Need for Space-Age Revisions to the International Telecommunication Convention*, 23 FED. B.J. 1 (1963); Kraus, *Legal Aspects of Space Age Communications and Space Surveillance*, 29 J. AIR LAW & COMM. 230 (1963); Moulton, *Some Legal Aspects of International Communications*, 41 N.C.L. REV. 354 (1963); Sarnoff, *Communications and the Law*, 7 ANTITRUST BULL. 677 (1962); Segal, *Communications Satellites—Progress and the Road Ahead*, 17 VAND. L. REV. 677 (1964); Underwood, *Problems of Participation in the Global Commercial Communications Satellite System*, 18 S.C.L. REV. 796 (1966). *See also* PRESIDENT'S RECOMMENDATIONS RELATIVE TO WORLD COMMUNICATIONS, *supra* note 28.

73. The material in this section is developed more fully by Johnson, *supra* note 67. On satellite broadcasting, see also Johnson, *supra* note 28; Hult, *supra* note 28; Pierce, *supra* note 28; DIMLING & COFFEY, THE EVALUATION OF ALTERNATIVES FOR THE PRODUCTION, DISTRIBUTION AND FINANCING OF TELEVISION PROGRAMS (Report 219 prepared for DTM by Spindletop Research 1967); Smythe, *Freedom of Information: Some Analysis and a Proposal for Satellite Broadcasting*, Q. REF. OF ECON. & BUS., Autumn 1966, at 7.

74. The first four items are discussed in Johnson, *supra* note 67.

(3) Waveguides and laser pipes. High frequency emissions can be confined within conduits to achieve point-to-point transmissions without raising problems of intereference with other signals. The systems envisaged, while very costly, have a high capacity and a low cost per unit at high levels of utilization. Their development probably will be associated with increasing demands for point-to-point communications, stimulated by data transmission and new uses of electronic media.

(4) Transistorized cables. Like waveguides and laser pipes, transistorized cables are conduits for electronic transmissions that avoid atmospheric interference. The introduction of such cables in recent years has increased capacity and reduced cost in comparison with previous cable technology.

(5) Video tapes. While video tapes are presently used extensively in television production, there are suggestions that they may prove to be valuable in television distribution as well. Thus the transportation of television tapes by aircraft may provide a suitable alternative to the point-to-point electronic transmission of television programs. (This mode of distributing tapes is now being used by the educational network.) Tapes also may provide a basis for instructional television over closed circuits, reducing reliance on over-the-air transmissions. Finally, single-program video records may be sold to consumers for replay through their television sets in the same manner as audio recordings are played on phonographs. But though this use of tapes may provide a non-spectrum mode of program distribution (to stations, classrooms or consumers), this method may be more costly and less satisfactory than the spectrum alternative in some applications.

(6) Redesign of television assignments. As previously noted, there are several alternatives to the present method of distributing television programs via local broadcasting stations, including wire television and direct satellite broadcasting. The former clearly economizes on spectrum use, and the latter may do so. Still another method of economizing on spectrum used for television is to redesign the present geographical distribution of television stations. This proposal envisages the assignment of more stations to more communities with lower power and closer spacings; alternate vertical and horizontal polarization of signals would facilitate closer spacing. There would be increased interference and smaller service areas; but this would be more than outweighed by the larger number of stations made possible. With such a redesign of television assignments, it was claimed that "the same broadcasting activities . . . could be carried on with smaller spectrum, or, alternatively, more broadcasting services could be accommodated with increased competition."

The objection to this proposal (as to such other alternatives as wire tele-

vision and direct satellite broadcasting) is "the Commission's concern with stations as local entities, which means that a station is licensed to a community and has a basic initial responsibility to serve the community." It was feared that these alternative modes of program distribution would tend to break down the identification of stations with local communities.

> You could have done the same thing, of course, by stratovision, putting a number of airplanes up there, and they would have supplied again national coverage but with very little in the way of . . . local identification and local service.

This point was disputed in the context of particular proposals, but an additional and more general observation also was advanced:

> A great deal that [the FCC does] is premised on the assumptions . . . that the broadcasting station is a part of the local community, that its local programming serves the local community, and that this is a net social good, and presumably that the programming is responsive to needs of the local community, is in response to expressed desires on the part of local citizens. . . . I would say at the very least there is some question as to the viability of those assumptions. . . .
>
> [I]f in fact what we have is national programming distributed out of New York City by means of a network of microwave towers interconnecting local stations that are broadcasting to people within the local community . . . and carrying in large measure national [programs], that service can be provided in many other ways than through this system of networks and local stations.
>
> There are advantages to those other ways. The disadvantages are principally that you don't have the local programming. And that brings us back again to the question of: What is this local programming? What in fact is it doing? How useful is it? How would the community be different if it did not exist?

VI. Concluding Observations

The Airlie House conference provided some interesting insights into the problems of radio spectrum management. Its success on this score was attributable in large measure to the diversity of the participants—economists, engineers, lawyers and administrators from government, industry the universities and research organizations. However, this diversity also presented some problems in communication among the different disciplines, particularly as between the economists and the engineers, the two disciplines having the largest numbers in attendance. At a number of points in the discussion, it became evident that the economists or the engineers had failed to present their views in a manner that was comprehensible to members of the other group. This difficulty in interdisciplinary communication suggested still another problem: the means by which the findings of the spe-

cialists are to be communicated to the general public and their elected representatives. Spectrum management presents complex problems of engineering, economics, public administration and law, and it is not clear how the alternatives can be reduced to terms sufficiently simple for public understanding and political action.

The conference suggested a number of avenues for further exploration:

(1) If changes are to be made in the present method of frequency management, it is essential that this method be fully understood so that any proposed revision may be compared with the status quo. It was suggested that the problems of frequency allocation under existing government procedures might be studied in the context of specific allocation decisions.

(2) Any alternative to present frequency management arrangements must be set forth with sufficient clarity to indicate the extent of departure from present arrangements and the manner in which existing management functions will be performed. Thus, any proposal for a market system in spectrum rights must indicate how the rights will be defined; how their transfer among different uses will be reconciled with international obligations and the advantages of establishing "zones" for disparate uses; and how weight will be given to various social interests which may not find adequate recognition in the market place. Probably such a proposal will require the combined efforts of economists, engineers and lawyers.

(3) To the extent that a revision in frequency management arrangements is premised on poor economic performance under the present system, an effort should be made to determine the extent of economic loss—even if very crude estimates must be employed. Similarly, to the extent that some improvement is envisaged under a proposed revision in management approach, some estimate should be made of the costs of transition, so that these costs may be offset against any benefit to be derived.

(4) Finally, recognizing that revision of the present system is not likely in the short run at least, efforts should be made to live within the present system as intelligently as possible. To this end, much of the information that is gathered under the preceding heading might well be transmitted to the pertinent regulatory authorities for use in the performance of their frequency management functions.