# PART 1
# COMMUNICATIONS SATELLITES

## HEARINGS

BEFORE THE

## COMMITTEE ON
## INTERSTATE AND FOREIGN COMMERCE
## HOUSE OF REPRESENTATIVES

EIGHTY-SEVENTH CONGRESS

FIRST SESSION

ON

ESTABLISHMENT, OWNERSHIP, OPERATION AND REGULATION
OF A COMMERCIAL COMMUNICATIONS SATELLITE SYSTEM

JULY 25, 26, 27, AND 28, 1961

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# COMMUNICATIONS SATELLITES

TUESDAY, JULY 25, 1961

HOUSE OF REPRESENTATIVES,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
*Washington, D.C.*

The committee met, pursuant to notice, at 10:05 a.m., in room 1334, New House Office Building, Hon. Oren Harris (chairman) presiding.

The CHAIRMAN. The committee will come to order.

Today the Committee on Interstate and Foreign Commerce again undertakes several days of most important hearings on communication satellites and U.S. communications policies.

In our judgment, these hearings are most timely and appropriate. I think this is one of the most important problems, insofar as the future of our country is concerned, that face us for our consideration, particularly in view of the fact that we have now progressed, in this country, so far in the scientific development of satellites.

The basic policies are now being determined as to the operational features and, also rates to be charged and all of the innumerable problems that go with it.

There appears to be a reasonable probability that within a relatively short time communications satellites will play an important role in international communications. The existence of this probability makes it incumbent upon this committee to seek information at this time from the departments and agencies of our Government which have participated importantly in the development of this new communications tool, and which are now making plans for its future use as a part of our national and international communications system.

Let it be remembered that in the last Congress an effort was made by this committee to try to bring about, for consideration, the policy as to the most efficient use of the spectrum. This is the big problem ultimately that is going to have to be resolved.

It is my hope that, even though these hearings are in a more limited field in the use of the spectrum, ultimately we can resolve this big problem because it is terribly important to our future that it be resolved.

Under the rules of the House of Representatives and pursuant to House Resolution 108, 87th Congress, this committee is charged with legislative responsibility in the fields of: (1) The regulation of interstate and foreign communications; (2) the allocation of the radio spectrum; (3) ownership and control of communications facilities; (4) technical developments in the communications field; and (5)—a related field—research in weather and the operations of the Weather Bureau.

Under legislation enacted in 1927 and reenacted in somewhat modified form in 1934, the Federal Communications Commission is charged with the responsibility of studying new uses for radio, provide for experimental uses of frequencies, and generally encouraging the larger and more effective use of radio in the public interest.

When we speak in terms of "radio" we mean, of course, television and other uses in this field.

I want to take this occasion to congratulate the Commission for having pursued energetically the development of plans for the early utilization of space satellites as a part of our national and international communications system.

I feel very strongly that the Commission has an important responsibility in this area but I feel equally strongly that this committee likewise has vital responsibilities to discharge in this field.

The Commission is an arm of the Congress in discharging the authority delegated to it under the provisions of the Communications Act of 1934—and that act incidentally originated with this committee.

In asking the Commission to come before us today we are seeking information on a number of important points:

(1) The statutory basis on which the Commission is relying in developing the program which it has developed thus far;

(2) The nature of alternative programs which have been considered by the Commission and the reasons which have led the Commission to select this particular program and to reject alternative plans; and

(3) Any recommendations that the Commission might have at this time for additional legislation in this field which might be needed in order to protect the public interest, including additional legislation dealing with problems of spectrum allocation.

While I am pleased that the Commission has been diligent and energetic in developing the program in this field, the ultimate responsibility for such a program and the policies on which it is based must rest with the Congress. It is for the Congress to decide whether to go along with the program as developed or whether to insist on particular changes or modifications which Congress may determine to be necessary to protect the public interest.

While I have emphasized the responsibility of the Federal Communications Commission in this field, there are other departments and agencies of our Government which have shared and which will continue to share in the development of this program. We are going to hear from representatives of these other departments and agencies tomorrow and on the following day and we greatly appreciate their cooperation in making available to this committee information which is indispensable for a proper understanding of the policy issues involved in this program.

## STATEMENT OF HON. NEWTON N. MINOW, CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION, ACCOMPANIED BY COMMISSIONERS FREDERICK W. FORD, ROSEL H. HYDE, ROBERT T. BARTLEY, ROBERT E. LEE, T. A. M. CRAVEN, AND JOHN S. CROSS; MAX D. PAGLIN, GENERAL COUNSEL; AND BERNARD STRASSBURG, ASSISTANT CHIEF, COMMON CARRIER BUREAU

The CHAIRMAN. It is my understanding that the Commission has issued an order dated this morning in connection with the policy which, I assume, you will present to the committee in the course of your presentation, Mr. Chairman.

Mr. MINOW. That is right, Mr. Chairman.

The CHAIRMAN. I should like to note that I have just received a copy of a release from the White House, which is a statement of the President on communication satellite policy.

I assume that the Chairman of the Commission will refer also to this in the course of your presentation.

Mr. MINOW. Yes, Mr. Chairman.

The CHAIRMAN. So it will be included in the record at the proper place as we come to it.

We are pleased to have as our first witness in this important hearing this morning the Chairman of the Federal Communications Commission, the Honorable Newton N. Minow.

I believe every member of the Federal Communications Commission is attending these hearings this morning. I think the record should show the presence of each one of them.

We are glad to see Commissioner Ford, Commissioner Hyde, Commissioner Bartley, Commissioner Lee, Commissioner Craven, and Commissioner Cross.

I assume also that certain of your staff are here——

Mr. MINOW. That is right.

The CHAIRMAN (continuing). Whom we would like noted for the record. You might identify those who are with you, Mr. Chairman.

Mr. MINOW. Mr. Chairman, and members of the committee, we are grateful for the opportunity to be here today to discuss this very far-reaching and important subject.

Commissioner Craven, who has been designated by the Commission as our Space Coordinator and carries a very heavy load in this field very admirably, is seated at my side, and all of my colleagues have come here in view of the importance of the question and are available to answer questions.

In addition, some members of our staff are here: Mr. Paglin, our General Counsel; Mr. Strassburg, the Assistant Chief of the Common Carrier Bureau; and there are certain other members, in addition.

I should like at this time to read a statement of the full Commission which recounts the actions which we have taken, Mr. Chairman.

The purpose of this statement is to outline the views of this Commission toward the establishment of an operational civil communications satellite system and the role of the Commission in connection therewith. It also describes the working relationships which have been established with the National Aeronautics and Space Council, the National Aeronautics and Space Administration (NASA) and other interested departments, agencies, and groups.

The Commission is responsible for the administration of the Communications Act of 1934, the primary purpose of which is to make available, so far as possible, to all the people of the United States, a rapid, efficient, nationwide and worldwide wire and radio communication service, with adequate facilities at reasonable charges.

To this end, the act directs the Commission to keep itself informed as to technical developments and improvements in wire and radio communication so that the benefits of new inventions and developments may be made available to the people of the United States, and to study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest. Further, the Communications Act gives to the Commission exclusive jurisdiction to authorize all non-Government wire and radio operations in interstate and foreign commerce through the issuance of construction permits, station licenses, and certificates of public convenience and necessity, upon a finding that such operations are in the public interest.

The Commission, in accordance with its statutory responsibilities, has endeavored to keep pace with, and act in response to, the rapid developments in the new technology of space satellite communications. It believes that the earliest possible realization of space communication systems for use by the public will not only demonstrate the advantages such systems offer to us and the other nations of the world over conventional means of communication, but will also demonstrate to the world our leadership in the application of space science to peaceful and useful ends.

The Commission believes that the principal value of communication satellite systems is to provide long-distance communications, particularly for intercontinental use. The much needed additional capacity they promise to afford will be available to accommodate the rapidly increasing growth of commercial common carrier communications. Their technical characteristics also will permit institution of new services, such as wideband data transmission and intercontinental television relay.

Global television is, of course, one of the important benefits that may possibly be derived from a civil satellite communication system. However, direct satellite-to-public television broadcasting should be considered only as a long-term objective. Such factors as language barriers, time differences, differences in presently existing technical standards, and the present state of the art with respect to feasible satellite power, are significant practical limitations to an early realization of direct television broadcasting via satellites.

The Commission has been devoting considerable effort to a resolution of the problems involved in the realization of commercially operable satellite communications system. Our activities in this field have reflected our conviction that such systems will and should take their place

within the framework of our free enterprise system, under which public communication facilities are owned and operated by private companies subject to Government regulation. The merits of such a policy have been amply demonstrated by the record of achievements attained by our communications industry in providing a high quality of service at reasonable charges to the public.

The history of international communications is replete with a series of significant technological achievements. It is pertinent to note that as this Nation has progressed from narrow band transoceanic telegraph cables, to high-frequency radio, to high repeater wide band voice and record cables, we have not altered our basic concept of the role performed by the various private entities in the telecommunication field. Telecommunications facilities for public use, in this country, have always been privately owned and financed, subject to appropriate Government regulation to insure operations in the public interest and the maintenance of competitive benefits wherever feasible.

When viewed from its functional aspects, space communication via satellite relay will be a supplement to, rather than a substitute for, existing international wire and radio communications.

Accordingly, although communication via space satellites represents a new technology it should be considered primarily as another means of long-distance communication which, when fully developed, will take its proper place within the complex of the existing international communication systems.

The launching of the communication satellites into orbit will, of course, require the cooperation of the National Aeronautics and Space Administration, which also has a significant role in the research and development work on communications satellites.

The Commission and NASA, cognizant of the need for mutual cooperation, have jointly signed a memorandum of understanding setting forth certain conditions of fact and policy guidelines.

If I may interpolate a moment there, Mr. Chairman, an agreement was signed in February of this year by my predecessor, Chairman Ford, and Mr. Dryden, acting for NASA. Since that time we have worked very cooperatively with Mr. Webb of NASA and the fundamentals of that agreement have continued and are in full force and are working in a very harmonious manner.

The CHAIRMAN. Do you have a copy of the agreement?

Mr. MINOW. Yes. We are submitting it for the record, Mr. Chairman.

The CHAIRMAN. Very well. It will be included in the record, and such other information as you would like to include in the record with your statement.

Mr. MINOW. Each has agreed that the earliest practicable realization of a commercially operable communication satellite system is a national objective, and each has agreed to conduct its respective activities with a full exchange of information so as to accelerate necessary research and development and to coordinate governmental actions necessary to attain the national objective. It is requested that a copy of the memorandum of understanding be made a part of the record.

(The memorandum of understanding between FCC and NASA follows:)

FEDERAL COMMUNICATIONS COMMISSION,
*Washington, D.C., February 28, 1961.*

MEMORANDUM OF UNDERSTANDING BETWEEN FCC AND NASA ON RESPECTIVE CIVIL SPACE COMMUNICATIONS ACTIVITIES

Chairman Frederick W. Ford of the Federal Communications Commission and Deputy Director Hugh L. Dryden of the National Aeronautics and Space Administration have signed the following memorandum of understanding between those agencies for delineating and coordinating their respective responsibilities in the field of civil communications space activities:

"The purpose of this memorandum is to provide a basis for coordinating the activities of the National Aeronautics and Space Administration and the Federal Communications Commission in the application of space technology to civil communications in order that their respective statutory responsibilities may be carried out in the national interest. It is mutually recognized that future Presidential or congressional actions may necessitate some modification of this memorandum.

"Following full and complete discussions of the present situation and future objectives, certain conditions of fact and policy guidelines were agreed upon. Both NASA and the FCC recognize as conditions of fact—

"(1) That the present state of the technology of communication satellites strongly suggests the feasibility of utilizing such satellites to expand and improve existing facilities for worldwide communications services;

"(2) That a substantial amount of further research and development is necessary to demonstrate both the technical and economic feasibility of utilizing communication satellites on a commercial basis;

"(3) That in accordance with traditional communications policy in this country, oversea public communications are provided by private enterprise, subject to Government regulation, and that at the present time oversea voice communications are provided primarily by a single company and oversea record communications are provided by several companies;

"(4) That the FCC and NASA are concerned with the Nation's total communications capability from the points of view, respectively, of civil communications policy and the commercial utilization of space technology; and that existing common carriers and others are interested in participating in the development of space telecommunications technology to expand and improve worldwide channels of communication through private expenditures; and

"(5) That the congestion and technical limitations of the radio spectrum presently useful for worldwide communications are such that without communication satellite technology the spectrum probably cannot support the very substantial increases in capacity necessary to satisfy new services, such as transoceanic TV and wide band data transmission, or to satisfy the anticipated expansion of ordinary types of services.

"On the basis of the foregoing observations, both NASA and the FCC affirm the following propositions as guidelines for the coordinated conduct of their respective activities:

"(1) The earliest practicable realization of a commercially operable communication satellite system is a national objective.

"(2) The attainment of this urgent national objective in the field of communications may be accomplished through concerted action by existing agencies of Government and private enterprise.

"(3) The statutory authority of NASA and the FCC appears adequate to enable each agency to proceed expeditiously with the research and development activities necessary to achieve a commercially operable communication satellite system. Special problems which may arise in connection with the regulation of a commercially operable system are being explored by both agencies, and may result in legislative recommendations at a later date.

"(4) In accordance with the traditional policy of conducting international communications services through private enterprise subject to governmental regulation, private enterprise should be encouraged to undertake development and utilization of satellite systems for public communication services.

"(5) Both NASA and the FCC will conduct their respective activities with a full exchange of information so as to accelerate necessary research and development and to coordinate governmental actions necessary to attain the national objective.

"(6) NASA, in appropriate cooperation with other Government agencies, will continue to direct its activities in this field toward the advancement of space technology and its application to civil communications.

"(7) The FCC, in appropriate cooperation with other Government agencies, will continue to direct its activities in this field toward the development of communications policy and the implementation and utilization of space telecommunications technology through the licensing and regulation of U.S. common carriers. In this connection, the FCC will take into account the total Government needs for communication services where such needs normally are provided by privately owned facilities.

"(8) Both NASA and the FCC, consistent with the policies of the Department of State, will facilitate international cooperative activities in the field of space telecommunications within the framework of this Nation's international obligations and aims.

"(9) Existing interagency organizations and procedures for coordination will be employed with respect to the allocation and assignment of frequencies necessary to support both the research and development and the operational phases of a civil communication satellite system."

Mr. MINOW. The Commission also has been working with the Space Council, in conjunction with other Government departments and agencies which are concerned with the new space technology, on a top level policy study which looks toward the formulation of Governmentwide policy recommendations designed to effectuate the optimum use of operational communication satellites at the earliest practicable time. This study was undertaken by the Space Council pursuant to the direction of President Kennedy. It has been completed and I am sure the committee is aware of the President's recently announced statement—it was announced yesterday—of national policy on satellite communications.

The Commission is pleased to point out that the action it has thus far undertaken toward the realization of a commercial satellite communication system is consistent with the national policy. Any future action it may take will, of course, be guided by the national objectives as set forth in the President's statement of policy.

The Commission also is participating in the work of the International Radio Consultative Committee (CCIR), with other U.S. representatives in studying the international aspects of the technical side of space radio requirements. These studies will result in recommendations to the CCIR's 10th Plenary Assembly at New Delhi in January 1963. The work of the U.S. representatives, under the sponsorship of the Department of State, is proceeding on a broad front and should be completed well in advance of the scheduled meeting in order to provide adequate time for circulation of U.S. views abroad.

I might add that Commissioner Craven has had a most responsible role in this and has chaired many of the interagency committees, and I feel if there is any question about that he is perfectly prepared to answer them today.

There are, of course, additional problems presented by the new space science that must be resolved before a commercial space satellite communications system can become a reality. The Commission is doing all that it can to aid in a prompt resolution of these problems. In this connection, the following actions and activities appear deserving of mention.

In early 1957, the Commission recognized the need for international agreement on the allocation of spectrum space satellite communications and other related space communication functions. Accordingly, it undertook, in connection with the Department of State and other Government agencies and interested segments of the communications industry, extensive studies which ultimately led to the formulation of

space communication proposals which were presented by the United States at the Ordinary Administrative Radio Conference of the International Telecommunications Union (ITU), Geneva, 1959. A feeling, not shared by the United States, generally prevailed at the Conference that too little was known at that time about the actual needs of an operable space communication system to warrant the allocation of wide bands of spectrum space for operational space communication purposes. The Conference did, though, principally on the initiative of the United States, make available certain frequency bands for space research.

In addition, the Conference recognized the necessity for the International Telecommunication Union to provide adequate frequency allocations for all categories of space radio communications at the earliest practicable date. Accordingly, it adopted a resolution which provides for the convening of an Extraordinary Administrative Radio Conference tentatively scheduled for the latter part of 1963 to consider the allocation of frequency bands required to support both research and operational phases of the various categories of space radio communication.

Since the adjournment of the 1959 Geneva Conference, the Commission has been actively engaged in preparatory work for the 1963 Extraordinary Conference.

Thus, in May 1960, it instituted a formal inquiry (docket 13522) looking toward the formulation of proposals to be made by the United States at the Conference. The issues in this proceeding include the feasibility of sharing space system frequencies with existing fixed and mobile operations; the amount of spectrum space required for various space communication functions; the most desirable portion of the spectrum within which such functions should be accommodated; and the degree of protection from harmful interferences required by each such function.

Taking into account the information filed in this proceeding, substantial progress has been made on formulation of proposals for radio frequency allocations to support the space program internationally. The Interdepartment Radio Advisory Committee has prepared, with Commission staff collaboration, a draft statement of preliminary views of the United States on this subject.

This draft has been approved by the Office of Civil and Defense Mobilization for formal coordination with this Commission, and the Commission has published it for industry comment in the form of a "Second Notice of Inquiry" in docket No. 13522. It is requested that our "Second Notice of Inquiry" be made a part of the record.

It is a comprehensive first proposal for the kind of frequency support for which international agreement appears to be necessary if the full benefits of space technology are to be made available to all the peoples of the world.

Specifically, it deals with allocation for space research, weather satellite, and communication via satellite relay. Industry views to the proposal have been filed. They are generally favorable and contain a number of constructive recommendations. As soon as possible after study of the industry views, it is planned that parallel

recommendations will be made to the Department of State by this Commission and the OCDM, for the purpose of circulation of our views abroad. The objective is to secure the widest possible area of agreement among the administrations which are members of the International Telecommunications Union—well in advance of the commencing of an international conference on frequency allocations for space.

In addition to the work being done on frequencies, the Commission has acted to facilitate experimentation by private industry designed to develop constructive technical information in furtherance of the country's overall space program.

The Collins Radio Co. has utilized experimental licenses granted early in 1960 to relay signals by way of reflection from *Echo*, the first passive communication satellite. In addition, an experimental authorization was granted in January of this year to the International Telephone & Telegraph Corp. to bounce signals off the moon and manmade passive satellites for basic research and study.

Also, in the same month, an experimental authorization was granted to the American Telephone & Telegraph Co. which will permit it to conduct an experimental program involving the transmission and reception of signals between earth terminal facilities and active communications satellites. The Commission also has granted an application filed by Westinghouse for an experimental authorization involving a pure research program directed toward development of suitable earth-station components and subsystems.

There is pending an application, filed May 1, 1961, by Communication Satellites, Inc., currently a subsidiary of the General Electric Co., requesting authority to establish a communications satellite system intended to provide worldwide interconnecting facilities for existing national telecommunications network.

This application currently is under study. Unlike all other space applications which have been handled by the Commission, this one is for regular rather than experimental service.

The Commission has also taken steps to arrive at an early solution to the administrative and regulatory problems relating to the future authorization of commercially operable space systems. Inasmuch as it now appears that it will not be feasible, for the foreseeable future, to have more than one commercial satellite system, a serious problem is presented as to the manner in which such a system can be accommodated within the existing competitive framework of our international common carrier communications industry and within the antitrust laws. The Commission felt that prompt consideration of this problem would avoid delays in the establishment of commercial communications via satellites. Accordingly, on May 29, 1961, we instituted a formal inquiry (docket No. 14024) soliciting views as to, among other things, the best method of insuring that international common carriers participate in a satellite system on an equitable and nondiscriminatory basis. It is requested that a copy of our notice of inquiry be made a part of the record.

The CHAIRMAN. Let it be included in the record.

(The notice of inquiry referred to follows:)

[Before the Federal Communications Commission, Washington 25, D.C.]

Docket No. 14024

IN THE MATTER OF AN INQUIRY INTO THE ADMINISTRATIVE AND REGULATORY PROBLEMS RELATING TO THE AUTHORIZATION OF COMMERCIALLY OPERABLE SPACE COMMUNICATIONS SYSTEMS

NOTICE OF INQUIRY

1. It is the expressed policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind. The earliest possible realization of a commercially operable point-to-point space satellite communication system represents one of the most significant, practical, and beneficial means of implementing this vital national policy. The Commission, in furtherance of its statutory responsibilities and in an effort to facilitate the advancement of the nation's vital space policy, has been engaged for some time in an attempt to assess the nature of the many varied and complex problems associated with international communications via space satellites. Present studies indicate the possible arising of conditions and circumstances which appear likely to present certain problems with respect to the authorization and operation of satellite systems for communication services between the United States and foreign points. These problems require an assessment of the Commission's administrative and regulatory functions and authority with respect thereto.

2. A number of industry organizations, including existing international communication common carriers, have expressed an active interest in the establishment and operation of space satellite relays for international public communications services. While their views differ with respect to technical characteristics, it has been suggested by some that a single integrated system, or a limited number of independent systems, offers the most feasible means of successful operation within the foreseeable future. Such view appears to be based on the premise that a multiplicity of commercial satellite systems appears unlikely in view of the substantial capital investment which will be necessary, the limitations which may be required by efficient spectrum management considerations, both national and international, and a possible inability to justify economically more than a limited number of systems in the near future.

3. The United States has, of course, maintained a policy of fostering beneficial competition among privately owned and operated international communication common carriers. However, assuming that the organization of a single or limited number of satellite systems will best serve the public interest, there is a question as to the extent to which this will be consistent with the maintenance of competition in international communications, and with the anti-trust laws and policies of the United States. The purposes of this proceeding therefore are to ascertain the various methods by which participation in such system or systems by all interested present and future international communication common carriers and others can best be effectuated on an equitable, non-discriminatory, and lawful basis.

4. In instituting this proceeding the Commission wishes to make it perfectly clear that it is mindful of the scope and complexity of the international problems inherent in the field of space communications. It is recognized that international cooperation and agreement on frequency allocations and other essential matters are required if a truly useful and efficient satellite communication system is to be realized. The Commission is also fully cognizant that before a fully operational commercial satellite communication system can be established a substantial amount of research and development remains to be completed. However, it is the Commission's opinion that consideration of the questions involved in this proceeding in advance of the resolution of these other related problems will hasten the establishment of international communication via space satellites.

5. Accordingly, there is instituted herewith pursuant to the provisions of Section 403 of the Communications Act of 1934, as amended, an inquiry into the following questions:

(1) Assuming the authorization of a single or limited number of satellite communication systems will best serve the public interest, what plan of participation is best designed to provide equitable access to, and nondiscriminatory use of, satellite communication facilities, by existing and future international communication common carriers and others? Should such a plan include participation of manufacturers of satellite communication and launching equipment? Specify in detail the features of the plan including the financial and operational arrangements related to the ownership and use of the system.

(2) Specify in detail, with supporting briefs, how such plan would comply with existing laws and policies (particular attention being given to Sections 313 and 314 of the Communications Act and pertinent anti-trust statutes).

(3) Specify in detail, with supporting briefs, the provisions of the Communications Act and Commission Rules and policies which are relied upon as authority for the Commission to prescribe such plan to the exclusion of other plans and to require licenses or other authorizations to be obtained thereunder; or, in the absence of such authority, specify in detail the changes recommended in the laws and policies in order to implement such plan.

(4) Specify in detail the extent to which each of the various parties involved in the systems covered by such plan would be subject to regulation by this Commission as common carriers or otherwise.

(5) State whether you intend to participate in such plan and the nature and extent of such participation.

6. All interested parties are invited to respond in writing to the questions herein. In view of the vital nature and widespread interest in this subject it is requested that 40 copies of each such response be filed in this proceeding rather than 15 copies ordinarily required by Section 1.54 of the Commission's Rules and Regulations. Parties responding to this inquiry shall furnish their responses on or before the 1st day of May, 1961, and replies to such responses should be filed on or before the 15th day of May, 1961. Any further filings or other proceedings herein shall be announced by subsequent orders of the Commission.

FEDERAL COMMUNICATIONS COMMISSION,
BEN F. WAPLE, *Acting Secretary.*

Adopted: March 29, 1961.
Released: April 3, 1961.

Mr. MINOW. Upon consideration of the responses and replies filed in this proceeding, the Commission, on May 24, 1961, adopted a first report in which the Commission stated that the formation of a joint venture, composed only of existing U.S. international telephone and telegraph common carriers, was deserving of exploration at this time as a means of promoting the orderly development of a commercial space satellite communication system.

In its first report, the Commission pointed out that it is not now possible or feasible to state all of the specific features which it believes should be incorporated in the joint venture, but did enumerate certain minimum objectives that any joint venture must meet.

Briefly, there must be assurance that existing and future international communication carriers, whether or not participating as owners, shall have equitable access to and nondiscriminatory use of the satellite system under fair and reasonable terms, and that any joint venture must make adequate and effective provision to insure that there be no favoritism in the procurement of equipment essential for the construction, operation, and maintenance of a satellite system. It is requested that a copy of our first report be made a part of the record.

(The first report referred to follows:)

[Before the Federal Communications Commission, Washington 25, D.C.]

Docket No. 14024

IN THE MATTER OF AN INQUIRY INTO THE ADMINISTRATIVE AND REGULATORY PROBLEMS RELATING TO THE AUTHORIZATION OF COMMERCIALLY OPERABLE SPACE COMMUNICATIONS SYSTEMS

FIRST REPORT

By the Commission:

1. On March 29, 1961, the Commission adopted a Notice of Inquiry (released on April 3, 1961) designed to facilitate an early solution to the administrative and regulatory problems relating to the future authorization of commercially operable space communication systems. It was stated in the Notice that it may not be feasible to have more than one or a limited number of commercial satellite communication systems due to the substantial capital investment required and limitation of radio spectrum space; and that this raises a problem as to the manner in which such a system or limited number of systems could be accommodated within the Commission's policy of fostering beneficial competition in the international communication field and within the anti-trust laws. Accordingly, the Notice solicited views from all interested parties as to the best plan of insuring that international communications common carriers, and others, participate on an equitable and non-discriminatory basis in a single or limited number of satellite systems. Views were also solicited as to the legality of the suggested plan; the Commission's authority to prescribe such plan; and the extent to which participants in the plan would be subject to the Commission's jurisdiction. The Notice directed that responses thereto be filed on or before May 1, 1961 and that replies to such responses be filed on or before May 15, 1961.

2. Responses have been filed by twelve parties, viz., American Rocket Society; American Securities Corporation (for the future Western Union International, Inc.); American Telephone and Telegraph Company; General Electric Company; General Telephone & Electronics Corporation; Hawaiian Telephone Company; International Telephone & Telegraph Corporation (and American Cable & Radio Corporation; Lockheed Aircraft Corporation; Press Wireless, Inc.; Radio Corporation of America (and RCA Communications, Inc.); The Western Union Telegraph Company; and the Department of Justice (commenting only on anti-trust matters).

3. Replies to such responses were filed by American Telephone and Telegraph Company, General Electric Company, and Lockheed Aircraft Corporation.

4. In general, the respondents were in agreement that for economic and other reasons a single satellite communications system or a limited number of systems, financed and owned by private enterprise, would best serve the public interest. To the extent that the respondents addressed themselves to a specific type of plan, they generally favor a joint venture for the ownership and operation of a system. The principal difference among respondents in this respect related to the composition of such a joint venture. Thus, American Telephone and Telegraph Company and International Telephone and Telegraph Corporation favor ownership in such a system being limited to international communications common carriers, such entities participating in ownership to a degree consistent with their relative use of the system; General Telephone & Electronics Corporation would limit the ownership to both domestic and international communications common carriers; while Lockheed Aircraft Corporation,[1] General Electric Company, and the Western Union Telegraph Company favor ownership by common carriers, the manufacturing companies, and possibly the public.

5. Upon consideration of the responses and replies filed herein the Commission has arrived at certain conclusions, the application of which will serve to foster and accelerate the ultimate establishment of a commercially operable space satellite communication system in the public interest.

6. We have concluded that the recommendations made herein with respect to the formation or arrangement of a joint venture (or joint undertaking) composed only of existing common carriers engaged in international telephone and telegraph communication is deserving of consideration and exploration as an

[1] Lockheed in its reply comments withdrew its proposal that ownership in a satellite system include private interests other than the international carriers.

effective means of promoting the orderly development and effectuation of such a system. We believe that, under Commission regulatory jurisdiction and subject to the conditions and safeguards hereinafter set forth, some form of joint venture by the international common carriers is clearly indicated as best serving the public interest for the following reasons:

(a) It appears to be generally accepted that because of considerations of practical economics and technical limitations, it will not be feasible for some time to come to accommodate more than one commercial satellite system.

(b) Communication via satellite will be a supplement to, rather than a substitute for, existing communication systems operated by the international common carriers, thereby becoming an integral part of the total communication system of each such carrier.

(c) The responses filed by the international carriers express a willingness and indicate a capability to marshal their respective resources for the purposes of developing a satellite communication facility.

(d) By reason of their experience in and responsibility for furnishing international communications service, the international carriers themselves are logically the ones best qualified to determine the nature and extent of the facilities best suited to their needs and those of their foreign correspondents, with whom they have long standing and effective commercial relationships and who necessarily will have a substantial interest in the operations of any satellite system.

(e) Under the Communications Act, the international carriers are obligated to furnish the public with adequate, efficient service at reasonable charges, and this obligation can best be discharged by those carriers maintaining, as far as possible, the greatest degree of direct control and responsibility over the facilities employed in this service.[2]

7. These considerations, in our opinion, demonstrate the desirability of exploring at this time the means whereby the internationl common carriers may, collectively, but subject to appropriate regulation and safeguards, take such steps as are necessary to plan and effect the ultimate integration of satellite communication techniques into the fabric of international common carrier service. At the same time these considerations would appear to militate against the suggestions which have been made by certain of the respondents that any joint venture with respect to the ownership of satellite communication systems should include participation by the public or by companies in the aerospace and communications equipment manufacturing industries.

8. We are not unmindful of the substantial interests that these industries have in the field of space science and the important contributions they have to make to this field. Nor are we unmindful of the potential market that satellite systems represent for the sale of communications and related equipment. However, it appears that the adaptation and integration of satellite communication techniques to international common carrier operations is within the economic means of the existing carriers, although requiring cooperative arrangements among them. We fail to see why ownership participation by the aerospace and communications equipment industries will be beneficial or necessary to the establishment of a satellite communication system to be used by the common carrier industry. On the other hand, such participation may well result in encumbering the system with complicated and costly corporate relationships, disrupting operational patterns that have been established in the international common carrier industry, and impeding effective regulation of the rates and services of the industry.

9. Insofar as the proposal for such participation may have been motivated by concern that without participation the manufacturers of communications equipment will be excluded from this market by the manufacturing companies affiliated with the participating common carriers, the Commission is well aware of this danger. Accordingly, it is the Commission's intention to require that any joint venture that may evolve shall make adequate and effective provision, such as competitive bidding, to insure that there will be no favoritism in the procure-

[2] It is recognized that this new technology of communication may present numerous, unique, and difficult problems which may involve several approaches and solutions of a type and nature different from those which have been used heretofore in the field of international communications. However, we are satisfied that any such new problems can best be resolved by working within the existing framework of our international common carrier industry.

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ment of communications equipment required for the construction, operation, and maintenance of the satellite system. We want to stress that we shall also take all necessary measures and establish regularized procedures to insure that such a policy is faithfully and conscientiously administered. In this connection, and also to promote the maximum degree of standardization, the Commission will also require that its approval be obtained with respect to the specifications for all equipment used by the common carriers in the satellite system, including the ground terminals. At the same time, before approving any specifications, we shall examine closely into the relevant patent situation to insure that an undesirable or dominant patent position will not hamper or frustrate the Commission's objectives in this regard.

10. It is neither possible nor feasible for the Commission here to indicate all the specific features which it believes should be incorporated in any joint venture of international common carriers. These matters will, of course, require careful, extended study and formulation by the interested carriers acting under the aegis of the Commission and in accordance with the procedures and policies hereafter to be provided for. However, regardless of the plan of organization or type of entity that may subsequently evolve, it must contain clear and definite provisions which will insure that existing and future international common carriers, whether or not any such carrier participates through ownership in the joint venture, shall have equitable access to, and non-discriminatory use of, the satellite system, under fair and reasonable terms, so as to obtain communication facilities in the system to serve oversea points with the types of services for which they are licensed or authorized by this Commission. The Commission, in issuing licenses or other authorizations that may be required to effectuate such joint venture, will take all appropriate measures to implement this policy and to effect such other safeguards as may be required in the public interest.

11. We are making no determination at this time as to the desirability or need for participation in any such joint venture by domestic common carriers.

12. In view of the foregoing, the Commission hereby announces that it will invite all United States international common carriers and certain United States government agencies to attend a conference with the Commission at an early date to explore plans and procedures whereunder consideration of the matters dealt with herein may go forward. A further order will be issued upon conclusion of such consideration.

FEDERAL COMMUNICATIONS COMMISSION,
BEN F. WAPLE, *Acting Secretary.*

Adopted: May 24, 1961.
Released: May 24, 1961.

Mr. MINOW. The Commission feels that it is essential to take such measure as will require the joint venture to afford adequate opportunity, to those not participating in the plan, to contribute their knowledge and skills to this new technology. The magnitude of the task and its significance to the national interest requires the utilization of the best scientific technology, industrial capacity, and managerial skill that this country possesses.

Accordingly, it is the Commission's intention to scrutinize critically each and every feature of any plan that may evolve to determine its compatibility with the public interest and consistency with the antitrust laws.

Pursuant to the first report the Commission on June 5, 1961, held a conference to which there were invited all respondents in Docket No. 14024, other international communication common carriers, various interested Government agencies, and staff members of several congressional committees, including a staff member of this committee, Mr. Chairman.

The purpose of this conference was to exchange views as to the plans and procedures under which exploration of the manner in which the organization of a suitable joint venture by the international carriers could best go forward. The various parties, governmental

and nongovernmental, agreed on the need for vigorous action and expressed willingness to cooperate with the Commission in its efforts to give impetus to the creation of a commercially operable space communication system.

The Commission, however, believed that it would be inappropriate to act upon the suggestions and views advanced in the meeting until after it had acted upon petitions previously filed by General Electric and General Telephone & Electronics Corp. which requested that it reconsider its first report and enlarge the basis for participation in the joint venture so as to include aerospace and communication equipment manufacturers, domestic carriers, and the public.

Following the June 5 conference, the Commission acted on the petitions and is now prepared to continue its efforts to advance the realization of a commercially operable space system.

On July 25, 1961, the Commission released a memorandum opinion and order dismissing without prejudice the petitions of General Electric and General Telephone & Electronics Corp.

I should like at this time to describe our order in some detail.

The CHAIRMAN. I wish you would.

Mr. MINOW. In its memorandum opinion and order the Commission stated that it is still in the preliminary stage of gathering essential information for its guidance in advance of taking such action as may be necessary and proper to achieve the expeditious establishment of a commercial satellite communications system.

It further stated that on the basis of the information and proposals that may evolve from the discussion of the international carriers, together with all other proposals and information, the Commission will then take such action, consistent with the public interest and applicable legal procedures, to achieve the establishment of a commercial satellite communications system.

At such time, the Commission noted, all interested parties will be afforded full opportunity to be heard concerning any rules, policies, or other actions proposed to be adopted, and the views of General Electric & General Telephone will then be considered.

Concurrently, with the issuance of its memorandum opinion and order the Commission issued a supplemental notice of inquiry by which it prescribed procedures whereunder a committee of international common carriers can engage in discussions looking toward the formulation of a plan of organization or joint venture for the development and operation of a satellite communications system.

The procedure prescribed by the Commission to govern the discussions has been determined with a view to avoiding possible violation of the antitrust laws that such discussions might otherwise engender. They require that all discussions be conducted under the surveillance of a representative of the Commission to insure that the participants strictly adhere to an agenda to be approved in advance by the Commission or its representative designated to preside.

Provision also is made for inviting representatives of interested Government agencies and industry to advise and assist the Carrier Committee. With respect to the foregoing provision, it is the Commission's desire that the Carrier Committee call upon and obtain the views of other sources wherever it appears they can make a contribution.

The Commission also specified several public interest objectives which the plan of organization of any joint venture or undertaking will be expected to meet. Thus, the plan must provide for a satellite system with the potential capacity for global coverage; ownership of the satellite portion of the system should be shared with interested foreign governments; and, all foreign communication agencies, regardless of ownership, should have access to the system on an equitable basis.

The joint venture must be so structured as to prevent domination by any single carrier, and all existing and future international carriers will be entitled to equitable access to, and nondiscriminatory use of the system under reasonable terms for the purpose of providing oversea communication services for which they are, or may be licensed or authorized by the Commission. In addition, adequate and effective provision, such as competitive bidding, must be made to insure that there will be no favoritism in the procurement of equipment required for the system, and to foster opportunity for continued research and development by all enterprises seeking to compete in furnishing such equipment for the satellite system. It is requested that a copy of the Commission's memorandum opinion and order and supplemental notice of inquiry be made a part of the record.

The CHAIRMAN. Do we have that?

Mr. MINOW. I believe so, Mr. Chairman. It is attached to the package.

At the top right-hand corner of our memorandum opinion and order would be "FCC 61-926," and on the supplemental notice of inquire would be "FCC 61-927."

The CHAIRMAN. Yes, I have it.

Mr. MINOW. All right. Thank you.

(The memorandum opinion and order and supplemental notice of inquiry referred to follow:)

[Before the Federal Communications Commission, Washington 25, D.C.]

Docket No. 14024

In the Matter of An Inquiry the Administrative and Regulatory Problems Relating to the Authorization of Commercially Operable Space Communications Systems

MEMORANDUM OPINION AND ORDER

By the Commission: Commissioners Hyde and Ford absent.

1. We are here concerned with petitions filed herein by General Electric Company and its subsidiary, Communication Satellites, Inc.,[1] and by General Telephone and Electronics Corporation. The former asks that the First Report issued herein on May 24, which concludes that a joint venture of international common carriers is deserving of exploration as a means of promoting development of a space communications system, be modified to envisage a joint venture open to all respondents in Docket No. 14024, others in the aerospace and communications industries, and the general public. The latter asks that the First Report be modified to permit participation by domestic carriers or that General Telephone be considered an international carrier.

2. Pleadings in response were filed by Lockheed Aircraft Corporation, clarifying its own position; American Telephone and Telegraph Company, opposing the General Electric petition and General Telephone petition but stating it had no position on General Telephone being considered an international carrier; Hawaiian Telephone Company, opposing the General Electric petition; The Western Union Telegraph Company, supporting the General Elec-

[1] Hereinafter referred to collectively as "General Electric."

tric petition; and International Telephone and Telegraph Company (and its subsidiaries American Cable & Radio Corporation and Radio Corporation of Puerto Rico) opposing the General Electric petition. Western Union then filed a reply to AT&T and Hawaiian; AT&T filed a reply to Lockheed and Western Union; and General Electric filed a reply to AT&T, Hawaiian and IT&T. No pleadings were filed by American Rocket Society, American Securities Corporation, Press Wireless, Inc., Radio Corporation of America (and RCA Communications, Inc.), or the Department of Justice, all of whom responded to the initial Notice of Inquiry in Docket No. 14024.

3. In our First Report herein, we stated, assuming only one commercial communications satellite system would be feasible, that a joint venture limited to international telephone and telegraph common carriers was deserving of consideration and exploration as a means of promoting the orderly development of such system. We listed several considerations which we felt supported this, and stated that these and certain other considerations appeared to militate against the participation in the joint venture by the public or by the companies in the aerospace and communications equipment manufacturing industry. We further stated that we were making no determination at the present time as to the desirability or need for participation by domestic common carriers. Further, we indicated certain minimum objectives that any joint venture must meet.

4. As contemplated by the First Report, a conference was held on June 5, 1961, under our auspices, to explore plans and procedures whereunder the matters dealt with in the report might go forward. Those invited to such conference included all international common carriers, the respondents to the inquiry in the proceeding, and interested government agencies. At the conference suggestion was made that an *ad hoc* committee of the international carriers be formed to develop a plan of organization for the joint venture. However, the Commission decided to defer any action until it had considered the petition (filed May 31) by the General Electric Company asking that the First Report be modified as indicated above. The General Telephone petition was subsequently filed.

5. General Electric takes issue with the considerations enumerated in the First Report in support of our conclusions as to the desirability of a joint venture of only international common carriers, and urges that such a limitation would be inconsistent with the timely establishment of a communications satellite system, anti-trust requirements and objectives, and the public interest. It states that it filed its petition at this time because of the urgency of the matter, since the action at which its petition is directed is obviously designed to shape the nature and make-up of any future joint venture to establish a communications satellite system. It states that, although under normal conditions applications of other parties for authorization to provide a satellite relay service would be entitled to full and comparative consideration, the Commission properly seeks because of urgent national policy considerations an approach by which it can proceed at a more rapid pace. In so doing, General Electric states, it seems that as a matter of fairness the Commission should make it possible for those who have shown a proper and affirmative interest to become part of the joint venture.

6. General Telephone urges that, through its subsidiaries and affiliates, it is an international carrier and should be so considered for the purposes of participation in any committee and in the ultimate ownership of any communications satellite system. It urges further that no basis has been presented for assuming that such a system will be limited to international communications, and that it may well be used for domesic traffic. General Telephone states that the fact that it, through subsidiaries, operates more than 4,000,000 telephones in thirty-one states would be a sound basis on which we could determine that General Telephone would be entitled to participate in any industry committee set up to study and implement a communications satellite system.

7. The petitions of General Electric and General Telephone, insofar as they request the Commission to modify its First Report, misconstrue the real import of the First Report. Such import must be considered in the context of the Notice of Inquiry preceding the First Report. That Notice proposed no rule or policy, but requested a submission of views and information on the various questions set forth therein. In other words, the Commission was seeking information which it felt it needed to guide its subsequent formulation of reasonable rules and policies in accordance with applicable statutory requirements to

govern, among other things, the issuance of authorizations and licenses to persons seeking to effectuate a commercial satellite communications system.

8. Upon consideration of the responses filed pursuant to the Notice of Inquiry, the Commission stated that it was of the opinion that the recommendation made with respect to a joint venture of international common carriers was deserving of consideration and exploration as an effective means of promoting the orderly development and effectuation of a communications satellite system.

9. However, the Commission recognized that additional information with respect to the organization and operation of any such joint venture was required before its feasibility and efficacy could be properly assessed, and that such information could best be afforded by the submission into the record of this proceeding of a concrete plan formulated by the interested common carriers. We also recognized that such a concrete proposal could not be formulated without those carriers engaging in discussions among themselves; but that such discussions would possibly engender charges of anti-trust violations. Accordingly, we called the meeting of June 5 to consider plans and procedures whereunder such discussions and planning could go forward with propriety.

10. Thus, at this stage of the proceedings, the Commission is in the process of carrying forward its inquiry to develop necessary and useful information. (To this end we are concurrently herewith issuing a Supplemental Notice of Inquiry herein.) Any proposal or information that may evolve from this further stage of the inquiry, together with all information and proposals supplies by petitioners and others, will provide a basis upon which the Commission, consistent with the public interest and applicable legal procedures, will take such further action as may be necessary to achieve the expeditious establishment of a commercial satellite communications system. At such time, all interested parties will be afforded full opportunity to be heard with respect to any rules, policies or other actions that the Commission proposes to adopt. Also, at that time the arguments advanced by General Electric and General Telephone with respect to the merits of a joint venture limited to international common carriers will be heard and carefully considered by the Commission should such arguments be relevant to the proposals then under consideration. We do not feel that in the present posture of the matter, petitioners will be prejudiced by deferring consideration of their arguments until that time.

11. We now pass to the General Telephone request that it be considered an international carrier as that term is used in our First Report.

12. General Telephone states that it has three foreign subsidiaries serving British Columbia and the Dominican Republic, and that it owns a minority interest and has operating control in a Philippine telephone company. It also states that it wholly owns subsidiaries operating international circuits from the Dominican Republic to the United States and Puerto Rico, and from Haiti to the United States, and that the Philippine company in which it has a minority interest operates circuits from Manila to the United States. It refers also to other subsidiaries which are expanding facilities between Alaska, British Columbia, Canada, and Washington.

13. We do not think that General Telephone qualifies as an international carrier as we used that term in our First Report. Each of the subsidiaries it mentioned that are not located on the North American continent are in foreign countries and therefore subject to foreign jurisdiction. They are not, even though they may be engaged in overseas operations, United States international carriers. It appears to us that they will have an opportunity to participate in the communications satellite system when and if the nation to whose jurisdiction they are subject authorizes its carriers to so participate. Insofar as General's subsidiaries which engage in communications between contiguous points on the North American continent are concerned, such operations are not of the type we consider to be international in character, since we view that term as being restricted to carriers engaging in operations between the United States and overseas points.

14. In view of the above, we see no purpose to be served by oral argument or hearings on the matters raised by the petitions herein.

15. Accordingly, it is ORDERED, this 21st day of July, 1961, that the petition herein of General Electric Company is DISMISSED WITHOUT PREJUDICE to its further participation in these proceedings and that the petition herein of General Telephone and Electronics Corporation is DENIED insofar as it is requested that

petitioner be considered an international common carrier as that term is used in our First Report herein, and in all other respects is DISMISSED WITHOUT PREJUDICE to its further participation in these proceedings.

FEDERAL COMMUNICATIONS COMMISSION,
BEN F. WAPLE, *Acting Secretary.*

Released: July 25, 1961.

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[Before the Federal Communications Commission, Washington 25, D.C.]

Docket No. 14024

IN THE MATTER OF AN INQUIRY INTO THE ADMINISTRATIVE AND REGULATORY PROBLEMS RELATING TO THE AUTHORIZATION OF COMMERCIALLY OPERABLE SPACE COMMUNICATIONS SYSTEMS

SUPPLEMENTAL NOTICE OF INQUIRY

1. The Commission has under consideration (a) its First Report herein in which the Commission stated that a joint venture of international telephone and telegraph common carriers deserved exploration as a means of promoting the prompt and orderly effectuation of a commercially operable satellite communications system; (b) the record of the conference held on June 5, 1961, herein, pursuant to the First Report, at which suggestions were made as to plans and procedures whereby such exploration may best go forward; and (c) the Memorandum Opinion and Order adopted today with respect to petitions for reconsideration requesting the Commission to modify the First Report in certain respects.

2. The Commission is now prepared to set forth a plan of procedure to govern future discussions by the international common carriers, hereinafter specified, through a committee referred to herein as the *Ad Hoc* Carrier Committee, looking toward their joint formulation of a plan of organization or joint venture for the development, construction, ownership, operation, management, and use of a commercially operable satellite communications system. This plan of procedure has been determined with a view to avoiding possible violations of the anti-trust laws that such discussions might otherwise engender.

3. The Commission feels that the results of the proposed discussions by the international carriers will furnish to the Commission significant information which, together with all other information and proposals, will provide the basis on which the Commission may take such further steps as are necessary, in accordance with the public interest and requirements of law, to achieve the establishment of a commercially operable satellite communications system at the earliest practicable date.

4. It is to be emphasized at the outset that the Commission intends to provide an officer to preside at all discussions of the *Ad Hoc* Carrier Committee, but *only* for the purpose of insuring that such discussions are conducted with strict adherence to an agenda approved in advance by the Commission or its representative designated to preside. It is also expected that complete minutes shall be made of the principal content of all such discussions, and the accuracy of all such minutes shall be certified by the Commission's representative.

5. The agenda shall be initially formulated by the *ad hoc* committee meeting under the supervision of the Commission's designated representative. There shall be no departure from the approved agenda without first securing from the Commission, or its representative, approval of the proposed modification, depletion or addition. Subject to the consent and approval of the Commission's representative, the agenda may be taken up in such order as may be agreed to by a majority of the participants on the *ad hoc* committee who are present at a duly constituted meeting of such committee. There shall be no discussions of any kind between any carrier participants regarding any subject matter related to the approved agenda except within the committee itself and in the presence of the Commission's representative who shall designate the time and place for all committee discussions. The Commission's representative shall have authority to terminate any discussion or adjourn any meeting whenever he considers such action to be in the public interest.

6. As the agenda subject matter may warrant, representatives of interested government agencies and industry may be invited by the *Ad Hoc* Carrier Committee to participate in discussions for the purpose of furnishing the committee advice or assistance regarding matters within their competence or concern. It

is the Commission's desire that the *Ad Hoc* Carrier Committee call upon and obtain the views of other sources wherever it appears that they can make a contribution. For example, representatives of interested government agencies and industry groups clearly would have an interest in several aspects of subsection (f), par. 8, infra. Therefore, we would expect that they would be permitted to make their contribution to the formulation of the plans concerning these aspects. We wish to make clear, however, that at this stage we leave the extent and nature of participation by such groups to the *Ad Hoc* Carrier Committee.

7. Representatives of the following international common carriers are invited to participate as members of the *Ad Hoc* Carrier Committee:

American Cable and Radio Corporation (Mackay Radio, Inc., the Commercial Cable Company, All America Cables and Radio, Inc., and Globe Wireless, Ltd.)
American Telephone and Telegraph Company
Hawaiian Telephone Company
Press Wireless, Inc.
Radio Corporation of Puerto Rico
RCA Communications, Inc.
South Porto Rico Sugar Company
Tropical Radio Telegraph Company
United States-Liberia Radio Corporation
The Western Union Telegraph Company

8. The *ad hoc* committee should give full regard to the following public interest objectives which the plan of organization and operation of any joint venture will be expected to satisfy and accommodate:

(a) A commercially operable communications satellite system will be expected to provide the potential means for global coverage.

(b) Ownership of the satellite portion of the system will be shared with interested foreign governments or communications agencies.

(c) All such foreign governments or communications agencies, whether or not participating in ownership of the satellite portion of the system, will be entitled to access to the system on an equitable basis and on reasonable terms.

(d) Any joint venture of international common carriers shall be so arranged or structured (1) to prevent any single participating carrier from being in a position to dominate or control the development, construction, management, operation or use of the communications satellite system to the detriment of any other common carrier whether or not such other common carrier or carriers participate in the joint venture as an owner thereof, and (2) to permit future ownership participation by any international common carrier that may subsequently be created, or any existing international common carrier which subsequently may desire ownership participation.

(e) The plan of organization and operation of any joint venture must make clear and definite provision to insure that existing and future international common carriers, whether or not any such carrier participates through ownership in the joint venture, will have equitable access to, and nondiscriminatory use of, the satellite system under fair and reasonable terms, for the purpose of obtaining communications facilities in the system to serve overseas points with the types of services for which they are or may be licensed or authorized by the Commission.

(f) The plan of organization and operation of any joint venture shall make adequate and effective provision, such as competitive bidding, to insure that there will be no favoritism in the procurement of communications equipment required for the construction, operation, and maintenance of the satellite system and to foster opportunity for continued research and development activity by all enterprises seeking to compete in furnishing such equipment for the satellite system.

(g) The accounting and records maintained by any joint venture shall be of such a nature and detail as to reflect fully its investment, expenses, taxes, revenues, assets, and liabilities and to comply with all applicable governmental regulations with respect to such matters.

9. It is to be understood that the aforementioned objectives are not intended to be all inclusive of the public interest objectives against which any proposed joint venture will be tested.

10. The Commission regards the establishment of a communications satellite system of the greatest urgency and national importance. Therefore, in order to avoid delay in achieving this national objective, the *ad hoc* committee shall

complete its work with the greatest possible expedition. Upon completion of the discussions by the *ad hoc* committee, but in any event no later than October 13, 1961, the committee shall submit for the record herein a full written description and explanation of the organization and operation of any proposed joint venture that it may formulate, giving particular regard to the aforementioned objectives. Such statement shall also include information on behalf of each participant as to the capital contributions it is committed to make to the joint venture and the extent to which such participant or any of its corporate affiliates proposes or intends to furnish or offer to furnish to the joint venture any equipment, apparatus, supplies or services of any kind. In addition, with respect to paragraph 8(e) above, the statement shall include, on behalf of each participant which also owns, operates or controls common carrier communication facilities used to furnish service between points within the continental United States, a full description of all policies and practices which such participant proposes to apply with respect to the interconnection of those facilities with the facilities of any international common carrier for rendering those services licensed or authorized by the Commission. The *ad hoc* committee shall duly serve its report upon all respondents herein, who are hereby authorized to submit written comments thereon to the Commission within 15 days following such service.

FEDERAL COMMUNICATIONS COMMISSION,
BEN F. WAPLE, *Acting Secretary.*

Adopted: July 21, 1961.
Released: July 25, 1961.

Mr. MINOW. The Commission regards the establishment of a communication satellite system of the greatest urgency and national importance. Therefore, in order to avoid delay in achieving the national objective the Commission has directed the Carrier Committee to complete its work with the greatest possible expedition.

To this end, the Commission has scheduled a meeting of the Committee for August 3, 1961.

Commissioner Craven has been designated by the Commission, Mr. Chairman, to be our representative at that meeting.

The Committee is required to submit to the Commission not later than October 13, 1961, a detailed written description and explanation of the organization and operation of any proposed joint venture that it may formulate, giving particular regard to the public interest considerations set forth by the Commission.

The Commission feels that the results of the proposed discussions by the international carriers will provide it with significant information which, together with all other information and proposals, will form the basis on which the Commission may take such further steps as are necessary, in accordance with the public interest and requirements of law, to achieve the establishment of a commercially operable satellite communications system at the earliest practicable date.

Since the administration of the antitrust laws by the Department of Justice is involved in this matter, the Commission is maintaining continuing liaison with the Department. The Department has expressed its desire to assist the Commission in any way possible in order to facilitate the establishment of a commercial space system.

We trust, Mr. Chairman and members of the committee, that this statement serves to delineate the Commission's role in the development of commercial satellite communication systems, and provides the committee with information and data which will be of assistance to it. The Commission shall, of course, keep the committee fully informed of all further developments which occur within its area of responsibility.

(The second notice of inquiry referred to follows:)

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington25, D. C.

FCC 61-652
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| In the Matter of | ) | |
| | ) | |
| An Inquiry into the Allocation of Frequency Bands for Space Communications | ) | DOCKET NO. 13522 |

SECOND NOTICE OF INQUIRY

1. The first Notice of Inquiry in this proceeding, adopted by the Commission on May 18, 1960, called for initial comments to be filed with the Commission on or before March 1, 1961. Having reviewed those comments, and having consulted with the Office of Civil and Defense Mobilization (OCDM) and the Interdepartment Radio Advisory Committee (IRAC), the Commission now offers for public comment a draft statement entitled "Preliminary Views of the United States of America - Frequency Allocations for Space Radiocommunication". It is not intended to be a recommended United States position for the proposed 1963 space conference of the International Telecommunication Union. Rather, its purpose is to serve as a vehicle by which the ideas and reactions of other countries can be obtained and taken into account.

Following study of the comments received in response to this Second Notice, the Commission, in consultation with the OCDM, expects to make such modifications in the attached statement in the light of comments received as appear to be appropriate and practicable. The resultant statement then is expected to be transmitted to the Department of State with a recommendation that it be used by U. S. representatives as the basis of discussion with other countries.

2. Inasmuch as the attached statement has been prepared for international study, it is premature to indicate at this time the ultimate national distribution of spectrum space as between government and non-government users in the space program. Additionally, since this document represents only preliminary views, it is reasonable to expect that it will be changed before it reaches the status of a U. S. proposal to an international conference empowered to allocate frequency space for space programs. Following such a conference, and depending upon the results thereof, it then will be appropriate to perfect domestic arrangements for implementation of the new allocations.

3. The Commission recognizes that, from a purely technical viewpoint, the attached preliminary views with respect to frequency support for space radiocommunication are based on projected as well as present technology and also on comparatively limited operational experience. They therefore represent a present best estimate of new requirements deserving international recognition, and are subject to

modification in the light of future developments in the space programs of the United States and of other countries.

4. The attached statement is intended to be as complete and understandable as possible without being overly long or ultra-scientific. In this context, and taking into account its intended future use, not only comments directed to the substance of the statement but also editorial suggestions, are invited.

5. The Commission recognizes that if the frequency allocations discussed in the attached statement eventually should achieve treaty status, it will be important to present and prospective users of the bands for non-space purposes to know where the earth terminals of the space system(s) will be located. This general problem of early identification of earth terminal site locations was raised by Issue 9 * in this proceeding. Issue 9 was contained in a supplement to the First Notice of Inquiry. Although the parties responding to Issue 9 were not entirely in agreement, a majority of comments favored the idea. In any event, the Commission presently believes that such action would be in the best interests of its licensees. Accordingly, a separate rule-making proceeding will be initiated as soon as possible, looking toward the designation of a minimum number of such sites and establishment of the protection criteria to be observed by the sharing services concerned. These criteria will be based upon the filings already received in this proceeding.

6. Any interested person is invited to file comments with the Commission concerning this matter on or before June 23, 1961. No provision is made for filing of reply comments. The urgency attaching to this matter from a national point of view makes it imperative that every effort be made to submit comments by the date set forth herein. Due to the interest expressed in the subject of space communication and the extensive intra-governmental coordination necessary to formulate a national position on this subject, it is requested that an original and 39 copies of each comment be furnished to the Commission.

FEDERAL COMMUNICATIONS COMMISSION

Attachment

Ben F. Waple
Acting Secretary

Adopted: May 17, 1961

Released: May 19, 1961

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* Issue "9. Assuming, at least initially, (1) that existing surface communications must continue to function, and (2) that geographical separation is the key to successful sharing of frequency bands, it appears that earth terminals should be located in sparsely settled areas, away from concentrations of communication installations. Therefore, should the Commission, on the basis of criteria developed pursuant to the new issue three, give consideration to amending its Rules at an early date to establish protected geographical areas to be held in reserve for the installation of future earth terminals for civil communication systems via space relays?.."

Attachment to
Second Notice of Inquiry
Docket 13522

D R A F T

PRELIMINARY VIEWS
OF THE
UNITED STATES OF AMERICA

FREQUENCY ALLOCATIONS
FOR
SPACE RADIOCOMMUNICATION

May 17, 1961

## PRELIMINARY VIEWS OF THE U.S.A. FOR FREQUENCY ALLOCATIONS FOR SPACE RADIOCOMMUNICATION

1. INTRODUCTION - Studies of the world trend in telecommunication requirements and the known plans for expansion of existing telecommunication facilities throughout the world have repeatedly indicated that beginning about 1965 the loading of these facilities will approach saturation in many areas. This is particularly true of such facilities as submarine cables and high-frequency radio circuits. With regard to cables, economic factors will govern the number of cables which will be installed and the location of the terminals which they will serve. The matter of congestion in the high-frequency spectrum has concerned Members of the International Telecommunication Union (ITU) for many years. There is no foreseeable reduction in the use of high frequencies for global communication. On the other hand, expansion of service in the high frequency bands will become increasingly impracticable. Accordingly, it becomes necessary to seek alternative means to satisfy growing telecommunication needs of the peoples of the world, particularly of new or developing countries. These alternative means are needed for growth. Global communication via earth-satellite relays promises to afford such an alternative which will be required beginning about 1965. It is the purpose of this paper to set forth in broad outline certain initial conclusions with regard to frequency allocations for this promising new telecommunication development, and other space radiocommunication needs.

1.1 Since the first demonstration of the practicability of transmitting intelligence from one part of the earth to another by the use of radio waves relayed by artificial satellites, the U.S.A. has been studying the technical parameters which appear to be relevant to eventual frequency allocations for all categories of space radiocommunication, in the context of Recommendation No. 36 of the Ordinary Administrative Radio Conference (OARC), Geneva, 1959.

1.2 The uses of space radiocommunication may be grouped as follows:

a. Aeronautical Mobile.
b. Broadcasting.
c. Meteorological.
d. Navigation.
e. Space Research - guidance, control and associated communications, including tracking and telemetering.
f. Communication relay (both active and passive).

1.3 While radio astronomy is not classified by the ITU as a space service, nevertheless, because of its scientific importance, the matter of radio astronomy allocations is under study.

1.4 An operating world-wide communication satellite space service is probably one of the first areas in which a practical use may be made of satellites, involving high-capacity, reliable information exchange

between points on the earth's surface, including ships, aircraft and aerospacecraft. Relay may be effected by several means --e.g., low or intermediate altitude satellites in random or controlled orbit, high altitude satellites in synchronous orbit, natural or man-made passive reflectors, etc. International standardization of frequency allocations is a prerequisite to the introduction of world-wide operational communication satellite systems.

1.5 Certain relevant radio wave propagation data were made known at the Plenary Assembly of the CCIR at Los Angeles in 1959. Subsequently, the 1959 OARC at Geneva established certain allocations for space research. These allocations, however, were not intended to accommodate the larger bands of frequencies required by satellite communication systems equipped for high-capacity, multi-channel transmission.

2. AERONAUTICAL MOBILE - The advances in the field of air transportation in recent years point to the approaching need to accommodate communications for aircraft and aerospacecraft operating at extremely high speeds and altitudes. Present indications are that the speeds and altitudes of aeronautical operations will increase on an evolutionary basis to speeds many times in excess of that of sound and altitudes beyond 160 kilometers. Further, these operations are unique in that the aircraft or aerospacecraft must operate in the earth's atmosphere during the departure and reentry phase of the flight and in space or near space during the middle portion of the flight.

2.1 Such flights, when operating in the atmosphere and traveling at high speeds, are expected to require frequency bands much higher than those aviation bands presently allocated due to ion shielding created by thermal friction. For example, present indications are that 5 Gc/s frequencies are the lowest usable order of the spectrum which will satisfy radio communication with vehicles traveling in the atmosphere at 17 times the speed of sound. Until substantially more research and development has been accomplished in this field, however, it is not possible to set forth the entire space radiocommunication needs for the aeronautical mobile services.

2.2 On the other hand, during the earlier stages of aeronautical evolution toward space operations, space radiocommunication techniques will be required. That is to say, aircraft operating at speeds of 2 - 7 times the speed of sound and at altitudes beyond 80 - 100 thousand feet will probably require a constant communication link with ground stations. Flights of this nature can be controlled by a computer and automatic data communications throughout the entire flight. Since constant radiocommunications of this type would be incompatible with the present aviation system of common user frequency deployment, additional spectrum space is required. Accordingly, the U.S. proposes to provide for aeronautical mobile (R) service operation in the band 1540-1660 Mc/s on a shared basis with radionavigation for this mode of aeronautical communications.

3. BROADCASTING - "Broadcasting" as the term is used in the Radio Regulations means transmissions intended for direct reception by the general public. It is probable that communication satellites will be used to relay aural and television broadcast programs. However, the likelihood that the general public will be receiving such transmissions directly from satellites in the near future seems remote. Special receiving stations on the earth's surface may be established to relay programs over conventional communications systems to the broadcasting stations which already serve the general public. The relaying of broadcast programs by means of satellites would not be an operation in the broadcasting service.

4. METEOROLOGICAL - A "universal" meteorological satellite has been the subject of international study in the World Meteorological Organization (WMO). The United States has participated in this planning and is anticipating the ultimate use of meteorological satellites on an operational basis.

4.1 Two types of satellites are under consideration for the operational meteorological satellite system - polar or quasi-polar orbiting satellites and the so-called synchronous orbiting satellites. Three types of transmissions are planned with each of these systems:

a. From Command Data Acquisition station (CDA) to the satellite(s) during periods when the satellite is within line-of-sight of the CDA station.

b. From the satellite to the CDA station on command during the time the satellite is within line-of-sight of the CDA station.

c. Continuous transmission from the satellite.

4.2 Several frequency channels with various bandwidths will be needed to meet these requirements, as follows:

4.2.1 The command frequency requirements can be met in the manner proposed in paragraph 8 below.

4.2.2. Two channels of 90 kc/s bandwidth each will be required for digital and slowed down video transmission from the satellite to the ground. It is proposed to satisfy this requirement in the band 137-138 Mc/s. These transmitters will have up to a possible maximum of 50 watts power output and may operate continuously or on command.

4.2.3 Four channels of 5 Mc/s bandwidth each (includes guard band) will be required for broad-band video transmission from the satellite to the ground. Power output of these transmitters will be up to a possible maximum of 50 watts, and initially will operate only on command and in the vicinity of the CDA stations. The bands 1660-1670 and 1690-1700 Mc/s are proposed for the satisfaction of this requirement.

4.2.4 A 100 Mc/s band is required for satellite weather radar. It is proposed that this requirement for suitable precipitation detection, be met in the radiolocation band 9.8-10.0 Gc/s in the manner indicated in paragraph 8.

4.2.5 A channel of approximately 100 Mc/s bandwidth is required to transmit a large volume of high resolution picture data from the satellite to the CDA station on each orbital pass. It is proposed that this requirement be met in the band 7.2-7.65 Gc/s in the manner indicated in paragraph 8.

4.2.6 One channel of 100 Mc/s bandwidth is required for cloud detection radar. These pulsed radars will have power output as high as 100 kW peak power and operate throughout the orbit. It is proposed that this requirement be met in the band 33.4-36.0 Gc/s.

5. NAVIGATION - At such time as there is available an operational space satellite navigational aid of widespread interest to aviation and shipping, appropriate frequency allocation provision for such a navigational system may be derived from bands available to the radionavigation service. The roles of the International Civil Aviation Organization (ICAO) and the Inter-governmental Maritime Consultative Organization (IMCO) with respect to such aids are recognized in this regard.

6. SPACE RESEARCH - The experience of the U.S.A., to date, with the "space research" bands allocated at the 1959 OARC at Geneva, together with present planning estimates, indicate these should be augmented. At this writing (April 1961) there have been 54 earth satellites launched, all with transmitters on board. There has never been any report of interference to other services from the space service although the space vehicles have experienced interference from these other services. Consequently, the U.S.A. suggests more protection to the space bands as well as some deletions and augmentations. Command frequencies are mentioned for the first time, and these can be accommodated on an area basis, but should be noted in the table. Present use of the 1959 OARC space research bands is summarized in Appendix 1. Recommendations for their augmentation are set forth in Appendix 2.

7. COMMUNICATION SATELLITES - The establishment of frequency allocations for communication satellites requires evaluation of various types of information. The principal factors to be considered can be grouped under the following main headings:

a. Radio wave propagation characteristics.
b. State of the art.
c. Amount of spectrum space required.
d. Feasibility of sharing.
e. Selection of bands.

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7.1 The conclusions which can be drawn after evaluation of these five factors are not in all respect mutually consistent. For example, analysis of some of the parameters involved will lead to a conclusion that the allocation for communication satellites should be established in one part of the spectrum, while analysis of other parameters will indicate a need for a quite different part of the spectrum. The following paragraphs sum up presently available information on each of the factors which appear to be relevant.

7.2 RADIO WAVE PROPAGATION CHARACTERISTICS - Radio wave propagation data now available indicate there are several "windows" in different parts of the radio spectrum through which radio signals may be transmitted from the surface of the earth to points outside the earth's atmosphere, and vice versa. The most significant of these "windows" from the standpoint of the present state of development of the radio art and the limitations presently imposed by space technology, appears to lie roughly between 100 Mc/s and 20 Gc/s. Appendix 3 contains 20 curves depicting the various relevant parameters and their variations under different stated conditions. It is apparent from evaluation of this Appendix that within the general range of frequencies between about 100 Mc/s and 20 Gc/s there are varying degrees of attenuation affecting radio signals transmitted from the earth's surface to a satellite in space, or vice versa. The choice of frequency bands within the broad area represented by the "window" between and about 100 Mc/s and 20 Gc/s must necessarily take into account considerations other than the absorption and attenuation factors set forth in Appendix 3. Consideration of bandwidth and state of the art indicate the desirability of employing bands above 4 Gc/s. Satellite-to-satellite relaying can be performed above 20 Gc/s without interference to or from earthbound radio services.

7.3 STATE OF THE ART - Provision of spectrum space by the ITU for communication satellites, when effected, should serve to guide Administrations for some years to come. It therefore appears necessary to take into account both the present state of the radio art and the anticipated developments for the next several years. From available information it would appear that the present state of the art lends itself to the inauguration of the communication satellite space service only in those frequency bands below about 10 Gc/s. This is because the available receiver input power, with practical systems which can be built at the present time, will not overcome the various absorption and attenuation factors sufficiently to provide continuous, reliable communication, under practical operating conditions, at frequencies much above 10 Gc/s. This situation may be seen from Figures 17 through 20 in Appendix 3, when account is taken of the fact that satellite powers of the order of only a few watts are presently available. The intensive research and development programs now under way will, however, lead to various improvements in the state of the art, including much greater satellite transmitter power and supporting energy sources therefor, and it may be expected that frequencies up to about 16 Gc/s may become usable for practical satellite systems.

7.4 AMOUNT OF SPECTRUM SPACE REQUIRED - An appreciation of the amount of spectrum space required for allocation to communication satellite systems of the future requires taking into account the present and foreseeable capacities of other communication systems and the anticipated growth and demand for service, at least until about 1970. The existing systems include transoceanic cables, conventional microwave radio relay systems, tropospheric scatter systems, ionospheric scatter systems, land line circuits and high-frequency fixed radio circuits.

7.4.1 The requirements of the peoples of the world to communicate are not susceptible to exact mathematical prediction. It has been well established over the years, however, that given a new communication facility, the requirements to use it are seldom lacking. If a large number of new international communication facilities of any type could be made available at once, there is little doubt that they would soon be in regular use.

7.4.2 An important consideration is that the financial costs involved in building and launching communication satellites are such that a large number of communication channels will have to be provided if the satellites are to prove economically feasible.

7.4.3 Compared with conventional communication techniques, a relatively small number of communication satellite channels can presently be derived from a given amount of spectrum space. This is due to modulation techniques presently employed which are chosen because of the relatively low orders of power presently realizeable in satellite transmitters. As advances in the state of the art are made it can be expected that the number of actual communication satellite channels that can be derived from a given amount of spectrum space will progressively increase. Nevertheless, the efficiency (ratio of intelligence bandwidth to radio frequency bandwidth), at the present time, is of the order of 10-15%. This consideration is influential in estimates of the amount of spectrum space to be allocated initially for communication satellites. Moreover, the expected increase in channel efficiency should serve to offset future growth requirements as communication satellite uses expand and the demands placed on them increase. A further consideration is that the available channels in a given satellite must, in effect, be divided among the various (earth) satellite terminal stations in simultaneous communication with that satellite.

7.5 FEASIBILITY OF SHARING - On the basis of information currently available, there is little doubt that it is feasible for a communication satellite space service to share frequency bands with fixed and mobile services to which these bands are now allocated, provided reasonable engineering care is exercised by each of the sharing services. Because of the low transmitting power capability of satellites expected to be used during the next several years, it appears necessary to employ wideband modulation techniques on board the satellites to improve the signal-to-noise ratios to a usable level at the earth receiving terminal, even when using high gain antennas and parametric or maser amplifier techniques. As a result, the satellites' signals at the earth's surface will not be detectable by receivers in the fixed and mobile services. Satellite-to-earth

signals can thus be discounted as potential interference sources for several years to come, despite probalbe improvements in both microwave and satellite techniques, within reasonable limits. Conversely, the likelihood of harmful interference to the reception on board satellites which might be caused by terrestial fixed and mobile stations also appears to be negligible. The problem remaining them becomes one of preventing mutual interference between the receiving and transmitting earth terminals of the space system and stations of the services with which sharing is desired. Factors to be considered in preventing this interference are: geographical separation, minimum permissible antenna elevation angles for earth terminals, transmitter powers, antenna orientation, local terrain, and receiver noise figures. However, mobile requirements are foreseen which dictate the need for minimal allocation provisions on an exclusive basis.

7.5.1 Sharing criteria applicable to tha above problem are currently under study in U.S. CCIR Study Group IV. Based on information currently under development for introduction into that Study Group, it appears that 75 miles separation between earth stations will provide adequate protection from mutual interference. This assumes that earth station antennas will not be depressed below $7\frac{1}{2}^{o}$ and a mean power of 1 kW into the earth station antenna. This also assumes a smooth earth condition, and that the antennas are separated in asimuth by at least $10^{o}$. The separation criteria, of course, will vary with powers and topography.

7.6 SELECTION OF BANDS - The U.S.A. estimates that a total of about 3000 Mc/s of spectrum space should be allocated at this time to meet foreseeable requirements until about 1970. Between 3700 and 8400 Mc/s, the existing fixed and mobile space should be designated in the Table of Frequency Allocations as follows:

| | | |
|---|---|---|
| 3.7-4.2 | Gc/s | COMMUNICATION SATELLITE SPACE (Space stations)<br>FIXED<br>MOBILE |
| 5.925-6.425 | Gc/s | COMMUNICATION SATELLITE SPACE (Earth stations)<br>FIXED<br>MOBILE |
| 6.425-7.2 | Gc/s | COMMUNICATION SATELLITE SPACE (Earth and Space stations)<br>FIXED<br>MOBILE |
| 7.2-7.65 | Gc/s | COMMUNICATION SATELLITE SPACE (Space stations)<br>FIXED<br>METEOROLOGICAL SATELLITE SPACE (100 Mc/s)<br>Mobile |
| 7.65-7.7 | Gc/s | COMMUNICATION SATELLITE SPACE (Space stations) |

| | | | |
|---|---|---|---|
| 7.7-7.9 | Gc/s | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | (Earth and Space stations) |
| 7.9-8.35 | Gc/s | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | (Earth stations) |
| 8.35-8.4 | Gc/s | COMMUNICATION SATELLITE SPACE | (Earth stations) |

This arrangement of bands provides:

a) A total of 1000 Mc/s for satellite-to-earth transmissions of which 50 Mc/s (7.65-7.7 Gc/s) is exclusively for that purpose and the remaining 950 Mc/s shared with the fixed and mobile services.

b) A total of 1000 Mc/s for earth-to-satellite transmissions of which 50 Mc/s (8.35-8.4 Gc/s) is exclusively for that purpose, and the remaining 950 Mc/s shared with the fixed and mobile services.

c) Two bands, shared with fixed and mobile services, not designated at this time, either for earth stations only or satellite stations only. These two bands (6.425-7.2 and 7.7-7.9 Gc/s) are so placed as to permit later adjustment as needed dependent upon the nature and magnitude of requirements and advancements in the state of the radio art.

d) A total of 2975 Mc/s for the communication satellite space service.

8. CONCLUSIONS - The U.S.A. has concluded that, in order to:

a. Accommodate aerospacecraft,

b. Accommodate meteorological satellites,

c. Augment the Space and Earth-Space (space research) bands contained in the Geneva Radio Regulations, and

d. Provide frequency allocations in the immediate future for the reliable exchange, via communication satellite relay, of high-capacity information between points on the earth's surface, including ships, aircraft and aerospacecraft,

the Table of Frequency Allocations should be amended as follows:

| BAND (Mc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 136-137 | SPACE RESEARCH | |
| 137-138 | METEOROLOGICAL SATELLITE SPACE<br>SPACE RESEARCH<br>SPACE (tracking) | |
| 138-144 | FIXED<br>MOBILE<br>Radiolocation* | The frequencies 144.0 and 148.0 Mc/s, with a maximum bandwidth of 20 kc/s, may be used for satellite command purposes subject to agreement between administrations concerned and those whose services, operating in accordance with the Table, may be affected.<br><br>287** |
| 144-148 | AMATEUR | |
| 148-174 | FIXED<br>MOBILE | |
| 400-401 | METEOROLIGICAL AIDS<br>SPACE RESEARCH | |
| 406-420 | FIXED<br>MOBILE except aeronautical mobile | The frequencies 420.0 and 450.0 Mc/s, with a maximum bandwidth of 25 kc/s, may be used for satellite command purposes subject to agreement between administrations concerned and those whose services, operating in accordance with the Table, may be affected.<br><br>317**<br>318** |
| 420-450 | RADIOLOCATION<br>Amateur | |
| 450-470 | FIXED<br>MOBILE | |
| 1427-1525 | FIXED<br>MOBILE | |
| 1525-1540 | SPACE | In the band 1525-1535 Mc/s, telemetry only; in the band 1535-1540 Mc/s, command only. |

* Permitted service.
** Footnote as contained in Geneva Radio Regulations.

| BAND (Mc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 1540-1660 | AERONAUTICAL MOBILE (R)<br>AERONAUTICAL RADIONAVIGATION | The use of the band 1540-1660 Mc/s by the aeronautical mobile (R) service is limited to radiocommunications along civil routes for flights utilizing space radiocommunication techniques and which may be operating in the space environment.<br><br>In the band 1600-1660 Mc/s the aeronautical radionavigation service will be protected from harmful interference from the aeronautical mobile (R) service for an unspecified period of time.<br><br>341** |
| 1660-1670 | METEOROLOGICAL SATELLITE SPACE<br>Radio Astronomy | The radio astronomy service is authorized to use the band 1664.4-1668.4 Mc/s. The radio astronomy service shall be protected from harmful interference from services operating in other bands only to the extent that these services are protected from each other. |
| 1670-1690 | METEOROLOGICAL AIDS (Radiosonde) | |
| 1690-1700 | METEOROLOGICAL SATELLITE SPACE | |
| 1700-1710 | SPACE RESEARCH | |
| 1710-2290 | FIXED<br>MOBILE | The band 2110-2120 Mc/s may be used for command of spacecraft engaged in deep space research, subject to agreement between administrations concerned and those whose services, operating in accordance with the Table, may be affected. |
| 2290-2300 | SPACE RESEARCH | For deep space research only. |

** Footnote as contained in Geneva Radio Regulations, but with the limits of the appropriate band changed to read: 1540-1660 Mc/s.

| BAND (Gc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 3.7-4.2 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | For transmission only by communication satellite stations whose field strength at the earth's surface is below that detectable by receivers in the fixed and mobile services. |
| 5.925-6.425 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | For transmission only by earth stations, subject to agreement between administrations affected. |
| 6.425-7.2 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | Transmission by earth stations in this band is subject to agreement between administrations affected. When used for communication satellite stations, the field strength at the earth's surface shall be below that detectable by receivers in the fixed and mobile services.<br><br>The band 7.12-7.13 Gc/s may be used for command of spacecraft subject to agreement between administrations affected. |
| 7.2-7.65 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>METEOROLOGICAL SATELLITE SPACE<br>MOBILE | For transmission only by communication satellite and meteorological satellite stations whose field strength at the earth's surface is below that detectable by receivers in the fixed and mobile services.<br><br>Meteorological satellite stations share 100 Mc/s of this band. |
| 7.65-7.7 | COMMUNICATION SATELLITE SPACE | For transmission only by communication satellite stations. |
| 7.7-7.9 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | Transmission by earth stations in this band is subject to agreement between the administrations affected.<br><br>When used for communication satellite stations, the field strength at the earth's surface shall be below that detectable by receivers in the fixed and mobile services. |

| BAND (Gc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 7.9-8.35 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | For transmission only by earth stations and subject to agreement between administrations affected. |
| 8.35-8.4 | COMMUNICATION SATELLITE SPACE | For transmission only by earth stations. |
| 8.4-8.5 | SPACE RESEARCH | |
| 9.8-10.0 | RADIOLOCATION | The band 9.9-10.0 Gc/s may be used for satellite weather radar for precipitation detection. |
| 15.15-15.25 | SPACE RESEARCH | |
| 31.5-31.8 | SPACE RESEARCH | |
| 33.4-36.0 | RADIOLOCATION | Satellite weather radars for cloud detection share 100 Mc/s of this band. |

9. Certain proposed consequential changes to the Geneva Radio Regulations are indicated in Appendix 4.

10. These preliminary views of the U.S.A. are put forth at this time for informal discussion in the hope that such discussions, together with additional experience and subsequent developments in the state of the art, will lead to firm conclusions which can become the basis of action in whatever administrative radio conference takes up the question referred to in Recommendation No. 36 of the 1959 OARC, Geneva.

Appendices 1 through 4

## APPENDIX 1

### GUIDE FOR USE OF THE 1959 I.T.U. SPACE AND EARTH-SPACE RESEARCH BANDS

| BAND, Mc/s | PRIMARY USE | REASON | SECONDARY USE |
|---|---|---|---|
| 10.003-10.005 | Ionosphere research. | Marked propagation effect; can be used world-wide with standard receivers and antennas. | Ultra-range telemetry, low altitude satellite. |
| 136-137 | Tracking in center-third of the band; telemetering in the other two-thirds. | Replaces the IGY 108 Mc/s; minimum noise area for tube receivers. World-wide tracking net is available. | Ionospheric measurements in association with the above band. Narrow band telemetering. |
| 183.1-184.1 | No planned use. | | |
| 400-401 | Telemetering; low scan rate TV for geophysical and astronomical satellites; navigation satellites | Conventional transistors are practical | Deep space research with very large antennas. |
| 1427-1429 | Telemetering; narrow-band TV; deep space; development of precision minitrack. | Excellent for deep space with very large antennas. Very low propagation effects. | |
| 1700-1710 | Wide-band TV for meteorological satellites. | For meteorological and data transmission where wide-band is needed; likewise for radio-relay. | Planet radar. |
| 2290-2300 | Primary telemetering and tracking band for deep space research. | Nearly the ideal frequency area for 85 foot parabolic reflector antennas. Very low cosmic noise. | "Double-doppler" cross-band velocity measurements. |

## APPENDIX 1

| BAND, Gc/s | PRIMARY USE | REASON | SECONDARY USE |
|---|---|---|---|
| 5.25-5.255 | No planned use. | | |
| 8.4-8.5 | Communication satellite research - earth-to-earth relay experiments. Deep space probes. | The 100 Mc/s bandwidth here permits wide-band communications relay. | Space navigation application; planet radar; meteorology (with 15.15 and 31.5 Gc/s bands). |
| 15.15-15.25 | Space relay. | High directivity. | Meteorology (used with 8.4 and 31.5 Gc/s bands). |
| 31.5-31.8 | Space relay; re-entry telemetering. | High directivity - small antennas. Penetration of plasma layer. | Meteorology (used with 8.4 and 15.15 Gc/s bands). |

APPENDIX 2a

SUMMARY OF CHANGES IN AND ADDITIONS TO
THE 1959 ITU SPACE RESEARCH BANDS - SPACE RESEARCH REQUIREMENTS TO 1967

| Present Space Band Mc/s | Changes Required | New Band Limits Mc/s | Remarks |
|---|---|---|---|
| 10.003-10.005 | No change | Same | Being used for ionospheric research |
| 19.99-20.01 | No change | Same | Being used for ionospheric research |
| 39.986-40.002 | No change | Same | Being used for ionospheric research |
| 136-137 | Add 1 Mc/s | 136-138 | Principal Tracking and telemetry band, earth-satellites. The additional megacycle required by 1965. |
| 183.1-184.1 | - | - | No planned use. |
| 400-401 | For space research, no change | Same | |
| 1427-1429 | Delete | Add: 1525-1535 | Exclusive for space research. |
| 1700-1710 | Make exclusive | Same | To be used for presently scheduled meteorological research satellite. |
| 2290-2300 | See remarks (Change of priority) | Same | Being activated for deep space research - Should be exclusive for this purpose only. |

APPENDIX 2a
(Cont'd)

| Present ITU Space Band Gc/s | Changes Required | New Band Limits Gc/s | Remarks |
|---|---|---|---|
| 5.25-5.255 | - | - | No planned use. |
| 8.4-8.5 | No change | Same | To be used for communication satellite research. |
| 15.15-15.25 | No change | - | |
| 31.5-31.8 | No change | - | |

APPENDIX 2b

PROPOSED NEW INTERNATIONAL SPACE RESEARCH BANDS

| In ITU Bands: | Need: | Remarks: |
|---|---|---|
| 137-174 Mc/s | Two frequencies for earth-to-space satellite command purposes. One should be at 144 Mc/s and the other at 148 Mc/s, each 20 kc/s bandwidth. | The selection of these band-edge frequencies, 144 and 148 Mc/s, would produce the minimum impact on existing services -- a "command" is usually a single pulse of less than one second duration -- adjacent services will not be aware of its presence. |
| 406-470 Mc/s | Two frequencies for earth-to-space satellite command purposes. One should be at 420 Mc/s and the other at 450 Mc/s. The bandwidth should be 25 kc/s. | The selection of these band-edge frequencies, 420 and 450 Mc/s, should produce a minimum impact on the existing services, reasoning as above. |
| 1435-1660 Mc/s | The band 1525-1540 Mc/s for space use, for both telemetering and command purposes. | The too-narrow band 1427-1429 Mc/s should be deleted. The band 1525-1535 Mc/s would be used for space-to-earth telemetering, and the band 1535-1540 Mc/s for earth-to-space services, such as command, interrogation and control of the space vehicle. |
| 1700-2300 Mc/s | The band 2110-2120 Mc/s for deep space command, footnote status. | Suggested footnote: The band 2110-2120 Mc/s may be used for earth-to-space-probe command purposes subject to agreement between administrations concerned and affected. This band would be paired with the 2290-2300 Mc/s deep-space research band for command purposes. |
| 5.925-8.4 Gc/s | A command band 7.12-7.13 Gc/s for command of research satellites using the 8.4-8.5 Gc/s space research band, footnote status. | Suggested footnote: The band 7.12-7.13 Gc/s may be used for command of spacecraft subject to agreement between administrations concerned and affected. This band is paired with the 8.4-8.5 Gc/s space research band for command, interrogation and control purposes. |

## APPENDIX 3

### TECHNICAL FACTORS INFLUENCING THE SELECTION OF FREQUENCIES FOR SPACE COMMUNICATIONS

Adequate signal to noise ratio is a major factor in the satisfactory operation of any communication system. In this appendix available signal to noise ratio is assumed to be suitable criteria for selecting frequencies for space communication. Factors influencing the upper frequency limit in the range 1000 Mc/s to 40 Gc/s are emphasized. Transmissions are assumed to be from the satellite to the earth terminal. However, propagation may be assumed to be reciprocal and the available signals shown will apply to transmission in either direction.

Three major factors influence the available signal to noise ratio in a space communication: (1) The signal power available under free space propagation conditions (2) The absorption in the atmosphere and (3) The radio noise level.

Free Space Signals:

Figure 1 illustrates the frequency dependence of available power at the receiver when isotropic antennas are used at both the transmitting and receiving terminals. Note the available power decreases as frequency increases.

Figure 2 shows how antenna gain increases as either antenna physical size or operating frequency is increased. If a directive antenna is used at either the transmitting or receiving terminal or both, the gain from this chart may be combined with the values of Figure 1 to estimate available signal power when directive antennas are used.

Figure 3 illustrates the decrease in antenna beamwidth as operating frequency or antenna size increase.

Figure 4 illustrates the lack of frequency dependence when a directive antenna is used at the earth terminal and an isotropic antenna in the satellite. Note that available power increases with antenna physical size but that the antenna's beamwidth becomes increasingly narrow.

Figure 5 is a portion of Figure 4 illustrating that available signal remains constant to the higher frequencies if ability to use narrow beamwidth improves. The chart assumes physical size of the antenna is limited.

Figure 6 is also a portion of Figure 4, illustrating that increasing the physical size of the antenna offers an advantage only at the lower frequencies if operational or other requirements establish a minimum beamwidth.

Figure 7 illustrates the frequency dependence of available signal power if directive antennas are used at both terminals. Note that available power increases with frequency.

Figure 8 illustrates the leveling off of available signal power at lower and lower frequencies as physical size of the earth terminal antenna increases with an operational or other limitation of antenna beamwidth.

Figure 9 illustrates that available signal power levels off at higher and higher frequencies as operational or other factors decrease the required or available beamwidth for an antenna of fixed physical size.

Figure 10 illustrates that a plateau in the frequency range develops if both terminals have maximum antenna size and minimum antenna beamwidth limitations. Note that for fixed minimum beamwidth limitations the plateau shifts to lower frequencies as antenna sizes increase. Antenna sizes and beamwidths may be selected to narrow the plateau until available signal power is maximum at a discrete frequency.

Figure 11 illustrates shift of the plateau to the higher frequencies if antenna physical sizes are fixed and beamwidth limitations are reduced.

Signal Absorption in The Atmosphere:

Figure 12 is a nomogram to estimate atmospheric absorption of the signal as a function of frequency, terminal elevation and vertical reception angle. The nomogram is based on theoretical absorption in an atmosphere typical of Washington, D. C. in August. Values from this chart can be combined with chart 1 and charts 4 through 11 to estimate available signal power in the absence of rainfall. Additional theoretical and experimental work are necessary to more completely determine atmospheric absorption. This chart is a first approximation.

Figure 13 is a nomogram to estimate signal absorption due to rainfall. These values should be added to those of Figure 12 to estimate total absorption during rainfall. The total absorption may be further combined with the free space available signal power from chart 1 and charts 4 through 11 to estimate available signal during rainfall. Estimation of absorption due to rainfall is complicated by variation of drop size distributions for the same rainfall rate and by turbulence which may produce a different water

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content in the air than indicated by surface measurements. Figure 13 applies to a typical drop size distribution in steady rainfall.

Vertical Angle to a "Stationary" Equatorial Satellite

Figure 14 is a diagram of vertical reception angles, measured above the ground, to an equatorial stationary satellite at 105° west longitude.

RADIO NOISE:

Figure 15 is a nomogram to estimate noise power at the receiver. If effective antenna temperature is known enter with this temperature and bandwidth. If effective temperature is not known it can be estimated from frequency and vertical reception angle in the left hand portion of the nomogram.

Signal to Noise Ratios:

Figure 16 combines the data of the previous charts to illustrate the frequency dependence of available signals and noise in a simple satellite system. The orbit is 1000 kilometers from the earth, the earth terminal has a sea level location, the satellite has an isotropic antenna, the antenna at the earth terminal is limited to 20 meters in diameter and the minimum beamwidth is 0.2 degrees. Note the available signal starts to decrease between 5 and 6 Gc/s at all vertical angles and at the lower vertical angles starts to decrease at even lower frequencies during heavy rainfall. The same general shape of the curve holds for a broad fixed beamwidth antenna on the satellite, e.g. 20 degree beamwidth for antennas one meter in diameter or larger. Available power will increase but frequency dependence is not altered.

Figure 17 illustrates available signal to noise in a more sophisticated satellite system using highly directive antennas in a 6000 kilometer orbit. Note that adequate signal power is extended to higher frequencies especially in absence of rainfall.

Figure 18 illustrates slightly different assumptions than those reflected in Figure 17.

Figure 19 illustrates available signal power in an even more sophisticated satellite system using "stationary" orbit and extremely directive antennas. Note that available signal power remains adequate at even higher frequencies especially at vertical angles exceeding 5 degrees.

Figure 20 is the same as Figure 19 except the system has been further improved by the elevation of the earth terminal and its location in an area of "moderate" rainfall.

Conclusions:

(1) For all-weather unstabilized satellite communication systems,

available signal to noise will decrease as frequency is increased above about 6 Gc/s. The exact frequency is dependent upon maximum antenna size and minimum beamwidth limitations at the earth terminal.

(2) As systems become more sophisticated through stabilized satellites and ability to use narrow beam antennas the upper frequency limit increases.

(3) The upper frequency limit may extend to above 15 Gc/s for sophisticated systems if reception is not required at very low angles.

(4) Theoretical disadvantages at the higher frequencies estimated on the basis of clear channel operation may be offset by the increased likelihood of successful frequency sharing at these frequencies since:

(a) Sharper antenna directivity tends to reduce the vertical angle at which interference or noise from the earth will dominate the signal from the space vehicle;

(b) Sharper antenna directivity reduces the degrees in asimuth from which interference is likely;

(c) Wider bandwidths available at the higher frequencies permit "spread spectrum" modulation techniques which promise gains in immunity to interference;

(d) Atmospheric absorption tends to reduce low angle interfering signals relative to the higher angle satellite signals.

AVAILABLE SIGNAL POWER IN FREE SPACE

ONE WATT TRANSMITTER - ISOTROPIC ANTENNA TO ISOTROPIC ANTENNA

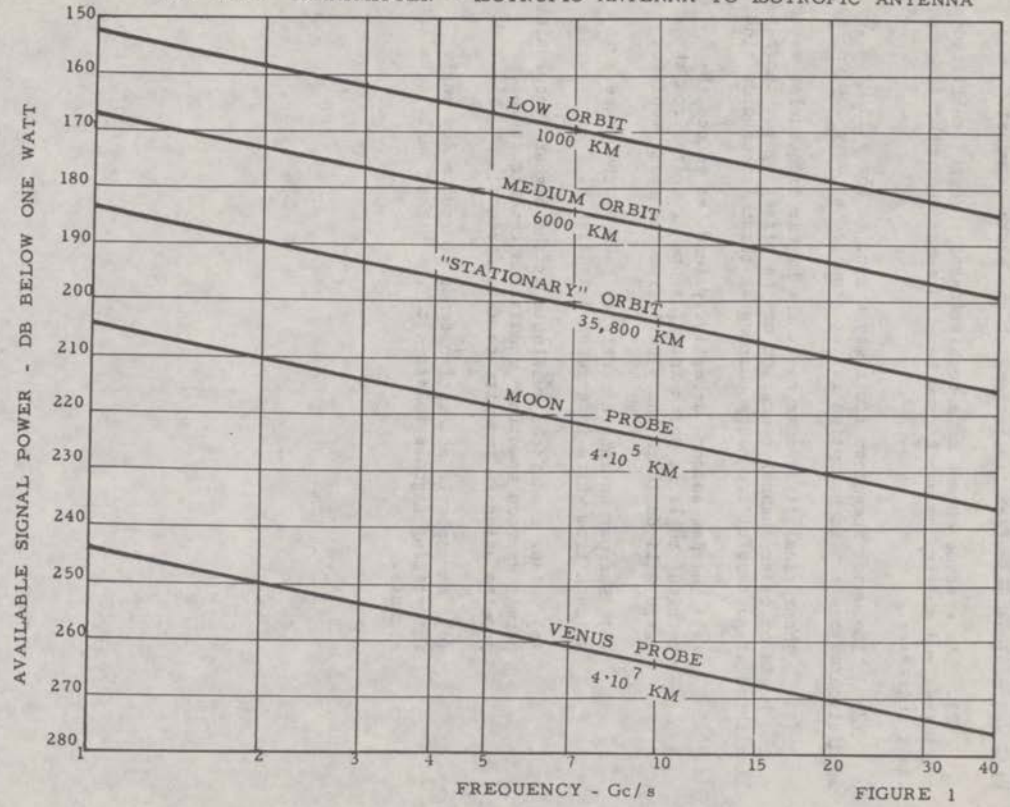



FIGURE 1

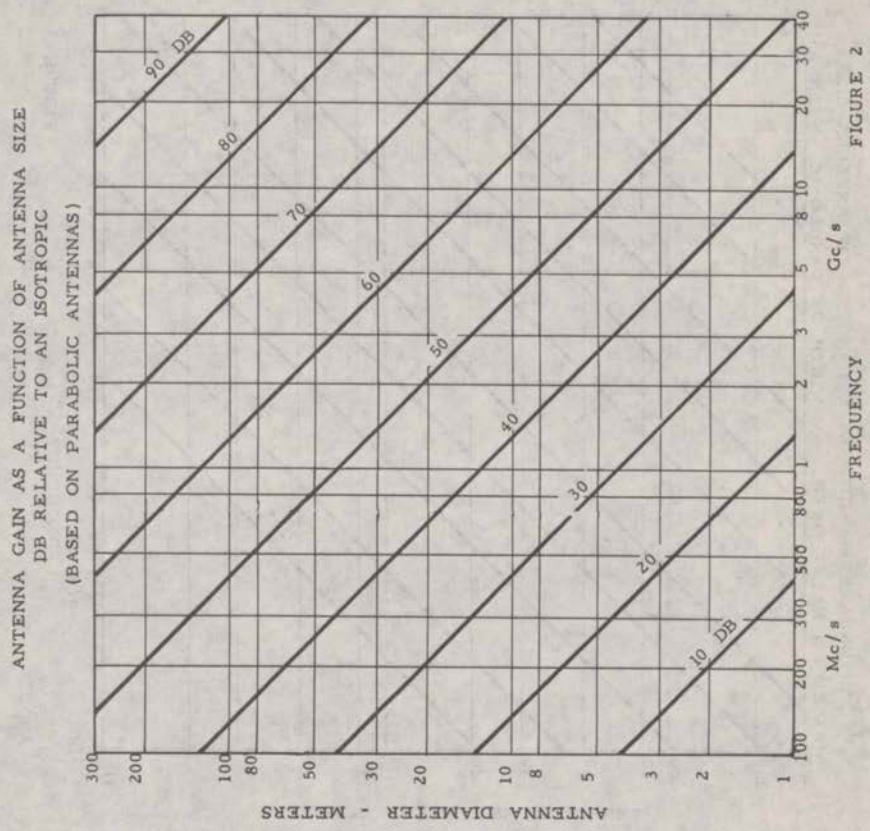

ANTENNA GAIN AS A FUNCTION OF ANTENNA SIZE
DB RELATIVE TO AN ISOTROPIC
(BASED ON PARABOLIC ANTENNAS)
90 DB
80
70
60
50
40
30
20
10 DB
ANTENNA DIAMETER - METERS
300
200
100
80
50
30
20
10
8
5
3
2
1
FREQUENCY
Mc/s
100
200
300
500
800
1
2
3
5
8
10
20
30
40
Gc/s

FIGURE 2

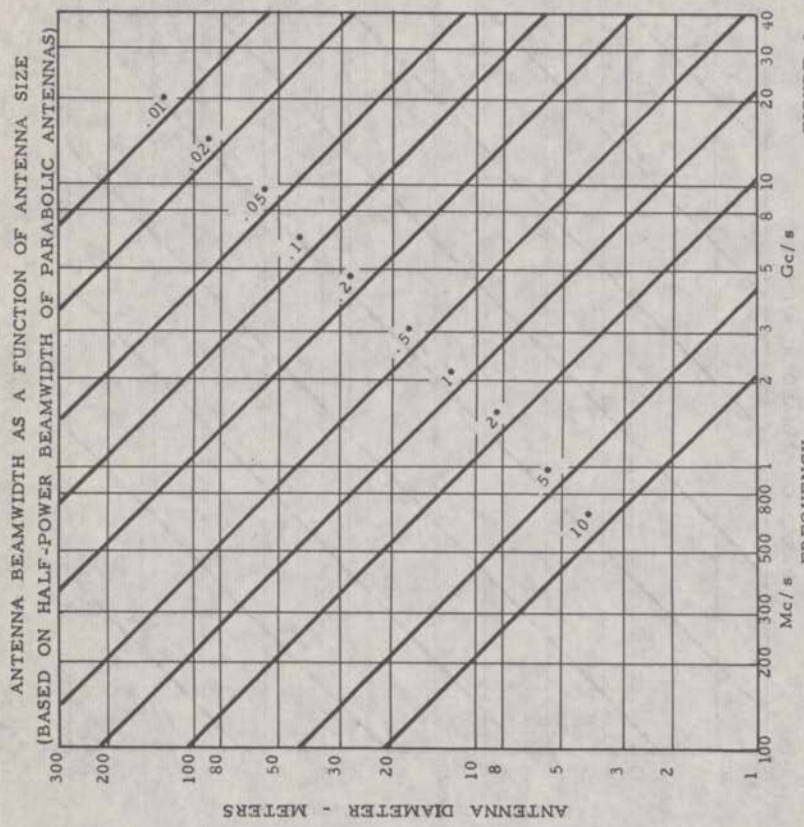

ANTENNA BEAMWIDTH AS A FUNCTION OF ANTENNA SIZE
(BASED ON HALF-POWER BEAMWIDTH OF PARABOLIC ANTENNAS)
.01°
.02°
.05°
.1°
.2°
.5°
1°
2°
5°
10°
ANTENNA DIAMETER - METERS
300
200
100
80
50
30
20
10
8
5
3
2
1
100
200
300
500
800
1
2
3
5
8
10
20
30
40
Mc/s
Gc/s
FREQUENCY

FIGURE 3

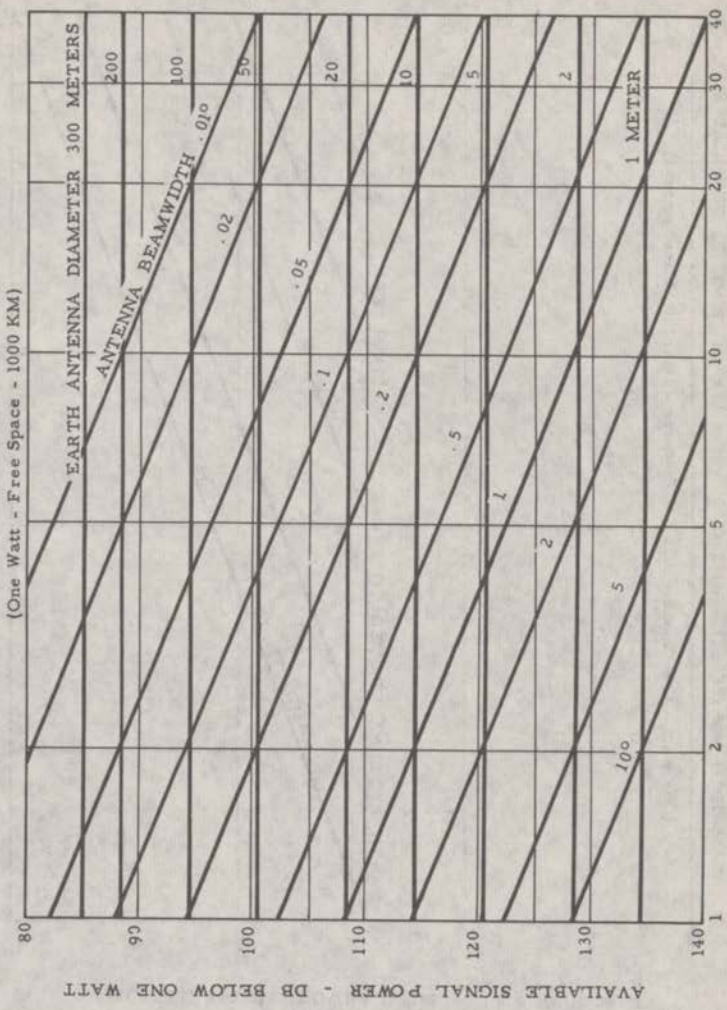

AVAILABLE SIGNAL POWER
ISOTROPIC SPACE ANTENNA TO VARIOUS SIZE EARTH ANTENNAS
(One Watt - Free Space - 1000 KM)
EARTH ANTENNA DIAMETER 300 METERS
200
100
50
20
10
5
2
1 METER
ANTENNA BEAMWIDTH .01°
.02
.05
.1
.2
.5
1
2
5
10°
80
90
100
110
120
130
140
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
1
2
5
10
20
30
40
FREQUENCY - Gc/s

FIGURE 4

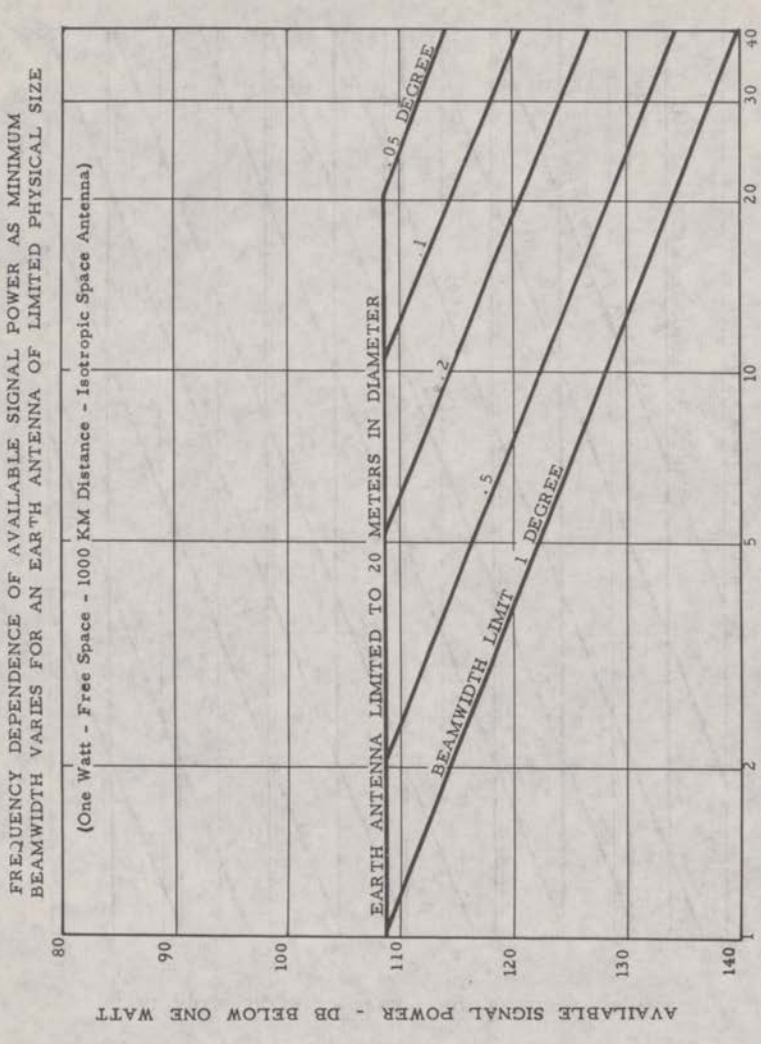

FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MINIMUM
BEAMWIDTH VARIES FOR AN EARTH ANTENNA OF LIMITED PHYSICAL SIZE
(One Watt - Free Space - 1000 KM Distance - Isotropic Space Antenna)
EARTH ANTENNA LIMITED TO 20 METERS IN DIAMETER
.05 DEGREE
.1
.2
.5
1 DEGREE
BEAMWIDTH LIMIT
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
80
90
100
110
120
130
140
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 5.

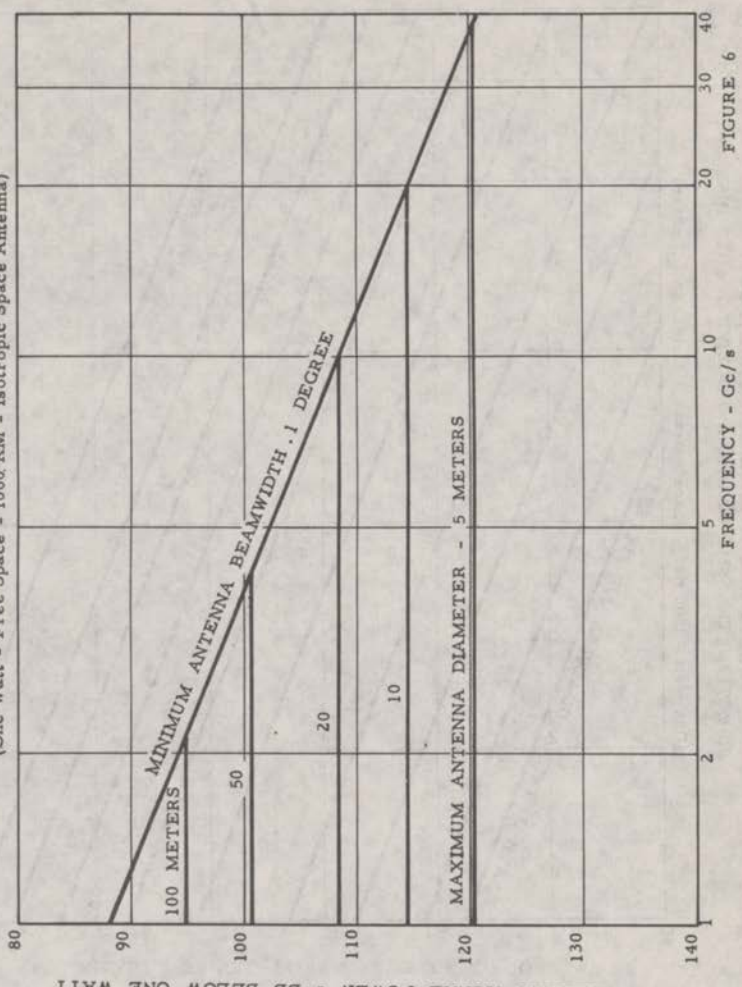

FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MAXIMUM
SIZE VARIES FOR AN EARTH ANTENNA OF FIXED MINIMUM BEAMWIDTH
(One Watt - Free Space - 1000 KM - Isotropic Space Antenna)
MINIMUM ANTENNA BEAMWIDTH .1 DEGREE
100 METERS
50
20
10
MAXIMUM ANTENNA DIAMETER - 5 METERS
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
80
90
100
110
120
130
140
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 6

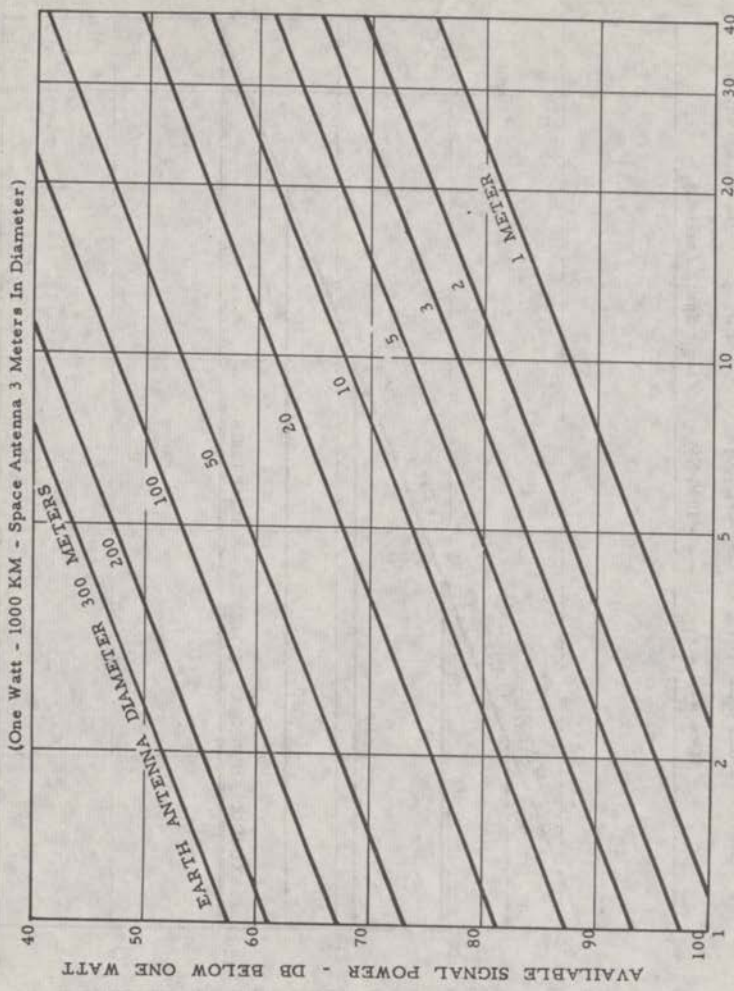
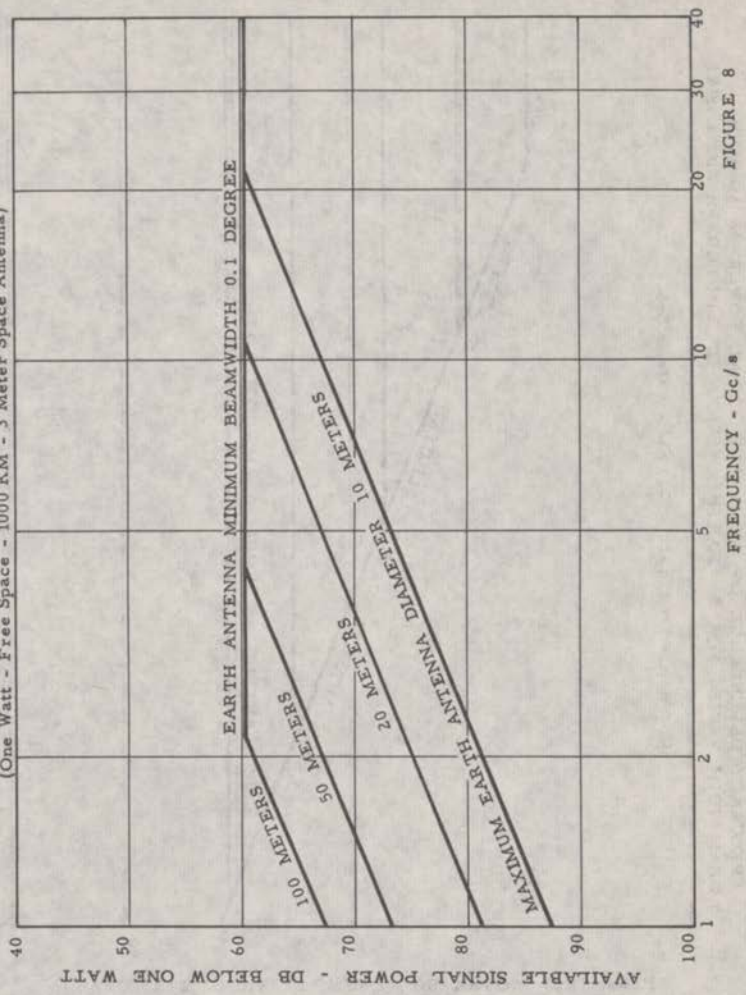

FREE SPACE AVAILABLE SIGNAL POWER
DIRECTIVE TRANSMITTING AND RECEIVING ANTENNAS
(One Watt - 1000 KM - Space Antenna 3 Meters In Diameter)
EARTH ANTENNA DIAMETER
300 METERS
200
100
50
20
10
5
3
2
1 METER
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
1
2
5
10
20
30
40
FREQUENCY - Gc/s

FIGURE 7




FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL AS MAXIMUM SIZE VARIES FOR AN EARTH ANTENNA OF FIXED MINIMUM BEAMWIDTH

(One Watt - Free Space - 1000 KM - 3 Meter Space Antenna)

FIGURE 8

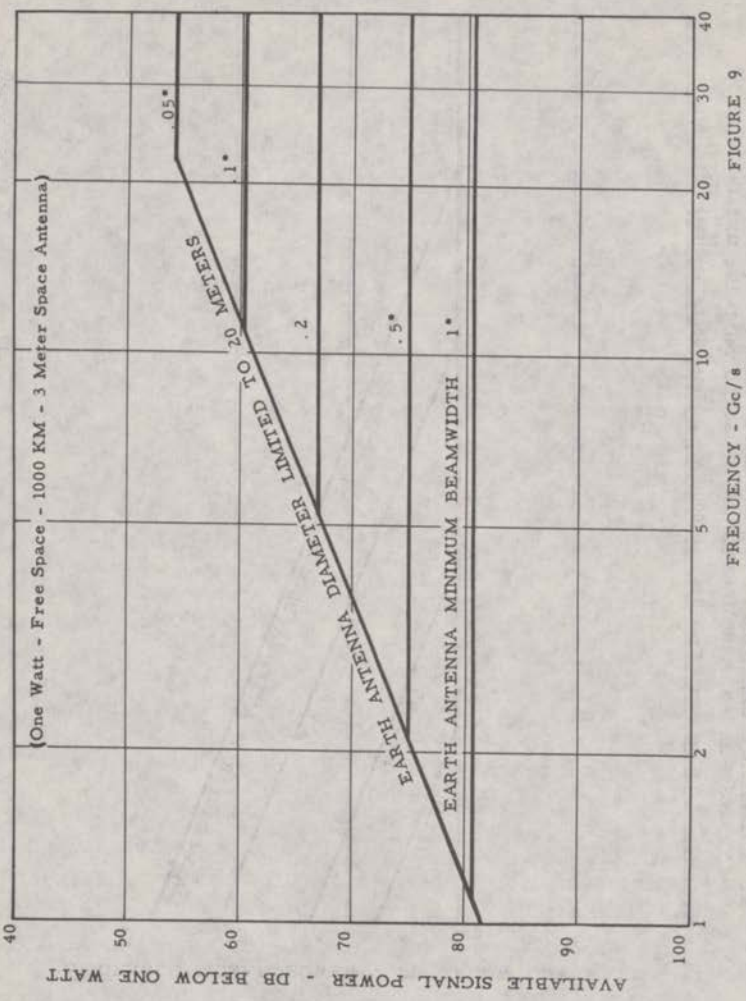

FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MINIMUM
BEAMWIDTH VARIES FOR AN EARTH ANTENNA OF LIMITED PHYSICAL SIZE
(One Watt - Free Space - 1000 KM - 3 Meter Space Antenna)
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
FREQUENCY - Gc/s
1
2
5
10
20
30
40
.05°
.1°
.2
.5°
1°
EARTH ANTENNA DIAMETER LIMITED TO 20 METERS
EARTH ANTENNA MINIMUM BEAMWIDTH

FIGURE 9

FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS ANTENNA PHYSICAL SIZE LIMITATIONS CHANGE WITH FIXED MINIMUM BEAMWIDTH REQUIREMENTS

(One Watt - Free Space - 1000 KM)

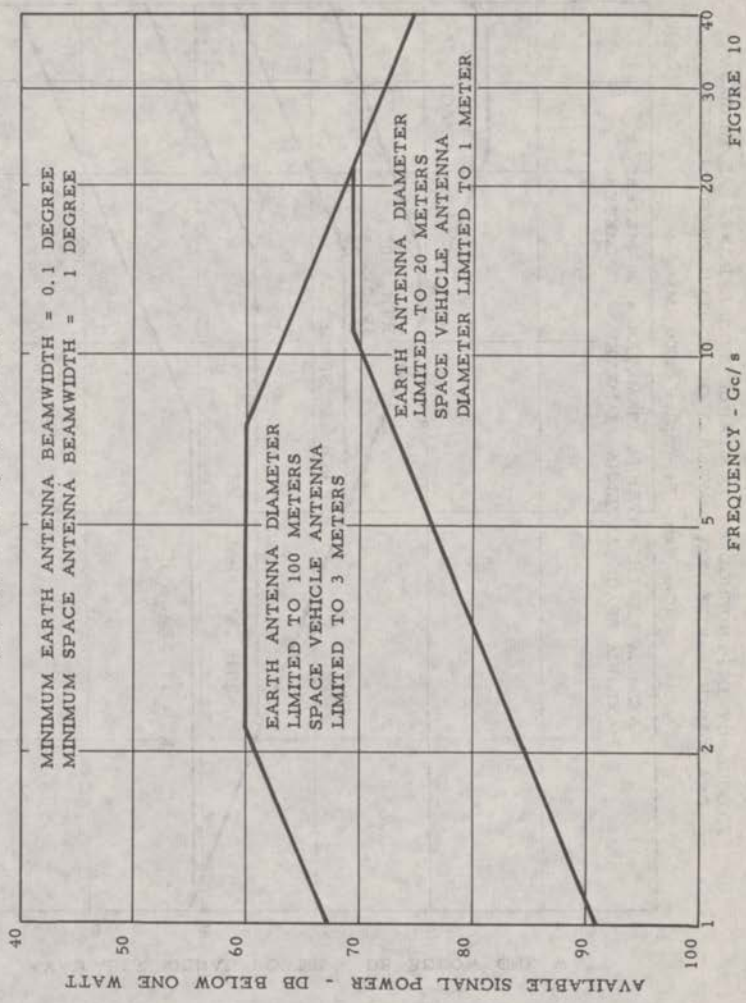



FIGURE 10

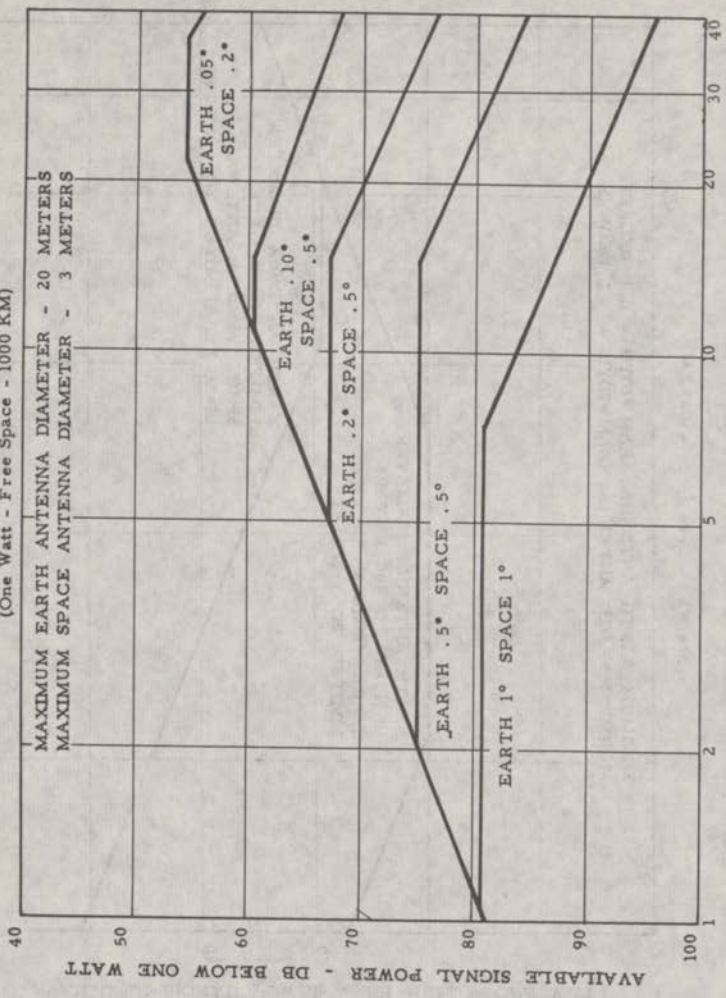

FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MINIMUM BEAMWIDTH VARIES FOR ANTENNAS OF LIMITED PHYSCIAL SIZE
(One Watt - Free Space - 1000 KM)
MAXIMUM EARTH ANTENNA DIAMETER - 20 METERS
MAXIMUM SPACE ANTENNA DIAMETER - 3 METERS
EARTH .05°
SPACE .2°
EARTH .10°
SPACE .5°
EARTH .2° SPACE .5°
EARTH .5° SPACE .5°
EARTH 1° SPACE 1°
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 11

CHART TO ESTIMATE ATMOSPHERIC ABSORPTION AS A FUNCTION OF TERMINAL ELEVATION AND VERTICAL ANGLE

(Atmosphere Typical Of Washington D. C. In August)

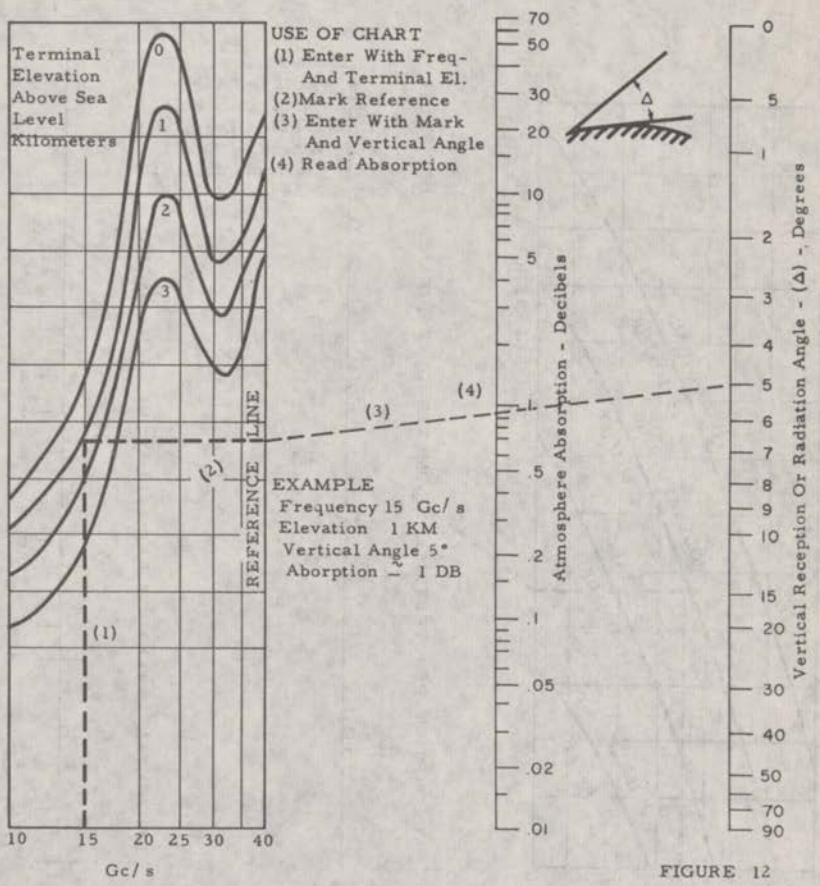



FIGURE 12

CHART TO ESTIMATE ABSORPTION BY RAINFALL

(1) Enter With Freq And Rainfall Rate
(2) Mark Reference Line
(3) Enter With Mark And (Δ)
(4) Read Absorption
(5) Enter With Mark And (H)
(6) Read Absorption
(7) Multiply Lower Of (4) Or (6) By Vertical Depth Of Rainfall

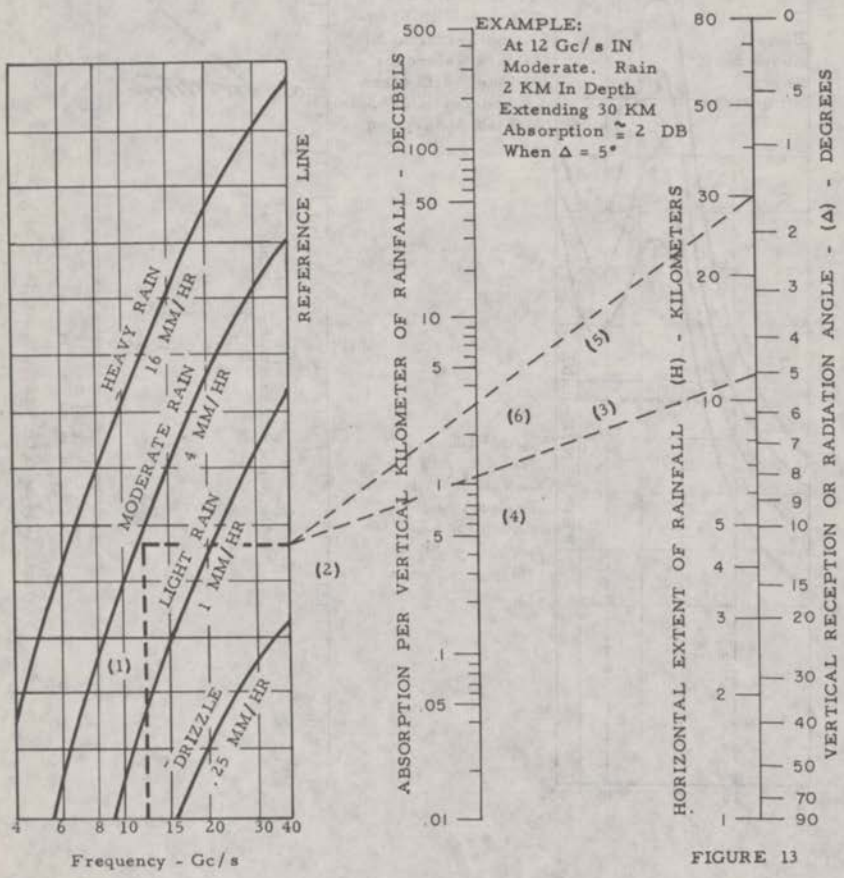



FIGURE 13

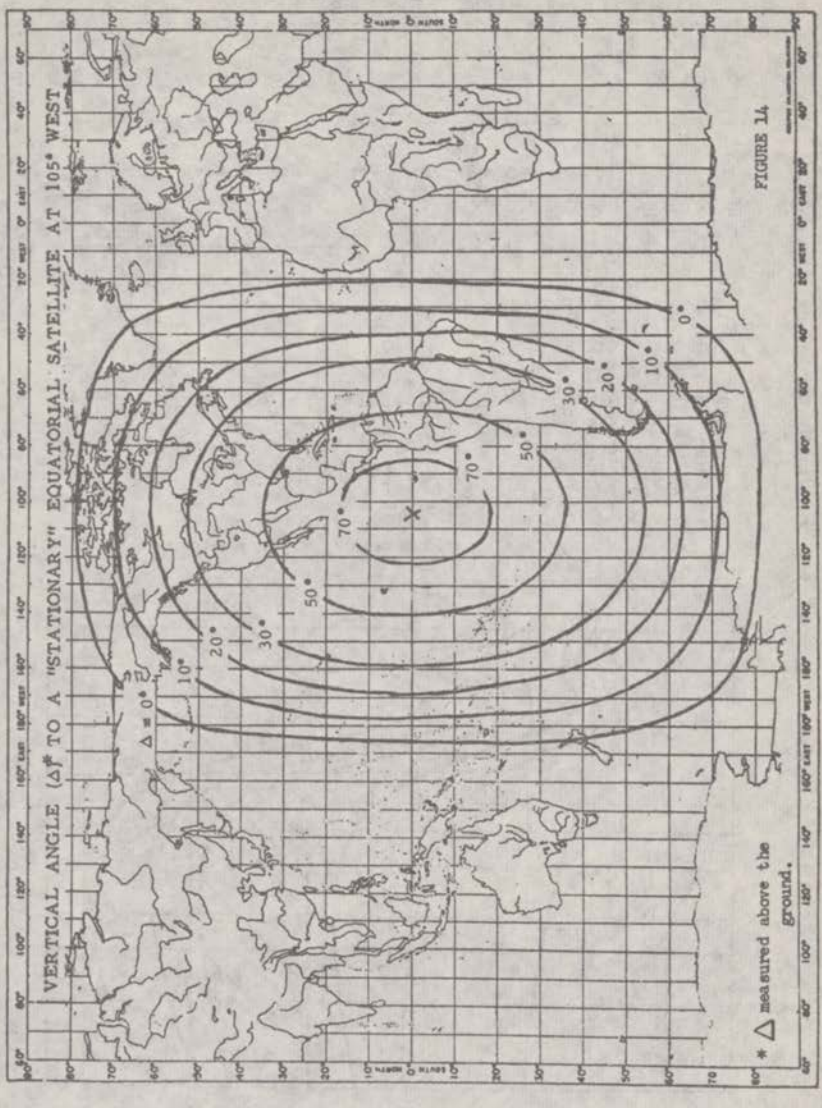

VERTICAL ANGLE (Δ)* TO A "STATIONARY" EQUATORIAL SATELLITE AT 105° WEST
Δ = 0°
10°
20°
30°
50°
70°
0°
10°
20°
30°
50°
70°
* Δ measured above the ground.

FIGURE 14

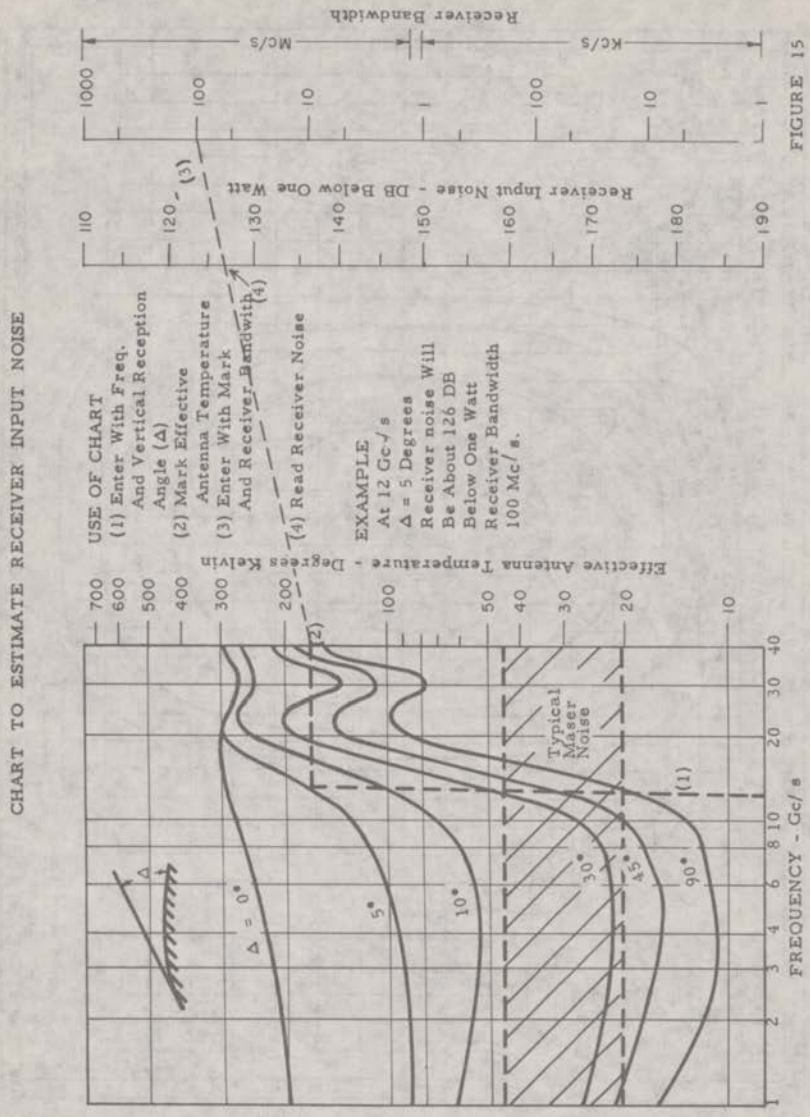


CHART TO ESTIMATE RECEIVER INPUT NOISE
USE OF CHART
(1) Enter With Freq. And Vertical Reception Angle (Δ)
(2) Mark Effective Antenna Temperature
(3) Enter With Mark And Receiver Bandwith
(4) Read Receiver Noise
EXAMPLE
At 12 Gc/s
Δ = 5 Degrees
Receiver noise Will Be About 126 DB Below One Watt
Receiver Bandwidth 100 Mc/s.
Effective Antenna Temperature - Degrees Kelvin
Receiver Input Noise - DB Below One Watt
Receiver Bandwidth
MC/S
KC/S
FREQUENCY - Gc/s
Typical Maser Noise
Δ = 0°
5°
10°
30°
45°
90°
(1)
(2)
(3)
(4)

FIGURE 15

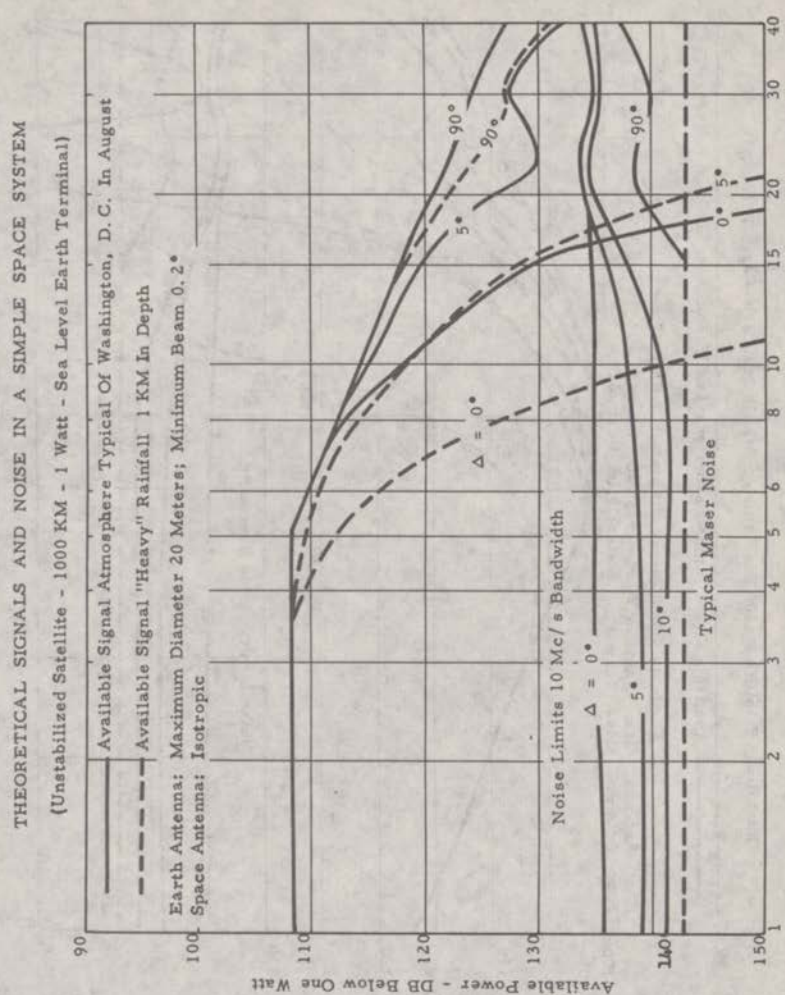

THEORETICAL SIGNALS AND NOISE IN A SIMPLE SPACE SYSTEM
(Unstabilized Satellite - 1000 KM - 1 Watt - Sea Level Earth Terminal)
Available Signal Atmosphere Typical Of Washington, D.C. In August
Available Signal "Heavy" Rainfall 1 KM In Depth
Earth Antenna: Maximum Diameter 20 Meters; Minimum Beam 0.2°
Space Antenna: Isotropic
Noise Limits 10 Mc/s Bandwidth
Typical Maser Noise
Δ = 0°
5°
10°
90°
Available Power - DB Below One Watt
FREQUENCY - Gc/s
90
100
110
120
130
140
150
1
2
3
4
5
6
8
10
15
20
30
40

FIGURE 16

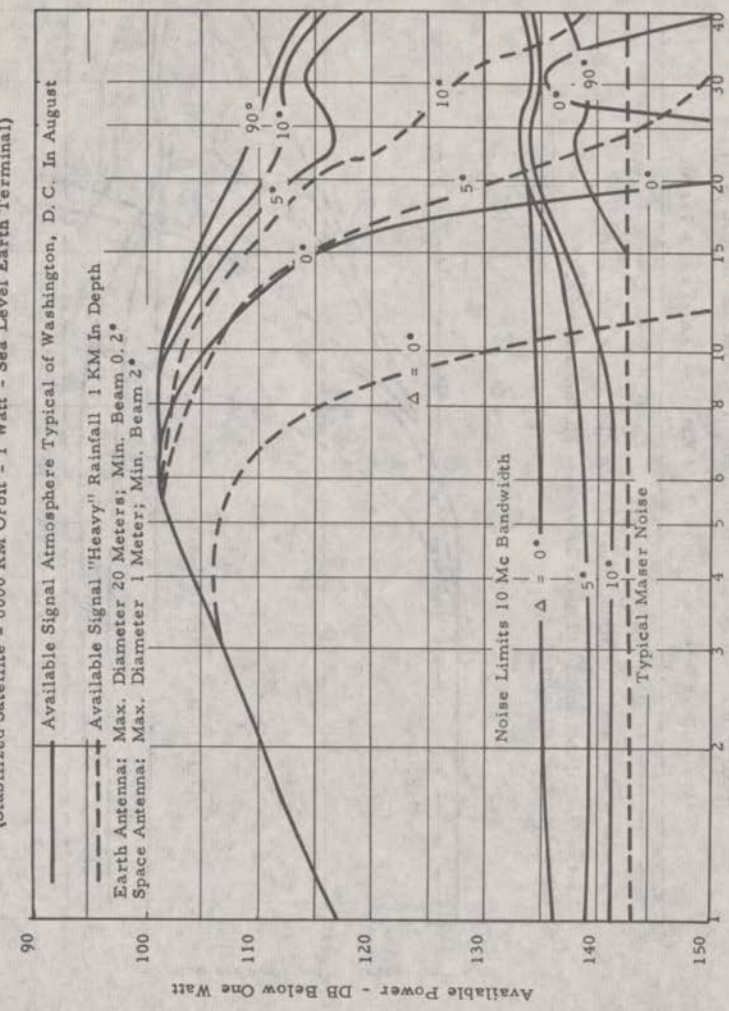

THEORETICAL SIGNALS AND NOISE IN A "TYPICAL" SPACE SYSTEM
(Stabilized Satellite - 6000 KM Orbit - 1 Watt - Sea Level Earth Terminal)
Available Signal Atmosphere Typical of Washington, D.C. In August
Available Signal "Heavy" Rainfall 1 KM In Depth
Earth Antenna: Max. Diameter 20 Meters; Min. Beam 0.2°
Space Antenna: Max. Diameter 1 Meter; Min. Beam 2°
Noise Limits 10 Mc Bandwidth
Typical Maser Noise
Available Power - DB Below One Watt
FREQUENCY - Gc/s
90
100
110
120
130
140
150
1
2
3
4
5
6
8
10
15
20
30
40
Δ = 0°
0°
5°
10°
90°

FIGURE 17

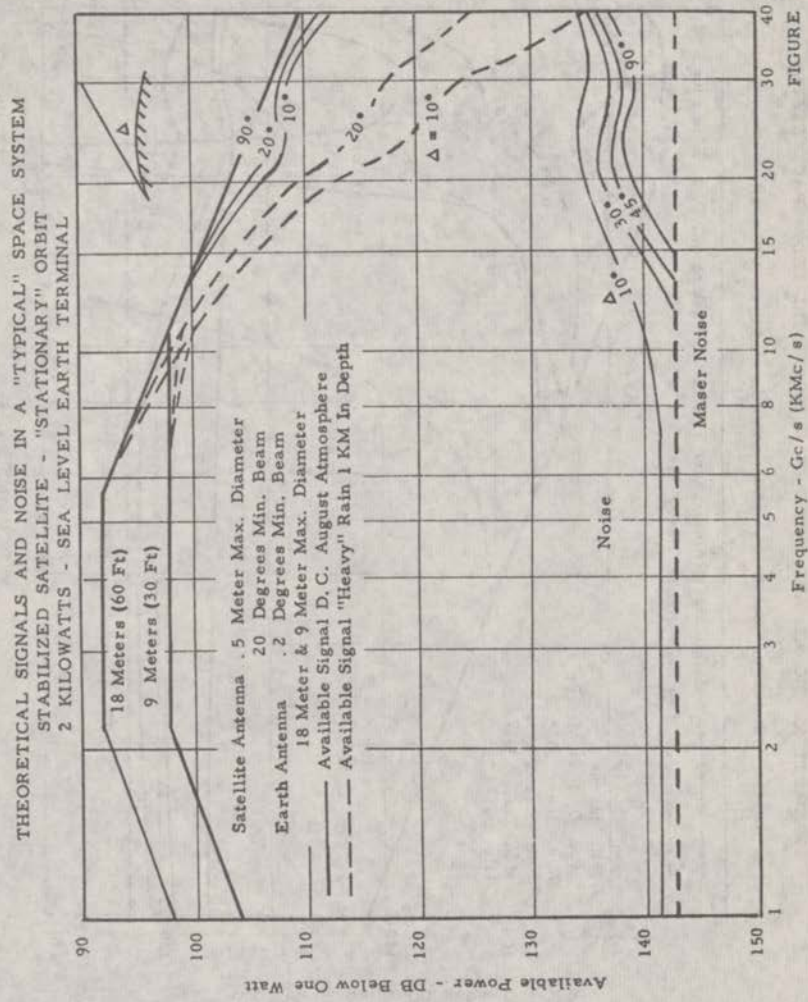

THEORETICAL SIGNALS AND NOISE IN A "TYPICAL" SPACE SYSTEM
STABILIZED SATELLITE - "STATIONARY" ORBIT
2 KILOWATTS - SEA LEVEL EARTH TERMINAL
18 Meters (60 Ft)
9 Meters (30 Ft)
Satellite Antenna .5 Meter Max. Diameter
20 Degrees Min. Beam
Earth Antenna .2 Degrees Min. Beam
18 Meter & 9 Meter Max. Diameter
Available Signal D.C. August Atmosphere
Available Signal "Heavy" Rain 1 KM In Depth
Δ
90°
20°
10°
Δ = 10°
Noise
Maser Noise
Available Power - DB Below One Watt
Frequency - Gc/s (KMc/s)
90
100
110
120
130
140
150
1
2
3
4
5
6
8
10
15
20
30
40

FIGURE 18

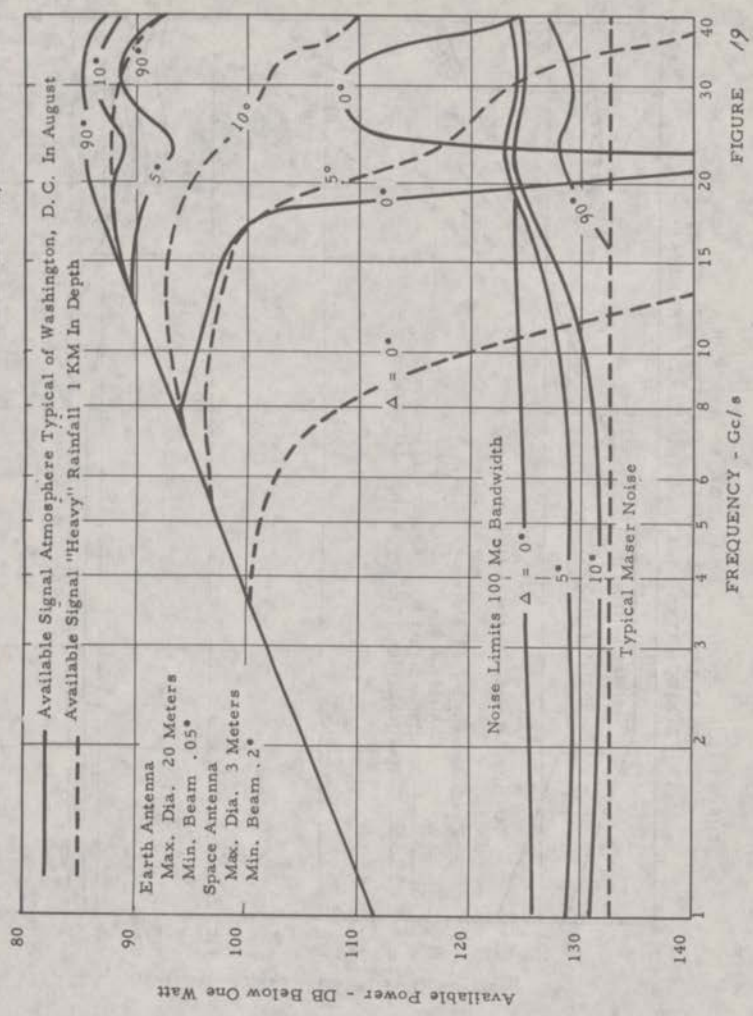

THEORETICAL SIGNAL AND NOISE IN A "SOPHISTICATED" SPACE SYSTEM
("Stationary" Satellite - 1 Watt - Sea Level Earth Terminal)
Available Signal Atmosphere Typical of Washington, D.C. In August
Available Signal "Heavy" Rainfall 1 KM In Depth
Earth Antenna
Max. Dia. 20 Meters
Min. Beam .05°
Space Antenna
Max. Dia. 3 Meters
Min. Beam .2°
Noise Limits 100 Mc Bandwidth
Typical Maser Noise
Δ = 0°
5°
10°
90°
Available Power - DB Below One Watt
FREQUENCY - Gc/s
80
90
100
110
120
130
140
1
2
3
4
5
6
8
10
15
20
30
40

FIGURE 19

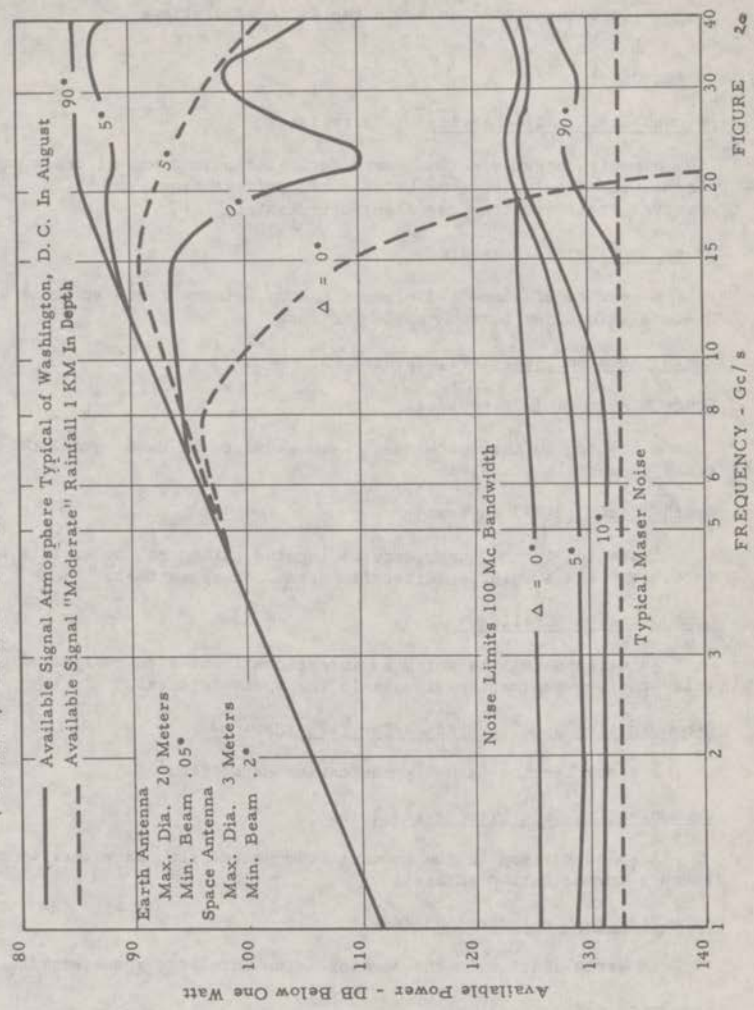

THEORETICAL SIGNAL AND NOISE IN AN "SOPHISTICATED" SPACE SYSTEM
("Stationary" Satellite - 1 Watt - Earth Terminal 2 KM Above Sea Level)
Available Signal Atmosphere Typical of Washington, D. C. In August
Available Signal "Moderate" Rainfall 1 KM In Depth
Earth Antenna
Max. Dia. 20 Meters
Min. Beam .05°
Space Antenna
Max. Dia. 3 Meters
Min. Beam .2°
Noise Limits 100 Mc Bandwidth
Typical Maser Noise
Δ = 0°
5°
10°
90°
0°
Available Power - DB Below One Watt
80
90
100
110
120
130
140
FREQUENCY - Gc/s
1
2
3
5
6
8
10
15
20
30
40

FIGURE 2a

## APPENDIX 4

Consequential changes to the Radio Regulations

I. RR ARTICLE 1

Aeronautical Mobile Service: (#33 revised)

A mobile service between aeronautical stations and aircraft or aerospacecraft stations, or between aircraft stations, in which survival craft stations may also participate.

Space Service: (#70 revised)

A service of space radiocommunication between earth stations and space stations, or between space stations.

Earth-Space Service: (#71, delete)

Space Station: (#72 revised)

A station in the space service intended to be used beyond the earth's sensible atmosphere.

Earth Station: (#73 revised)

A station in the space service located either on the earth's surface, on board a ship, an aircraft, or an aerospacecraft.

Communication Satellite: (New)

An earth-satellite which is intentionally used to reflect or relay radiocommunication signals in the space service.

Communication Satellite Space Service: (New)

A space service using communication satellites.

Communication Satellite Station: (New)

A space station in the communication satellite space service on board a communication satellite.

Satellite Terminal Station: (New)

An earth station in the communication satellite space service.

Aerospacecraft: (New)

A vehicle capable of traveling both within and beyond the earth's sensible atmosphere.

Meteorological Satellite Space Service: (New)

A space service providing for the one-way transmission of meteorological information from meteorological satellite stations to earth stations.

Meteorological Satellite Station: (New)

A space station in the meteorological satellite service.

Space Research Service: (New)

A space service providing for the acquisition and transmission to earth stations, or between space stations, of scientific and technological information acquired by or pertaining to earth satellites or spacecraft.

II. RR ARTICLE 7

Amend No. 429 to read:

"Frequencies in any band allocated to the aeronautical mobile (R) service are reserved for communications between any aircraft or aerospacecraft and those aeronautical stations primarily concerned with the safety and regularity of flight along national or international civil air routes."

Amend No. 430 to read:

"Frequencies in any band allocated to the aeronautical mobile (OR) service are reserved for communications between any aircraft or aerospacecraft and aeronautical stations other than those primarily concerned with flight along national or international civil air routes."

The CHAIRMAN. Does that conclude your statement?

Mr. MINOW. That concludes my statement, Mr. Chairman.

The CHAIRMAN. First, may I thank you, Mr. Minow, for what I consider to be not only an important but a very fine statement.

I think it does clearly delineate the responsibility of the Federal Communications Commission——

Mr. MINOW. Thank you.

The CHAIRMAN (continuing). In this field in a very brief and concise way.

The memorandums referred to, as I have previously indicated, will be included in the record with your statement.

You referred to your cooperating or, rather, working with the Space Council in conjunction with other Government departments and agencies.

I refer to the statement of the President which was released yesterday, I assume——

Mr. MINOW. Yes.

The CHAIRMAN (continuing). Or last night.

Mr. MINOW. Yes.

The CHAIRMAN. I should think it would be advisable for the statement to be included in the record. As a matter of fact, I think that for the committee, it should be read; that is, the statement of the President.

I think probably it might, for the information of the committee, be helpful in such questions that might arise.

First, I might say that the Space Council unanimously agreed to certain policies a few days ago. Is that true?

Mr. MINOW. That is right, Mr. Chairman.

The CHAIRMAN. The Federal Communications Commission is a member of the Space Council?

Mr. MINOW. No; we are not, Mr. Chairman. However, we were invited to cooperate in the recommendations of the Space Council, and I think we were on that particular occasion an ex officio member. We are not a statutory member.

The CHAIRMAN. Who are the members of the Space Council?

Mr. MINOW. The Vice President, the head of NASA, the Secretary of State, the Attorney General, the Secretary of Defense, and I think that is it. It is a statutory body and the members are designated under the law.

The CHAIRMAN. Yes; I realize that.

Do you have a copy of the statement of policies which the President had for his consideration?

Mr. MINOW. No; I do not, Mr. Chairman. I do not have that with me.

The CHAIRMAN. Is there such a statement available?

Mr. MINOW. Yes, sir. I do not think it is available through us.

I would prefer, Mr. Chairman, if you would request that of the Space Council rather than ourselves, because all we did was to cooperate in it.

The CHAIRMAN. Yes. And that has not been made public, so far as you know?

Mr. MINOW. No, sir; not that I know of.

The CHAIRMAN. If the committee agrees, I think we should probably have the clerk read the statement. We can look into it later on as to whether it is available for the use of the committee.

This is a release, dated July 24, of the White House, a statement of the President on communication satellite policy. [Reading:]

Science and technology have progressed to such a degree that communication through the use of space satellites has become possible. Through this country's leadership, this competence should be developed for global benefit at the earliest practicable time.

To accomplish this practical objective, increased resources must be devoted to the task and a coordinated national policy should guide the use of those resources in the public interest. Consequently, on May 25, 1961, I asked the Congress for additional funds to accelerate the use of space satellites for worldwide communications. Also, on June 15, I asked the Vice President to have the Space Council make the necessary studies and policy recommendations for the optimum development and operation of such system. This has been done. The primary guideline for the preparation of such recommendations was that public interest objectives be given the highest priority.

I again invite all nations to participate in a communication satellite system, in the interest of world peace and closer brotherhood among peoples throughout the world.

The present status of the communication satellite programs, both civil and military, is that of research and development. To date, no arrangements between the Government and private industry contain any commitments as to an operational system.

A. POLICY OF OWNERSHIP AND OPERATION

Private ownership and operation of the U.S. portion of the system is favored, provided that such ownership and operation meet the following policy requirements:

(1) New and expanded international communications services be made available at the earliest practicable date;

(2) Make the system global in coverage so as to provide efficient communication service throughout the whole world as soon as technically feasible, including service where individual portions of the coverage are not profitable;

(3) Provide opportunities for foreign participation through ownership or otherwise, in the communications satellite system;

(4) Nondiscriminatory use of and equitable access to the system by present and future authorized communications carriers;

(5) Effective competition, such as competitive bidding, in the acquisition of equipment used in the system;

(6) Structure of ownership or control which will assure maximum possible competition;

(7) Full compliance with antitrust legislation and with the regulatory controls of the Government;

(8) Development of an economical system, the benefits of which will be reflected in oversea communication rates.

B. POLICY OF GOVERNMENT RESPONSIBILITY

In addition to its regulatory responsibilities, the U.S. Government will:

(1) Conduct and encourage research and development to advance the state of the art and to give maximum assurance of rapid and continuous scientific and technological progress;

(2) Conduct or maintain supervision of international agreements and negotiations;

(3) Control all launching of U.S. spacecraft;

(4) Make use of the commercial system for the general governmental purposes and establish separate communications satellite systems when required to meet unique Government needs which cannot, in the national interest, be met by the commercial system;

(5) Assure the effective use of the radiofrequency spectrum;

(6) Assure the ability to discontinue the electronic functioning of satellites when required in the interest of communication efficiency and effectiveness;

(7) Provide technical assistance to newly developing countries in order to help attain an effective global system as soon as practicable;

(8) Examine with other countries the most constructive role for the United Nations, including the ITU, in international space communications.

C. COORDINATION

I have asked the full cooperation of all agencies of the Government in the vigorous implementation of the policies stated herein. The National Aeronautics and Space Council will provide continuing policy coordination and will also have responsibility for recommending to me any actions needed to achieve full and prompt compliance with the policy. With the guidelines provided here, I am anxious that development of this new technology to bring the farthest corner of the globe within reach by voice and visual communication, fairly and equitably available for use, proceed with all possible promptness.

The CHAIRMAN. Your statement appears to be in line with this statement of policy from the President.

Mr. MINOW. We believe so, Mr. Chairman.

Basically, what we have done now is to ask industry and, particularly the licensed international carriers, to come up now with a proposal which will meet these public interest standards, if they can do it, and we will then examine it and scrutinize it to decide whether this seems to be the wisest way to proceed.

We believe that this is the spirit of our act, the Federal Communications Act, that we ought to encourage a private system.

And we believe that the international carriers, since they are licensed by us, since they do have arrangements with many foreign partners in the cable and other fields, are the logical ones to examine, first, to see whether they can put a system together that is sound and in the public interest.

We have now asked them to come forward with a proposal which we will then examine in accordance with the standards of our order, and I believe it is fully consistent with the standards set out in the President's statement.

The CHAIRMAN. The Commission has the responsibility of assigning first, that is assigning of frequency of all non-Government uses of the spectrum.

Is that right?

Mr. MINOW. That is correct, Mr. Chairman. That is our exclusive responsibility.

The CHAIRMAN. And in other words, any frequency used by the military or any other Government agency does not come within your jurisdiction?

Mr. MINOW. That is correct, except insofar as we participate in it with IRAC, to work out with them agreements on the various frequencies, but we do not have the final say on the nongovernmental users.

That is right.

The CHAIRMAN. Now, this gets a little beyond——

Mr. MINOW. Excuse me. We do not have the final say on the governmental users. We do have it on the nongovernmental users.

The CHAIRMAN. Yes.

Mr. MINOW. I misspoke.

The CHAIRMAN. Yes, that is what I understand.

Now, this goes beyond the purpose of this hearing today, but we are still in the dilemma of the right hand not knowing what the left is doing with reference to the efficient use of the spectrum.

Is that true?

Mr. MINOW. I think that is right, Mr. Chairman.

I read the hearings of this committee on this subject last year, and I think they delineated the problem extremely well.

I think what is needed now is some action to resolve the present arrangements which are really a dilemma, and I do feel that there will be some action taken on that very promptly.

The CHAIRMAN. Yes, I have been following, myself, some of the developments in the last several months, as I know you and others have. And I have some hopes that there will be some more developments in the near future.

Now you mentioned the action of the Commission with reference to frequency assignments to General Electric, A.T. & T., Westinghouse, and others.

Mr. MINOW. Right.

The CHAIRMAN. Now the assignment of those frequencies for these purposes is within the jurisdiction of your Commission?

Mr. MINOW. That is right. In all of those cases, Mr. Chairman, they have been only for experimental use in each of them.

We have not yet assigned any frequency for an operational system, but in all of those cases that was our exclusive responsibility and we awarded all of those for an experimental purpose only.

The CHAIRMAN. And these experimental assignments are made along the lines of developing or experimenting with international radio or communications by way of the satellite?

Mr. MINOW. That is right, Mr. Chairman.

Commissioner Craven can answer this better than I can, but, although the scientists all agree that this is technically feasible—communication via satellites—that it will work, we still have a lot to learn about the details and the use of the experimental frequencies, designed to give us more knowledge, to give industry more knowledge, and the Government more knowledge so that we will know how to proceed.

There are wide differences of opinion among the scientists, for example, about the kinds of satellites and the kinds of orbit, and the life of a satellite.

There are wide differences of opinion on this, and we are trying to encourage whoever we can in the advancement of knowledge to find out the answers.

The CHAIRMAN. Have you thought about the stability of the satellite?

Mr. MINOW. Well, I will ask Commissioner Craven to answer that.

Mr. CRAVEN. We have given a lot of thought to all of the technical aspects, and we hope to have resolved, prior to 1963, and established by experimentation the best possible system, including the circuitry, including the type of orbit and whether it should be active or passive satellites, and whether the frequencies which we are experimenting with are the most suitable.

The CHAIRMAN. I do not want to use too much of the time, but I have a lot of questions in my mind, but I think I will forego some of them at this moment to give the other members of the committee a chance.

Mr. MINOW. Mr. Chairman, could I just answer one of your other questions?

On the Space Council, the other member I did not mention is the Chairman of the Atomic Energy Commission.

For the record I wanted to indicate that.

He is a statutory member of the Space Council also.

The CHAIRMAN. Yes. One of the questions that I wanted to develop and that I will go into is with reference to the action of the Commission, as you explained here, regarding the expected or anticipated responsibility of the American Telephone & Telegraph Co., and what their responsibility is, and the controversy with reference to General Electric.

Would you clarify the nature and status of that just a little bit more?

Mr. MINOW. Well, basically, in our first report and order we said that we wanted to explore a joint venture of the carriers.

This would necessarily exclude those who are not licensed now to be in the international communications carrier business. There are, I think, 10 or 11 international carriers now licensed.

The CHAIRMAN. Could you include those in the record at this point or submit it——

Mr. MINOW. Yes.

The CHAIRMAN. Later if you do not have it now.

Mr. MINOW. They are the American Cable & Radio Corp., which includes Mackay Radio, Inc., the Commercial Cable Co., All America Cables & Radio, Inc., and Globe Wireless, Ltd. Then there is the American Telephone & Telegraph Co., the Hawaiian Telephone Co., Press Wireless, Inc., Radio Corp. of Puerto Rico, RCA Communications, Inc., South Puerto Rico Sugar Co., Tropical Radio Telegraph Co., United States-Liberia Radio Corp., and the Western Union Telegraph Co.

These are the ones who have been designated, under our order, to be members of the Ad Hoc Carrier Committee which is now going to meet to propose a plan.

Now, the controversy with the other noncarriers, such as General Electric, have been whether someone who is a manufacturer of equipment, who is not licensed as a communications carrier, should be permitted to be a part of this exploratory committee.

We have taken the position, I might add, unanimously, the Commission, that for the time being, while we explore this, we think it should be limited to the carriers because they are licensed by us subject to Government regulations, because they are in the business, because they have got counterparts abroad and partners and relationships with foreign countries, and for other reasons.

And this is the nature of the controversy, I think, which has been discussed.

In addition to that, we are very concerned, very concerned, that we do not exclude any know-how, any scientific brains in this venture because, Lord knows, the country needs the best talent available.

Therefore, we have specifically directed, in our order, that the committee go out and take information and views from others as well as those who are carriers.

Let me read the paragraph into the record at this point. It is paragraph 6 of our supplemental notice of inquiry. [Reads:]

As the agenda subject matter may warrant, representatives of interested Government agencies and industry may be invited by the Ad Hoc Carrier Committee to participate in discussions for the purpose of furnishing the committee advice or assistance regarding matters within their competence or concern. It is the Commission's desire that the Ad Hoc Carrier Committee call upon and obtain the views of other sources wherever it appears that they can make a contribution. For example, representatives of interested Government agencies and industry groups clearly would have an interest in several aspects of subsection (f), paragraph 8, infra.

That is the competitive bidding for equipment section.

Therefore, we would expect that they would be permittted to make their contribution to the formulation of the plans concerning these aspects. We wish to make clear however, that at this stage we leave the extent and nature of participation by such groups to the Ad Hoc Carrier Committee.

The CHAIRMAN. Mr. Springer?

Mr. SPRINGER. Mr. Minow, first, I want to congratulate you on the preciseness of the statement you made.

Mr. MINOW. Thank you.

Mr. SPRINGER. We have run into so many instances where they have dragged on and on, and this time we have gotten to the point where there is a decision and that is an important point.

Mr. MINOW. Thank you.

I might say, for the Commission, that we regard this as the most important item that we have, and we are giving it our full attention.

The CHAIRMAN. Will you yield?

Mr. SPRINGER. Yes.

The CHAIRMAN. Is the Commission unanimous in its action?

Mr. MINOW. Yes, sir.

Mr. SPRINGER. If I may, I would like to start with——

Mr. MINOW. Let me note that at our meeting Friday, when this was adopted, two Commissioners were absent: Commissioner Hyde and Commissioner Ford.

We were unanimous on our first report and order. There may be some other changes, but at our meeting Friday everyone there was unanimously for it.

Mr. SPRINGER. I would like to start at the beginning, if I could, so that this committee and myself will have an understanding of what is taking place in this whole thing.

Now, before you come into the picture, you have to put something up there to reflect——

Mr. MINOW. Right.

Mr. SPRINGER. The sound. That has to be done by NASA?

Mr. MINOW. That is correct, sir.

Mr. SPRINGER. Have you an agreement with NASA on that?

Mr. MINOW. Yes, we do. That agreement was signed in February of this year, and it is made a part of the record today, Mr. Springer.

Mr. SPRINGER. Well, now, in essence, as briefly as you can make it, what does that agreement say?

Mr. MINOW. Basically, it is an agreement that the objective of achieving a communication satellite system is to take very urgent priority, that we would share our information and work out problems in a close liaison.

I think Commissioner Craven is in touch with them on a day-to-day basis.

And we agreed at that time to this, and I will read this one short paragraph. [Reads:]

> That in accordance with traditional communications policy in this country, oversea public communications are provided by private enterprise, subject to Government regulations.

And that the FCC and NASA would work together to try to use the spectrum efficiently and to aid in developing the satellite technology.

It further states that the statutory authority of both NASA and the FCC appears adequate to enable each agency to proceed expeditiously.

Mr. SPRINGER. I want to get a little closer to the point.

Does that agreement say that NASA will put the satellite up?

Mr. MINOW. I do not think so.

Mr. SPRINGER. Well, now, what covers that?

Mr. MINOW. I would think the Space Act itself. We would have nothing to do with that part of it.

Mr. SPRINGER. In other words, you do not have any agreement on that. Is that correct?

Mr. MINOW. No. It is not a part of this agreement; no, sir.

Mr. SPRINGER. All right. Now, when do you expect to do that?

Mr. MINOW. Well, I am not sure that that is actually within our particular responsibility.

What we can do, if a carrier comes to us and says, "We would like to use a frequency," we have the say on this "Yes" or "No."

Mr. SPRINGER. Now, you do not come into this picture until such time as a common carrier comes to you and says, "I would like a frequency by which to reflect a sound off of this object." Is that correct?

Mr. MINOW. That is correct, I believe. Yes, sir.

Mr. SPRINGER. Now, who does approach NASA with reference to putting that satellite up?

Mr. MINOW. The carrier.

Mr. SPRINGER. All right. Has that been done?

Mr. MINOW. I believe that that has been done.

I believe that NASA, first of all, has made an arrangement to have RCA build a satellite under contract, to be owned by the Government and to experiment with.

I believe A.T. & T. is negotiating with NASA to send up a satellite owned by A.T. & T. as an experiment.

Mr. SPRINGER. Do you know by whom the contract has been signed at A.T. & T.?

Mr. MINOW. I do not know.

Mr. SPRINGER. You do not know that, as a matter of fact?

Mr. MINOW. No.

Mr. SPRINGER. Now, have you already executed any contract with A.T. & T. for reflection of a sound from that object after it is up there?

Mr. MINOW. Well, we do not ever execute a contract, but we did give them the experimental use of a frequency.

We did that early this year, and it is pursuant to that that we are now negotiating with NASA to send it up.

Mr. SPRINGER. Now, that is where it stands as of today? Am I right?

Is there anything beyond that? This is July 25, 1961.

Mr. MINOW. Well, I think you have to distinguished between the experimental part and the operational part.

Mr. SPRINGER. Then this first part is only experimental?

Mr. MINOW. That is correct.

Mr. SPRINGER. In the experimental stage will there be any country included besides the United States?

Mr. MINOW. Yes.

Mr. SPRINGER. What other countries?

Mr. CRAVEN. France, England, and possibly Germany.

Mr. SPRINGER. Those are the three besides the United States in the experimental stage.

How long do you expect the experimental stage to last?

Mr. CRAVEN. About a year.

Mr. SPRINGER. And then you think at the end of that time you will be in a position to grant a permanent frequency.

Is that correct?

Mr. CRAVEN. Perhaps not as a result of this particular experiment. There may be other experiments which are required.

Mr. SPRINGER. All right. Will those experiments all be under the control of the United States or foreign governments?

Mr. CRAVEN. It will be in cooperation between the United States and foreign governments.

Mr. SPRINGER. Is it expected that there will be only one commercial satellite put up?

Mr. CRAVEN. One commercial satellite? There will be more satellites, but one commercial satellite system.

Mr. SPRINGER. One commercial satellite system?

Mr. CRAVEN. That is right.

Mr. SPRINGER. After that satellite system is in being, is that system subject to the Federal Communications Commission or to another Government agency?

Mr. CRAVEN. The Federal Communications Commission.

Mr. SPRINGER. The Federal Communications Commission will have total jurisdiction after the system is established?

Mr. CRAVEN. Well, they will have sole jurisdiction, as I understand it.

Mr. SPRINGER. Mr. Reporter, would you read his answer back, please?

(The record was read by the reporter as requested.)

Mr. CRAVEN. Of the operation of the system.

This may have to be contracts for the maintenance of the system between the satellite company in this country and NASA to keep the satellites maintained.

Mr. SPRINGER. Now, is it anticipated that there will probably—I use the word "probably"—be one private enterprise group that will have exclusive, we will say, public utility power to operate?

Mr. MINOW. Well, I think that our present view is that there is going to have to be one entity.

Mr. SPRINGER. One entity?

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Mr. MINOW. Composed of a number of different private companies. I mean, one joint venture, a joint entity; yes, sir.

Mr. SPRINGER. Will that be a U.S. venture?

Mr. MINOW. Well, it may be that the American companies will have to take into ownership with them some of the foreign countries as they do now in the cable field.

For example, today in the cables connecting Western Europe and the United States, the private carrier, the American Telephone & Telepraph Co., has a partner, either the Government of England or France, as the case may be.

So that we anticipate that some of those same principles will carry over to the satellite.

Mr. CRAVEN. I would like to clarify that a little bit for you, Mr. Chairman.

The ground facilities in this country will be owned by the carriers. There may be the RCA who may own some ground systems. A.T. & T., and others, may own separate ground systems.

The ownership of the satellite itself will be participated in in this country, and the carriers or, rather, by the carriers in this country and other foreign governments.

And other communication—private communication agencies, if they are existing, in foreign lands.

Mr. SPRINGER. Now, in this system, looking ahead and projecting your best estimate, I take it that your first form of communication will be telephone and telegraph?

Mr. MINOW. We think so; yes, sir.

Mr. SPRINGER. Which one?

Mr. MINOW. I think they would probably both go together. I think they would go together.

Mr. CRAVEN. It would include all forms of communication—telephone, telegraph, the modern modes of communication, data processing and, perhaps, the relay of television.

Mr. SPRINGER. I am trying to get this in order so we will get a record here.

What do you expect first? Telephone or telegraph or both at the same time?

Mr. CRAVEN. All at the same time.

Mr. SPRINGER. All at the same time? Now, when do you expect it?

May I ask the date for your projected estimate for telephone and telegraph?

Mr. CRAVEN. Experimentally, the first one, I think, will be some time in 1963.

Mr. SPRINGER. Experimentally in 1963?

Mr. CRAVEN. That is right. We intend to not have a fully operated system until we have an international agreement on the frequencies.

Mr. SPRINGER. Is the international agreement the thing now next that has to be done in order to institute this on a permanent basis?

Mr. CRAVEN. No, sir. We have got to do something here first. We have to get an organization going.

Mr. SPRINGER. That is this international agreement which is the second stage?

Mr. CRAVEN. That is part of it. The experimentation is the second thing.

Mr. SPRINGER. All right. Now, then, when do you expect this system to be in permanent operation?

Mr. CRAVEN. In early 1964.

Mr. SPRINGER. In early 1964?

That is on a telegraph and telephone basis?

Mr. CRAVEN. That is right.

Mr. SPRINGER. Now, when, on a projected basis, do you expect the television?

Mr. CRAVEN. You mean relay television or direct television?

Mr. SPRINGER. Well, would you distinguish that and——

Mr. CRAVEN. Yes. The relay television is, we start the television program here in this country at some studio, transmit by landlines to the ground station, and then to the satellite, and then to the ground receiving station in another country, and then by landlines to a studio.

Mr. SPRINGER. Now, that——

Mr. CRAVEN. That is different than having a direct broadcast from this country by means of satellites to the home receiver.

Mr. SPRINGER. Now, will you project those for me?

Mr. CRAVEN. I cannot project when it will be feasible to have direct broadcasting by television via the satellite direct to the homes in other countries.

That is a long way off.

Mr. SPRINGER. Are you thinking in terms of 10 years?

Mr. CRAVEN. I am thinking in terms of 20 years.

Mr. SPRINGER. What about relay?

Mr. CRAVEN. That can start along with the other communications systems.

Mr. SPRINGER. About 1964 or 1965?

Mr. CRAVEN. That is right.

Mr. SPRINGER. From the best estimate that you can make, as of this time, is ours the only country now projecting such an international satellite communication system?

Mr. CRAVEN. Well, I would say that the arrangements between the United States and Great Britain, the United States and Germany, and the United States and France, and, bringing in the other countries, I also know that there is a possibility of having some experimentation with Brazil.

I also know that the Japanese are interested in cooperating with the United States. I do not know of any other plans.

Mr. SPRINGER. Well, now, may I ask you this: Do you know of any other country at the present time that is projecting the possibility of putting up its own satellite system other than the United States?

Mr. CRAVEN. I do not.

Mr. SPRINGER. Nothing has been heard from Russia on this, as far as you know?

Mr. CRAVEN. The information we have from Russia is rather negative.

Mr. FRIEDEL. What was that answer? I missed that.

Mr. CRAVEN. The information that we secure from Russia is negative.

The CHAIRMAN. What about the other way? The information we provide them?

Mr. CRAVEN. Well, we provide them with plenty of information. This hearing provides them with information itself.

Mr. SPRINGER. Mr. Chairman, may I, just in closing for the moment, go to what you call your common carrier committee, and I take it that that is made up of the 10 or 11 companies that you named there.

Now, in substance, what is that?

Mr. MINOW. What is their duty?

Mr. SPRINGER. Yes.

Mr. MINOW. Well, they will have their first meeting, Mr. Springer, August 3 pursuant to this order, and they will then—you see, our problem has been that they have been unable to even meet in a room because of the fear that they will be violating the antitrust laws.

So we are going to provide a forum for them so they can discuss whether or not they can agree on a joint venture which will meet the standards of our order.

That is, no one company must dominate it. Each must have equitable access to it and so on and so on.

They will have then a discussion and I think it is a magnificent test, it seems to me, of the free enterprise system to see whether we can come up with a workable plan quickly, and put together a commercially successful satellite system.

Mr. SPRINGER. Now, this last thing: You are going to get a lot of discussion with this before you are through with it.

You hear all kinds of rumors and people on Capitol Hill making all kinds of statements.

If you have direct control of this yourself, is it possible to be in violation of the antitrust laws and—I will take this one step further—also if whoever you grant this to, following the orders and directions of the Commission——

Mr. MINOW. Well, if we are able to come up with a plan here that the Department of Justice says is all right, that does not give anybody domination, that insures that those people, let's say, who manufacture equipment have a fair shake at getting it so, then I think we will not be involved with the antitrust laws.

Mr. SPRINGER. Actually, it is true, is it not, that a carrier is a monopoly, isn't it, to the extent to which you give him authority?

Mr. MINOW. Correct.

Mr. SPRINGER. And he is a total monopoly?

Mr. MINOW. Correct. It is a regulated monopoly.

Mr. SPRINGER. All right. A regulated monopoly.

It was my understanding, and I may be a poor lawyer, that anybody who is a public regulated utility and follows the directions with reference to the orders of the Commission is not in violation of the antitrust laws.

What does your——

Mr. MINOW. It is hard to generalize because there have been cases in the past where regulated companies have been found by the courts to have violated the antitrust laws.

This happens sometimes in the airline field. It happens sometimes in the communications field.

It happens all the time, and it is a matter the courts struggle with, and I wish there were a clear answer I could give you but there is not.

Mr. SPRINGER. All right. Then I take it that it is going to be the policy of your Commission to get, in essence, then, a blanket coverage from the Department of Justice with reference to this matter before any grant is made?

Mr. MINOW. Well, I could say this: We are not going to authorize any plan that the Department of Justice tell us violates the antitrust laws.

We are going to work with them. If we can develop a plan that is satisfactory under the law and also under our standards of our order, fine.

If we cannot, then we will have to look around for some other alternative.

Mr. SPRINGER. I hope the Commission will follow that because I do not see any reason, when this is all over, for anybody to be charged by some future administration, whether it is Republican or Democrat, that the antitrust laws have been violated if they operated under an order of this Commission.

Mr. MINOW. Well, the history is interesting on this, Congressman Springer. In the early days of communications, the Government called in a number of carriers—I think around World War I—and put them all together and, then, 30 years later, proceeded to break them up.

So it is hard, you know, to look ahead terribly far, but we are trying to work at a plan here from the beginning that has the blessings of the Department of Justice and our own regulation pattern.

Mr. SPRINGER. Thank you, Mr. Chairman.

The CHAIRMAN. You may proceed, Mr. Rogers.

Mr. ROGERS of Texas. Mr. Minow, with relation to the memorandum of cooperation between the FCC and NASA, why was that necessary?

Mr. MINOW. I think I would rather have, if you do not mind, Commissioner Ford answer that.

Mr. FORD. Well, I think Commissioner Craven worked most of that out. As I understand it, there was a question that arose with respect to just what areas and what was the primary jurisdiction and the authority of the Commission with respect to communications.

And, on the other hand, NASA's authority with respect to the satellite itself.

So that there was some feeling, I think, that perhaps the authority of NASA went a little further into the communications field than we thought. And it was through a series of discussions between representatives of the Commission and NASA where we arrived at, and delineated, our respective responsibilities of the two agencies with respect to the communications and satellites.

And so it was felt wise and reasonable to reduce that to writing so that there would not be any question of us trying to get over into the area that would probably—that was properly theirs or that NASA would be encroaching jurisdiction of the Commission. And that was done on an amicable basis and has worked satisfactorily. I think that is correct, is it not, Commissioner Craven, sir?

Mr. CRAVEN. That is correct, Mr. Congressman.

There appeared in the early stages of the game a little misunderstanding with respect to the authority of NASA to make contracts with private enterprise for communication satellites where it required a license from the Federal Communications Commission. So, very

early in the game, we got together and resolved our differences and came up with this understanding.

Mr. ROGERS of Texas. Well, now, would you say it was done more in the spirit of trying to avoid duplication rather than from the standpoint of jealousy of jurisdiction?

Mr. CRAVEN. There is no jealousy involved, I do not believe.

I think we were trying to——

Mr. ROGERS of Texas. I am just speaking of jealousy of jurisdiction in a rather broad sense.

Was it the position of NASA that it had the right because of the space type of the situation, the outer space character, that it had the right to authorize companies to enter into contracts without reference to the Federal Communications Commission?

Mr. CRAVEN. Well, they did have the right, so far as the use of the Government frequency is concerned, if they were going to own and operate the satellite.

Mr. ROGERS of Texas. Now, that is the question: Now, this stemmed from primarily the fact that the National Space Agency was advocating Government ownership of the satellite rather than ownership by private enterprise; was it not?

Mr. CRAVEN. I do not recall that NASA has been an advocator of Government ownership and operation.

Mr. ROGERS of Texas. What was that statement?

Mr. CRAVEN. Frankly, I do not recall that NASA has advocated Government ownership and operation at any time.

Mr. ROGERS of Texas. You do not recall?

Mr. CRAVEN. No; not officially. There may be people in Government who believe in Government operation in competition with private enterprise, but that is not the prevailing view and was not the prevailing view of NASA.

Mr. ROGERS of Texas. Then this need for this memorandum did not come up because NASA was supporting Government ownership and FCC was supporting private enterprise?

Mr. CRAVEN. No, sir. That was not the reason.

Mr. ROGERS of Texas. Have you experienced any difficulties with NASA in obtaining full cooperation and information on all matters that they have access to?

Mr. CRAVEN. They have been most cooperative. I see them almost every day and exchange information with them, and have knowledge that they give me with respect to what they plan to do in experimentation in the communications satellite field and matters of that nature.

Mr. ROGERS of Texas. Then, Mr. Craven, you have not run into any situations that have been classified "highly classified" or "super classified" insofar as NASA is concerned?

Mr. CRAVEN. Well, they have given me classified information when it affects the possibilities of commercial satellite systems.

Mr. ROGERS of Texas. And you are experiencing no difficulty in obtaining all the information you feel that the FCC needs?

Mr. CRAVEN. One of the best agencies is NASA that I have ever met in Government so far as cooperation is concerned.

Mr. ROGERS of Texas. The reason I am asking these questions, and one reason is that we are here interested in it, and I think it would

be a very sad commentary on the Federal Government if, because of difficulties between agencies, in this space race, we should suffer some obstacles or defeat.

I think it would be a terrible thing, and I think that if there is even a semblance of that in the present situation that could develop and grow worse, I think that the time for us to act on it is right now.

Mr. CRAVEN. Well, I would just like to repeat that I feel that the cooperation between NASA and ourselves has been full and very, very helpful. And I would like to read at this point in the record the first part of the memorandum of understanding.

The purpose of this memorandum is to provide a basis for coordinating the activities of the National Aeronautics and Space Administration and the Federal Communications Commission in the application of space technology to civil communications in order that their respective statutory responsibilities may be carried out in the national interest. It is mutually recognized that future presidential or congressional actions may necessitate some modification of this memorandum.

Mr. ROGERS of Texas. I appreciate that, Mr. Craven, but I am sure you can understand my feeling that sometimes the words stated in the thing do not always express what is between the lines. And I just wanted to be sure that there was not anything like avoiding stepping on each others toes in this situation, to proper——

Mr. CRAVEN. Well, I think we have a very happy relationship with NASA.

Mr. ROGERS of Texas. Well, I am very glad to hear that.

Mr. MINOW. I would only repeat that for myself, Congressman Rogers. I have had a series of meetings with Mr. Webb, and we have always agreed—we are a small agency as the Government goes, but we work together with them with the greatest spirit of cooperation in the exchange of information.

Mr. ROGERS of Texas. In the exchange of these views and the——

Mr. FORD. May I say that prior to that time, when Dr. Glennan was there, that same situation existed.

If anything I said in my explanation led you to believe that there has ever been any friction between the two agencies then I am very sorry, because that was not the case during the time that Dr. Glennan was there and when I was Chairman.

And as you have heard, Chairman Minow has had exactly the same experience with that agency.

Mr. ROGERS of Texas. Thank you, Mr. Ford.

Then I can presume that there has been no difficulties or no differences of opinion insofar as NASA is concerned, with your conclusions as to a study group by the international carriers to place this communication satellite under free enterprise.

Mr. MINOW. No, sir. They have not disagreed with our view at all on that.

They sent a man to our first meeting, under our first order, and voiced no disagreement whatever.

Mr. ROGERS of Texas. Well, Mr. Minow, of course, you understand I am not trying to condemn either agency, but what I think is this, that this is a matter of course that is new to all of us, and I think it ought to be fully explored.

Now, if public ownership is better and there are situations where I think we must all admit that public ownership is better because of risks involved and things of that sort in the beginning, if that is the question, I think we ought to get right to the task of determining it so that we can move forward as quickly as possible, because we are not dealing as between States with one another.

We are dealing with foreign countries that are very anxious to get ahead of us.

Mr. MINOW. Right.

Mr. ROGERS of Texas. Now, in relation to your confining of the study to the international carriers and your order declaring General Telephone is not in the international carriers, may I ask what prompted you, Mr. Minow, to include only international carriers in the first instance?

Mr. MINOW. Right. I would like to read into the record the considerations of our order.

These are paragraphs A and B of paragraph 6 of our first report:

It appears to be generally accepted that because of considerations of practical economics and technical limitations, it will not be feasible for some time to come to accommodate more than one commercial satellite system.

(*b*) Communication via satellite will be a supplement to, rather than a substitute for it, existing communication systems operated by the international common carriers, thereby becoming an integral part of the total communication system of each such carrier.

(*c*) The responses filed by the international carriers express a willingness and indicate a capability to marshal their respective resources for the purposes of developing a satellite communication facility.

(*d*) By reason of their experience in and responsibility for furnishing international communications service, the international carriers themselves are logically the ones best qualified to determine the nature and extent of the facilities best suited to their needs and those of the foreign correspondents, with whom they have longstanding and effective commercial relationships and who necessarily will have a substantial interest in the operations of any satellite system.

(*e*) Under the Communications Act, the international carriers are obligated to furnish the public with adequate, efficient service at reasonable charges, and this obligation can best be discharged by those carriers maintaining, as far as possible, the greatest degree of direct control and responsibility over the facilities employed in this service.

If I am not mistaken, the only domestic carrier who sought to be in it, arguing that it should be classified as an international carrier, was the General Telephone Co.

Western Union is both a common and an international carrier.

Mr. ROGERS of Texas. Well now, with relation to this procedure that was followed, would the international carriers receive any benefits by virtue of it that would not be available to the domestic carriers?

Mr. MINOW. Well, I think not.

Actually, we hear all of the time that this is going to be a fabulously successful enterprise, and it may be at the time.

But whoever goes into it now is going to have to put up some money and take some chances.

The Government's view, that this should be a global system, may impose some economic problems here on the carriers because it is one thing to go to a place where you foresee a lot of traffic which will make it commercially successful. It is another thing to put it into an underdeveloped part of the world where it may not.

So it is really too early to tell now whether it will be any great development.

Mr. ROGERS of Texas. What you are trying to do, Mr. Minow—and there are a lot of questions I would like to ask you about this—but what you are trying to do is to work this thing out on the basis of the free enterprise system——

Mr. MINOW. Exactly.

Mr. ROGERS of Texas. So that people will have an opportunity under that system to do the job.

Mr. MINOW. Well, exactly. I think, philosophically, that if we are in a race with the Russians this is a great way to test our system and put it to work and let's see if it will work.

Mr. ROGERS of Texas. But, as I understand your order, it did not block out the domestic carriers at all.

You are going on a fishing expedition, trying to find out the best way.

Mr. MINOW. Precisely, and we have reserved judgment, really, on the desirability of taking in the others later.

Mr. ROGERS of Texas. There are other questions about this that I would like to ask you, but in the interest of time I want to ask one more question and then I will quit.

If NASA should make a contract with a private carrier to operate a Government-owned satellite, could they do that at the same time you could authorize the use of frequencies under your jurisdiction by joint venture private group?

Mr. MINOW. I would say yes, except I think probably now in view of the President's statement of policy that that would be unlikely.

That would be unlikely.

Mr. ROGERS of Texas. Well, but the Government-owned satellite, would it use Government frequencies——

Mr. MINOW. Yes.

Mr. ROGERS of Texas. Or would it use frequencies——

Mr. MINOW. It would use a Government frequency.

Mr. ROGERS of Texas. Then if NASA decided to have a publicly owned satellite they could have one using Government frequencies, and if you wanted to have a private enterprise satellite you could have one using frequencies under your jurisdiction?

Mr. CRAVEN. That is correct.

There probably will be a Government system but not for public communications.

It will be for certain restricted uses by the Government for communication purposes.

Mr. ROGERS of Texas. Yes. Well, I can understand that, Mr. Craven but what I had in mind was the possibility of a Government-owned satellite in which the Government itself will try to control the use.

In other words, if the Government put up a publicly owned satellite it would not bar the putting up of a privately owned satellite using frequencies over which the FCC has jurisdiction?

Mr. CRAVEN. Well, insofar as my understanding of the arrangements is concerned, when a communication satellite is used for Government communication it only will use Government frequencies.

A non-Government satellite communication system will use frequencies under the jurisdiction of the Federal Communications Commission.

Now, to carry this one step further, before you can communicate with a foreign country you have to have an agreement with that foreign country.

Mr. ROGERS of Texas. Yes. If they had a Government-owned satellite though and they wanted to use frequencies over which the FCC has jurisdiction, they would have to come in and get your permission to use those frequencies?

Mr. MINOW. That is right.

Mr. ROGERS of Texas. If you denied them that right they would have a satellite up there without any communications?

Mr. MINOW. That is right.

Mr. ROGERS of Texas. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Younger?

Mr. YOUNGER. Mr. Minow, nowhere in your presentation or, if there was, I did not hear it, has anything been said so far that any legislation is needed in connection with this program.

What is your idea on that?

Mr. MINOW. We feel at this point, Congressman Younger, that our present statutory authority is sufficient.

We are early in the game though, and it is all a new field and we may, in the course of time, come here with some recommendations.

But at the present it is the Commission's feeling that the present statutory authority is all right.

Mr. YOUNGER. The only thing in the present statute is the control over the spectrum.

Mr. MINOW. Well, more than that. We also control the—anybody who wants to go into the international communications business, regardless of satellites, would have to come to us for a license.

So we control the regulation of any carrier in the international communications field.

The satellite part of it gets us into the frequency management as well. And for that reason we feel that, at least at present, our statutory authority is all right.

In our first inquiry we asked this question of everyone else, everyone who participated in it, Government agencies and industry, and the Department of Justice, as to their views on our statutory authority.

And no one at that time suggested that any legislation was needed. But this is not to foreclose it.

Within a year from now we may conclude that there will have to be some changes but for the present we think it is all right.

Mr. YOUNGER. I was a little confused this morning in reading in the press of the President's pronouncement which, to me, seems a little unusual for the President to set policy where there is a body, either a Commission or a Board, that is supposed to set policy.

Mr. MINOW. Well, the President has taken no view, it seems to me, on our particular orders.

The only basic policy involved that he has taken is whether—because, you see, this is one of the rare ventures, it seems to me, where you cannot have a purely private thing, because no one could get a satellite up in orbit without the Government.

And, therefore, by the very nature of the problem you have got a mixture here of Government regulation and private enterprise.

And I think the President's basic point there was to say that the ownership and operation of a commercial system should be left to private hands.

Mr. DINGELL. Would you yield to me?

Mr. YOUNGER. Yes.

Mr. DINGELL. Isn't it also a fact, Mr. Chairman, in addition to this, that we have a question of international relations——

Mr. MINOW. Extremely——

Mr. DINGELL (continuing). Of foreign policy on which the President has, under the Constitution, primary jurisdiction?

Mr. MINOW. Well, extremely so.

The Department of State, of course, is vitally interested in all of these matters. And we are not—we realize the limitations on our own competence, and are trying very hard not to get into any foreign-policy situation.

So we look for guidance on that to the Department of State.

Mr. YOUNGER. Are you through?

Mr. DINGELL. Yes.

Mr. YOUNGER. All through your report you speak of providing oversea communications.

Is there any reason why the satellite communications system cannot be used for interstate communication?

Mr. MINOW. It could, but at the present time it seems economically not useful.

It is much cheaper now, technically, to communicate through our present existing systems, microwave, and Commissioner Craven could amplify that.

This may happen if the satellite thing becomes cheaper but for the present, no. But Commissioner Craven could amplify that.

Mr. CRAVEN. There is one limitation that we have to bear in mind at the present time and that is the amount of radio spectrum space which can be allocated to this communication system.

It is not too great an amount that we can have by reason of scientific limitations.

Now, if the traffic in the United States is so great as to impair the capacity of the system to handle international communications, then it might not be desirable to make the interstate commerce communications—to use the satellite system.

Now, further than that, as mentioned by the Chairman, there is the cost. It may cost a whole lot more to communicate by satellites between two points in this country, in view of the relatively low cost landline systems that we have.

Mr. YOUNGER. Well, if you have a receiving station and a sending station in New York and you have a receiving station in San Francisco, and the satellite is up there, what is the additional cost?

Mr. CRAVEN. Well, there would be no additional cost, but the question is the amount of traffic——

Mr. YOUNGER. Well, you say it would be expensive.

How could it be expensive?

Mr. CRAVEN. Well, it is going to cost a whole lot of money to get them up there.

Mr. YOUNGER. Well, they are up there already. You cannot have the oversea communication unless the satellites are already up there.

Mr. CRAVEN. I agree with that.

Mr. YOUNGER. If there are 50 satellites as are proposed already up there.

Now, I just foresee that we are going to get into probably some other complications by attempts for the use of these satellites for interstate communications in this country.

Mr. CRAVEN. Well, this may happen in the future, depending on the developments of science.

But at the present time there are at least two different systems being proposed, and we do not know which is the best. One is an equatorial system, which would be available to all of the nations of the world on a direct basis. And the other is a Polaire system which will utilize relays on the ground.

If we use the Polaire system there seems to be some opportunity for the system to handle some domestic traffic in addition to international traffic, but when you use the equatorial system there are some grave doubts whether or not we have spectrum space enough to accommodate the needs of the entire world.

Mr. YOUNGER. That will be determined by the experimentation that will go on from now until they get the system adopted which you want to follow?

Mr. MINOW. Yes, sir.

Mr. YOUNGER. That is all I have.

The CHAIRMAN. Mr. Friedel?

Mr. FRIEDEL. Mr. Chairman, I want to congratulate you and the members of the Federal Communications Commission. I am very, very pleased to learn that the Government is not going to get into the communications field.

I just want to explore one thing and I well be very brief.

I will not ask any questions that might give the Russians some information.

This is page 8 on the top line of your statement. [Reads:]

> In addition, an experimental authorization was granted in January of this year to the International Telephone & Telegraph Corp. to bounce signals off the moon and manmade passive satellites for basic research and study.
>
> Also, in the same month, an experimental authorization was granted to the American Telephone & Telegraph Co. which will permit it to conduct an experimental program involving the transmission and reception of signals between terminal facilities and active communication satellites.

I want to make this statement. I do not own any stock in A.T. & T. I understand that they are willing to spend anywhere from $400 to $500 million to send up a satellite for experimental purposes. Why was that not granted?

Mr. MINOW. I think this is what you are referring to: There have been articles in the press saying that they wanted to pay to send up their own satellite and that experimentation part of it should be distinguished from the operation part.

That is when you get into the hundreds of millions. The experimentation part is a substantial amount, but it is not of that magnitude.

And the experimental part, they are now negotiating with NASA to send it up. We gave them the right to the experimental frequency.

Now, they are negotiating with NASA on the terms to send it up.

Mr. FRIEDEL. Send up their own satellite?

Mr. MINOW. That is right.

Mr. FRIEDEL. Except that NASA——

Mr. MINOW. NASA has not, I believe, reached a conclusion on it. I am not sure. They have not signed an agreement on it as yet.

Now, on the other part of it, it is true that A.T. & T. is willing to invest a lot of money in the operational system. So are all of the other carriers, except the small, real tiny, ones who want to use it but not invest in it.

And that will be decided under our proposal here, to see if they can come up with a plan which satisfies the public interest. And I would say we certainly hope that they can.

But you have got to distinguish between the experimental thing with NASA and the operational one with us.

Mr. FRIEDEL. If they are willing to send their own satellite up it would still be under Governent control—is that correct—but the licensing, wavelengths and bands, would adhere to FCC regulations?

Mr. MINOW. The FCC, right. That would be up to us.

Mr. FRIEDEL. I am very happy to learn that the Government is not going into the communications system and that is the one point I wanted to clear up.

When the A.T. & T., and I think they have the know-how as they have proved it in their system, if they are willing to spend their own money, $400 million or $500 million, I think they should be given the opportunity. Thank you.

The CHAIRMAN. Mr. Collier?

Mr. COLLIER. Mr. Minow, it seems to me, looking at this system in long-range perspective, that eventually the regulation of the system would necessarily become predominantly international in scope.

Mr. MINOW. Well, it is possible. The International Telecommunication Union, which is a part of the United Nations—well, not a part of it, but it has an agreement with the United Nations, has been the international clearing house for the agreement on frequencies.

And Commissioner Craven has gone to a number of their meetings. It seems to be one part of the international affairs where countries do agree, because if you do not, there is no way to communicate with each other.

And it may be that in time, some of this will go that way although the cable system presently is regulated now by us and by foreign countries, regulating their part of it. It has worked out pretty well.

Mr. COLLIER. With that thought in mind, I would like to know a little bit more about the CCIR which was mentioned there.

Specifically, is this an informal group, so to speak, or is there a formal membership to the CCIR?

Mr. MINOW. I would like to have Commissioner Craven answer that because he represents——

Mr. CRAVEN. The CCIR is a technical committee of the International Telecommunication Union to which all members, all members of the Union, send representatives.

They are limited to technical recommendations only. They have no power to issue rules or anything of that character.

They make recommendations to the International Telecommunications Union. Those recommendations are considered in international conferences of members of the Union.

Mr. COLLIER. And their meetings are not attended primarily by officials of the governments but rather by technical——

Mr. CRAVEN. They are attended by representatives designated by the various governments and in this country the State Department sends both Government representatives, people in the Government, as well as private enterprise people.

Mr. COLLIER. Might I ask what official representation has there been—well, specifically, isn't the Soviet Union represented in this?

Mr. CRAVEN. They have the right to be represented. Whether they are going to appear at the next meeting, I do not know.

Mr. COLLIER. Have they appeared?

Mr. CRAVEN. They have appeared at many meetings. They have had people present at many meetings.

The representatives from the U.S.S.R. were present at the conference in Geneva in 1959, the International Communications Conference, and participated very thoroughly in that conference.

Mr. COLLIER. How many of the so-called satellite countries were represented?

Mr. CRAVEN. There were 80-some-odd nations represented. The U.S.S.R. and Czechoslovakia were represented. Hungary was represented and Bulgaria. Red China was not a member of the Union and was not represented. And Outer Mongolia was not represented.

South Vietnam was not represented and some others were not represented, but the vast majority of the Iron Curtain Europeans were represented. However, East Germany was not represented.

Mr. COLLIER. When you say they were represented, of course, in this sense they would be represented actually by representatives of the governments?

Mr. CRAVEN. That is correct.

Mr. COLLIER. Rather than by the technical people. Is that right?

Mr. CRAVEN. Representatives of the governments. But, generally speaking, they were communication experts, including the technicians as well as the administrators.

Mr. COLLIER. Was their attitude, as far as you could gather at the preliminary meeting, one that was amenable to a cooperative program in this field?

Mr. CRAVEN. The Chairman of our delegation to the Geneva Conference, while we had some political differences, he secured an agreement with them and they were more or less cooperative.

Mr. COLLIER. Does there not exist an urgency in dealing with this matter now, that would dictate an earlier meeting of this group than January of 1964.

Mr. CRAVEN. There is an urgency, all right, but I do not think you can secure international agreement to an earlier meeting.

This is 1963, by the way.

Mr. COLLIER. Well, as I understand it, they have no authority to consider any agreements other than to more or less deal with the overall problem, and to make such recommendations as those with the authority to an agreement you might adopt?

Mr. CRAVEN. That is the CCIR, I think you are talking about.

Mr. COLLIER. Yes, sir.

Mr. CRAVEN. Well, the CCIR is composed of technical representatives from the various governments, and in this country, from private enterprise.

They are meeting early in 1963 and they will make recommendations with respect to this subject, the technical aspects of this subject, to the international conference, the administrative conference, called for in the latter part of 1963.

Now, they are confined to recommendations only. We hope, of course, that as a result of our experimentation, if we can get started early, that we will contribute very valuable information and we will have, perhaps, superior technical information which may be helpful, and in addition to that, will as we are now, collaborate with other nations in these experiments.

Mr. COLLIER. At the present time, Mr. Craven, does not the International Telecommunications Union simply approve the establishment of all commercial communications systems, the installations and so on, as it is directed through the CIA or the AID, as you prefer, and the firms that secure loans for establishment of communications systems, through the International Loan Development Fund—is that correct?

Mr. CRAVEN. I think that is correct.

Mr. COLLIER. They have no official authority, actually, in this field as of now, other than, perhaps, recommendations?

Mr. CRAVEN. Well the International Telecommunications Union does not, of itself, establish communications systems.

It merely comes to an agreement between the various nations as to the procedures that shall be used in communications from one nation to another.

You will have to have some standardization. It comes to an agreement with respect as to the frequency to be assigned to various series, such as aircraft, ships, and point-to-point services and things of that nature.

They have some additional regulations concerning the charges to be made for the various types of services, such as marine services and so forth.

We do not belong to that. We have not subscribed to those.

Mr. COLLIER. I have two further questions: One, in the process of the experimentation and research in this field, has there been evidence that these bands or the communication system can be jammed?

Mr. CRAVEN. Well, at the present time, we contemplate that there is a possibility of jamming.

It depends on the technical characteristics of the system that we are ultimately going to adopt.

Mr. COLLIER. And one final question, and that is this: Then it would appear from our little exchange here that it eventually will then be necessary to establish an official organization, international organization, properly constituted to deal with the overall international problem in this field.

Is that right?

Mr. CRAVEN. One has already been established. That is the International Telecommunications Union.

Mr. COLLIER. Well the question of whether, in its present jurisdiction, it would have been blessed with powers at this time to deal in this field with broad authority to do that——

Mr. CRAVEN. We have taken the view, sir, that the action of the International Telecommunications Union at the International Conference of 1959, has recognized, by its allocation of frequencies, this type of service. And it has already been done.

Now we think that the principles of international law have been established; that is, the peaceful use of satellites for communications purposes.

And at this stage of the game, sir, I would like to explain a little bit further, there is no new principle. The basic principles of communications have already been established.

We still use the pickup of services, such as the telephone system in this country. We still use the ground base radio stations, and we still use automatic relays, but in this instance, instead of being on the ground they are up in the air, up in space.

Mr. COLLIER. Their present authority then would simply be extended to embrace the satellite system of communications?

Mr. CRAVEN. There is nothing new in the communications principles that is here at all.

You are operating under established orders which have been in effect for many years.

Mr. COLLIER. I see. Thank you very much, sir.

That is all I have, Mr. Chairman.

The CHAIRMAN. The committee will have to adjourn now in view of the hour and the House meeting. I had hoped that we could continue this afternoon in order to conclude with the Commission, but, in view of the scheduled program in the House, we will be unable to meet this afternoon.

Can you come back for a while in the morning, Mr. Chairman?

Mr. MINOW. Could we go off the record for a moment, Mr. Chairman?

The CHAIRMAN. Yes.

(Discussion off the record.)

The CHAIRMAN. Back on the record.

Mr. NELSEN. Mr. Chairman, I noted that two members were absent when the Commission took action on this report.

Is there any dissenting opinion on the part of those who were absent?

I was interested in that. If there is, I would like to have in mind that we would like to get at that at a future meeting.

The CHAIRMAN. We asked that question earlier and——

Mr. NELSEN. The first answer was that it was the unanimous decision, but then it later was indicated that two members were not present.

Mr. FORD. Well, I was not present at the meeting and do not have the benefit of the discussion of the other Commissioners.

In preparing for the meeting I had certain ideas of modification of the document which I thought should be made.

Whether or not I would have had a dissenting opinion, had I heard the discussions, I do not know.

But I thought that, in view of the fact that I did not participate and may, at some future time when the matter comes again, have a little different position, that it would be a little unfair to the committee and to me to have it go in the record as a unanimous item when I was not there.

Mr. NELSEN. Thank you.

Mr. FORD. That is the sole basis. I had no prepared dissent.

Mr. MINOW. Commissioner Hyde.

Mr. HYDE. My position was exactly that of Commissioner Ford's.

I did agree to the original statement of policy. What was up for consideration in the meeting was the petition to reconsider, as I understand it.

I did not hear the discussion then but I did not want the record to appear that I had participated in it.

Mr. NELSEN. Thank you.

The CHAIRMAN. The committee will adjourn until 10 o'clock promptly tomorrow morning.

(Whereupon, at 12:15 p.m., the committee was recessed, to reconvene at 10 a.m., Wednesday, July 26, 1961.)

80559—62—pt. 1——7

# COMMUNICATIONS SATELLITES

WEDNESDAY, JULY 26, 1961

HOUSE OF REPRESENTATIVES,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
*Washington, D.C.*

The committee met, pursuant to recess at 10 a.m., in room 1334, New House Office Building, Hon. Oren Harris (chairman) presiding.

The CHAIRMAN. The committee will come to order.

Yesterday, we did not quite conclude with the Federal Communications Commission in the interrogation of the Commission concerning the problems with reference to an international communications system by way of satellites.

They had concluded their presentation, however, and the members of the committee were interrogating the Chairman of the Commission.

It was suggested, since several members did not get their allotted time, that they come back this morning. However, we find that Mr. Webb is here to testify for NASA, and we have Judge Loevinger. We have quite a few witnesses this morning.

Under the arrangements we had, I thought part of it would be this afternoon. So we are trying to do our best to rearrange this as conveniently for all of those different people as we can.

In view of this, Mr. Minow, Chairman of the Federal Communications Commission, and Mr. Craven will return for further questioning by members of the committee on Friday morning. Therefore, we will be able then to proceed at this time with Mr. James E. Webb, Administrator of the National Aeronautics and Space Administration.

I want to go off the record for a moment.

(Discussion off the record.)

## STATEMENT OF JAMES E. WEBB, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, ACCOMPANIED BY JOHN A. JOHNSON, GENERAL COUNSEL, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The CHAIRMAN. We are very glad to have, this morning, Mr. James E. Webb, Administrator of the National Aeronautics and Space Administration.

Yesterday morning, Mr. Webb, I gave a brief analysis of the role of this committee in connection with this problem of communications by way of satellite, looking to its operation and control, rates, and so forth, which is within the jurisdiction of this committee.

You and your agency have been involved during these last few months, and now for some time, in the research field. We under-

stand that we have reached a stage where this type of communication, will be put into operation on an international scale.

Therefore, this committee, in assuming its responsibility, is conducting hearings looking into that future program.

On behalf of the committee, I want to thank you for your appearance here. I know that we are all interested jointly in the progress of the tremendous program that we know is going to develop in this field.

I believe you have a statement that you would first prefer to read to the committee.

Mr. WEBB. I do, Mr. Chairman. Before reading this prepared statement though, I would like to take just about 1 or 2 minutes to say that it took us 58 years from the time the Wright brothers flew to today, when any citizen can buy a ticket on a jet transport and fly either across the ocean to another country or across our continent in a very short period of time.

A great deal of research and experimentation had to be conducted. The Government did do a great deal of the research involved in this rapid transition of this new technology.

The predecessor agency, the National Advisory Committee for Aeronautics, which has formed the basis for our present National Aeronautics and Space Administration, has been actively involved over many years in this translation of a new technology into the utilization of it for the benefits of our Nation.

This applies, of course, to the research done for military aircraft as well as for civilian use.

It has taken us 35 years from the time Dr. Goddard flew his first rocket to today, and in that 35 years I think we have made tremendously rapid progress. We are not quite at the point where this science is actually useful for the kind of purposes that aviation is, but if you bear in mind that only 10 percent of this 35 years or 3½ years encompasses the time when orbital flight has been demonstrated, that is 3½ years since Sputnik I, you can see there is a tremendously accelerating rate of progress in rocketery.

Now, what the rocket does for us is to permit us to get out beyond the atmosphere of the earth into the environment of space where we encounter three really new and difficult conditions.

The first is radiation. This has particular applicability to the communication satellite problem and the utilization of satellites in space.

We have found the radiation problem is considerably more severe out in space than was anticipated earlier.

The areas around the earth, in the Van Allen belt, have very high concentrations of radiation. In fact, we probably have learned more in the last few years of how friendly the earth's atmosphere is to us than we have ever known before, because we know now we simply could not live on this earth without the atmosphere that shields us here from that radiation.

The second thing we know in this area of outer space is that it is a hard vacuum. Materials like aluminum, which get in an oxidized surface condition within the earth's atmosphere, and this gives them protection, simply do not get the oxidized surface out in space and, therefore, it slowly deteriorates or, in common parlance, evaporates.

We have tremendous problems with materials for use out in this new enviroment.

In the manned program, of course, we have the condition of weightlessness when the human body is subjected to the first really new environtal factor. Man has carried his environment with him, first, on the surface of the sea, then under the sea, then into the air, and now into outer space.

But here, for the first time, he encounters an absolutely new condition, which is this condition of weightlessness in orbital flight.

So I just wanted to get that perspective of 58 years for aviation, 35 years since Dr. Goddard flew his rocket, and 3½ years since we were able to achieve orbital flight in this world.

Now, further, I wanted to leave another idea: that this agency is experienced in translating these new technologies into practical use, and that is why the Congress enacted into law the requirement that we do research and experimental work, looking toward the application of space for practical purposes.

And we have adopted in our program three main areas where, we believe, this application can be most useful.

The communication satellite is one of the most interesting ones. We find, as civilization goes forward, that we have increasing needs for communications, and we are now at a point where we believe those needs can be better satisfied through communication satellites than through other more conventional means.

We find in the meteorological satellite vast applications for the benefit of mankind, and, we are working at the problem of a navigation satellite which can assist materially as man moves around both in the air, on the sea, and in any other environment such as space.

With that brief statement, Mr. Chairman, I would like to go ahead specifically to the communication satellite, and to say that it is a great pleasure to appear before you today to talk about the work of our agency in this field of communication satellites.

As you gentlemen know, the President on Monday of this week issued a statement on communications satellite policy as the result of the studies which, on June 15, he asked the National Aeronautics and Space Council to undertake. In that statement, the President made it clear that this country's leadership in science and technology should be exercised to achieve worldwide communications through the use of satellites at the earliest praticable date.

At the same time, however, the President emphasized that communication satellite programs are presently in the research and development stage, and that to date no arrangements between the Government and private industry contain any commitments to to an operational system.

In recognition of this fact, the President stated that the Government, in addition to its regulatory responsibilities, will—

> conduct and encourage research and development to advance the state of the art and to give maximum assurance of rapid and continuous scientific and technological progress.

That is a quotation from the President's statement.

NASA's primary role in the communications satellite picture is to carry out this portion of the President's directive. It is NASA's task to provide leadership and direction for the extensive research and

development effort which is essential in order that a technically feasible communications satellite system may be established at the earliest possible date.

In this connection, I believe the committee will be interested in hearing about two communications satellite projects of major importance which NASA has recently initiated. The first of these is Project Relay, which calls for the development of an experimental satellite design and prototype capable of testing the life of various components in the space environment and providing data needed to design a feasible communications satellite system.

Relay will be an active repeater satellite which will be put into an orbit extending outward to about 3,000 miles above the earth. After competitive bidding, the Radio Corp. of America was selected as the contractor for Project Relay in June, and it is expected that the project will be carried forward with the greatest possible speed.

The second project is a cooperative venture which NASA is about to commence with A.T. & T. for the development and experimental testing of active communications satellites which A.T. & T. will design and build entirely at its own expense. NASA will provide the facilities for launching and tracking at least two of these satellites during calendar year 1962, but A.T. & T. will reimburse the Government for the use of these facilities as well as for all other costs associated with the launchings.

These arrangements with A.T. & T. will add to the total program of experimentation in satellite communications and to the development of cooperative relationships between Government and industry which are essential if the total national effort is to be maximized and an operational satellite system achieved at the earliest possible time.

The resources and many years of experience of our international communications carriers are a national asset of great value. The scientific and technical ingenuity of our electronic and aerospace industries have much to contribute. Therefore, as a matter of policy, private initiative and resources, as well as those of the Government, are being applied to our job.

NASA is engaged in many other activities relating to the field of satellite communications. For example, we participate in the work of the International Radio Consultative Committee, which was established as a branch of the International Telecommunications Union for the purpose of studying and making recommendations on technical radio questions and operating procedures.

NASA has also participated, with other agencies of our Government, in the formulation of a U.S. position with respect to the international allocation of radiofrequencies. Also, the work of the Interdepartmental Radio Advisory Committee, on which NASA is represented, has resulted in a major step toward a U.S. position which will provide a sound contribution to international agreement in this important area.

Our efforts have been directed not only toward the farsighted allocation of bands for use by commercial and governmental agencies all over the world to provide a variety of communications services using satellite relays, but also toward obtaining the necessary international agreements in support of the use of certain radiofrequencies for other space exploration purposes.

As the members of this committee are probably aware, an international conference will be held under the auspices of the International Telecommunications Union in the fall of 1963 to consider the allocation of radiofrequencies for both research and operational phases of space communications. The ITU is a specialized agency of the United Nations and, as such, in our view will play a most constructive role in achieving international agreements to support the use of a universal but limited resource of nature; namely, the radiofrequency spectrum.

In February of this year, NASA completed negotiations for technical arrangements whereby the communications organizations in England and France will provide ground stations for experimental purposes in connection with Project Relay and other projects in the future. Those technical arrangements were made with the full knowledge of the Department of State, and subsequently an exchange of notes on a Government-to-Government basis was made to cover the experimental cooperation with those countries.

It is significant, I think, that from the very beginning the United States has dealt with foreign countries interested in communications satellites on a cooperative basis. We have sought to make arrangements which provide interested countries the greatest possible opportunity for participation in experimentation. This should pave the way for further cooperative agreements that may be necessary, particularly when operational systems become technically and economically feasible.

In many of the activities outlined above, NASA has acted in close coordination with the Federal Communications Commission. We in NASA fully recognize the important responsibilities of the Commission in relation to the establishment of an operational communications satellite system at the earliest practicable date.

We have had the closest and most cooperative relationship with the Commission at all levels, and I know that this will continue to be the case. Our business is primarily the advancement of space technology, and we shall stand ready at all times to provide the Commission with any advice and assistance on this aspect of satellite communications which it desires.

Thank you, Mr. Chairman.

Mr. MACK. Does that complete your statement?

Mr. WEBB. It does, Mr. Chairman.

Mr. MACK. Approximately how much money have we spent on space exploration——

Mr. WEBB. On space exploration?

Mr. MACK (continuing). And in our missile program since its inception?

Mr. WEBB. First of all, let me say that the National Aeronautics and Space Administration is only 2½ years old; that it is a consolidation of a number of efforts that were heretofore existing in the field, and the figures that I have here do not go back beyond the year 1960.

But I think these figures will be indicative of what has happened in this agency.

The budget for 1960 was $523 million. This increased for the year 1960 to $954 million, including the supplemental, that was passed early in this Congress—about February.

The budget for fiscal year 1962, which is now before the Congress is $1,784,300,000.

So I think you can see that there is a very substantial buildup in the whole area of space.

Now, when you speak of "missiles" you are entering the military field which is not under this Administration. I simply do not have the figures on the military field, but this is an expensive program.

I am convinced it is going to yield very valuable results.

Mr. MACK. Well is it not true that you rely heavily on the work of the military services in the Department of Defense?

Mr. WEBB. We work very closely with them and where they develop techniques and knowledge that are useful, we employ them in our work.

When we develop techniques that are useful to them, they employ them. For instance, to go into space we have to get through the air, and the National Aeronautics and Space Administration is primarily concerned with aeronautical research, the reentry problem.

We did a great deal of the research work on the nose cone reentry problem for the military people. So this is the kind of relationship that we have with them.

I think I could give you this, that might help with your question: Whereas our program is roughly $1,784 million for 1962, the military programs are slightly more than a billion in the space field.

Now, I do not believe this includes the missile. This is the space-related activities in the military budget, as I recall the figure.

Mr. MACK. Then that does not include the booster effort to put the missile into space?

Mr. WEBB. It includes whatever boosters they are using for space research and space applications, but I doubt if it includes things like the Polaris, Minuteman, and the strictly military weapons.

I am certain it could not. It would not be big enough to include that.

Mr. MACK. Well do you rely on experiments made by the Defense Department such as Polaris and other missiles?

Mr. WEBB. Yes, sir. We work in the closest relationship with them and do rely on any advances they make which will be useful in our program.

Mr. MACK. I imagine that their research and development in this field has been quite helpful to you in your work.

Mr. WEBB. That is right.

And, in effect, Mr. Chairman, what we have done is to divide the field so that each of us can do those things that are most applicable to our knowledge and experience.

For instance, in the field of the communications satellite the military have their own program called Advent which they are pushing very hard.

We have the other areas of communications satellites. But we work very closely together, know each other, know the work we are doing, have an Aeronautics and Astronomics Coordinating Board with many different panels, and under the instructions of President Kennedy, Mr. McNamara and I personally meet in connection with these cooperative efforts and keep a pretty close check on what is going on in these agencies.

Mr. MACK. Well, I think that is commendable that you do.

Also, it is apparent that some of the costs in the program generally are spread out over the Defense Department as well as yours.

Mr. WEBB. That is right.

Mr. MACK. Well then on that basis how can you actually compute costs in the future so that you can be reimbursed by A.T. & T.?

Mr. WEBB. Well in this particular case we know about what the costs to launch are. We know the cost of the launching vehicle, and these shots that we expect to do for A.T. & T. are going to cost about $6 million a shot.

This is our estimate.

We will accumulate those costs, just as you would in any kind of an accounting arrangement, and under the contract they will be expected to reimburse us for them.

Mr. DINGELL. Would you yield?

Mr. MACK. Yes.

Mr. DINGELL. You requested $50 million to start this program rolling?

Mr. WEBB. That is right, but this has nothing to do with the A.T. & T. arrangement.

Mr. DINGELL. And you have gotten $50 million authorized and appropriated for this purpose, have you not?

Mr. WEBB. No, sir. It has been authorized but not yet appropriated.

Mr. DINGELL. It has been authorized but not yet appropriated?

Well now, how much of this $50 million is going to go into your operation on this commercial space satellite?

Mr. WEBB. Well, first, you must bear in mind that the Relay program of the agency is a completely funded program with Government money.

Mr. DINGELL. I know that.

Mr. WEBB. Now this is——

Mr. MACK. Now, may I interrupt you right there?

Now that is the RCA program?

Mr. WEBB. That is right.

Mr. MACK. And the Federal Government is paying all of the cost of the RCA program.

Is that correct?

Mr. WEBB. That is right.

I would rather characterize it as the Government's Relay program on which we have let a contract to RCA to make the satellite.

It is not a program of RCA. They entered into competition and submitted the best proposal, and we selected them as the Government contractor to carry out the work the Government wanted done.

Mr. MACK. Yes, well, I accept that. And that was my understanding, that it is a contract, a Government project.

The Government is paying the entire cost of this project?

Mr. WEBB. And it is intended to give us the information and knowledge necessary both for our own program and for the military programs of what happens to components in satellites in the space environment, and to test the relationship between the satellite and the ground equipment. You see, those satellites, with this kind of complicated equipment, have not lived in space very long. Three months is about the life.

To get a commercially viable system you have got to get satellites that live much longer and perform useful work much longer, and we simply have to find out the information for many purposes.

The Relay is a vehicle through which we find it out.

Mr. HEMPHILL. Will the chairman yield to me?

Mr. MACK. Does the gentleman from Michigan have anything further?

Mr. DINGELL. Not at this point.

Mr. HEMPHILL. Will you yield to me?

Mr. MACK. Yes.

Mr. HEMPHILL. The thing that puzzles me is the fact that apparently you realize the ability of A.T. & T. to perform at least part of the mission——

Mr. WEBB. Yes.

Mr. HEMPHILL. So why do the American people have to pay $50 million when the A. T. & T. is willing to do it itself?

Mr. WEBB. This would take some discussion but, maybe, I can shorten it and then see how far you want to go.

I think if you go back to last December, the A.T. & T. submitted a proposal which had a number of factors in it but, basically, said, "If we can sit down and agree as to the specifications for a communications satellite, we will build it and launch it, and become the instrument if the Government can provide us with all of the franchises and other things necessary. So we will do the whole job with our own money."

Now, it was decided by the previous administration that they would ask for competitive proposals rather than to sit down and adopt that procedure.

So, on the 4th of January a request for competitive proposals to build a communications satellite for experimental purposes was put out. Seven submissions were made under that.

The RCA submitted the one that was considered to offer the most promise and the best accumulation of information.

So they were selected, after technical evaluation, to be given the contract under this proposal that was solicited on the 4th of January.

Now, it is true, though, that A.T. & T. all along said, as you did, that they wanted to go forward and make the investment and do the whole thing. They have a great capacity in this field.

They have been building and doing experimental work with respect to satellites. Further than that, they do control the whole system by which telephone communications flow to the satellite.

So there is an intimate relationship between the ground equipment and the system by which the messages are accumulated and relayed via the satellite.

So it was concluded that if they wanted to go ahead and spend their own money for further research and development, under conditions that would permit their effort to contribute to bringing into early use an American system of communication satellites, and that would not prejudice the position of either the Government or the other companies who were interested or the position of the Federal Communications Commission, in connection with its decision in its own area of responsibility as to the proper means by which this result was to be accomplished, then we would undertake to launch and permit the testing of the A.T. & T. satellites.

Now, bear in mind, there is no way they could have conducted their research beyond the ground except if the Government would do the launching. As long as they were prepared to pay for it, and as long as they were prepared to make the knowledge gained available to the Government and to any agencies that were brought into being by the Government to do this job, and because we believed that their contribution would add to that of the Government's own program through RCA and otherwise, it was decided that this was a good thing to do.

Mr. HEMPHILL. Thank you very much.

Mr. Chairman, I will pursue that further if I get a chance to ask questions.

Thank you.

Mr. MACK. Has the A.T. & T. had any Government contracts?

Mr. WEBB. Oh, yes, sir. Many, I am sure.

Do you mean specifically in this field?

Mr. MACK. Well, I mean in missile field and related areas.

Mr. WEBB. Oh, yes.

Mr. MACK. Or contracts through you or the Defense Department?

Mr. WEBB. My understanding is that they are a very large contractor.

Mr. MACK. Then has not the Federal Government paid for these contracts as well?

Mr. WEBB. Certainly. Where they have made a contract——

Mr. MACK. This would be similar to the RCA contract at the present time?

Mr. WEBB. I am not sure I understand the question.

Mr. MACK. A few minutes ago I clarified the situation in regard to your project Relay——

Mr. WEBB. Yes.

Mr. MACK. That is a contract which has been let by your agency to RCA and that will be paid for with Government funds?

Mr. WEBB. That is right.

Mr. MACK. Now, you mentioned that the A.T. & T. has done a lot of research in this field.

Has this been private research or has some of it been through a Government contract?

Mr. WEBB. Well, they have done a vast amount of research in many fields.

Now, the research that they have done on communications satellites has been with their own money. The Government has not given them a contract, certainly not through my agency, and I know of no other contract that they have had in the communications satellite field. So——

Mr. MACK. Well, I think private enterprise is a wonderful thing, a high-sounding phrase, and we are all for it.

I am having a little difficulty, myself, determining just how private this enterprise is that they are talking about.

I cannot quite understand how you can share this cost.

You are going to charge them about $6 million to launch the satellite when your agency will have spent some $10 million in this entire program.

Mr. WEBB. Well now, the $10 million is related to the launching of the Relay and not the A.T. & T.

Mr. MACK. I have figures of your appropriation alone for 3 years which would put us over $3 billion for your agency.

Mr. WEBB. Well, we are making a great many launchings, Mr. Chairman. We are going to launch over 300 sounding rockets in the next 12 months.

We have just launched this manned flight from Cape Canaveral.

We are engaged in a vast amount of launchings, and we do keep cost figures and know about what it costs to do each launching.

Mr. DINGELL. Mr. Chairman, if you will yield: You have $50 million, according to what you told the Judiciary Committee, for this A.T. & T. launching?

Mr. WEBB. No, sir. The $50 million is designed to go forward with anything over and above what we are doing with RCA and the Relay project or anything.

This is over and above anything that we are doing with the A.T. & T. This is an amount in which we are working very closely with the military services on still another possible approach through research and experimentation, and also as a follow-on to what we may learn in the work we do.

Now, I would like to make one point very clear. In the contract which we have in mind with A.T. & T., all of the knowledge, all of the patents, every bit of advantage that flows from doing this experimental work, which they are going to pay for, is given to the Government under a royalty-free license, with the ability of the Government to transfer this to whatever agency is brought into being by the Government.

So this cooperation with A.T. & T., to permit them to spend their own money doing research, is not changing their position.

My own position is that it does not subtract from their competitive position, nor does it add to it, because every single thing that is learned or gained from this is made available to the Government on a royalty-free basis, and with the ability to utilize it in whatever system the Government decides to bring into being.

Mr. MACK. Well, I am not convinced that they are spending all of their own money.

You have indicated that they have had several contracts in this general area in the past, and will it be taken advantage of, the experience in completing the——

Mr. WEBB. They will be taking advantage of all of the experience that they have gained, whether under Government contract or developing their telephone system. This is one thing that the Government is very anxious to bring into play, because we are anxious to bring this communications satellite into being at the earliest possible time.

We do not want to see some other country bring a system in ahead of us, for instance, and we do know that we have very greatly increasing needs for communication facilities.

Mr. MACK. I am sure that we are all in agreement on that. And we want to move forward to accomplish our goal.

But it seems to me that it would be very difficult for you to actually divide the cost or charge A.T. & T. for the appropriate cost of developing the booster or for any research that had been done.

You are talking about charging them only for——

Mr. WEBB. The out-of-pocket cost for the launching is what we expect to charge them under the contract.

Now bear in mind that the benefit of the research is made available to the Government for whatever system comes into being.

So the benefit is not something that they hold on to as a private company.

Mr. MACK. It works both ways, does it not?

The benefit of the research is made available to the private companies as well as to the Government?

The taxpayers have spent a lot of money developing the entire field. We have spent a lot of the taxpayers' money for this purpose.

Mr. WEBB. That is right.

Mr. MACK. And we are also taking advantage of that.

Mr. WEBB. What we are trying to do, Mr. Chairman, under this contract, is to take advantage of all that the taxpayers have bought with the money that has been spent, and find a way to apply it to bring into being a communications satellite system at the earliest possible time, and under proper governmental regulation and control.

That is the effort here.

Mr. COLLIER. Will the gentleman yield?

Mr. MACK. Yes.

Mr. COLLIER. We are looking upon this thing apparently as though it were something new. We have dealt in the field of employing the know-how and the research of the Federal Government in about every field from medical research and educational research to the manufacture of atomic weapons.

This is not something new where there is a cooperative program between private industry and the Government working in the welfare and the interests of the public. There is knowledge that is gained through a program of this nature.

It is, in turn, employing, as a cooperative means, private industry for the general benefit of the people, if we are to assume that that is what this program is for.

Mr. HEMPHILL. Will the gentleman yield to me?

Mr. COLLIER. The Chair has the floor, sir.

Mr. HEMPHILL. Will you yield?

Mr. MACK. Yes.

Mr. HEMPHILL. I would like to ask the gentleman a question.

Do you think what we are faced with here is a duplication instead of concentration of effort?

Mr. COLLIER. Not at all. I do not think you can break that down. Where does concentration of effort come in?

How can you break it down as to whether or not it is a duplication?

In all areas of Government——

Mr. HEMPHILL. It seems to me that if we recognize, on the one hand, that here is a private company that is patriotic enough, and I suppose it has some motives in its own future development, to spend $180 million or $200 million why do we not concentrate on that effort instead of charging the taxpayers $50 million for some duplication?

It concerns we that so many are so loose with the people's money.

Mr. COLLIER. Well, I think I am on the gentleman's side in this regard.

It is just that I was pointing up——

Mr. MACK. I hate to cut off this very interesting discussion but I would prefer to proceed.

I think this colloquy indicates the problems we have generally, and that is why I cannot see how you can draw the line and accurately reflect the cost of launching.

Mr. WEBB. I think, Mr. Chairman, that we can give you any specific information that you want on the accounting methods by which this is done, but on the policy I think it might be useful to comment that just as the A.T. & T. is willing to spend its own money doing research over and beyond that involved in the Relay program, which the Government pays for and which we have determined will advance the date at which we will have a communications satellite system, they are just as willing to throw into this effort the full benefit of the research which they do.

And I am sure that one of their motivating factors is that they have an obligation to furnish communication services.

They generate about 80 percent of the traffic, as I understand it, that is apt to go on such a system. They either have to lay cables or they have to have communications satellites or find some other means to do the work.

So they have a strong public obligation to provide communication services.

I am sure this is one part. But the fact is that they are prepared to throw the full benefit of the money they spend into the bringing into being of a communications satellite system.

Now, the Government, at the same time, is throwing into this effort, to bring into being a communications satellite system, the result of all of the work that it has done, not only in space, but in many other areas of communication, because the objective is to bring the system into being at the earliest practicable time to serve the public interest.

Mr. MACK. Then do I understand correctly that your concern is not primarily with private enterprise, or so-called private enterprise, but it is to accomplish your objective at the earliest practical date?

Mr. WEBB. Yes, sir. Our job is to see that the research work gets done——

Mr. MACK. You have answered part of my question and I appreciate that—because I have some question in my mind about the advertising program now being conducted—and I appreciate your frankness in answering the question.

At this time I recognize Mr. Springer.

Mr. SPRINGER. Mr. Webb, in this committee we are limited to the question of communications. The question of science and space and aeronautics rests with another committee.

We are interested in the communications field in the satellite program.

In order for this to go into being you have to first put the experimental satellite in the sky.

That is correct, is it not?

Mr. WEBB. That is right.

Mr. SPRINGER. Have you made a contract for that?

Mr. WEBB. Yes. We have a letter of intent with RCA which will move forward to a contract as early as it can be worked out.

Mr. SPRINGER. Let's take the RCA. RCA is going to manufacture the satellite. That is what they are going to do—to put it in the simplest terms—is it not?

Mr. WEBB. That is right.

Mr. SPRINGER. When they get that satellite finished it is going to be your property?

Mr. WEBB. That is right.

Mr. SPRINGER. It is going to be the property of the U.S. Government.

Mr. WEBB. That is right.

Mr. SPRINGER. And not the A.T. & T. or any other company?

Mr. WEBB. Correct.

Mr. SPRINGER. Now, have you executed a contract to put the satellite into space?

Mr. WEBB. No, sir. We would do that ourselves in the space agency.

Now we might go to the manufacturer of the rocket and ask him to launch it, but it is essentially a Government operation, to launch the satellite.

Mr. SPRINGER. That is going to be your business, to put that satellite into space?

Mr. WEBB. That is right.

Mr. SPRINGER. Now have you a contract with any company during this experimental stage of ground equipment with the satellite while in space?

Mr. WEBB. I am not sure it is a contract.

We have arrangements by which any company, wishing to experiment with this satellite, can do so or, certainly, the major ones who can contribute to the experimental program, including the companies abroad in France and England, who will be a part of this experimental arrangement.

Mr. SPRINGER. Now what is the $6 million contract or arrangement that you have with the A.T. & T. Co.? What does that cover?

Mr. WEBB. The arrangement with the A.T. & T. is one under which satellites they have manufactured with their own money, are to be launched by the Government with the cost of the launching reimbursed, and under arrangements where the same companies, who have been anxious to experiment with the Government satellite will also be permitted to experiment with the A.T. & T. satellite, including the foreign companies.

And further, under which all information, knowledge, patents, know-how, gained will be made available on a royalty-free license to the U.S. Government, and under which the Government can transfer these to any entity the Government brings into being to carry forward communications satellites.

Mr. SPRINGER. Now will those satellites be A.T. & T. satellites or will those be RCA satellites?

Mr. WEBB. The experimental ones that A.T. & T. will build will belong to them.

Mr. SPRINGER. And that is paid for with their own money?

Mr. WEBB. Yes, sir.

Mr. SPRINGER. Are all the experiments with reference to those satellites paid for by A.T. & T. money?

Mr. WEBB. Yes, sir.

Mr. SPRINGER. When they bring that satellite to you all they ask you to do is to launch it and put it up in the sky.

Is that not correct?

Mr. WEBB. That is right.

Mr. SPRINGER. They are not asking you to pay any experimental cost with reference to those satellites, are they?

Mr. WEBB. That is right.

Mr. SPRINGER. The only cost is the out-of-pocket money that it costs to put it up into space.

Am I correct in that or not?

Mr. WEBB. The expenditures which the Government will make and which will be refunded to the Government by A.T. & T. relate to the launching of the satellite, the tracking of the satellite, and the reporting in of the data from our tracking stations.

Mr. SPRINGER. Now are they paying for all of those services?

Mr. WEBB. Yes, sir.

Mr. SPRINGER. You are charging them for all of the costs of the tracking and other services in full?

Mr. WEBB. All of the out-of-pocket costs, all of the extra cost that the Government incurs by doing this but, as the chairman has indicated, we do not try to go back and accumulate all of the research cost that might have gone into the tracking, the worldwide tracking network, for instance.

Any extra cost that this procedure entails to the Government, A.T. & T. will reimburse.

Mr. SPRINGER. Now, in the beginning, before this program was set up, A.T. & T. offered to do the whole thing all out of their own pocket, the whole $50 million?

Mr. WEBB. $50 million is not the right figure.

They offered to do the whole job of putting up a communication satellite system.

Mr. SPRINGER. And incur all of those costs themselves?

Mr. WEBB. Well, Congressman, let me say this: When you say "offered to do" it, you get into a very complicated question as to what is an offer and what is an acceptance, and how clear are the terms under which you might have a meeting of the minds.

Mr. SPRINGER. Would you put it in general terms, what they said?

Mr. WEBB. Yes, sir.

They indicated that they were interested in having the opportunity to spend their own money to put up a communication satellite system, to utilize this new technology to increase and improve communications.

Mr. SPRINGER. All right.

Now, after this satellite system is in being, both RCA and the one that you own, RCA and the ones that are put up there by A.T. & T., with their own money and their own experiments, the agreement, as I understand it, is that all other communication companies may have equal access to them.

Is that correct?

Mr. WEBB. All of the companies desiring to experiment with these experimental satellites have the right to do so.

Now I think I must put a slight limitation on this. We cannot allow any company to come in and do anything they want, just as we have not agreed to do everything the A.T. & T. wants.

We have looked at what they propose to do, and have made a determination that what they propose to do will add to the national effort and be of value to the Government.

Therefore we have made an arrangement. Now we would look at what any company proposed to do, and if it would make a real contribution they would have the chance to do it, but if it was a frivolous thing we would not agree to it.

Mr. SPRINGER. Now this has to do with those communication companies which are licensed by the Federal Communications Commission, has it not?

Mr. WEBB. Yes, sir; and certain others interested in the experimental work beyond those licensed.

There are some other companies interested in manufacturing equipment that also want to experiment with these satellites.

Mr. SPRINGER. Now do they have to go to the Federal Communications Commission to get a license to do that?

Mr. WEBB. I do not know the answer to that question.

I am sure the arrangements are that they will have the opportunity to do it.

Now what the procedure is, I am not so sure.

May I ask Mr. Johnson, the general counsel of the space agency?

We think, although we are not sure—this may be a question for the FCC—but we think the experimental grant of the frequency to A.T. & T. by the FCC, and the arrangements that A.T. & T. have made to permit this kind of access by any other company, means that they do not have to go to the FCC for a permit.

Mr. SPRINGER. All right. But they are operating with the acquiescence of the Federal Communications Commission?

Mr. WEBB. Under a grant of frequencies that they have made for experimental purposes.

May I say just one more word there?

We need to keep in mind at all times that these particular satellites are experimental ones. The job of my agency is to get the experimental work done so satellites that will do the job will live a long time in space and be economical, and will be available when the commercial system comes into being.

At some future time they are going to face the question of bringing in the commercial system.

All of this that we are talking about is an experimental program to learn how to do the work.

Mr. SPRINGER. Now, it is my understanding that you have executed a contract with the A.T. & T. Co., with reference to putting this satellite up.

Is that true?

Mr. WEBB. No. It has not yet been signed but it is in the final stages of negotiation.

Mr. SPRINGER. Is there an intent to sign it?

Mr. WEBB. There is an intent on my part, if we have a meeting of the minds, and I think we are very close to it.

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Mr. SPRINGER. I hear everything on Capitol Hill, Mr. Webb, as you probably do too, and that a Senator has written you a letter.

I do not intend to write you any letter. I intend, so far as I have anything to do with it on this committee—and I have told the FCC that they are to make up their own minds about what they think ought to be done.

And I hope that you will not let any individual influence you in what your best judgment is as to what should be done in this program.

Mr. WEBB. Thank you, sir. That is my intention.

Mr. SPRINGER. And your testimony here today has been quite frank, and I have been much impressed by it, and I hope that you will hold whatever you believe to be right in this whole program.

Mr. WEBB. Thank you, sir.

Mr. MACK. Mr. Friedel?

Mr. FRIEDEL. Mr. Webb, I want to congratulate you on your very fine statement. I think it is right to the point and very clear.

I gathered the impression that althought the satellite would be for experimental purposes the future goal is that they would be operated by private enterprise as far as communication is concerned.

Am I correct?

Mr. WEBB. Yes, sir. But this is a determination by the Federal Communications Commission and they are in the process of completing this determination. This is not my determination.

But I do not mind stating my view. My view is that we will get further and faster if we turn it over to private industry.

Mr. FRIEDEL. We practically got an assurance yesterday about that.

How many satellites in outer space would be needed for communications, including radio and television?

How many satellites will we have to have?

Mr. WEBB. Congressman, this depends a good deal on the system that you have, and what I mean by that is that satellites that are at a very high altitude are visible electronically from a much wider area than those that are close to the earth on account of the curvature of the earth.

Now, the real problem that you face in putting them up high is that there is a time delay for the message to go up and come back.

If it is 22,500 miles it takes roughly six-tenths of a second for it to go up and come back, which means you will have a delay in the telephone conversation.

You have to wait a little for the message to travel to you before you can talk back.

Now, this is not true in radio. So the real question is here: Are you going to have a low-level system or a high-level system?

The relay system is aimed to stay under 3,000 miles and it would give you practically an instantaneous transmission. In that case we would probably need somewhere on the order of 50 satellites to give you a worldwide system with almost no interruption.

There would also be some possibility of maybe a half a minute or so sometimes when you might not be able to communicate. The higher up we go, the less satellites will be required.

Mr. FRIEDEL. You keep within 3,000 miles, is that it?

Mr. WEBB. Yes, 3,000 miles.

Mr. FRIEDEL. And that would take about 50?

Mr. WEBB. About 50.

Mr. FRIEDEL. Well, now——

Mr. WEBB. But with about 12 we could still do a reasonably good job of supplementing our present communications facilities.

Mr. FRIEDEL. You only need 12 to——

Mr. WEBB. Well, I say you could not cover it on a 24-hour basis, but with about 12 you could add a good deal to your present long-distance communications facilities.

Mr. FRIEDEL. And one more question and then I will be through:

On page 3 you say:

**Relay will be an active repeater satellite which will be put into an orbit extending outward to about 3,000 miles above the earth.**

That is an active repeater satellite.

Now, how often would they have to be repeated?

Mr. WEBB. What this means is that you have a radio receiver and transmitter in the satellite. So it receives the message sent from one ground station, moves it from the receiver over to the transmitter, and transmits the identical message back so that it can be received in another place on the earth thousands of miles away.

That is what we mean by "repeater."

It is just a relay station that receives the message and amplifies it and sends it on.

Mr. FRIEDEL. What is the life expectancy of a satellite for——

Mr. WEBB. We are doing the experimental work to increase the life expectancy. Up to now the satellites have not had a long life because the solar cells deteriorate due to the radiation and other effects in space.

We hope very much to get up to about 5 years. Anything below 2 years will probably mean quite an expensive system.

Mr. FRIEDEL. I am very happy to know that private enterprise will be in the picture, and I want to thank you for your very, very wonderful statement.

Mr. WEBB. Thank you, sir.

Mr. FRIEDEL. Thank you, Mr. Chairman.

Mr. MACK. Mr. Moss, will you yield?

Mr. MOSS. Yes.

Mr. MACK. Mr. Collier?

Mr. COLLIER. Well, Mr. Webb, we are primarily faced, I know, with getting this program off the ground from the standpoint of our international interest.

The thought keeps recurring to me that eventually the coordinating and the controlling body in the satellite communication program will be international in scope and, I believe, necessarily so.

So with that in mind, may I go to page 4 of your statement and specifically to your statement where it says:

**NASA is engaged in many other activities relating to the field of satellite communications. For example, we participate in the work of the International Radio Consultative Committee, which was established as a branch of the International Telecommunications Union for the purpose of studying and making recommendations on technical radio questions and operating procedures.**

This group, the International Radio Consultative Committee, as I understand from interrogation of Chairman Minow yesterday, is primarily a technical group made up of technicians from many nations and is, in fact, an arm, shall I say, of the United Nations.

Now exactly what work has NASA engaged in or what activities with this IRCC up to this time?

Mr. WEBB. Could Mr. Johnson answer that?

Mr. COLLIER. Anyone who has the answer.

Mr. JOHNSON. Well this is really a technical question.

I think all I can say is that NASA has been primarily responsible. inside the Government, for making known the needs of space science as such, in addition to satellite communications as such, for appropriate frequency allocations.

As you know, the spectrum is limited, and as these new scientific uses come along, which were not known before, it appears to be in the public interest to set aside certain frequencies for those purposes.

Astronomical research is an example of the many kinds of communications that may be conducted with satellites and deep-space probes for purely scientific purposes.

This is an area in which NASA can be very useful, both within the Government and in this international forum, in making known the needs of space science for an appropriate slice of the radio spectrum.

While I am not personally acquainted with it, it is my understanding that NASA's efforts have been in that direction to be sure that, as this revolutionary new field develops, appropriate measures are taken in time to be sure that we can use the new tools that space technology puts at our disposal, and are not going to be hampered by shortsightedness in the radio allocation field.

Mr. WEBB. I would like to check this again on the record, but I think what you will find is that this technical committee makes recommendations to the International Telecommunications Union and, therefore, the parent body or larger organization places a great deal of reliance on the study of the technical people as to exactly what frequencies are best to use and so forth.

So this is the area we have to work with them on.

Mr. COLLIER. This is just the point that I am getting at. In fact, you foreclosed my next question.

If this is true, and since the International Telecommunications Union is a child of the United Nations, and since the participants include the satellite nations and the Soviet Union, and since, I presume, it is going to be necessary in establishing these radio spectrums or bands to pass over or to embrace the satellite nations as well as the Soviet Union, then we might well, unless the climate of the world conditions will change, encounter some problems in this field.

And this, of course, raises the question then, will participation include those nations, specifically Red China, which is not recognized by the United Nations?

Perhaps, I am pushing it a little bit far, but I think these are things that are normal thoughts in dealing with a new and broad program of this nature.

Mr. WEBB. I think I could comment on this to this extent: If you can get the frequencies assigned both to do the experimental work and to bring the operational system into being, we do not have to wait until all of these problems are worked out, because we can make certain reservations as a Government in the franchise given to whoever is to actually run the international system.

And I believe this is a matter that the Federal Communications Commission has very much in mind and have indicated in their release.

We are not trying to solve the question for the long-term future, but we are trying to reserve enough of the governmental position so what we have to meet can be met to use this new and revolutionary addition to worldwide communications.

You know, the President did say in his statement of policy that he invited all nations, without restriction, to come in and discuss ways and means of working together in this field.

Mr. COLLIER. I noticed that. And that satement, in itself, is thought provoking when we again consider the conditions of the world today.

Now one other question along the same lines:

Would you be in a position to tell us or give us any idea of what other nations have, in fact, communication industries in other countries which are putting forth any effort or setting aside any funds for development and research in this field?

Mr. WEBB. First of all, we have signed Government agreements with France and England, and negotiated with the agencies there that do this work for the experimental participation in this program.

We are currently negotiating with Brazil and Germany and had some indication of interest from others, but in the experimental program this is about as much as we can take in because the number of satellites would be limited and the number of companies, for instance in the United States, that want to do experimental work is also fairly numerous.

Now, the Europeans have some interest in this field. There has been a group of companies there going forward to do some experimental work. We do not know precisely how far this will go. It is quite an expensive thing.

But, by and large, this is the major effort being done certainly in the free world, and we are not familiar with anything that may be going on behind the Iron Curtain.

I think you must also say that the arrangement we have with a good many of these nations in the general satellite field, for instance, contributes to this.

There are eight nations working with us in various phases of cooperation in connection with satellite programs.

Two of those nations, Canada and England, are building complete experimental satellites to be launched as part of our program. Japan is interested in putting experiments in some of our satellites.

This is the policy established by Congress for us to follow. We are following it in our worldwide tracking network. A good many of the nations furnish the entire crew and the cost of the station, for instance, in the Mercury network. Those stations are staffed and paid for in some instances by the foreign nations as a means of contributing to this international effort.

So all of this work tends to help the communications satellite program. It is pretty hard to identify exactly the extent.

Mr. COLLIER. Yes. Well, it is a normal question, because I know that the International Telecommunications Union which generally controls the communications——

Mr. WEBB. The frequency allocations.

Mr. COLLIER. The frequency allocations?

Mr. WEBB. Yes, sir.

Mr. COLLIER. Well, in fact, they go further than that, do they not, Mr. Webb, in making determinations for the establishment of any communications equipment or facilities in foreign countries where funds are provided by the International Home Development Bank or through the CIA?

Mr. WEBB. I had not thought the ITU went that far but I am not an expert on the ITU, but you probably know more about that than I do.

I had thought that our primary interest with them was the international agreement on the use of frequencies for specific purposes.

Now, that is, in the avoidance of interference, protection of those frequencies.

Now, I am sure they have a great deal of technical work that contributes to this, but I believe this is their main task. And I think each country generally regulates, in one way or another, through ownership or regulatory action, the companies engaged in international communication activities in their country.

Mr. COLLIER. I would like to pursue——

Mr. WEBB. I will be glad to give you a statement for the record after some investigation, if you wish it.

Mr. COLLIER. If you will, sir.

Thank you, Mr. Chairman.

Mr. MACK. Without objection, it will be received in the record at this time.

(The aforementioned document follows:)

The International Telecommunication Union was formed in 1932 in Madrid, Spain. The purposes of this Union as stated in the 1959 convention are:

"(a) To maintain and extend international cooperation for the improvement and rational use of telecommunication of all kinds;

"(b) To promote the development of technical facilities and their most efficient operation with a view to improving the efficiency of telecommunication services, increasing their usefulness and making them, so far as possible, generally available to the public;

"(c) To harmonize the actions of nations in the attainment of those common ends."

To this end, the Union shall in particular:

"(a) Effect allocation of the radio frequency spectrum and registration of radio frequency assignments in order to avoid harmful interference between radio stations of different countries;

"(b) Coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio frequency spectrum;

"(c) Foster collaboration among its members and associate members with a view to the establishment of rates at levels as low as possible consistent with an efficient service and taking into account the necessity for maintaining independent financial administration of telecommunication on a sound basis;

"(d) Foster the creation, development and improvement of telecommunication equipment and networks in new or developing countries by every means at its disposal, especially its participation in the appropriate programs of the United Nations;

"(e) Promote the adoption of measures for insuring the safety of life through the cooperation of telecommunication service;

"(f) Undertake studies, formulate recommendations and opinions, and collect and publish information concerning telecommunication matters for the benefit of all members and associate members."

The permanent organs of the Union are the General Secretariat, the International Frequency Registration Board (IFRB), the International Radio Consultative Committee and the International Telegraph and Telephone Consultative Committee.

The essential duties of the IFRB are to record frequency assignments made by the different countries with the view of insuring formal international recognition, and the avoidance of harmful interference.

The International Radio Consultative Committee (called the CCIR) is to study technical and operating questions relating to radiocommunication and to issue recommendations on them.

The duties of the International Telegraph and Telephone Consultative Committee (CCIR) are to study technical, operating and tariff questions relating to telegraphy and telephony and to issue recommendations on them. Representatives of NASA are actively participating in study programs of the CCIR, especially in the Special Study Group IV established to study space telecommunications. Dr. Hagen of NASA is serving as chairman of the U.S. section of this study group.

Upon request, the ITU provides technical assistance to member countries in the establishment and operation of telecommunication facilities.

Mr. MACK. Mr. Moss, do you desire to be recognized at this time?

Mr. MOSS. Yes.

Mr. Webb, in response to the question by Congressman Friedel, you indicated that if we had a satellite system up to about 3,000 miles, that it would take approximately 50 satellites to operate.

You also indicated that if we went up 22,300 miles that there would be a time lag.

What types of systems are we experimenting with in NASA? Are they the low level or the high level or in the medium level?

Mr. WEBB. Well, first, you mean the active satellites? Because we have a very heavy experimental program in the passive satellites like ECHO and REBOUND, and then beyond that.

But in the active field our primary effort at this moment is with Relay. Now, we are cooperating with the military in connection with the Advent program.

We are considering a sort of an interim system that might be higher than the low level active satellites and which might give us a good deal of information that would be helpful before we move on to the very high altitude satellites.

Mr. MOSS. Now, at the moment the FCC is trying to arrive at a policy determination as to ownership and operation of a commercial satellite system. Of course, it is a fact that this commercial aspect of it is regulated that generates the interest of this committee.

Is there any competing work with the work of NASA because decisions have not been made at this point?

Mr. WEBB. No, sir. We have worked in the closest cooperation with the Federal Communications Commission in this area. They know completely all that we are doing. They understand that we are pressing just as hard as we know how to do the work that will give us the knowledge and permit us to manufacture and utilize satellites.

Now, what I have been hoping has been that they would proceed along to the point that even though the lawyers in all the companies would not have buttoned up all the words and phrases, that some kind of interim operational committee at a technical level could be brought into being, because the question of what satellites you are going to use, what frequencies you are going to use, how they work with the ground stations, is a technical question that does not really relate to the owner-

ship, and it has seemed to me that, perhaps, before they settled all the details of ownership and corporate form and that kind of thing, it might be possible for the technical work to go forward hand in hand with us. But up to this time there has not been a delay.

Mr. Moss. Well, if there is a delay in their decision, it does not create a delay in the experimental work being handled by NASA; is that correct?

Mr. WEBB. If there were an extended delay, then I think that the time would come when we had gotten to the end of the experimental work and were ready to go into the first stages of an operational system. If they were unable to find a formula to do that, as soon as the capability was there, then I think this would be a very real concern to the Government because the Government's policy is to bring into being an operational capability at the earliest possible time.

Mr. Moss. Now yesterday the Commission called for the formation of an ad hoc committee to undertake this preliminary work which is not necessarily finalized.

In the creation of such a committee which would be aimed toward the final formation of an operating entity or owner entity, those participating in that will have rather important voices in decisions that are fundamental decisions as to the type of system which will be finally agreed upon and operated; is that correct?

Mr. WEBB. That is right.

Mr. Moss. That committee is composed of international common carriers—that ad hoc committee is composed of international common carriers?

Mr. WEBB. That is my understanding.

Mr. Moss. Now, I note in your statement, and I want to apologize for having to leave in the middle of it, but I was called to another committee where I had a report I had to get out. I note that you say the resources and many years of experience of our international communications carriers are a national asset of great value, and I think we would all agree that that is true.

Mr. WEBB. That is right.

Mr. Moss. And something that we place great reliance upon. And you continue and say that the scientific and technical ingenuity of our electronic and aerospace industries have much to contribute.

Mr. WEBB. That is right.

Mr. Moss. Have they less to contribute than the common carriers?

Mr. WEBB. I do not know how you can draw an exact line to measure that.

What I had in mind, in writing that statement, was that at some point the people who have to run the system, satisfy the customers, collect the revenue for it, have to have a judgment as to the best way to conduct the system that furnishes the service and has the best chance to pay its way and make profit under regulation.

Now I think that these international common carriers have a vast experience in this, and I think that at some point you have to decide, for instance, that you are going to freeze and go to an operational system.

Some people might say, "Let us do another year of experimentation."

Mr. Moss. Are we at the point where we should freeze?

Mr. WEBB. No, sir.

Mr. Moss. Thank you. Isn't there sound logic to concluding that the continued participation of the electronic and aerospace industries, even in the ad hoc committee, would make important contributions?

Mr. WEBB. My own view is that you will get further if you begin to get the operating entity into a form where it can organize and be prepared to make the important decisions.

Now these other people are not precluded from making their contribution because they are not in this particular group of companies to operate the system. They are primarily equipment people and people in other forms of electronics.

Mr. Moss. Isn't the equipment feature of this venture a most significant one economically?

Mr. WEBB. Yes, sir.

Mr. Moss. We agreed earlier that participation in this ad hoc committee could have significant effect upon the types of hardware or system decisions which were made; and, in view of the fact that some of those who are members of the ad hoc committee are also important manufacturers, isn't there a possibility that actions could be taken or decisions made prejudicial to others who are important in research, in development, and in manufacturing?

Mr. WEBB. Well my view about that is that a purchaser who is going to spend a few hundred million to buy a vehicle that he has got to use in commercial practice to try to make money under a governmentally regulated system, is going to use his best judgment as to how to take advantage of the most advanced design, and I think that the people who have contributions to make are going to have to compete for business.

I think further, when you speak of the aerospace industries, that one of the most complex and difficult questions we have, and on which we will be spending a good deal of money in the Government, is how do you do multiple launches.

If you can only launch one satellite with one booster, the cost of this system is going to be very high.

If we can find a way to launch five or six of these satellites with one booster, and then space them around, they will be useful in this kind of a contribution, and we will be pushing experimental work, and the suppliers will be offering these articles to the companies.

Mr. Moss. Isn't this a field in which the Government will continue its experimentation in order to further the art?

Mr. WEBB. Absolutely; yes, sir.

Mr. Moss. So the principal costs in this will be borne by the public rather than by the participants in the ad hoc committee.

Mr. WEBB. They will certainly in the early stages, and the President's statement states this very clearly, that it is the policy to continue this, because the Government wants to bring the system into being at the earliest possible time, and wants it to be an economically viable system so that it can pay its way and thereby relieve the Government of the cost at some time.

Mr. Moss. Of course, I recognize fully that in the directions to NASA, and in the preliminary determinations that the policies of the President are the policies which appropriately should be followed.

However, I do not feel that the policies enunciated by the President—and in reading them I do not find that they would in any way

conflict with my own views or my own concerns, but if they did, I would not feel that they bound me or were to properly bind the Congress or this committee which has a responsibility in the commercial application of this new technology.

Mr. WEBB. I agree with you. I think the whole action of the executive branch and the regulatory agencies should be carefully reviewed by the Congress. This is a very important matter on which we are embarking.

Mr. MOSS. Well there is a peculiar relationship between the regulatory agencies and the Congress in which those agencies, unlike your agency, are not exercising primarily executive functions, in fact, they are operating under a charter, a grant of congressional authority.

Mr. WEBB. That is why I drew the distinction between them.

Mr. MOSS. And so our relationship with them is even closer, an even closer relationship than it would normally be with your agency.

Mr. WEBB. Yes. But you must bear in mind that we also are somewhat in the nature of a regulatory agency with respect to space and the launchings.

Mr. MOSS. Yes, I recognize that. You have a very interesting and challenging assignment.

In the experimental work underway, as I recall, at the time we drafted the act creating your agency, we set out certain terms by statute relating to patents. You can reserve them or you can waive them, as I recall it.

Mr. WEBB. That is right.

Mr. MOSS. In the Project Relay which, I understand, is under your direction——

Mr. WEBB. That is right.

Mr. MOSS (continuing). Have you reserved or have you waived.

Mr. WEBB. We have entered a letter of intent.

Mr. Johnson is the man who is going to draft that contract and is negotiating it. Would you wish him to answer?

Mr. MOSS. I would like whoever can give me the answer to do so.

Mr. JOHNSON. At the present time we have only the letter of intent with RCA, and up to the present we have been discussing the technical specifications.

We have just about reached the limit of that, and we will be negotiating the terms of what we call the definitive contract during the coming month.

We will follow the requirements of the statute. Undoubtedly, there will go into that agreement a standard patent clause which we have for our research and development contracts. We have not yet decided in detail, and I think it would be inappropriate to discuss exactly the position we will take with RCA in the negotiations as to what rights we will eventually acquire.

We would be happy to report this to the committee after these negotiations have been concluded, but I think it would be a bit prejudicial at this time.

Mr. MOSS. If you had not made a decision, obviously you could not report.

Mr. JOHNSON. What I am saying is this: Under section 305 a normal procedure is provided under which inventions are reported as they are made under the contract, and then a wide measure of discretion,

in effect, unlimited discretion, is given to the Administrator to determine what rights should be retained by the United States in the procedure outlined in section 305.

The normal procedure is for the contractor to petition for a waiver of the Government's rights to the invention if the contractor wishes to retain certain commercial rights.

Now in the process of dealing with such a petition a lot of matters would be taken into consideration. It might be desirable in the RCA contract, in view of the fact that this ties in so closely with an eventual commercial operation of a system as presently seems to be the policy, to reserve certain additional rights for the Government at the time the contract is entered into rather than to leave this in the normal state of suspense until waiver petitions are submitted. It is that which we have not determined precisely yet.

Mr. Moss. Well I think it would be most helpful to the committee if, when the determination is made, we were informed as to the nature of the agreement.

Mr. WEBB. We would be very glad to do it.

(The following data was submitted in reply to the request for the above information:)

As of the date of submission, no definitive contract has been agreed to between RCA and the NASA; therefore, we are unable to supply details at this time.

You understand this means, in a sense, this arrangement would be more restrictive with respect to RCA, and would transfer, perhaps, more to the Government than would be true in the normal cases, or at least would make the determination earlier, so we would all know exactly where we stood.

Mr. Moss. And now, you indicated in the proposed contract with A.T. & T. that there would be royalty-free licensing provisions for any commercially operated satellite system on whatever was developed in their joint experiment with the Government; is that correct?

Mr. WEBB. Let Mr. Johnson give you the precise thing we have in mind.

Mr. JOHNSON. I can speak specifically on that one because we have reached the point, we think, almost of concluding the negotiations.

There we will be providing with respect to all inventions that are made under this cooperative agreement by A.T. & T., that we will not only reserve a royalty-free license to the Government for use by or on behalf of the Government and to any foreign nation that is a party to certain patent treaties and agreements with us, as is required by section 305 of the act, but we will also reserve in that case the right to grant licenses under those inventions on any terms that the Administrator of NASA deems appropriate, which would include a royalty-free license, to any other party for any purpose whatsoever for the practice of that invention throughout the world.

This, therefore, would enable us, after the owning and operating entity is finally determined in the course of the FCC proceedings, to give that entity a royalty-free license for the use of all of those inventions that are determined to have been made under this cooperative agreement, and in addition to that will make it possible for us to give a royalty-free license to any company that is engaged in the manufacture of components for the satellites or for any of the transmitting and receiving equipment that is associated with the system; and, there-

fore, they will get the benefit, without having to pay any royalties and without having to be restricted in any way by A.T. & T.'s patent position insofar as inventions are concerned which are made under the cooperative agreement.

Mr. WEBB. Or if a second communications satellite should be brought into being at some future time, we would be prepared to—we would be in a position to—grant the same privileges to the second system.

Mr. FRIEDEL. Will the gentleman yield for just a question?

Mr. MOSS. Just a moment and I will.

The space agency has spent considerable funds in experimenting and in research and in development. What would be your estimate or could you supply—fairly—the figures for the record of this hearing?

Mr. WEBB. Of total expenditures by the agency for research and development?

Mr. MOSS. Yes, on this project.

Mr. WEBB. We can segregate something that will be helpful to you. It is not an easy thing to do, but we can give you a statement, I think, that may be helpful.

(The information requested above follows:)

NASA ACTIVE COMMUNICATION SATELLITE R. & D. EFFORT

New obligational authority amounts related to NASA active communication satellites to date has been:

| | Fiscal year 1961 | Fiscal year 1962 | Total |
|---|---|---|---|
| Total | $20,700,000 | $70,650,000 | $91,350,000 |
| Radiation measurements | 2,000,000 | | 2,000,000 |
| Relay | 18,700,000 | 16,350,000 | 35,050,000 |
| Transitional system | | 54,300,000 | 54,300,000 |

No new obligational authority was requested for active communication satellites prior to fiscal year 1961.

Mr. MOSS. Now, what is the overall status of the patents on the, well I guess the catchall phrase is hardware, which have been evolved in the course of these experiments? To what extent are they available for the use of a commercial satellite system, whatever the ownership or operating entity that is finally determined upon?

Mr. JOHNSON. Well, this would depend upon the particular invention. We would have to go back and look at them, invention by invention.

In some cases the United States has the unqualified title to an invention that was made under NASA-sponsored research and development.

This is not true typically in the case of the Department of Defense's research and development contracts.

Mr. MOSS. No, I recollect there is a considerable difference.

Mr. JOHNSON. Although even there it might be that the Government would have title, because the companies are not always interested in pursuing their own patent position, and frequently they do yield

to the Government whatever property rights there may be in the inventions.

So even there it is not true that the Department of Defense never acquires title for the Government. It does so when the company is not interested.

In our case, a number of the inventions that have been reported to us have been the subject of petitions for waiver of the Government's rights.

We have a rather elaborate set of regulations which indicate that waiver will normally be granted in certain cases and normally not be granted in other cases.

One has to realize also that we are a pretty young research and development organization in terms of patentable inventions. Many of our largest research and development contracts run on for a period of 5 or 6 years, and it will only be toward the end of the period of those contracts that we will have a significant reporting of inventions made in the course of them.

So that the number of inventions reported to us up to the present time is relatively small, and the number of waiver petitions we have considered and granted have been relatively small.

However, in all cases we receive a royalty-free license to the Government, as a minimum, for governmental uses. But this would not include a commercial use by a private company. We would only be able to license the invention for a private commercial use if we retained title to it or if we specifically contracted for that right, as we are doing in advance in the A.T. & T. cooperative agreement.

Now, you see, communications satellites are the first instance of a prospective commercial use of space and, therefore, we will be introducing some special terms undoubtedly in the RCA agreement as we have in the A.T. & T. agreement.

Mr. Moss. I will yield to the gentleman from Maryland.

Mr. Friedel. Just to clarify the record, one of our colleagues mentioned that the A.T. & T. is willing to spend $50 million. It is my understanding that they are willing to spend around $400 to $500 million. Am I correct in that figure?

Mr. Webb. They have never stated to us officially the precise amount. They have used publicly some figures like $170 million, but they have indicated that if the Government would turn the whole job over to them and give them the job to do, they would do it.

Mr. Friedel. Thank you. That is all I want to clear up for the record.

Mr. Moss. Mr. Dingell.

Mr. Dingell. I was wondering if the witnesses could tell us what steps you have taken to assure that the Government will not pay royalties on patents let by your agency on which it already has either ownership or has patent rights of one sort or another?

In other words, a provision for waiver of royalties to the Government?

Mr. Johnson. We always obtain, at a minimum, and so does the Department of Defense, for that matter, a royalty-free license from the contractor for the practice of the invention by or on behalf of the U.S. Government.

This would include, therefore, the use of the invention in any research and development contract or production contracts which NASA, the Department of Defense, or any other agency may place.

Mr. DINGELL. Do you take steps to see to it that the Government does not pay royalties——

Mr. JOHNSON. Oh, yes.

Mr. DINGELL (continuing). —in these instances?

Mr. JOHNSON. Oh, yes.

Mr. WEBB. Of course, under the contract, it is carefully audited and, as a matter of fact, the Government has a fairly elaborate machinery for determination of the payments of royalties. They are sort of set aside in a special class, of course, under contracts.

Mr. JOHNSON. The only time we pay a royalty on an invention is when the company has a previously established patent position of its own which it developed not as a result of the contract with the Government.

Now this, of course, frequently does occur. But in that respect we must recognize their private rights just as we recognize the property rights of any other person.

Mr. MOSS. Of course, I think it most appropriate that where the patent or a patentable item was developed from the resources of any company that the rights be recognized by the Government and that they be fully protected.

However, in the development of such patent as part of the contract with an agency of the Government, we are concerned not only as to the license-free availability of those or at least the royalty-free availability of those to the Government, but if we are talking of a commercial communications, I am concerned as to the availability for use in that system, because ultimately through rates we all participate in the paying for whatever goes into the creation.

Mr. WEBB. And benefit from any previous research that may have been done by the structure, the same rate structure.

Mr. MOSS. That is correct.

I think there should be the fullest public benefit to be derived from those expenditures.

I think that is all the questions I have at the moment, Mr. Chairman.

Mr. MACK. Mr. Nelsen.

Mr. NELSEN. Mr. Chairman, I want to ask Mr. Webb what the cost would be if the Government took over the total program, of the satellite program as compared to the cooperative program which is now planned; I just wondered what the total cost would have been had the Government taken it over altogether as compared to what the cost will be when this program that is now being contemplated is undertaken; has that ever been estimated?

Mr. WEBB. It is very difficult to separate the research and experimentation phases of this from what may have to be done in going forward. Now the costs to the Government of the research program are less, I am sure, as a result of the fact that A.T. & T. is prepared to bear part of those costs.

If they go forward to four launchings, this will be $6 million a launching, $24 million.

They have certainly spent some money on the research and experimentation with respect to their satellites.

But beyond the experimental phase—when you come to the problem of bringing an operational system into being, which means a continuous operating system, the maintenance, repair and all of the ground equipment that may be involved, my own guess is that you are looking at a figure between $400 and $600 million.

If the Government was to bring into being a governmentally operated system, after having completed the research and development phase, they would then have to spend this money.

The revenues, of course, would return to the Government if the Government were to operate it. But it has not been the practice of the Government to operate this kind of a thing. It has always been the practice to have this service furnished in the economy by private entities, under governmental regulation where they have monopolistic positions.

Mr. NELSEN. Thank you, Mr. Chairman.

Mr. MACK. Mr. Dingell.

Mr. DINGELL. Thank you, Mr. Chairman.

You said the cost of a satellite system will be $600 million?

Mr. WEBB. I am giving you a bracket. Between $400 and $600 million is my guess or estimate as to about what somebody is going to have to spend in the way of capital investment and funds to do the interim operational job until you actually get going and begin to get the revenue in in substantial amounts.

Mr. DINGELL. All right.

Now you have requested $50 million for satellite programs within your agency, is that correct?

Mr. WEBB. We have requested $94 million for the satellite programs, of which $50 million is to expedite the bringing into being of an operational system.

Mr. DINGELL. All right.

Now, in your allocations of costs in an individual launching of a satellite, do you propose to allocate in your charge against the carrier or carriers for whom you put a satellite up, merely the barebones cost of the rocket, such as production of the rocket, use of launching pad, technicians, and the other facilities to put it up, together with utilization and necessary tracking facilities, or do you propose to allocate these costs plus also research and development costs incidental to the particular rocket on a proper and a commercial cost basis?

Mr. WEBB. First, the only company with which we are entering arrangements to launch the experimental satellites is A.T. & T., although we have said we would do the same for other companies who had a valid program that would contribute to the knowledge and information.

Mr. DINGELL. All right.

Now, with regard to this, do you proposed to charge all research and development costs?

Mr. WEBB. Not with respect to the A.T. & T. contracts.

Mr. DINGELL. Well then, in other words, are you telling us that there is going to be Government subsidy of this particular contract?

Mr. WEBB. No, sir. I am, in a way, saying the reverse because, you see, the full benefit of the A.T. & T. program is made available

to the Government and to the commercial operating entity that will be brought into being by the Government.

So the benefits of the program are to flow into these entities into which the Government has such a major interest and is pressing so hard to go forward with.

Mr. DINGELL. What you are saying is that the benefits of this particular program are going to accrue to the later commercial developer, in other words, the information, isn't that correct?

Mr. WEBB. And to the customers of the service through lower rates.

Mr. DINGELL. Well, that is an important consideration.

Now we have three systems which we are discussing here; am I correct? The first is the system to have a stationary satellite, which moves around the earth at exactly the same speed that the earth turns; is that correct?

Mr. WEBB. This is basically the military system called the Advent, and we have only touched on it briefly here today. It is not considered at this time for commercial application.

Mr. DINGELL. Then you have the random-placed, roughly polar orbit, satellites which are proposed to be utilized under one system; am I correct?

Mr. WEBB. That is right.

Mr. DINGELL. You have a third system which has carefully placed, roughly equally orbited on a equatorial orbit; am I correct?

Mr. WEBB. No, sir. The first one you mentioned, the Advent, the military type of system, is the same as the third one you mentioned.

Mr. DINGELL. You have three systems; am I correct?

What is the third one?

Mr. WEBB. The three systems are the passive system, that is Echo and others that are not active repeaters, they simply are reflectors really; then you have the low-level active repeating satellite, and you have the high-level, more-or-less stationary position, satellite system.

Mr. DINGELL. You have a third system which would also be a low level, going around the Equator; am I correct or off on that?

Mr. WEBB. This is one we have under consideration but have not implemented, and this is the one we might spend part of this $50 million bringing into being, but that is not yet to a stage that is more than a discussion, paper studies, and so forth.

Mr. DINGELL. All right.

Now, let us talk a little about these three. The FCC is going to allocate these channels on the basis of its own considerations. How much consultation is being conducted with your agency to determine which of these is the best, most economical, and utilitarian system from the standpoint of age, operation, cost to the ratepayer and the cost to the Government by your agency?

Mr. WEBB. Well, we have had a good deal of consultation with the FCC.

Mr. DINGELL. Which system have you advised the FCC is in the best interest of the Government?

Mr. WEBB. What we have done is made available to them any information they desire on all of the work that is being done.

Mr. DINGELL. Are you telling us you have not advised them what, in your opinion, or in the opinion of your agency, is best from the standpoint of costs to the consumers?

Mr. WEBB. I do not have an opinion as yet. We are doing the research work to find the answer to that question, and most of it depends upon two factors. One is, can you do a multiple launch to cut the cost of the launching of each satellite; and, second, how can you get a long-life satellite.

If we can get a long life satellite at an altitude above the Van Allen radiation belts, but not one within the belts, this will be an important consideration as to the type of system.

Mr. DINGELL. What I am trying to find out is are you merely passively advising the FCC or are you merely waiting for them to come to you and say, "What do you think about this particular thing?" Or are you conducting yourself in an active and a vigorous way to advise them which of these systems is the best?

Mr. WEBB. We are acting in a close cooperative relationship to keep them informed as to everything we are doing, the information we are gaining from it, and what it may show.

Mr. DINGELL. Are you telling them which is the best system from the standpoint of the cost of putting up the system or are you just waiting for them to come to you for advice and information on this point?

Mr. WEBB. What we are actually doing is keeping in very close touch, so they are following the activities of our agency in this field, and are constantly kept in touch with the results of those activities.

Mr. DINGELL. You still have not answered my question. Are you advising them which, as you go along, in your opinion, is the best system from the standpoint of putting up the satellite?

Mr. WEBB. I have not given them that advice because we have not reached a determination.

Mr. DINGELL. When you reach that determination are you going to advise them which system you consider to be the best?

Mr. WEBB. Yes, we will. But I think that where we are having our trouble is that when you speak of which system is the best, we are considering a wide range of possibilities and doing a lot of experimental work. Out of this may come some new idea or some new breakthrough we do not even know about at this time, and I do not think you can freeze into a pattern of free systems and say that we have to choose one or the other of those. We are looking at a spectrum of possibilities.

Mr. DINGELL. I recognize that fact. But when you reach an opinion as to which of these systems is going to be the best or is the best, are you going to so advise the FCC?

Mr. WEBB. We will advise them as to our best judgment on every factor affecting the bringing into being of a system. But where I am also having a little trouble is that whoever is to operate the system and invest some hundreds of millions of dollars in it, also are important in making the decision as to what is to be done, and basically, the FCC, I think, will most likely be in a position of either approving or disapproving what is proposed to them by the people who have to invest the money and do the work.

Mr. DINGELL. Is the FCC going to make all of the determinations, and your agency merely limiting itself to advice or are you going to actively participate in the decision-making process with regard to what is the best satellite system from the standpoint of launching and durability?

Mr. WEBB. I am one Government administrator in a complex that involves others.

I intend to do everything I can in my job to bring into being the best possible system that will serve the best interests of the United States and its people, and if this means pressing hard with the FCC in the direction that our experimental work indicates we should go, I will do that.

If it means asking Congress for money to support a system in its early stages because the economic feasibility studies show that it is going to be 5 or 8 years before it can be economically feasible, I will be up here suggesting that this ought to be supported because I firmly believe we must bring a system into being at the earliest possible time not only for purposes of our whole position of technical leadership in the world but also because we need the capacity to handle communications traffic.

Mr. DINGELL. Thank you, Mr. Chairman.

Mr. MACK. Mr. Keith.

Mr. KEITH. Mr. Chairman, thank you. I would like to join with my colleagues in this committee in complimenting you for the splendid job you have done.

Personnel plays a big role in your program, it seems to me?

Mr. WEBB. Yes, sir.

Mr. KEITH. Have you and the industry had a hard time in getting the necessary personnel in order to implement this extensive program of yours and theirs?

Mr. WEBB. Oh, yes, we are in an active and vigorous recruiting effort all the time to get good people.

Mr. KEITH. Are you successful in this?

Mr. WEBB. Yes, sir; we are very successful in obtaining good people. I would say that the difficulties are great, but up to now we have been able to overcome them and we have a very fine group of people.

Now, we do need some consideration from the Congress in connection with some more expected positions which are now being presented to the appropriate committees, so I do not want you to think the problem is completely solved.

Mr. KEITH. I do not think it is completely solved. I was thinking of what effect the moon shot is going to have on your personnel problem.

Mr. WEBB. It is going to add to it, but we are going to gear up to do it as well as make the shot to the moon, as well as other things we have to do.

Mr. KEITH. Thank you.

Mr. MACK. Mr. Hemphill.

Mr. HEMPHILL. Let me see if I get the picture correctly. As I understand it on the A.T. & T. proposition, NASA controls the booster, the shot?

Mr. WEBB. That is right.

Mr. HEMPHILL. So far as the communications field is concerned and the spectrum, the regulatory agency we call the FCC controls that?

Mr. WEBB. That is right.

Mr. HEMPHILL. Insofar as A.T. & T. is concerned, it is going to pay all of its own way?

Mr. WEBB. That is right.

Mr. HEMPHILL. Then why are we spending $50 million of the people's money to contract for a satellite when we have got here, almost free of charge, a satellite by A.T. & T., which we control getting into the air, which we control the frequency of, which we have all the access to, why do we spend the money before we know about the success of that satellite?

Mr. WEBB. Because there is no assurance that even as great a company as the A.T. & T. will solve the problem in a way best calculated to serve the entire interests of the United States.

Mr. HEMPHILL. It would naturally follow that there is no assurance that the $50 million will produce.

Mr. WEBB. That is right.

Mr. HEMPHILL. So we are spending $50 million in a duplicating effort of the people's money before you know all the pitfalls of the satellite program as will be explained in the A.T. & T. program; isn't that true?

Mr. WEBB. No, sir. In my opinion that is not true.

Mr. HEMPHILL. Well, the thing that bothers me is in this Government today we have this duplication of effort, and I see it now in your agency.

In the Defense Department we have a duplication and people try to compete, one department with another. Down here in the taxpayers' level which I am always concerned with, the man is footing the bill, and it seems to me that if A.T. & T. is controlled to the extent that I believe NASA and FCC can control it, that you could do a lot better than spending the $50 million by going to A.T. & T. and forcing them—which you can because you can say: "We won't put your satellite into space," or you can delay like somebody delayed in giving them permission apparently in your agency—you could go to A.T. & T. and say: "All right, we want the full information, full cooperation, and full disclosure," and I believe A.T. & T. would give it to you, would be forced into it, and we could save the $50 million until we found out that we needed the $50 million to be spent. Did you ever consider that?

Mr. WEBB. I think there are several factors that are pertinent here. First of all, the Government does have requirements beyond those of the A.T. & T. in an operational system.

A.T. & T. is primarily concerned with serving its customers. Its rate base is based on those expenditures required to serve its customers. But this is not the total communications problem of the United States, so the system which the Government requires is somewhat different.

Now the second point which I think is important is that the Government itself has, by the action of the FCC—and this is a matter they should explain rather than me—decided that they do not wish to have one chosen instrument do this job, that they believe it in the public interest to bring all of those people engaged in international communications into the system.

Now this is a matter of policy. You could make an argument that if the Government should wish a chosen instrument it could select A.T. & T. and say to it, "Do the job." But the Government has decided not to do that.

Now, entirely aside from those two factors, the job in my agency is to do the experimental work to get the necessary knowledge to

develop the technology that gets the application of space science, that gets out of this investment the public has made in space science as much of a return as can be had, and it looks in this case like the return is going to be very great.

Mr. HEMPHILL. Well I appreciate your sincerity, but your answer does not satisfy me.

Mr. WEBB. All right, sir.

Mr. HEMPHILL. Because here is something I cannot escape. We have recognized the potential ability of A.T. & T. to do a job. Now you, on the other hand, have gone and contracted with RCA, whom I assume you recognize with the potential to do the job, to spend $50 million.

Here is the company which, I assume, has to do this to keep up with future developments in the communications field through the use of space satellites.

If you are having personnel trouble, and if A.T. & T. is going to do this job, why not concentrate with A.T. & T. and save the taxpayers some money? I do not just see why we have to have the Government build empires when private business can do the job.

Mr. WEBB. I think I can answer you. I see the point you want to bring out.

First of all, on January 4 the Government made a call through our agency for competitive proposals to build an experimental satellite. A.T. & T. and six other companies submitted competitive proposals to do that work.

After careful evaluation, the design submitted by the RCA Co. was evaluated as being the best one and the contract was awarded to the RCA.

Now, following that——

Mr. HEMPHILL. Has there been a contract?

Mr. WEBB. A letter contract has been entered into. The award has been made to them. The details have got to be settled.

But now, following that, A.T. & T., which had not been evaluated as the highest on the scale, came in and said: "Nevertheless, in spite of the fact that we were not chosen out of the competitive proposals, we still want to go forward and do experimental work. We are prepared to spend our own money, but we cannot spend our own money unless the Government is prepared to fly our birds and let us do the experimental work."

So then, at that point, we made a very careful evaluation of what it was A.T. & T. wanted to do at that point, which was somewhat different than what they wanted to do originally, and we determined that what they wanted to do at that point would add to the total knowledge available to expedite the bringing into being of a communications satellite system, so we said: "Yes, what you propose to do will definitely add to the value of the whole effort and we will be prepared to cooperate with you so you can spend your own money to do this experimental work and make the results available so that the United States can have a system earlier than it would otherwise have one."

Mr. HEMPHILL. I commend you for the cooperation, but I wrote down the words that you have told Mr. Moss. I believe it was, about the benefits from A.T. & T. and you said: "The benefit is not what they hold onto as a private company." Those are the words you used.

So the American Government is getting, as I understand it—and if it is not, you should not have authorized this shot—is getting the benefit of whatever A.T. & T. does.

Mr. WEBB. We are. I stand by those words, and that is precisely what I was just describing to you, the method by which we did get the benefit. They said they wanted to do this experimental work, and the results would be made available completely to the Government under a royalty-free license, and with the ability to transfer it to whatever entity was brought into being by the Government.

Mr. HEMPHILL. After all, A.T. & T. had offered to pick up the check, did you people go back and say to them at any time: "If you will do this other thing to find out what we want found out in the RCA satellite," did you ask them to do that?

Mr. WEBB. Well, bear in mind now that when I came on this job on the 14th day of February there had been a submission by A.T. & T. in December; there had been a determination by the previous administration that they would not accept this, but would go forward for competitive proposals, and on the 4th day of January, before this administration took office, a request for competitive proposals was made.

So when we came, we were in the process of receiving proposals from anyone who answered that call sent out on the 4th day of January. So, in a sense, the rejection of A.T. & T.'s offer to become what you might call a chosen instrument of the Government had been made prior to this administration.

Mr. HEMPHILL. In other words, the Government rejected—as I understand your philosophy now—the Government has rejected the private company as its medium when it would be willing to pay its own way, so that the Government can spend $50 million to empire build; is that about the case?

Mr. WEBB. I think the conclusion is not warranted, sir.

I think the reason was it did not feel it was in the public interest to have one company completely in control of this whole vast operation.

Mr. HEMPHILL. Well now, hadn't A.T. & T. offered to cooperate with anybody else? Don't you know that?

Mr. WEBB. I am not——

Mr. HEMPHILL. Hadn't A.T. & T. offered to let other people come in? They let you come in, FCC is going to monitor it; have you explored the possibility of A.T. & T. letting RCA or these others come in and participate?

I am asking in the interest of saving the taxpayers' money, have you explored that?

Mr. WEBB. You see, this is an area in which the FCC should be answering your questions.

My job is to do the experimental work that provides good tools for the company to work with once they come into being.

Mr. HEMPHILL. If this is not your area, I won't pursue it. I thank you.

Mr. WEBB. Thank you.

Mr. HEMPHILL. Thank you, Mr. Chairman.

Mr. MACK. Are there any other questions?

Mr. Webb, I would like to thank you for your very fine statement this morning and for giving us the benefit of your views and for the frankness in answering our questions.

Mr. WEBB. Thank you, Mr. Chairman.

Mr. MACK. Thank you very much.

Is Mr. Loevinger here? Would it be convenient for you to come back at 2 o'clock this afternoon?

Mr. LOEVINGER. I expect I might, sir.

Mr. MACK. You seem to hesitate. Is there some question? Is it convenient?

Mr. LOEVINGER. No, I will be here. It is never convenient to take a half day off, Mr. Chairman, but we will do so, we will be happy to do it.

Mr. MACK. If it is not convenient I think we could work——

Mr. LOEVINGER. This is just as good a time as any, sir. I will be here at 2 o'clock.

Mr. MACK. There is also some question about our schedule in the House, but we would prefer to have you testify at 2 o'clock this afternoon.

Mr. LOEVINGER. Yes, sir.

Mr. MACK. If we can work it out ourselves.

Mr. LOEVINGER. I will be here, sir.

Mr. MACK. Therefore, the committee will stand adjourned until 2 this afternoon.

(Whereupon, at 12:10 p.m., the committee recessed to reconvene at 2 p.m., the same afternoon.)

AFTERNOON SESSION

The CHAIRMAN. The committee will come to order.

This afternoon the committee is pleased to have with us Judge Lee Loevinger, Assistant Attorney General in charge of the Antitrust Division, in connection with the subject of communications through the use of satellites and particularly with relation to the application of the antitrust proceedings.

Judge, I want to say that we are very sorry that we have detained you.

With the witness this morning, you understand the situation was that we thought that it would be but a little while before you would be called, so if we have caused you to stay here an unusual length of time, I will say, in the first place, we are always glad to have you with us; in the second place, we regret that we have caused you any inconvenience. But we do appreciate your being here with us, and we would be glad to have your testimony.

Mr. LOEVINGER. I think there was some compensation in that testimony and questioning this morning was very informative. I was delighted to be here.

The CHAIRMAN. I regret that I was unable to be here, but one person cannot be at two places, particularly if they are very far apart, as things are here on Capitol Hill.

I believe you have a statement which you want to present at the outset? You may do so at this time.

## STATEMENT OF HON. LEE LOEVINGER, ASSISTANT ATTORNEY GENERAL, ANTITRUST DIVISION, DEPARTMENT OF JUSTICE; ACCOMPANIED BY JOHN DUFFNER, EXECUTIVE ASSISTANT, AND JACK JAMES, TRIAL ATTORNEY, ANTITRUST DIVISION

Mr. LOEVINGER. Yes, sir.

Mr. Chairman, I appear today in response to the request of yourself, Mr. Chairman, and to comment on the participation in the field of satellite communication by the Department of Justice and to state the position of the Department on the antitrust safeguards that should be considered in the establishment and operation of a satellite communication system.

First, I would like to point out that the Department strongly believes that the national interest requires that a workable satellite system be established at the earliest possible date. The President's statement of July 24, makes it clear that the administration's program in this area is still being evolved and that the details are not at all complete at this time. It appears that because of economic and technical considerations only one commercial satellite system can be established in the foreseeable future. Its importance in the development of international communications and the general field of communications cannot of course, be accurately predicted at this time. However, it promises a vast expansion of international communication facilities available to areas of the world which presently have inadequate facilities. The Department of Justice is cooperating with other interested agencies in the carrying out of this project.

The Department believes that proper safeguards must be incorporated in any plan adopted so that the system will truly serve the national interest. Consideration at this time of problems that can be anticipated with development of the system will prevent difficulties and delays which may arise from adoption of a definitive plan not containing necessary safeguards.

The Department believes the following antitrust principles must be considered in the formulation of any plan for the establishment of a commercial satellite communication system.

(*a*) To assure maximum competition the satellite communication system, if it is to be privately owned, should be so organized that no single company is able to dominate the system through ownership or through patent control.

(*b*) All communication common carriers should have equitable and nondiscriminatory access to the system.

(*c*) All interested manufacturers should have an unrestricted opportuniy to participate in the furnishing of equipment.

(*d*) The results of research and development conducted under Government contract or supported by public funds should be available to all companies interested in satellite communication.

In April 1961 the Federal Communications Commission issued a "Notice of Inquiry Into the Administrative and Regulatory Problems Relating to the Authorization of Commercially Operable Space Communications Systems." On May 5, 1961, the Department filed a statement with the Commission setting forth its views on the antitrust factors that should be considered in the establishment of any plan for

satellite communication. I submit a copy of that statement for the record here.

The CHAIRMAN. Let it be received.

(The document referred to follows:)

[Before the Federal Communications Commission, Washington 25, D.C.]

Docket No. 14024

IN THE MATTER OF AN INQUIRY INTO THE ADMINISTRATIVE AND REGULATORY PROBLEMS RELATING TO THE AUTHORIZATION OF COMMERCIALLY OPERABLE SPACE COMMUNICATIONS SYSTEMS

STATEMENT OF THE DEPARTMENT OF JUSTICE

On April 3, 1961, the Federal Communications Commission released a Notice of Inquiry in the above entitled proceeding, inviting interested parties to comment on certain questions.

The Department of Justice does not deem it appropriate now to comment on each of the specific questions set forth in the Notice of Inquiry, as those questions are directed primarily to parties considering participation in development and operation of a satellite communication system. However, in view of the Department's responsibility for enforcement of the antitrust laws, we do consider it desirable to comment generally on the organization and ownership of such a system.

The Department of Justice recognizes the paramount importance to the United States of the development of a satellite communication system. The Department of Justice not only recognizes but emphasizes that our national interest requires prompt action and wholehearted effort by all those concerned with this matter, in both government and industry, to insure that this country will be first and foremost in bringing to the world satellite and other advanced systems of communication. It is the position of the Department of Justice that observance of certain basic principles embodied in the antitrust laws is not only consistent with but will assist in the attainment of this goal.

The antitrust laws, designed to preserve and promote a free competitive economy, apply to all areas of interstate commerce except those specifically exempted by the Congress.[1] While rates and services in the communication field are subject to control by regulatory agencies and access to the field may be limited or restricted by such agencies, no general immunity has been bestowed upon the communication field. The Commission has itself recognized the importance of competition in this area. It has found that "[c]ompetition between direct radiotelegraph circuits has been an important factor in inducing the carriers to improve their plant facilities and services, to introduce new services, and to institute rate reductions for service to the public. Thus, competition in direct radiotelegraph circuits generally has resulted in public benefit."[2]

This Department believes experience has demonstrated, as in the case of direct radiotelegraph circuits, that competition among companies engaged in communications services has resulted in progressive developments in the art of communication with attendant increased efficiency and improved service which would not have resulted had competition been eliminated or restrained. Conversely, experience has demonstrated that where competition has been eliminated or restrained comparable progress has not been made. The Department, therefore, believes that competition must be maintained and fostered in all phases of the communications field, unless strong countervailing circumstances require otherwise in a particular situation.

The Department neither suggests nor endorses any specific plan for the development and operation of a satellite communication system. However, the Department of Justice believes that to be consistent with the antitrust laws any plan adopted must meet certain conditions. These conditions are:

(1) All interested communication common carriers be given an opportunity to participate in ownership of the system;

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[1] *United States* v. *Borden Company, et al.*, 308 U.S. 188 (1939).

[2] *In the Matter of Mackay Radio and Telegraph Co., Inc.*, Docket No. 8777, 8 Pike and Fischer RR 1174, 1189 (June 30, 1955).

(2) All interested communication common carriers be given unrestricted use on non-discriminatory terms of the facilities of the system whether or not they elect to participate in ownership;

(3) All interested parties engaged in the production and sale of communication and related equipment be given an opportunity to participate in ownership of the system; and

(4) All interested parties engaged in the production and sale of communication and related equipment be given unrestricted opportunity to furnish such equipment to the system whether or not they elect to participate in ownership.

It is the opinion of the Department that any plan meeting these conditions will best serve the public interest since it will insure utilization of the best available equipment and will assist in the maintenance of existing competition in the international communications field. Conversely, any plan failing to meet any of these conditions, particularly unrestricted ownership by interested parties, may be subject to abuse by the dominant party. This will be so despite the fact that the system is subject to regulation by the Commission; for it is the Department's belief that regulation cannot eliminate the inherent advantage accruing to any communications concern which solely owns or controls the system. The continuing opportunity to favor its own facilities would always be present and would inevitably result in discrimination or suspicion of discrimination no matter how strict might be the policy of the dominant company to provide equal service to its competitors.

Directly related is the problem of unrestricted opportunity to furnish equipment to the system, particularly in view of the fact that several companies which offer communications services, and which may be expected to participate in the system, are also engaged in the production and sale of communication and related equipment. The opportunity to favor the purchase of equipment produced by the dominant company would be irresistible, particularly if it were able to build up a favorable patent position during the development of the system.

These considerations are especially important since it appears probable, and the Commission assumes that for the purpose of this inquiry, that, because of economic considerations and problems of spectrum management, only one or a limited number of satellite systems can be established and operated within the foreseeable future.

Any plan satisfying the conditions previously set forth would to some extent require joint action among competitors. If the choice is between monopoly and some degree of regulated joint action among competitors, the latter alternative would appear to be clearly preferable.[3]

Since, as previously stated, it appears that only one system may be established in the near future, regulated joint action would in fact promote competition since it would insure that no single company could, by dominating an important phase of international communications, stifle previously existing competition in that field.

Obviously, no specific views can be formulated until specific plans are put forth.[4] But it is the view of the Department of Justice that a plan meeting the conditions previously set forth under appropriate regulation could be consistent with the antitrust laws and with the Communications Act, including Sections 313 and 314 of that Act.[5]

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[3] See, e.g., *United States* v. *Terminal Railroad Association of St. Louis*, 224 U.S. 383 (1912).

[4] The Department of Justice has already reviewed one limited joint venture dealing with this matter. On January 19, 1961, the Lockheed Aircraft Corp. requested approval of a proposed joint study, in conjunction with RCA Communications, Inc., General Telephone and Electronics Corp., and perhaps other communication companies, to examine the feasibility of satellite communications and to consider the type of organization that might best develop and operate such a system. On the basis of representations made by Lockheed, the Department on February 10, 1961, issued a "railroad release" letter regarding this proposed joint study. (See FCC Docket No. 13522, Comments of Lockheed Aircraft Corp., March 1, 1961, Exhibit D.)

[5] Section 313 would, of course, have no application to a plan which was consistent with the antitrust laws.

Section 314 would not prevent the Commission approving a plan allowing participation by all interested parties as the purpose of the plan would be to promote competition in the communications industry. The courts have held that the Commission is entitled to look at the entire communications field and not to confine itself to a part when determining the grant of licenses. *Federal Communications Commission* v. *RCA Communications, Inc.*, 346 U.S. 86 (1953).

The precise impact of satellite communication upon the communications industry in general and international communications in particular cannot now be accurately predicted. Its importance, as a field in itself and as a part of the general communications industry, seemingly cannot be exaggerated. One observer reportedly has predicted that "world-wide communications using space satellites would constitute a $100,000,000,000-a-year business in ten to fifteen years."[6] Satellite communication may well revolutionize both international communications and communications within the United States. Thus, from the standpoint of its commercial impact alone, the importance of such a system seems patent.

The Department of Justice firmly believes that a project so important to the national interest should not be owned or controlled by a single private organization irrespective of the extent to which such a system will be subject to governmental regulation.

Satellite communication will by its very nature play an important role in international relations. The United States is presently engaged in a world-wide struggle to demonstrate that our economic system of free competitive enterprise can itself compete favorably with the Communist system of controlled monopoly. The satellite communication system can well be a prime example of the effective operation of the free enterprise system, and it is, therefore, of vital importance to the national interest that no single private concern dominate satellite communication.

MAY 5, 1961.

Respectfully submitted.

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Mr. LOEVINGER. On May 24, 1961, the Federal Communications Commission issued a first report in which it indicated an intention to explore the feasibility of a plan for a joint venture limited to internatonal common carriers. It stated that the inclusion of manufacturers in the ownership of the system would be cumbersome and create difficulties of operation. It did not pass on the advisability of permitting domestic common carriers to participate. The Commission stated that regulations would be established providing that all equipment be purchased by competitive bidding so that all interested manufacturers could participate in this phase of the operation. It further stated that use of the system should be available on an equitable and nondiscriminatory basis to all common carriers whether they participated in ownership or not.

An FCC conference on June 5 was attended by representatives of the international common carriers and representatives of those domestic common carirers and manufacturers interested in participating in the development of satellite communication. The Department of Justice there urged the Commission to consider the desirability of widening the base of ownership as the plan is being developed so as to lessen the likelihood that the system will be controlled by a single company.

There are cogent reasons why the antitrust factors that have been mentioned are of paramount importance. To a certain extent satel-

[6] Statement of Dr. Lloyd V. Berkner, a member of the President's Science Advisory Committee and Chairman of the Space Science Board of the National Academy of Sciences, as reported in the New York Times, February 13, 1961.

lite communications will supplement existing communication facilities, but it promises to do much more. It has been estimated that satellite communications will become a $100 billion a year industry. (Statement of Dr. Lloyd V. Berkner, a member of the President's Sicence Advisory Committee and Chairman of the Space Science Board of the National Academy of Sciences, as reported in the New York Times, February 13, 1961.)

It can well revolutionize the communications industry by providing vastly expanded facilities for the transmission of telephone and telegraph service of all kinds at substantially lower costs than exist today. It may provide the means of disseminating television programs.

Our economic system is based on the premise that research and development are best fostered by competition and that monopoly tends to stifle innovation. It is thus of the utmost importance that in a new industry so closely concerned with the national interest competition should be encoraged. If a single company should dominate the satellite communication system, it could not only control the type of system to be established and the use to be made of the system but it could extend its control over all forms of public communication.

Domination of the system could be acquired by ownership interest or by creation of patent control or by both. The Department believes that ownership of the proposed satellite system should be so broadly based that no single company has control. Provision should also be made so that no company could gain control of the system through ownership of patents. A substantial amount of Government funds have and will be expended to promote satellite communication. These expenditures should benefit the communications industry and the public rather than a single company.

The Department believes that all inventions developed under Government contracts or in projects supported in significant part by Government contracts should belong to the Government. While we believe this to be an extremely important consideration we do want to point out that the administration's program on patent policy is now being evolved and is not as yet final. No company should be able to block development or restrict the participation of other companies in satellite work through ownership of patents acquired in Government financed research. As the committee knows, there are presently before Congress bills dealing with the ownership of patents developed through the use of public funds. On April 21, 1961, I appeared before the Senate Subcommittee on Patents, Trademarks, and Copyrights and repeated the Department's position that public interest requires that the Government should have title to such inventions. The Department is also of the belief that there should be an exchange of licenses under relevant patents among companies participating in the development, ownership, or operation of the satellite communication system, and between such companies and the Government, in order to provide assurance that the best possible system will be developed at the earliest possible date by the fullest utilization of American inventiveness and technological skills.

All communication common carriers should have equitable and nondiscriminatory access to the system so that the public may be assured of the benefits of competition. The satellite communication system offers the possibility of increased service at lower costs and this possi-

bility can best be realized if there is competition in the furnishing of communication service of all types. Unless all communication common carriers are permitted nondiscriminatory use of the system, whether or not they participate in ownership, those excluded will be at a competitive disadvantage with companies having full use of the system.

There must also be assurance that the system will have the best equipment at the most reasonable cost, and this can be accomplished only if all interested manufacturers are able to participate in the furnishing of equipment. The Federal Communications Commission has suggested competitive bidding. This may be sufficient if other safeguards, such as the suggested patent provisions, are incorporated in the plan. It would be an empty gesture to require competitive bidding if at the same time a company were permitted to use its patents to preclude the purchase of competitive equipment. The manner of participation can be worked out. The important point is that adequate assurance be given that all manufacturing companies may be able to participate.

In addition to development of inventions a great deal of technical information is being and will be developed by companies operating under Government contract or will result from work supported by public funds. Such technical information should be available to the Government and to all companies who participate in any manner in the satellite communication system. No company should be permitted to gain a competitive advantage through use of public funds or facilities.

Satellite communication will be subject to Government regulation of rates and service as are other forms of communication, but regulation cannot eliminate the problems which would result from control of the system by a single company whether by ownership, by patents or otherwise.

It is no doubt easier to formulate broad general principles to be followed than to specify the details of a particular plan. Within the framework of these principles there may well be the possibility of a variety of specific plans. But regardless of what plan is ultimately adopted for establishment of the satellite communication system, it is clear that the system must be one which broadly serves the public interest. The Department will do all it can to assure that this project moves forward in this direction as rapidly as possible.

The CHAIRMAN. Does that conclude your statement?

Mr. LOEVINGER. Yes, sir.

The CHAIRMAN. Judge, I want to compliment you for a very forthright, frank, explicit, and clear statement on a subject that certainly will be an important part of the development of space satellites.

Mr. Younger, any questions?

Mr. YOUNGER. I would like to ask the judge, about a statement in here about the development of patents, and I am wondering whether you have considered the fact that if the Government is going to own these patents, whether it can get the best results from the originator of the patent if he gets no compensation for his work of discovery?

Mr. LOEVINGER. I am not quite sure that I follow the question, sir. This is a pretty broad question. When you say these patents, are you referring to a general policy or to a specific project?

Mr. YOUNGER. I think that the general policy would apply to human beings acting in about the same way whether they are working for the Government or whether they are working for somebody on the outside. If they have a patentable idea and cannot get any compensation for that in any way, shape or form, I am not sure that you encourage the right type of individual enterprise which has built this country. I'm just asking for information.

Mr. LOEVINGER. Again, this is a pretty broad question, because there are such a variety of things encompassed.

The specific projects that we have in mind that we are discussing, of course, are contracts, or let me put it this way, my statement is directed to a series of projects undertaken essentially at Government expense on the basis of Government-developed technology with Government facilities, with Government know-how, and provided essentially, as was the atomic energy project as a Government operation.

The process of moving from the essential Government monopoly position of know-how and technology to a system of private enterprise is a process that is a difficult one, certainly. I do not know and do not have any feeling that the Government's position in the atomic energy field, for example, has stifled initiative, individual initiative.

I have not really studied that subject, and I am not prepared to make a considered statement on it. It does seem to me that the danger that the Antitrust Division is concerned with is that a monopoly position having been developed essentially by the Government as a result of the expenditure of public funds in the development of a public technology or a Government technology and know-how, this may be appropriated by a private company to its own profit. This is not the method of developing individual initiative or encouraging individual inventiveness either. The Government should not, we believe be in the position of turning over Government-developed technology and Government-developed know-how to a private monopoly.

Mr. YOUNGER. What is the policy at the present time in regard to these various inventions and patents in connection with work that has been done partially or wholly by Government funds?

Mr. LOEVINGER. Well, this is part of the reason that I have difficulty in answering your question, sir. There are a variety of policies, and actually what has been happening with specific reference to the space satellite system is the development of a contract between NASA and A.T. & T., and I have been in intimate and rather lengthy communication with Mr. John Johnson who appeared here regarding the patent provisions of that contract.

We had certain objections to the initial draft that was shown to us which we voiced to Mr. Johnson. I understand that the draft has been amended, I understand from Mr. Johnson that the amended draft has been tentatively agreed to by NASA and A.T. & T., and a copy has been furnished to the Department of Justice.

I also understand from his explanation of it and from his statement here this morning that it meets the objections that we have, and complies fully with the statement that I have made to this committee.

I have not seen the amended draft. As I understand it, the amended draft was actually prepared last night and was delivered to my office this morning while I was over here, but this thing is mov-

ing forward very rapidly. We have cooperated fully with NASA; NASA has cooperated fully with us, and, if I understand the situation correctly, and I do not want to make a definitive statement because I have not yet seen the draft nor examined it, but if I am correctly informed and understand the situation correctly, I believe NASA in the one contract we have examined so far has fully satisfied the criteria that we would establish.

Mr. YOUNGER. Congress did have this problem before it on several occasions, as I recall in connection with the atomic energy and some other programs. Do you know what resulted there?

Mr. LOEVINGER. Well, there is a provision in the NASA Act that, in essence, provides that the Government shall have title to patents developed as the result of research undertaken at Government expense.

Mr. YOUNGER. Is that the same as in the Atomic Energy bill?

Mr. LOEVINGER. I believe that NASA has a larger right of waiver of Government rights than the AEC has. They are similar in general purpose and provision.

Mr. YOUNGER. Do both of those contracts comply with what you say here—

**The Department believes that all inventions developed under Government contracts or in projects supported in significant part by Government contracts belong to the Government?**

Mr. LOEVINGER. Again, I am not sure what you mean by both of these contracts.

Mr. YOUNGER. The AEC and NASA contract.

Mr. LOEVINGER. We have examined no AEC contracts, and I did not mean to speak with reference to any AEC contracts.

If anything I said was subject to such interpretation it was an error on my part. I was speaking only with reference to the AEC statute and the policy.

The only contract that I meant to comment on was the proposed contract between NASA and the A.T. & T.

It does not provide for title in the Government. Mr. Johnson, I believe, explained it this morning, for reasons that Mr. Johnson and Mr. Webb apparently consider sufficient, and that we are not prepared to quarrel with them about.

They have felt that they should, because of the peculiar circumstances of that contract, permit A.T. & T. to retain title and to give an advance waiver which, however, retained certain rights for the Government.

In other words, under the A.T. & T. contract the Government has an unrestricted nonexclusive royalty-free license on all patents developed in connection with this work, as well as the right to grant sublicenses for commercial or other purposes, as the Government may desire. So that the Government has most of the incidence of ownership with respect to any use it may care to make while, at the same time, A.T. & T. retains the right of sort of a dual ownership and technical title.

Mr. YOUNGER. Do you believe those existing contracts, whatever they may be, comply with our basic patent laws?

Mr. LOEVINGER. I see no conflict between that contract and the patent laws.

Mr. YOUNGER. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Rogers.

Mr. ROGERS of Texas. Judge, do I understand that the Antitrust Division takes the position that not only international carriers but all carriers ought to be considered in the development of the program to put a satellite in orbit, communications satellite?

Mr. LOEVINGER. All communications carriers?

Mr. ROGERS of Texas. All communications carriers.

Mr. LOEVINGER. Yes, sir.

Mr. ROGERS of Texas. In other words, you feel that the FCC was not exactly wrong, but not clearly right in limiting it to international carriers?

Mr. LOEVINGER. I think that is a fair statement.

Mr. ROGERS of Texas. Now, with relation to or with your vast experience in the antitrust laws, do you feel that under the present situation and under the present law, where we anticipate putting up only one satellite to be used by everyone that that can be done without violating the antitrust laws?

Mr. LOEVINGER. Yes.

The antitrust law, in effect, prohibits economically created monopolies. It does not, and I think cannot, prohibit physical monopolies.

In other words, if you had, let us say, to take a specific example, a river that had one place for a hydroelectric dam and only one place, and you either put up one dam and developed power at this one point in the river or you did not develop it at all, the antitrust laws certainly do not prohibit the erection of a dam at the one available point. It is a physical fact of nature that you can only have one dam there.

It is a matter of public policy whether this dam shall be Government-owned or privately owned.

Beyond this, the antitrust laws would say that whatever natural monopoly is inherent in the conditions with which you are presented should not be permitted to be taken advantage of by a private enterprise to extend its monopoly power beyond the limits inherent in the natural conditions.

Mr. ROGERS of Texas. But you do not feel that any amendment or changes in the law will be required in order to make it possible for private enterprise to undertake this rather than have the Government own the satellite itself?

Mr. LOEVINGER. I do not think I would be prepared to make a definitive statement on that now, sir.

As the President has pointed out, no commitments have been made yet as to the structure of the operational system.

I understand that the FCC is reserving decision on this. The matter is still in such an amorphous and fluid state, it seems to me that it would be improvident to attempt to suggest an opinion as to the application of the law to something that is still so vague.

Mr. ROGERS of Texas. In other words, the opening of the doors with relation to this new endeavor may create problems that none of us have anticipated or have thought of?

Mr. LOEVINGER. That is certainly true; yes, sir.

Mr. ROGERS of Texas. Now, with relation to the international carriers, do you feel that if the bidding on this is confined to those who can qualify as international carriers that we would be setting up a situation to invite violation of the antitrust laws in theory if not in fact?

Mr. LOEVINGER. There is a greater danger in that kind of structure than there is in the one that we have suggested, we believe.

Again, it requires a projection from hypothesis into an unknown future that is very difficult to make, really.

Mr. ROGERS of Texas. Judge, let me ask this final question: Do you think that those parties who might consider themselves aggrieved by virtue of the fact that the international carriers only were allowed to participate, that they could have a place in court under present law to force their consideration in working on this problem?

Mr. LOEVINGER. You mean in court literally, in the Federal courts, or do you mean they have a right to be heard before such agencies as are available, such as the FCC?

Mr. ROGERS of Texas. Well, in the courts, to prohibit by injunction, we will say, the FCC or to proceed by mandamus, if it would be appropriate in the case, to force consideration of their bid or their participation in the development of a program of this kind?

Mr. LOEVINGER. That is a pretty tough question to answer off the cuff.

My guess would be it would be pretty tough to get a Federal court to mandamus the FCC to do something other than whatever it has done or proposes to do in as experimental a field as this.

Mr. ROGERS of Texas. Yes. But what I have in mind is, though, let us say by injunction to prohibit them from moving forward in a situation like this, confining their consideration only to international carriers and not to other carriers, communication carriers, because of the antitrust laws.

Mr. LOEVINGER. Well, again, it is difficult to say because what they are doing now is experimental and not commercial.

Mr. ROGERS of Texas. Yes, sir; I understand.

Mr. LOEVINGER. Certainly there is nothing in the antitrust laws or any other laws that I am aware of that precludes the Government from giving permission to and making a contract with any company to conduct particular experimental work in any field for the Government. Once you get to the point of projecting a commercial satellite system for the international transmission of, let us say, telephone communications, it does seem to us that domestic telephone companies should be entitled to access to this system as well as the one dominant company, the Bell System.

The General Telephone and the other companies certainly are equally entitled to access to and to participation in, on whatever basis may be considered equitable, the international communications system.

Mr. ROGERS of Texas. You think though that we do have a fertile field for some lucrative lawsuits?

Mr. LOEVINGER. Gosh, I would hate to express an opinion on that.

Mr. ROGERS of Texas. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Dominick.

Mr. DOMINICK. Thank you, Mr. Chairman.

Judge, I was interested in your comments on the contract with the A.T. & T.

Under the circumstances, as I understood this morning from the explanation that was given by Mr. Webb, the A.T. & T. will be putting all of their own funds for building the satellite, proposed experimen-

tal satellite, and will also be paying the Government for the use of their launching facilities, and the cost of the rocket. So either by agreement or by out-of-pocket cash, A.T. & T. will be spending all of their own money on this, it will not be financed by Government money, except to the extent that the cost of the rocket is initially borne by the Government and then repaid.

Now, under those circumstances, where you have a private company spending all its own money, do the antitrust laws say or do the patent laws say that that company, in order to spend its own money in the field that it wants to, must turn over all inventions and discoveries that it has for the use not only in the Government whose facilities it is using, but also to all other competitors who are not advancing any of the funds?

Mr. LOEVINGER. Clearly, the antitrust laws do not contain any specific injunction that says that any company should turn over all its patents to the Government or to anyone else.

The antitrust laws contain certain general principles relating to the extension of monopoly which require interpretation and application in very complex circumstances. This involves a matter of considerable judgment in circumstances such as the present ones.

In this particular instance, for example, it seems to me that there may be some relevant facts that are not wholly expressed in your hypothetical question. One of them is the fact, as suggested in this morning's questioning, that A.T. & T., by repaying the cost of the specific missile which carries one satellite aloft is, by no means in fact repaying the public investment in this project.

There are more billions of public money invested in the development of that missile than A.T. & T. will be paying millions for the specific cost. A second factor that I think must be considered also is that A.T. & T. is not an ordinary private company. It is a regulated public utility which, in effect, levies through governmental action a charge on the people which, in many respects, is something in the character of a tax.

Included in its rate base are its costs, including, presumably experimental and developmental costs. So when A.T. & T. says it is going to spend money, what it is saying, in effect, is that "we will collect from our users to cover this cost," and it is not taking money out of an accumulated capital stock such as a more limited private company would when it increases its costs. It goes to the regulatory agency and increases its rates, if necessary, if there is not enough in there to absorb it.

In the circumstances, it seems that to permit A.T. & T. to come in in the situation which it did come in, and to develop patents that potentially might give it a complete control of the communications satellite system would be permitting it to take advantage of an existing monopoly position to gain a new monopoly which, in fact, had never been granted by intentional governmental action, by legislative action, or by any considered determination or decision.

It would be sort of rolling dice with the public to see whether or not A.T. & T. could develop patents out of this particular project that would enable it to control the new system.

Mr. Moss. Would the gentleman yield briefly at this point?

Mr. DOMINICK. Just let me finish my line of questioning and then I will be delighted to yield.

I do not claim to be an expert in this field nearly as much as you are, but I have done some work on it. I do not believe that I know of any cases in which it is held that even where you develop something with Government funds on a research project that this factor alone requires that that company not only permit the Government to use the developments that are made in the process of that research program, but that also all other competitors should have the use of it, and this is what I understood to be the position of the Department under your statement, namely, that not only would the Government have the right to use these developments under the A.T. & T. contract, but also so would all other competitors; is that right? Is that a fair statement of the position of the Department?

Mr. LOEVINGER. Well, this is not the position of the A.T. & T. contract that we have had under specific consideration. The A.T. & T. contract provides that the Government has the right to grant sublicenses to anyone for any use.

Mr. DOMINICK. Well, there is not very much difference.

Mr. LOEVINGER. There may be. This is a matter of Government determination at this point.

Mr. DOMINICK. Do you know of any other example that would correspond with this that you could give to me, as to this position?

Mr. LOEVINGER. The Government maintains even closer control of atomic energy——

Mr. DOMINICK. Yes.

Mr. LOEVINGER (continuing). And fissionable fuel and things of that character.

Mr. DOMINICK. In those cases, as I recall the Atomic Energy Act originally, there was an exemption from the antitrust laws in the act which was then removed. But also most of the developments that were created in that were created by funds supplied on research projects by the Government, in which there has been a long-standing rule, as I understand it, that when you develop through Government funds that the Government is entitled to a royalty-free license on those developments.

This, as I understand it, is the standing rule which has been there for quite a while.

Now, in this particular case, in the A.T. & T. case, as I said before, with the exception of 8 years of research on rocket work and rocket development, the A.T. & T. is putting up all its own money on this, which is not true in the atomic energy cases as I remember them.

Mr. LOEVINGER. There have been atomic energy cases in which companies have undertaken to do research work on their own. But they must have permission of the Government; they must get fissionable fuel from the Atomic Energy Commission.

I think the situation is quite analogous here. A.T. & T. cannot engage in research of this sort without Government missiles, and the relationship between the communications system that it proposes to put in the missile and the experimental work that it proposes to do on the missile, if I evaluate it at all correctly, is sort of like the relationship between the windshield wiper and an automobile.

The missile has cost so vastly much more to develop and to bring to its present stage than anything that is proposed to be done under existing contract, that I think there is no comparison.

Mr. DOMINICK. I yield to the gentleman from California, Mr. Moss.

Mr. Moss. Well, in considering this question, isn't there also the matter of technology which will be certainly utilized by A.T. & T. in the process of putting up a satellite, in constructing designing, that may well have been developed at considerable public expense?

Mr. LOEVINGER. Yes, sir.

Mr. Moss. Basic technology here is primarily technology developed as a result of Government contracts, is it not?

Mr. LOEVINGER. Yes, sir.

Mr. Moss. It would be difficult, perhaps, in relating it to a single project to precisely cost it, but the cost is there?

Mr. LOEVINGER. I understand Mr. Webb to say in substance that it is impossible to determine the specific allocable cost.

Mr. Moss. That was the only point I wanted to make at this time. Thank you, gentlemen.

Mr. DOMINICK. I want to be clearly understood on this. The point I am making is I am trying to find the background of the position that has been taken, and I gather that part of it is in connection with the eventual use of the communications satellite that will be developed, the fear of monopoly control and, secondly, as the basis for decision you are using an analogy to the Atomic Energy Act and the developments that have gone on there and, personally—and I am talking personally only, and I have no connection with the A.T. & T. of any kind—it seems to me somewhat unusual that under the circumstances where all these developments will be made available to everybody else, that they are still willing to go ahead and spend $200 million or $300 million of their own money in order to accelerate the development of this. They could presumably sit back and let the general taxpayers spend the money and get the same degree of benefit out of it.

Mr. LOEVINGER. I assume that they believe they would not get the same degree of benefit out of it, sir.

Mr. DOMINICK. I assume that they must. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Flynt?

Mr. FLYNT. Thank you, Mr. Chairman.

Mr. Loevinger, on page 4, line 3, I note a conflict between the written text and the manner in which you read the sentence. That is lines 2 and 3, and I will read it in its entirety:

> It has been estimated that satellite communications will become a $100 billion industry.

Mr. LOEVINGER. Yes, sir.

Mr. FLYNT. As I understand you to read it, you read it as $100 billion a year industry.

Mr. LOEVINGER. This is my understanding, sir.

Mr. FLYNT. Did I understand you correctly?

Mr. LOEVINGER. You understood me correctly, sir; and this is my understanding, although I could be wrong.

Mr. FLYNT. The reason I asked that, if that is correct, then that will far exceed the cost of the atomic energy program, indeed it would exceed the entire national budget for a year, and would be one-fifth of the gross national product.

The CHAIRMAN. Not by much. [Laughter.]

Mr. FLYNT. And will approximate one-fifth of the gross national product.

Mr. MOSS. Will the gentleman yield? That figure of $100 billion a year was supplied by the Chairman of the Space Science Board of the National Academy of Sciences in the antitrust hearings conducted June 14 and 15 of this year by the subcommittee of the Committee on the Judiciary, and it appears in their report on page 3.

Mr. LOEVINGER. Thank you. This was purely a recollection.

Mr. FLYNT. Anyone using the space satellite would constitute a $100 billion a year business in 10 to 15 years.

And in this connection, if that is true, then I think we are going to have to make a complete reappraisal of this entire program. If that is the size of it, then I think, perhaps, we ought to go into it on a strictly Government basis, and Government basis alone. But I just wanted to say, the main thing I wanted to do, was to clear it up, and the way you read it in your text should be corrected to read $100 billion a year industry.

Mr. LOEVINGER. I was interpolating my own recollection of the facts, sir.

Mr. FLYNT. All right, sir.

Do you agree with the concept that all regulated industries are either total or partial monopolies?

Mr. LOEVINGER. Yes, they are certainly partial monopolies by virtue of the fact of regulation.

Mr. FLYNT. At least partial.

Mr. LOEVINGER. At least partial; yes, sir.

Mr. FLYNT. There you have a choice between antitrust law enforcement as pertains to these monopolistic type industries or you have regulations, but you do have a choice of one or the other?

Mr. LOEVINGER. No, sir; I do not think the dichotomy is quite that clear. In fact, antitrust law does apply to regulated industries except to the degree that it is either expressly excluded by the statute or wholly inconsistent with the regulatory scheme, and there are considerable areas of antitrust law application within a number of fields of regulated industry.

Mr. FLYNT. Now, in this particular instance would your answer to the need for both regulation and antitrust law enforcement apply if it is a $1 billion industry or if it were a $100 billion a year industry?

Mr. LOEVINGER. I think the principles would be the same, sir. Obviously, it is a matter of much greater importance in view of the potential size and importance of this industry. I think that some of the things that may account for this estimate, which is a staggering one, are the facts that this may come to encompass not only telephonic communication but telegraphic communication, long-distance television and radio communication, and virtually every character of long-distance communication that we now know of. This is only a possibility.

I do not believe that it is certain. I do not believe that any scientist would now say that this will be the case, but this is at least a possibility, and the notion of having the entire long-distance communications system conveyed by a particular technical means is a fairly staggering prospect.

Mr. FLYNT. Let me refer to page 2 of your statement, to the subparagraph numbered (b) of the second unlettered paragraph on the page, where you say:

> All communication common carriers should have equitable and nondiscriminatory access to the system.

As a condition precedent to that, would you require all communication common carriers to advance a predetermined proportionate part of the cost of private industry development of this program?

Mr. LOEVINGER. I do not know. I think I am not prepared to answer that. I have not studied the problems deeply and thoroughly enough to be prepared to given an intelligent and reasoned answer.

Mr. FLYNT. Well, let me ask you this, was my question clear?

Mr. LOEVINGER. Sir?

Mr. FLYNT. Did I make my question clear?

Mr. LOEVINGER. Yes, your question is clear. I just do not have an opinion that I have enough confidence in to express.

Mr. FLYNT. Because I think that if this is the position of the Department of Justice, and I assume that it is, that if each communication common carrier company is to be required to participate costwise in the development of the experimental program and, therefore, to reap the reward when it goes into a commercial phase, that would be one thing; whereas, on the other hand, if they are not required to participate in a financial way, but are then, after it goes into a commercial phase, given the same opportunities and, therefore, the same benefits as those companies which do participate in the development of, in the research and development stage, it would constitute quite a windfall for those who are either unable or unwilling to participate in research and development.

Mr. LOEVINGER. I do not understand that this is the problem, sir. I believe that the problem now is that companies are seeking the opportunity to participate, and not being afforded the opportunity; I do not think that the problem is that of companies being unwilling to participate. There may be a number of small companies, but as far as communications common carriers in the United States are concerned, there are two principal ones, A.T. & T. and General Telephone.

Mr. FLYNT. And certain other companies in addition.

Mr. LOEVINGER. And then a very large number of very small ones.

I believe General Telephone would like to participate and is not now at least being afforded the opportunity because it is not now an international common carrier, although I understand the FCC has said it has not definitely decided this issue and will consider it.

Mr. FLYNT. Well, actually you have almost answered my original question, in that it is assuming, of course, if they come in they would come in on a participating basis, and that participation costwise would be a condition precedent to having equitable access to the system.

Mr. LOEVINGER. I do not think that this should be made a condition.

Thinking by analogy to the problem that arose in the development

of the telephone system, the history was, very crudely put, that there were a number of companies initially that had telephone systems.

A.T. & T. was a combination of a substantial number of companies then in the business, by no means dominant in the sense that it is today. It began to establish long-distance or long-line systems.

Mr. FLYNT. Which is what we are primarily and would be primarily concerned with from satellite communications.

Mr. LOEVINGER. That is right, sir.

It denied the right of a number of smaller companies to interconnect with its long-distance or long-line systems.

This had the effect of handicapping the smaller companies, so that a number of them either failed or fell into the A.T. & T. orbit.

This was strenuously objected to, and numerous States, I understand, eventually, all the States, passed laws requiring that any telephone company which was in operation and permitted to operate by the public utilities of the respective States, be given an opportunity to connect with the long-distance system of any other telephone company operating within that State.

It seems to me that under the public utility concept this is required not as a matter of antitrust law particularly but simply as a matter of basic common law.

If you are going to have a public utility system you must, as a public utility, offer your facilities equally on a nondiscriminatory basis to all who are willing to pay a minimum reasonable charge.

As I understand this, this goes back to law developed long before telephones were thought of. It goes back to the duties of the old lodging housekeeper.

Mr. FLYNT. I think there is no dispute on that. I think we are in complete agreement on that. But if this——

Mr. DOMINICK. Would you yield for just a minute?

Mr. FLYNT. I would be glad to.

Mr. DOMINICK. It seems to me the analogy is not clear at all because what you are talking about there is a question of the public utility being required to offer services to users, and here what you are talking about, even in the case of the other telephone companies, are competitors being given the right under a Government statute of some sort, to use the investment which the first company has already put up, which is a wholly different concept.

Mr. LOEVINGER. Well, I do not think this is quite analogous, sir, because what you have, in the first place, is a protected monopoly system, protected monopoly position, rather, in your long-distance communications system.

If you were to say, "We will open the field wide open, anybody who wants to string lines across the country or put up a communications satellite can do so," then you might have one situation.

But this is not what we are saying. We are saying that the circumstances are such that in order, well—for numerous technical reasons we are not going to permit this, we are going to permit one system and we are going to say who can put it up and under what circumstances; anyone who later wants to come along and engage in that long-distance communication must use the established facility.

If you deny an important independent company or any independent company the right to utilize the services, you are denying the users

the right to them, and in the independent company, it is not, in fact, a competitor in that facility or it would not be requiring the use of the services.

If the independent company, in fact, had the long-distance lines or the satellite communications facilities, it would not require those of the X consortium or whatever enterprise it is that is operating them.

Mr. DOMINICK. Just one more, if you will further yield. I am not saying that they should be given the right to deny to other carriers the right to use the satellite. What I am saying is what Mr. Flynt was taking about, which is that it seems to me that at least, if they are going to be given the benefit of the development which is acquired by the money which is spent by the primary occupant, that they should be required to pay a reasonable charge for the use of that.

Mr. LOEVINGER. I don't think there is any dispute about that. I don't think there is any proposal that these facilities should be made available without charge.

Mr. FLYNT. Pursuing that same line of questioning one step further, I know of one instance where there are actually three adjacently situated independent companies which operate a modified long-line toll system without the intervention of the so-called long lines of A.T. & T.

Each of those independent companies is a communications common carrier. They qualify as a limited long-lines carrier.

Under your proposal either of those three would have unrestricted, I assume, even though you do not use that word, unrestricted equitable and nondiscriminatory access to the communications satellite system and would, therefore, set up, in effect, another and possibly many other, competing long-lines communications common carriers; is that correct?

Mr. LOEVINGER. Well, I do not understand what is suggested by the term "unrestricted." Part of the problem arises from the fact——

Mr. FLYNT. I will strike out "unrestricted" then and just say equitable and nondiscriminatory access. However, I think unrestricted follows, but I will strike that word.

Mr. LOEVINGER. Well, we believe that any telephone company in the United States should have equitable and nondiscriminatory access to a long-distance satellite communications systems, as they are entitled now to equitable and nondiscriminatory access to long-distance cable systems.

Mr. FLYNT. That is true; that is true. But still the facilities would have to be used. As I understand this communications satellites system is so different from the present cable system and even the microwave system that once equitable and nondiscriminatory access is granted to them that any independent operator, in effect, becomes a second or *n*th long-lines communications common carrier, either domestic or international, if they can receive the necessary international agreements, with substantially little investment.

Mr. LOEVINGER. I am afraid that I do not follow all of the implications of this hypothesis, Mr. Flynt.

It seems to me that a telephone company which is a small independent company serving a particular area is not going to be in a position to do more than engage in long-distance communications for customers residing within its area. I do not quite see how it is going to get into a position to expand beyond that.

Mr. FLYNT. Well, that was the question I was asking because I can visualize an occasion where they might, and I think that chaos would be the result.

Mr. LOEVINGER. Well, I do not see any danger here, because all of these companies are operating under FCC regulation.

I am confident the FCC is not going to let chaos result.

As a matter of fact, the FCC was originally set up, of course, when radio broadcasting came in, and when the danger of a number of operators coming in and setting up to broadcast on the same wave lengths threatened a kind of chaos. The FCC brought order out of that chaos, at least in some fashion, and I am sure is capable of doing so here.

I do not know the technical problems that you are concerned with, but I think we are a long ways from having to meet them yet.

Mr. FLYNT. Which comes back to the original question about requiring as a condition precedent to participation, contributions to the research and development according to a predetermined formula.

Does the position of the Department of Justic envision such a contribution, because I am quite sure there will be many other companies in addition to General who would like to participate in this, and I just wonder if you have given any thought to, and to advance this theory here to a contribution according to a predetermined formula.

Mr. LOEVINGER. I think that we have assumed that those companies interested would be willing to contribute if given an opportunity.

I do not think that we are prepared to suggest any formula, nor do I know whether or not any other agency is. I do not know that there is any basis for establishing a formula of contribution at this time.

Mr. FLYNT. You just made one statement in which you may be correct and my concept of it may be wrong, but you made the statement that the communications common carriers were all subject to FCC regulation. Now it is my understanding that those who operate entirely intrastate are governed by the local or State regulatory agencies rather than by the Federal Communications Commission.

Now if I am wrong on that I would like you to correct me.

Mr. LOEVINGER. That is correct, sir, to the degree that they operate entirely intrastate but as soon as they start operating by satellite they are no longer intrastate, just as you have radio stations now, as a practical matter, that cannot be received effectively beyond the borders of their own State.

Nevertheless, those radio stations are subject to FCC regulation because any radio broadcasting emanation has effects upon (*a*) the reception of interstate broadcasting and (*b*) in other States even though it cannot be effectively received.

As soon as they get into this area where they are affecting interstate or foreign communication, they are subject to FCC regulation.

Mr. YOUNGER. Will the gentleman yield for a question?

Mr. FLYNT. Of course, that is made by the specific language of the Communications Act, is it not?

Mr. LOEVINGER. Yes, I believe that is correct.

Mr. FLYNT. I yield to Mr. Younger.

Mr. YOUNGER. Would it not be compensatory so far as the rates are concerned, because your anticipation of everybody participating in the satellite system does not say that they would not have to pay

a compensatory rate, and that compensatory rate would compensate the original entrepreneur for the money he put in.

It may not be necessary for all of the companies to financially participate; isn't that what you had in mind?

Mr. LOEVINGER. Yes, sir; precisely.

Mr. FLYNT. But to pay for it afterward or before, which would you prefer or does it make any difference?

Mr. LOEVINGER. I am sorry, sir, I am not a rate expert. I do not think I am prepared to make any statement as to how payment is to be made. I am sure that, as has been suggested, compensatory rates will and should be charged. As to how the advance payment is to be handled, I am simply not prepared to hazard an opinion.

Mr. FLYNT. I have no further questions.

The CHAIRMAN. Mr. Moss.

Mr. MOSS. I note in your statement on page 2 that you again spell out four conditions which the Department feels must be considered in the formulation of any entity to operate or to own a satellite system. Is this in any way a modification of the conditions spelled out in your statement filed with the Federal Communications Commission on May 5 of 1961?

Mr. LOEVINGER. Yes, sir; these conditions are different. I think they, to a substantial degree, incorporate those that were previously stated, but they are not the same.

This is a restatement of different, slightly different, conditions at a different stage in our thinking and our development respecting this whole problem.

Mr. MOSS. Is there any substantive difference in the position of the Department now and the position stated on May 5?

Mr. LOEVINGER. I would say that the condition that we stated as No. 1 to the FCC, which was the only condition which was not fully adopted by the FCC in its first report, has been modified slightly. Initially we suggested that all interested communication carriers be given an opportunity to participate in ownership.

Our first condition here is that to assure maximum competition, the satellite communications system should be so organized that no single company is able to dominate the system through ownership or through patent control.

Mr. DINGELL. If the gentleman will yield, What is the difference between the position you express today and the position which you expressed before the Antitrust Subcommittee of the House of Representatives at an earlier time, stated very simply?

Mr. LOEVINGER. Well, I do not think that there is any significant difference here. Before the Antitrust Subcommittee we had not formulated the statement that has now been presented, and simply had not addressed ourselves to this matter.

I simply said that our position was essentially the same then as it was before the FCC. I think that I might say now that we are a little less—I am searching for the word—a little less positive in saying that all common carriers must be owners so long as the structure of ownership is such that there is an assurance of competition and not single company domination.

Mr. Moss. Well, now, yesterday the Commission issued an order, and it also announced the formation of an ad hoc committee; it issued an order contending generally that it would not be prejudicial to the petitioners to have their matter deferred.

The question of a broader participation in ownership deferred, was their position, followed by the creation of an ad hoc committee made up of representatives of the international carriers. Was the Department of Justice familiar with this prior to the time the action was taken?

Mr. LOEVINGER. I believe not. We were advised yesterday, and I have seen Mr. Minow's statement. I do not believe we had information of this specific proposal.

Mr. Moss. It would seem to me that the effect of the formation of the ad hoc committee was rather effectively prejudicial to the interests of or the position of the carriers and the noncarriers, the manufacturing companies who had expressed interest in participating in ownerships.

Do you feel there is any prejudice created there?

Mr. LOEVINGER. Well, it certainly does not help them. I think that it does not preclude the adoption of a plan for a broader based ownership.

Mr. Moss. Of course, it leaves to the international common carriers the responsibility of coming up with some recommendations (1) to propose a commercially operable communications satellite system and (2) ownership of the satellite portion of the systems, and it goes on and, course, interested foreign governments or communication agencies. It covers quite a number of points as to what this committee is to consider.

Isn't it possible in the considerations by such a committee that they are going to finally propose a system to the Commission for adoption that they have an opportunity at least to gain definite advantages over the other manufacturers who are not privileged to be a part of the ad hoc committee?

Mr. LOEVINGER. I suppose that is possible; yes, sir.

Mr. Moss. It would have to agree maybe on a matter of broad lines of the type system they would propose on the type of equipment which would probably be utilized or favor such a system.

Mr. LOEVINGER. I suppose that is one of the tasks of the Government agencies to see, if such a proposal is made, that it is not acted upon without giving due consideration to the other matters that should be considered.

Mr. Moss. Well, if the due consideration is given upon the recommendations of the ad hoc committee, I am interested in either the Department of Justice reviewing it, if they do, or within the Commission itself, where they have the inshop competence to pass upon many of the technical aspects of the proposal which will be submitted to them for consideration.

Mr. LOEVINGER. One of the reasons that we have suggested a broad basis of ownership and participation is that the technical competence to analyze and criticize proposals of this character resides to a large extent in the personnel and organizations of those in the industry. I do not doubt that there is a good deal in the FCC.

The Antitrust Division and the Department of Justice have, of course, very little technical competence, and rely to a large degree upon the information that is given them by members of the industry and interested companies in various industries.

Therefore, if you have a number of companies participating in the development of such a system you are likely to get a more informed criticism of the organizations themselves, we believe, than if you have a very limited number of companies.

Mr. Moss. Isn't it in this area of preliminary decision or recommendation where the pattern which could lead to the sort of antitrust problems that concern you would most likely develop?

Mr. LOEVINGER. Yes, it could very well develop here.

It seems to me that I might add something, if I am permitted, that I think people sometimes think of antitrust as a somewhat narrow and arid limitation upon the expansion of economic power, the purpose of which is to prevent a sort of abstraction known as monopoly.

Now this is certainly one of the purposes. But the purposes are really much broader and much deeper than this. The purposes are ultimately to bring to the Nation and to the public the benefits of the informed criticism and analysis, and the benefits of the spur of competition in the development of new technology and invention.

For example, we think that had the railroads been given the right to own all of the trucklines in the country, we would today be probably not having the system of motor transportation that we now have, not that they are necessarily unduly selfish or would act improperly or wickedly, but their viewpoint on motor transportation is indubitably different from that than those whose main concernt is with motor transportation.

We think you get a fuller development of technology and a fuller spur to inventiveness and, therefore, you are likely to get a greater technological development and a faster technical establishment of a feasible system if you permit a wide base of participation.

Mr. Moss. Wait just a moment. In the appearance of Mr. Webb this morning, he indicated that our common carriers were a tremendous asset to the Nation. I think we can all agree that is certainly true.

He also then went on to mention the important constributions which could be made by the electronics and the aero space producers, and I asked if he could give us the difference in the contribution which could be made by one group as opposed to the other, and he could not, of course.

It is difficult at this point for, I think, anyone to tell us where we can expect to have the greatest resource or the knowledge which will enable us to develop the type of communications system which will best serve us and which will give us not only the best—which will best serve us, but give us the best that the system has, its fullest potential.

I notice that you, on page 3, say:

> There are cogent reasons why the antitrust factors that have been mentioned are of paramount importance. To a certain extent satellite communications will supplement existing communication facilities but it promises to do much more.

And, of course, that concerns me. I think that the full scope of benefit from this is difficult for any layman to envision, and I think for many of those who are closest to it.

But if we are going to have one group thinking, the international common carriers, and in the ad hoc committee through every step of the proposals which will then be finally considered and acted upon by the FCC, I wonder if it might not be that there would be a tendency there to regard it in some instances as supplementary rather than the considerations of its full potential?

Mr. LOEVINGER. I think there is this tendency.

Mr. MOSS. And, of course, this could lead to a lessening of competition outside of the actual operation of the satellite system itself.

That, of course, is going to be left to common carriers. Ownership, in the influence of thinking in the ad hoc committee, those are matters apart from the actual operation once it is constructed and placed in orbit, and the major problems worked out.

Mr. LOEVINGER. What is the question?

Mr. MOSS. Well, I say that the actual operation is a different thing from the steps we are now going through. Everything seems to be directed toward expediting. I think we all want to expedite but in the process of expediting we might so limit the base of advisers that the final product would not be the maximum expediting we would get from a broader base of advisers.

Mr. LOEVINGER. I do not think that the choice is between expedition and a broader participation. If there is any reason for assuming that participation of other responsible interested companies would have any deterrent effect on development, it has not been brought to our attention.

Mr. MOSS. No, I think you stated it after the meeting with—when was it, the June 5 meeting—the Commission stated the inclusion of manufacturers in the ownership of the system would be cumbersome and create difficulties of operation.

Mr. LOEVINGER. I believe there was a statement in the first report.

Mr. MOSS. Yes, the May 24 report, I see it. And you feel that that rather than any interest in expediting is the reason for the creation of an ad hoc committee that does not include representatives of manufacturers?

Mr. LOEVINGER. Since that is the statement of the FCC I assume it is their reason.

Mr. ROGERS of Florida. Would the gentleman yield?

Mr. MOSS. Yes.

Mr. ROGERS of Florida. I am not quite clear, judge, as to the function of your Department in a situation of this type where the FCC makes a determination, for instance, that it is in the public interest for this program to be developed, say, by one company. Even with governmental support, giving the primary development to one company, with no provision for anyone sharing it, they say, "Well, it is in the national interest for us to do it and do it quickly, and we are going ahead and doing it."

Now what action can your Department take? Can it nullify the action of another governmental agency which has declared, after hearings from other companies that may be involved, that it is in the national interest to do this thing a certain way?

If you could explain the relationship there and your action, that would certainly interest me.

Mr. LOEVINGER. The Department of Justice, sir, is the general counsel to the Government, and we occupy that peculiar and somewhat anomalous position that every general counsel does to his client. Sometimes it is difficult to say where legal advice ends and policy advice begins. Particularly when you are dealing with laws that are themselves rather broad and flexible in scope and that embody important national policies, policy and legality are almost inextricably interwoven.

We have only advisory authority with the exception of those very infrequent cases where the Attorney General is given some administrative power.

There are a few agreements, notably, I believe, under the Defense Production Act, that specifically require the Attorney General's approval for their legality; otherwise, in general, we act as, I say, only in an advisory capacity.

I believe it is fair to say, however, that because the Department of Justice advises all of the branches of the Government, and has traditionally represented the entire public interest rather than a particular viewpoint, that its advice has largely been influential with Government agencies.

Mr. ROGERS of Florida. Well, I am sure of that. But just one more——

Mr. MOSS. That is all right; go ahead.

Mr. ROGERS of Florida. The only point I was making was that if the FCC did determine it to be in the public interest, they would not necessarily have to follow the advice of Justice.

Mr. LOEVINGER. I believe that is correct, sir.

Mr. ROGERS of Florida. Now, could a company after that decision had been made by the FCC bring an antitrust action that the Government would pursue as a friend of the court, or try to help them to upset any decision made by the FCC in this matter? Would that be——

Mr. LOEVINGER. Suit could not be based upon the fact of an exclusive Government grant; no, sir.

This has been determined. If the Government, whether the Federal Government or State government, grants an exclusive right to any company to do a particular thing, the doing of that thing, the exercise of this Government-granted right, is not an antitrust violation which——

Mr. ROGERS of Florida. Yes.

If the FCC decided that it was advisable and in the national interest to move ahead quickly with the program before details were worked out, they could do so. I presume they would not do so without consultation, but as a matter of law they could.

Mr. LOEVINGER. Yes; I believe so.

Mr. ROGERS of Florida. Thank you.

Thank you, Mr. Moss.

Mr. MOSS. I yield to Mr. Dingell.

Mr. DINGELL. Thank you, Mr. Chairman.

Judge, I am very much interested in your position earlier before the Antitrust Subcommittee of the House of Representatives and your position today, and the reason for your change in position.

Can you tell us what prompted you and the Department of Justice to change your position with regard to the four criteria which you held earlier, both before the Antitrust Subcommittee and the FCC, to be four indispensable requirements which must be adhered to to comply with the recommendations of your Department?

Mr. LOEVINGER. We are contemplating certain standards that we think should be considered, that happened to be four in number, for the guidance of this committee.

The fact that they are four, and previously we also had four, is purely coincidental. These are different statements for different purposes.

Mr. DINGELL. This is a significant change of decision on the part of your Department, is it not?

Mr. LOEVINGER. Well, how significant you think it is a matter of opinion. The only point as to which I believe there is any significant—or there is any change—is a somewhat less doctrinaire insistence that the participation of all interested communications carriers should be on an ownership basis.

Mr. DINGELL. Well, you stated earlier that that was an important antitrust consideration. You stated that before——

Mr. LOEVINGER. The FCC.

Mr. DINGELL. The Antitrust Subcommittee of the Judiciary of the House; am I correct?

Mr. LOEVINGER. As I recollect, I do not recollect my precise testimony there.

Mr. DINGELL. You even went so far as to say before the Antitrust Subcommittee, and I am quoting now:

We said—

and then you quoted an earlier position before the FCC—

the Department of Justice believes that to be consistent with the antitrust laws. Any plan adopted must meet certain conditions.

That was your testimony before that committee at that time; am I correct?

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. Now you come before this committee and you have repudiated significantly your first position; am I correct in that? You longer adhere to the position that ownership must be spread rather widely among all common carriers.

Mr. LOEVINGER. Well, this says two different things. We still believe that ownership should be spread rather widely. Whether it must cover all common carriers and all equipment manufacturers, the right to a part of ownership seems to me, perhaps, to be a little too doctrinaire, and essentially what we have done, I think, is to put the same point in a somewhat more flexible manner in saying essentially that to assure the maximum benefits of competition, ownership should be structured so that there is not single company domination.

Mr. DINGELL. All right.

But you said before the Antitrust Committee, and I am quoting:

The Department of Justice believes that to be consistent with the antitrust laws any plan adopted must meet certain conditions.

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. And you have retreated from that position.

Mr. LOEVINGER. Well, let us say I have stated the conditions in a somewhat more flexible form.

Mr. DINGELL. Isn't it fair to say that you have stated different positions in a different way, or different conditions in a different way, because you have retreated from your previous ownership requirements?

Mr. LOEVINGER. I think it is fair to say that there has been some change. I think it also must be said, however, that requirements of the antitrust laws, being of a broad general nature, can frequently be met in different ways. Perhaps the original statement was too narrow.

Mr. DINGELL. All right.

Now, let us go a little bit further, if we may. You mentioned, in response to a question from Mr. Moss, that you felt generally that this was done on grounds of convenience and ease of management to satify one of the positions that the FCC took; am I correct in that regard?

Mr. LOEVINGER. I said that I thought that the mode of procedure that the FCC proposed to adopt was done because it, as it said itself, thought that a larger number of participants at this time would be unduly cumbersome.

Mr. DINGELL. Then, are you recasting the antitrust laws to do away with cumbersomeness?

Mr. LOEVINGER. No, sir.

Mr. DINGELL. Is this a consideration in passing on whether or not there is an antitrust question involved or not?

Mr. LOEVINGER. Well, all of these things are matters of degree. Presumably, if you got a situation which hypothetically was so cumbersome as to be virtually impossible of achievement, this would suggest that the conditions that you were seeking to impose were not, in fact, appropriate.

Mr. DINGELL. Are you telling us, then, that this was your previous position——

Mr. LOEVINGER. No.

Mr. DINGELL. That your previous position was so cumbersome as to be impossible to achieve?

Mr. LOEVINGER. No; I do not believe that is the situation, nor do I believe that a broad base of ownership among interested companies is impractical or undesirable.

Mr. DINGELL. All right.

I am going to ask you a very pointed question. Are you satisfied that the plan that the FCC has evolved in establishing this tentative ad hoc committee meets the requirements of the antitrust laws?

Mr. LOEVINGER. Well, this is merely an ad hoc committee for the purpose of moving immediately on tentative preliminary plans. I do not think this is necessarily involved in the antirust laws.

Were this to become the blueprint for the permanent consortium to operate a commercial system, I think we would be presented with quite a different situation.

Mr. DINGELL. Let us assume that it evolves into a commercial system, which it may very well do. Are you then going to regard this as being in conformity with or in violation of the antitrust laws?

Mr. LOEVINGER. I do not think that I ought to give any off-the-cuff answer for the reason that should it develop to this point it would undoubtedly be submitted to us, and we would then have to give a decision based upon our consideration of the specific details. I think it would be embarrassing to have prior testimony as to an offhand opinion.

Mr. DINGELL. I am not trying to nail you down to any embarrassing position nor to tie your hands in any way. But this committee is exploring today a commercial satellite communications system on the basis of which millions and millions of dollars of funds, both public and private, are going to be invested, and I think it is extremely important that the position of the Antitrust Division be made very plain, not only here this afternoon but also in the deliberations which the Federal Communications Commission makes on this subject.

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. And I notice that the previous position which your agency has taken has been retreated from. I have no objection to this per se, but I want to be sure that it is done in the public interest, and not only that it would be done in the public interest, but that people who subsequently enter into a system under this sort of an arrangement are not suddenly presented with an indictment or a civil complaint in an antitrust proceeding.

You see the importance of this, sir?

Mr. LOEVINGER. Yes; I understand.

We are relying upon the President's statement that says that to date no arrangements between the Government and private industry contains any commitments as to an operational system.

From my conversations with Mr. Minow of the FCC, and Mr. Johnson of NASA, I believe this to be the fact, and I think that it is an error to take a preliminary, a tentative, a research or an ad hoc arrangement and say that this necessarily suggests that the commercially operating system is going to be in this precise pattern.

We do not think that that is the case.

Mr. DINGELL. All right.

Now, before the Antitrust Subcommittee—you were asked why you had taken the position, and why you had enumerated the four points which you mentioned there, and you responded by saying, "I believe" you said in part, and I am quoting—

> I believe that by channeling the purchase and sale to a particular one or a structurally limited group of companies that you inhibit the incentive and opportunity for research and development.

Do you still feel that way?

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. You felt that way at the time you enumerated your four specific points?

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. How do you then justify your retreat from your previous position?

Mr. LOEVINGER. Well, it has not been a retreat of that order of magnitude, sir. We——

Mr. DINGELL. It has been a retreat.

Mr. LOEVINGER. Simply saying, in effect, that you may be able to achieve these objectives by something other than a strict ownership participation of every interested company.

Mr. DINGELL. All right; you went on to say:

> We wish, so far as possible, to avoid undue concentration in the future in order that the public interest may be safeguarded. That was my reason.

In view of that statement, how do you justify your retreat from your previous position?

Mr. LOEVINGER. I stand on that statement.

Mr. DINGELL. Are you familiar with the President's statement of July 24?

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. Did this have any impact on your determination in this matter?

Mr. LOEVINGER. Well, regardless of how I answer that I am in trouble.

Mr. DINGELL. I am not trying to——

Mr. LOEVINGER. Let me put it this way: I believe we were remarkably successful in anticipating the President's position.

Mr. DINGELL. Well, let me just scrutinize this a little bit further; are you aware of the recent decision of the *United States* v. *Radio Corporation of America et al.* (385 U.S. 334) and following?

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. In that case it was held that grant by the Federal Communications Commission of a license did not constitute exemption from the antitrust laws; am I correct?

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. Well, in view of that case, I believe that the people who are going into this particular operation with regard to the satellite are in some jeopardy from some antitrust proceedings if your views are not made fully, strongly, and consistently clear to the Federal Communications Commission; am I correct?

Mr. LOEVINGER. Yes, sir. They will be at an appropriate time when an issue is presented.

Mr. DINGELL. You feel that your views have so far been accepted by the Federal Commission with regard to the ad hoc committee so far established?

Mr. LOEVINGER. Not altogether, largely.

Mr. DINGELL. Largely.

In other words, are you saying to us that an antitrust question remains or no antitrust question remains resulting from the acceptance of your views?

Mr. LOEVINGER. No matter what is done, antitrust questions will remain until a specific plan has been formulated. Again we are talking now about research, development, and tentative formulation of plans.

At this point we are not involved with a violation of the antitrust laws.

Mr. DINGELL. Well now, a conspiracy is technically a simple agreement, is it not?

Mr. LOEVINGER. It may be; yes, sir.

Mr. DINGELL. In simple legal terms it is an agreement.

Mr. LOEVINGER. Yes, sir.

Mr. DINGELL. Any agreement technically may be a conspiracy, and a conspiracy which is in restraint of trade is a violation of the antitrust laws, is it not?

Mr. LOEVINGER. Yes, sir; the Supreme Court has said, which is in unreasonable restraint of trade.

Mr. DINGELL. All right, let us take that definition.

That being so, and having achieved that definition, isn't it possible even that an agreement to carry out certain research, development objectives may possibly be a conspiracy of an agreement in unreasonable restraint of trade?

Mr. LOEVINGER. It conceivably could be; yes.

Mr. DINGELL. Conceivably that danger is inherent in the situation.

Mr. LOEVINGER. Well, put in that form, the question cannot be answered "No."

Mr. DINGELL. I am not trying to say that it is. I wanted to have this clearly explored, and then to determine whether or not your views have been accepted as fully as you feel they should be by the FCC.

You mentioned earlier that your views had not been accepted fully by the FCC with regard to the four points which you set forth.

Have they accepted them fully with regard to the four points which you set forth for the Antitrust Subcommittee of the Judiciary Committee of the House?

Mr. LOEVINGER. Well, before the Antitrust Subcommittee I merely referred to my earlier statement. There was no new formulation of views. This was merely a report on what had been done to date with respect to a variety of subjects.

Mr. DINGELL. All right.

Now, with regard to the four points that you state to this committee today, are the actions of the Federal Communications Commission in substantial agreement with the four points you state here today?

Mr. LOEVINGER. I have not had time to study and analyze what the FCC did yesterday. A part of that, by the way, is because I have spent part of the time consulting with Mr. Johnson of NASA on something that was much more urgent in point of time, which was their A. T. & T. contract.

I think Mr. Johnson might concede, I do not know, maybe we have been a bother, maybe we have been a help to him, but in any event by consultation with Mr. Johnson, the original tentative proposal of NASA has been modified and, as I say, I understand that our views have finally come to be crystallized in a provision that we feel does meet all antitrust objectives.

Mr. DINGELL. With regard to the NASA contract?

Mr. LOEVINGER. With regard to the NASA contract which, I understand, will be entered into quite shortly.

Mr. DINGELL. Now, let us return to the FCC. Up until yesterday do you feel that your recommendations with regard to the four points you enunciate to this committee today have been met by the FCC?

Mr. LOEVINGER. Perhaps not fully.

Mr. DINGELL. Well now, you say perhaps not fully. In what regards have they, perhaps not fully met?

Mr. LOEVINGER. Well, I say that because the FCC, as you well know, and as you are seeking to bring out, I assume, has indicated the possibility of establishing a system limited to international carriers, international common carriers.

Mr. DINGELL. Do you believe that to be in conformity with the four points you enunciated this afternoon?

Mr. LOEVINGER. We believe that probably the basis for participation should be broader, although I do not to be doctrinaire about saying what the character of the participation must be.

There is such a tremendous variety of possibilities that I think it is very dangerous to attempt to lay down inflexible rules in advance without knowing the scope of the possibilities that are under consideration.

Mr. DINGELL. Have you communicated this view to the FCC?

Mr. LOEVINGER. I have not communicated this particular statement to the FCC because it was prepared only in time for presentation here.

I have spoken to Mr. Minow, most lately this morning in this room, and he has assured me that we will be in consultation before anything definitive is undertaken by the FCC.

Mr. DINGELL. Do you regard the establishment of this ad hoc committee as being definitive?

Mr. LOEVINGER. No.

Mr. DINGELL. You do not.

Then, to return to this, can you tell us any further—you mentioned one regard in which you feel the action of the FCC so far has not measured up to the four points which you enumerate today.

Is there any further point which you regard the FCC proposal or action up to but exclusive of yesterday, meets with the four points which you enunciate to us today?

Mr. LOEVINGER. In which it does or does not satisfy?

Mr. DINGELL. Does not was my question. In other words, you mentioned the limitation of membership in this ad hoc committee.

Mr. LOEVINGER. Well, actually, Mr. Minow, in his statement to you yesterday, and I had the statement although I did not have the ruling that you have, said to you that the plan, referring to the plan which they proposed eventually to formulate, must provide for a satellite system which, regardless of ownership, would be structured so as to prevent domination by any single carrier.

This indicates at least some concern for the point that we have made here. That was not an exact quotation but simply a reference to several statements that he made.

Mr. DINGELL. I recall under a previous head of the Antitrust Division, and a previous chairman of the FCC where the warning of the Antitrust Division with regard to a particular grant of a license in Boston—you may be familiar with the case, it has since been upset by the courts—that the FCC was warned by the Antitrust Division that the grant in question raised, and I believe this is a correct quote, "a grave question under the antitrust laws."

There was no further action by the Justice Department, and the recommendation and caution of the Justice Department were not taken by the FCC.

Are we to assume that that will continue, that kind of operation will continue, under your administration and under the administration of Mr. Minow?

Mr. LOEVINGER. I hope not.

Mr. DINGELL. Especially in view of the case which I cited earlier, *U.S.* v. *Radio Corporation of America?*

Mr. LOEVINGER. I hope there will be closer cooperation and respect for mutual views.

Mr. DINGELL. And vigor of action in the respective fields?

Mr. LOEVINGER. I hope so.

Mr. DINGELL. Thank you very much, Mr. Chairman.

The CHAIRMAN. Mr. Moss, do you have anything else?

Mr. MOSS. No.

The CHAIRMAN. Judge Loevinger, you have been here a good while, but I do have some questions I would like to raise.

In the first place, I would like to note that there seems to be unanimity everywhere that a workable satellite system be established, as you stated in your own statement, at the earliest possible date.

Now, to me that emphasizes that most everyone feels with certainty that this type of a system can be developed into a successful operating system. Would that be correct, in your judgment?

Mr. LOEVINGER. I am not a technical expert. This is my impression, sir.

The CHAIRMAN. I have the impression too that research and development thus far have virtually assured that this type of operation can be developed. That is the reason we are right now in this position of making a very important decision.

Now, following that, there seems to be a question as to whether or not there should be only one system developed, and you suggested in your statement that it appears that due to economic and technical considerations, only one system could be established in the near future.

It seems to me that is the thing that has raised most of these questions that you have been responding to this afternoon, and other questions raised during the course of this proceeding. I have had some conversations with some of the people interested in this, and the A.T. & T. has been referred to.

I have read some of their comments, some articles describing their proposal and so forth, and some reference has been made here to their willingness to provide funds for this experimental operation of the program, about $180 million.

Now, if one communications company would be willing to pay for it, as Mr. Dominick mentioned a little while ago, and in cooperation with the Government utilizing, of course, the military technical know-how to launch the satellite, and repay the Government for its expenses in giving this assistance, and it would comply with the criteria that you have mentioned here a moment ago, why wouldn't it be feasible if two or three or more than one company would undertake such a program and the Government permit it?

Mr. LOEVINGER. Again, I am not sure I get the point of your inquiry, sir.

The CHAIRMAN. Why have just one system? Why couldn't we develop two or three systems if we have people who are willing to do it?

Mr. LOEVINGER. This I do not know. This I assume simply on the word of the technical experts. I assume that what is involved is something like the limitations inherent in radio broadcasting; that the available band spread of suitable broadcasting wavelengths is of such character that if you have too many systems you get too much interference, and none of them function efficiently.

Obviously, you could not have a number of systems operating on the same wavelength.

The CHAIRMAN. No.

Mr. LOEVINGER. They would have to operate on different wavelengths.

As I understand it, there are only certain wavelengths that are efficiently suitable for the kind of transmission that is involved in satellite communication.

The CHAIRMAN. Now, that is another problem that bothers me about it. In connection with our missile program and sending these objects into orbit, we do not use the same wavelength, for example, that the Russians use.

Now, it would seem to me that if this is going to be, and it will have to be, an international operation, there has got to be an agreement, an international agreement, as to what frequency channel will be used.

And how can we be so technical or, I should say, so determined, to adhere to certain restrictive procedures in the development of this if we are going to have to cooperate with those in the international field?

I am posing this to you because, as I gather it, your entire statement is based on the assumption that this statement is true, that it appears there can be only one system in the foreseeable future. It would seem to me if there could be two, three systems—that is, different groups—then almost everything else that you have posed here as a problem, would be virtually eliminated.

Mr. LOEVINGER. It would certainly change the basis of our assumptions.

This, however, is the postulate that we are given to work on by the FCC, and we are simply in no position to challenge it. I cannot tell the——

The CHAIRMAN. Yes; I can appreciate that. But I think it is a point that we should certainly discuss; and somebody else, I think, should discuss it.

For example, I understand that one company feels that satellites should be put up maybe a few thousand miles; and it was suggested by others, I think this probably comes from NASA, that they ought to send one out 22,500 miles and operate it from out there.

Well, I do not know enough about it myself even to discuss it here, very frankly, because it gets far beyond me technically.

But I am realistic enough about it to know that if you have more than one group that is going to be in this development of this thing, it seems to me if the Government is going to carry out the policy that the President announced the day before yesterday, that we should encourage not only A.T. & T. but others who are willing to spend their money.

Mr. LOEVINGER. I would agree with this, sir.

The CHAIRMAN. I think that should be the basis of developing this communications field. As it is now, we have several international carriers operating, do we not?

Mr. LOEVINGER. Yes, sir.

The CHAIRMAN. They operate over different systems, do they not?

Mr. LOEVINGER. They operate over several different systems. I.T. & T. has its own cables. It also leases some of A.T. & T. cables. There is an interchange, but there are separate systems; yes, sir.

The CHAIRMAN. And, of course, those interchanges have to be under regulation.

Mr. LOEVINGER. Yes, sir.

The CHAIRMAN. And the Government can, under present law, adequately regulate that type of operation.

Mr. LOEVINGER. Yes, sir; I believe this is done. There are, of course, compensations for uses of cable systems.

The CHAIRMAN. Yes.

Mr. LOEVINGER. One company pays for the use of the other company's system when it uses it.

The CHAIRMAN. Well, it would seem to me the big argument that is going on now in this field, and which gets pretty deep, I think, particularly some of it under cover, so to speak, is in the development of this question of what is going to be the final outcome with reference to ownership.

That is another question I wanted to ask you about in connection with your statement.

Before I get to that, though, I did not want to pass over this, the criteria that you have set out on page 2 of your statement. Are you sufficiently familiar with the proposal of the Federal Communications Commission so as to indicate whether or not it meets these criteria?

Mr. LOEVINGER. I have not studied the ad hoc plan which, I understand, they announced yesterday.

The CHAIRMAN. Well, as I recall from the statement of the Chairman of the Commission, it seems to me that most, if not all, of these things are included in their consideration. I did not try to analyze it closely enough to try to find out.

The Department of Justice urged the Commission to consider the desirability of widening the base of ownership. That is included in your statement.

Mr. LOEVINGER. Yes.

The CHAIRMAN. Then on page 4 you say:

> The Department believes that ownership of the proposed satellite system should be so broadly based that no single company has control.

Could you elaborate on that? What do you mean by ownership being broadly based, or what do you mean by widening the base of ownership?

Mr. LOEVINGER. Well, one of the proposals that has been discussed is to limit ownership of the company that operates the satellite communications system to the companies now engaged as international common carriers, domiciled in the United States, based upon their relative amount of international communications traffic.

This would give A.T. & T. about 85 percent of the ownership and, therefore, clear working control of the system.

We believe that there should be an opportunity for ownership participation by other companies that want to enter the field that are willing to engage in experimentation, that are willing to make financial contributions, that are able to manufacture equipment or otherwise participate.

General Electric Co. has a proposal of this sort. I understand that General Telephone would like to participate. I cannot call off the roll of companies, but these are responsible American companies that we believe could make a contribution.

The CHAIRMAN. Yes; I agree. And, as I understand it, there is an exception filed with the Communications Commission by both of those companies.

Mr. LOEVINGER. I understand that the petition for rehearing was denied without prejudice and that the FCC indicated that at some later time it would consider the position of these companies.

The CHAIRMAN. Yes; that action, I think, was taken only a day or so ago.

Mr. LOEVINGER. Yes, sir.

The CHAIRMAN. But insofar as the ownership is concerned, if whoever owns it is going to be required to make the system available to anybody, I think, who wants to use it, then it is going to virtually be under the regulatory control of whatever agency or international group that is set up for that purpose, is it not?

Mr. LOEVINGER. Well, this, of course, is inherent in the character of the communications as a public utility.

The CHAIRMAN. Then the ownership is not going to mean nearly so much in an operating system of this kind as it would in an ordinary public utility where it has all the physical facilities that a normal utility serving these people would have.

Mr. LOEVINGER. Well, certainly ownership means something somewhat different in a public utility than in an ordinary private business corporation.

However, even under public regulation, there is an area of reasonableness of rates, let us say, there is an area within which regulation cannot be effective, put it that way.

The CHAIRMAN. Well, the owners are not going to determine the rates; are they?

Mr. LOEVINGER. To a limited degree; yes. Public utility regulation regulates only within a sort of broad area; in other words, they set a maximum and a minimum for rates, for the use of new equipment, for various other things.

There are limits within which regulation cannot control the operation of a public utility, and within which its operation must depend upon other factors.

The CHAIRMAN. Under present operations, international rates have got to be approved by the Commission; have they not?

Mr. LOEVINGER. Yes; I am sure that this will be the case.

But if a public utility is constantly pressing for higher rates, for example, and seeking to justify higher costs, it is more likely to get higher rates than if it is not pressing for higher rates.

In other words, the Commission operates somewhat in response to the representations made by the company, but more important than that, the question of rates, seems to me is likely to be the question of whether or not there is technological advancement and a spur to inventiveness and to the utilization of the greatest degree of American ingenuity possible, and we think this is most likely to come from having a broad-based participation of interested companies with variant viewpoints; that the domination by a company with a single viewpoint is less likely to act as a spur to progressive inventiveness and technological advancement than having a number of companies that may have somewhat different points.

Mr. DINGELL. Mr. Chairman, would you yield briefly?

The CHAIRMAN. Yes.

Mr. DINGELL. Are you telling us that you view a proposal which would vest in one company 85 percent of the ownership and effective control of this satellite communications system as a violation of the antitrust laws or raising an antitrust question?

Mr. LOEVINGER. I would say it raises an antitrust question.

Mr. DINGELL. Would you say it was a slight question or a grave question?

Mr. LOEVINGER. Any question in this area is necessarily grave because of the magnitude of the issues with which we are dealing.

Mr. DINGELL. Thank you very much, Mr. Chairman.

The CHAIRMAN. What percentage of the communications operations of the country is by A.T. & T. now?

Mr. LOEVINGER. About 85 percent, I understand.

The CHAIRMAN. That is the estimated percentage now?

Mr. LOEVINGER. Yes, sir.

The CHAIRMAN. Do you see there anything fundamentally wrong in that?

Mr. LOEVINGER. I prefer not to comment, Mr. Chairman. We are now engaged in considering various problems relating to the A. T. & T. and until we come to some conclusion I think it would be inappropriate for me to make a suggestion.

The CHAIRMAN. I would not ask you to make a comment on something you have actively under consideration. But the question, of course, raises the point of whether or not you are going to pass on the decision itself or whether you are going to propose to the Government, urge upon it, certain policies and certain types of procedures.

But if you have not made a decision as to what the policy is going to be with reference to your effort in that field, why, I can see why you would not want to discuss that.

But I do not assume that there is anybody in the country who would suggest that A. T. & T. or any other large company should be put out of business because they are large; would they?

Mr. LOEVINGER. No, sir.

The CHAIRMAN. I yield to the gentleman from Georgia.

Mr. FLYNT. I was going to pursue the same question, Mr. Chairman, and ask Judge Loevinger if he would feel that because A. T. & T. controlled 85 percent of certain types of interstate communications, that that might be a grave question which would result in reducing that percentage even though it meant higher rates to the consumer and poorer service to the consumer.

Mr. LOEVINGER. This, of course, is a conclusion that I do not believe we would accept, sir.

Mr. FLYNT. Well, then, I will come back to the same question: You think that is too much, that 85 percent is too much?

Mr. LOEVINGER. If I may run the risk of impertinence, let me ask you the question whether you would not consider 85 percent too much if, by having other companies participating we could get better service and lower rates?

Mr. FLYNT. Well, we do not usually answer questions, and I certainly do not consider it impertinent, but by the same token, we are interested in this very question right here, and we deal with it constantly throughout each session of Congress, and when the witness

a few minutes ago declined to answer the question, it naturally caused me to wonder whether size, and size alone, is the criterion, or whether lower rates and good service should take priority and precedence over size.

Mr. LOEVINGER. Size alone is not a criterion; no, sir. Market power is one of the criteria of monopoly.

Mr. FLYNT. I would just say this: That—and I will say it for the record—if the consumer could get better service at lower rates through any other method than that which has yet been devised, then I think all of us would welcome the introduction of such a method.

But I did question very seriously either the implication or the inference that your reluctance to answer the question might go to this very basic question of size as opposed to service and rate.

Mr. LOEVINGER. Well, actually, economic—antitrust criteria after all are neither size nor inherently service and rates. The theory of antitrust is that we will produce the best service, the best quality and, in the long run, the cheapest prices for the public by the freedom of a competitive economy, and we do not undertake to judge whether or not prices are too high or too low, or service is good or bad.

We could not possibly be informed sufficiently to attempt to pass judgment on prices in all industries or attempt to make technical judgments as to quality of service.

We believe it is the function of the marketplace in a free competitive economy to arrive at these determinations, and it is our job to attempt to keep the economy free, which means competitive.

Mr. FLYNT. In the very nature of these regulated industries, they are such that we do not have free competition in the marketplace.

Mr. LOEVINGER. You do not have altogether free competition, that is perfectly correct. But you do not altogether foreclose competition either.

Mr. DOMINICK. Would the chairman yield to me briefly?

The CHAIRMAN. Yes.

Mr. DOMINICK. Judge, in the discussion which you were having with the chairman concerning the ownership of the company which was to join in doing the operational work of the satellite, you indicated you thought, perhaps there needed to be more people in it, and I gathered from this you would include among those other people equipment manufacturers or someone like that.

We have had cases, as far as my recollection goes, particularly in the railroad industry, in which the Justice Department has said that the equipment manufacturers should not be in the operating company; isn't that true?

Mr. LOEVINGER. I am not familiar——

Mr. DOMINICK. In the *Pullman* case, to be explicit.

Mr. LOEVINGER. In the *Pullman* case?

Mr. DOMINICK. Didn't they state in there that the equipment people had to get out of the operating company?

Mr. LOEVINGER. Yes.

Mr. DOMINICK. The Pullman people themselves.

Mr. LOEVINGER. Yes. There was a divorcement of the equipment manufacturers from the operations in the *Pullman* case, and a similar separation was sought in a suit against Western Electric by the Justice Department some years ago; that is correct.

Mr. DOMINICK. Wouldn't the Justice Department also take a dim view of Douglas Aircraft owning a portion of United Air Lines?

Mr. LOEVINGER. That is pretty hypothetical. I just do not know enough about the industry, sir.

Mr. DOMINICK. The point I am making is that it seems to me in the past the vertical integration of this type has been frowned upon by the Justice Department, and it would seem to me, perhaps, you might be getting exactly that type of thing if you included everybody in one of these ownership companies, which would be a separate company.

Mr. LOEVINGER. Well, you see the difficulty that we have now is that if you confine this to the international common carriers, what you are doing is giving the one single largest equipment manufacturer an ownership interest because A.T. & T. owns Western Electric, and it and Western Electric will then be a part of the ownership interest of your international communications carrier, and we think if Western Electric has an ownership interest that its competitors should be in an equal position.

If Western Electric did not have an ownership through A.T. & T., then the situation would be quite different.

Mr. DOMINICK. One more question on this same line.

The antitrust laws also deal with U.S. companies which are involved in connection with foreign operations.

Mr. LOEVINGER. Yes, sir.

Mr. DOMINICK. Now, in this particular case, it will probably be true that a good deal of the operating facilities and equipment, perhaps not equipment but at least frequencies and many of the rules of operation, will apparently be governed by this I.T.U. or whatever they call it under the U.N.

Since we would be dealing under the U.N., how effective are our own antitrust laws going to be in connection with this situation anyhow, just as a thought? This has been bothering me from the beginning.

Mr. LOEVINGER. Well, the U.N., I take it, will have nothing to say about the ownership and domestic control of the American company that is operating the American satellite communications system.

Mr. DOMINICK. I would not subscribe to that at all.

It seems to me that if the U.N. is going to say that these other countries are going to be entitled to use this, they have got to be in a position to say what proportion of this system can be used by the American company, and everything else of that kind.

Mr. LOEVINGER. We may not be talking about the same thing, sir. Assuming that the FCC projects the creation of X Corp. which will be the operating corporation, I take is that the U.N. will not say that the stock of X Corp. must be distributed in any particular fashion.

This is essentially what we are talking about.

The U.N. may say X Corp. can have 50 percent or 75 percent or 40 percent of the time or of the wavelength or whatever of a particular radio transmission spectrum.

Mr. DOMINICK. When you were talking about $100 billion a year, were you talking about the whole international communications system or just the portion that would be attributable to the United States' use.

Mr. LOEVINGER. I have taken that from the estimate of another, and I assume that it is the entire industry.

Mr. DOMINICK. Thank you, Mr. Chairman. That is all I have at the moment.

The CHAIRMAN. Judge, thank you very much for your time and the presentation which you have made to us today.

Again, I apologize if we have detained you too long, but it was because we do feel that this had developed to a point where important decisions were being made, and for that reason we wanted to get every facet of it into this record for our consideration.

Mr. LOEVINGER. I appreciate the opportunity to appear, sir.

The CHAIRMAN. Thank you very much.

The Committee will adjourn until tomorrow morning at 10 o'clock, at which time we shall have the State Department and OCDM make their presentation.

(Whereupon, at 4:15 p.m., the committee adjourned to reconvene at 10 a.m. on Thursday, July 27, 1961).

# COMMUNICATIONS SATELLITES

THURSDAY, JULY 27, 1961

House of Representatives,
Committee on Interstate and Foreign Commerce,
*Washington, D.C.*

The committee met, pursuant to recess at 10:20 a.m., in room 1334, New House Office Building, Hon. Oren Harris (chairman) presiding.

The Chairman. Let the committee come to order.

First, I should like to recognize the presence of the distinctive group that is with us this morning.

Our colleague from Mississippi, Mr. Winstead, has done us the favor of bringing a group from the Chevy Chase Baptist Church to observe the proceedings this morning.

Mr. Winstead, let me say, in behalf of the committee, we are very glad to have you with us, and we are very glad that you would bring such a distinguished group here to observe the proceedings this morning.

Mr. Winstead. Thank you, Mr. Chairman. We are delighted to have this privilege.

The Chairman. You are welcome.

It reminds me of a story about the pastor of a little Baptist church.

After the services were over that night he was walking down a little lonesome, narrow road, and a highjacker jumped out and held him up, and asked him for all of his money.

He gave him the money.

The highjacker said, "Is that all you have got?"

He said, "That is all I have got that is mine. Over in this pocket I have got a few dollars here but it belongs to the little church that I am pastor of down the road, and you are not going to get it."

The highjacker gave him the seven and half back and said, "Here, take this back; I am a Baptist myself." [Laughter.]

## STATEMENT OF PHILIP J. FARLEY, SPECIAL ASSISTANT TO THE SECRETARY OF STATE FOR ATOMIC ENERGY AND OUTER SPACE; ACCOMPANIED BY HOWARD FURNAS, DEPUTY SPECIAL ASSISTANT TO THE SECRETARY OF STATE FOR ATOMIC ENERGY AND OUTER SPACE; WREATHAM GATHRIGHT, CHIEF, OUTER SPACE SECTION, DEPARTMENT OF STATE; FRANCIS COLT deWOLF, CHIEF, TELECOMMUNICATIONS DIVISION, DEPARTMENT OF STATE; AND RICHARD BLACK, TELECOMMUNICATIONS DIVISION, DEPARTMENT OF STATE

The Chairman. We are very glad to welcome to the committee this morning the representative of the State Department.

Incidentally, Mr. Farley, that story is one of Brooks Hays' stories.

Mr. Philip J. Farley is special assistant to the Secretary of State for atomic energy and outer space.

This is a continuation of our hearings on the development of this new system of communications in relation to ownership, its development, and to its operation, particularly commercial operation, which comes under the jurisdiction of the Federal Communications Commission.

We have had some very fine testimony presented on this subject thus far. I think the record is developing into an exceedingly fine one at this moment, and it is highly appropriate that this be done, because, as has been related by almost everyone and is common knowledge, research and development has progressed to the point where everyone fully believes that by some more experimentation now it is not only possible, but very probable that such a system will be developed and put into operation within a relatively short time.

This will be of tremendous importance to the supplementation of our communications system now.

The question of ownership is, of course, a most important subject at this time. I know that we have problems with reference to our own system of free enterprise and private ownership in this country as contrasted to the type of economic arrangements and systems of property ownership in other countries.

We think highly of our system. The President has made his suggestions with reference to the future of the program.

We have had the Federal Communications Commission and Mr. Webb, Mr. James E. Webb, of NASA.

We understand that the State Department has very strong views on the subject, too. For that reason we want to thank you for being here this morning.

I am very glad to welcome you to testify on behalf of the State Department. I believe you have a statement that you wish to read?

Mr. FARLEY. Thank you, Mr. Chairman. I think your remarks provide an excellent starting point, and I would, if this is agreeable, proceed with my statement.

I want to be helpful to the committee and if points come up, we will be prepared to discuss them at the time or to hold questions to the end, as you prefer.

The CHAIRMAN. We usually permit the witness to complete his statement and then subject himself to examination by members of the committee.

In the meantime, you may want to identify your associates who are with you here this morning for the record.

Mr. FARLEY. Fine.

This is Mr. Francis Colt deWolf, who is Chief of the Telecommunications Division, in the State Department.

I have with me also Mr. Howard Furnas, who is my deputy, and Mr. Wreatham Gathright, who is Chief of the Outer Space Section in my office. Mr. DeWolf has with him Mr. Richard Black of his division.

I am pleased to have an opportunity to appear before the House Committee on Interstate and Foreign Commerce. The Presidential statement of July 24 of communication satellite policy reflected clearly the great international significance of communications satellites, and my remarks will develop in more detail some of the underlying foreign

policy considerations bearing on the development of communications satellites and their introduction into operational use.

I understand that the committee is primarily interested in the role of the Federal Communications Commission in authorizing and regulating ventures in this new and important field. The committee will wish, I am sure, to examine this matter in the light of its broadest significance and implications so far as we are now able to foresee them. The Department of State has a keen interest in satellite relays, which are potentially of great importance for international communications and for our international relations.

I shall outline our present views briefly, and with the assistance of Mr. deWolf, Chief of the Department's Telecommunications Division, I shall be pleased to answer questions.

My comments will be concerned with the presently achievable use of satellites as relays for the trunking of communications between central ground-based transmitting and receiving stations. I do not plan to discuss direct broadcast satellites, which we are told will be well beyond the state of the art for some time.

The communications satellite will provide a new technological means of overcoming the natural physical barriers that separate men and make rapid, reliable and direct communication difficult and at times impossible. Since the special contributions of the communications satellite will be in facilitating communications over the long distances across the oceans and between the continents, its impact will be international.

When we speak of the international impact of the communications satellite, we do not refer primarily to psychological impact but rather to the potential practical effects of introducing a new tool of tremendous capabilities.

First, as we understand its potentialities, the communications satellite appears technically and economically to be the best way of establishing a communications system by means of which virtually all countries could communicate more readily with each other. A communications satellite system will be capable of offering access to more countries than conventional means of international communications and such a system should alleviate to a considerable degree the necessity for passing through third countries.

Secondly, the communications satellite promises to be more versatile than conventional means. It can be designed to provide virtually all types of communications services: voice, message, condensed data, facsimile, and television. In part the role of the communications satellites will be to increase the availability of these services, to improve their quality, and to lessen their cost. In part, its role will be to make new services available: this may be especially important in the fields of data and television transmission although in the latter case we should not underestimate the problems and overestimate the opportunities.

With such versatility, the communications satellite can clearly produce basic changes in the form of international communications.

Thirdly, the great traffic-handling capacity of the communications satellite would make possible substantial increases in the volume of international communication. Thus, it has been estimated, for example, that a single communications satellite system could effect a

20-fold increase in the present capacity of the United States for oversea voice communication. The relative increase could be even greater in the case of other countries having less advanced communications services than ours.

The coverage, versatility, and traffic handling capacity of the communications satellite suggest the emergence over a period of years of a truly global pattern of communications. They also suggest that the impact of a single system will be much greater than that of, say, a single submarine cable or a microwave relay link. Indeed, it would appear that a single communications satellite system can have a profound effect on the structure of international communications and of the communications industry here and abroad.

Such considerations as these point the way to criteria to guide both the design of a communications satellite system, including its ground facilities, and the manner of its operation. From the foreign policy point of view in particular, it is possible to identify certain criteria which should be met if the full usefulness of the communications satellite is to be realized in the spirit of the President's words:

> I am anxious that this new technology be applied to serve the rapidly expanding communications needs of this and other nations on a global basis, giving particular attention to these of this hemisphere and newly developing nations throughout the world.

First, to achieve maximum usefulness, the system should be designed with a view to offering service to the broadest area of the world and to providing the technical basis for access by the greatest number of countries. It should not cover merely the areas of heaviest traffic, current or foreseeable, it should also look in new diections and open new communications links whether or not all such links add to the profitability of the system.

Therefore, system design ought to be global in its concept. Whether it will prove to be global in fact will, of course, depend on economic and political as well as technical factors. However, the technical basis should be provided.

Second, it should facilitate not only the linking of other countries to the United States but also the establishment of more direct links among other countries. We should not think of this as a U.S.-oriented system but rather as a system that could meet the needs of other countries whether these needs involve communicating with us or communicating with each other.

Third, the system and its operation should be flexible enough to serve the needs of countries having a small volume of traffic as well as those having a large volume, and also the needs of developing as well as developed areas. The price of admission to the system, that is, the necessary ground facilities, should be as low as possible.

In the cae of developing areas, there will be the additional problem of keeping the capability for external communication in balance with the growth of internal communication capabilities. The communications satellite seems to be a promising way of reaching these countries and meeting their increasing needs.

Fourth, an important benefit of a satellite communications system can be the more efficient use of the hard-pressed frequency spectrum in handling a greatly increased volume of traffic of various kinds more reliably. However, different approaches to communications satellite

systems design vary in the degree to which they consume or conserve frequencies. We should certainly seek designs that conserve rather than abuse the frequency spectrum.

Fifth, internationally as well as domestically the question is going to arise as to how many communications satellite systems will be needed or would make sense. Certainly in the near term there are technical and economic considerations that point toward the desirability of a single or a minimum number of systems offering the same types of services. We would not wish a multiplicity of systems to limit the usefulness of all systems. If more than one system emerges, we should try to insure compatibility and interlinking of the several systems to make certain that together they can achieve the unique global possibilities of this tool.

Sixth, space communications can make a significant contribution in linking our defense forces wherever they may be located and in linking the alliances in which the United States participates.

It should be recognized that dependable and secure communications cannot only facilitate defensive operations, if these become necessary, but can also reduce the risk of war by accident, misinformation, or miscalculation. These defense purposes may be sufficiently important and unique to warrant a separate system.

Finally, an operational capability should be available at the earliest date compatible with meeting the foregoing criteria. It is clearly desirable that the United States proceed expeditiously in this field where we have a good deal of competence and where we can foresee really useful results. However, we have not placed "time" at the top of our list because of the importance of matching early availability with maximum usefulness.

It is important to recognize that the opportunity to extend widely the benefits of this peaceful use of outer space involves not only the technical capabilities of the system but also the arrangements through which other countries might participate in the use or operation of the system.

Among the most perplexing problems in this regard is that of determining the respective functions of government and private industry in this country and the part to be played by other governments. Novel arrangements may well be needed to deal with novel technology.

Internationally, it is a matter not of finding ways of doing something for other countries, but rather of working with them in a matter of common interest. Other nations should not only have ready access to use of the satellites but also should be afforded an equitable opportunity to participate in their operation.

A truly global system must be one in which many nations feel they have a stake as partners, responding to the President's invitation in his state of the Union message, reiterated this week, that other nations "join with us * * * in a new communications satellite program."

Furthermore, this is very much a case where we need the cooperation of other countries. A good illustration of this is the allocation of the frequencies that will be needed for any operating system. The International Telecommunication Union—ITU—a specialized agency of the United Nations, has, for many years, performed numerous functions in connection with conventional types of telecommunications.

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It will probably continue to perform those same functions in connection with communications satellites. Of all these functions probably the most pressing ones at this time are the allocation of adequate radio frequencies for space activities, and the ITU has undertaken extensive studies in this field.

The 1959 ITU Radio Conference at Geneva adopted a recommendation that an Extraordinary Administrative Radio Conference be held, possibly in 1963, for the purpose of allocating frequency for space activities. This Government has not yet determined definitively whether it believes 1963 should be confirmed as the date for that Conference.

Much will depend on the extent to which we, as a Nation, can be prepared to make useful proposals for that Conference. Work to develop such proposals is being advanced through the joint efforts of the Interdepartmental Radio Advisory Committee—IRAC—and the FCC.

There is a related area of international activity dealing with space communications matters where the United States is taking a leading part: the studies being conducted by the ITU's International Radio Consultative Committee—the CCIR—on space communications.

Study group IV of the CCIR was created in 1959 and given the responsibility for investigating the various scientific and engineering phases of space communications. The work of this study group started almost immediately and has been actively pursued ever since. This study group IV will meet in Washington in 1962. It is expected that the conclusions of the CCIR on this subject will be ready in ample time for consideration by the ITU's 1963 Space Allocation Conference, if it is decided to hold one. The Department of State coordinates the studies of the U.S. CCIR and its subordinate groups.

We are following the course of all of these matters very closely and will immediately take the necessary steps to formulate the U.S. proposals for the contemplated 1963 ITU Conference as soon as the pertinent national positions are determined.

If these technical and operational problems can be resolved, we can, without allowing speculation to run wild, foresee some clear, immediate uses which will come about at an early stage and as a logical and direct outcome of the availability of a communications satellite system. We can also see other possibilities which are more distant and less well-defined and which depend on future developments and on the effort we put in them.

In the former category, the communications satellite will provide a means for facilitating to an unprecedented degree the transaction of the world's governmental and commercial business.

In the latter category are possibilities for using the communications satellite to encourage the exchange of information, ideas, and opinion; to stimulate exchanges of educational and cultural value; and to disseminate more rapidly factual reports of events of worldwide interest such as the proceedings of the United Nations.

In addition, we can easily see how useful such a system might be in servicing future United Nations emergency or peacekeeping operations. As worldwide meteorological activities expand, particularly as weather satellites come into regular use, improved communications will be essential to permit timely transmission of a great volume of

data. Similarly, if our negotiations for disarmament measures under effective control ultimately lead to agreements, the worldwide inspection and verification organ would find a satellite communications system of special value for the widespread and instantaneous reporting required for effective monitoring.

It is impossible now to estimate the long-term effects on the relations of peoples and governments which might flow from the structural changes in the geographic pattern, form, and volume of communication that would be set in motion by the introduction of the communications satellite. Clearly, this innovation can reinforce the thrust of modern transport in narrowing the distance between the continents and around the globe.

We need not be able to measure these possible changes precisely to sense that they can be profound, and to conclude that it will be important insofar as possible to influence the direction of change in order to bring about a reduction of artificial as well as of natural physical barriers and to realize fully the potential contribution of the communications satellite to achievement of an open society internationally.

In the foregoing comments I have tried to suggest the international dimensions of the communications satellite. It is clear that the public interest in this field comprehends considerations of foreign as well as domestic policy and that there will be a continuing need for recognition of international factors in the criteria employed and the actions taken by the U.S. departments and agencies having responsibilities in insuring that this new tool is developed and put to use in the public interest.

Accordingly, international factors can be expected to have a direct bearing on the authorizing and regulatory functions of the FCC if the United States is to approach this field through a private venture and if such a private venture is to be fully responsive to the needs of public policy. The longstanding, effective working relationship between the FCC and the Department of State will provide a firm basis for the joint consultation and consistent action that may be increasingly necessary in this field.

Mr. Chairman, that concludes my statement and I am now at your disposition.

The CHAIRMAN. Thank you very much, Mr. Farley, for your statement.

This is off the record.

(Discussion off the record.)

The CHAIRMAN. Mr. Staggers, do you have any questions?

Mr. STAGGERS. Just one or two, if I might, Mr. Farley.

As I gather from all of your testimony, you are for the program and what the committee is trying to do to determine a type of control?

Mr. FARLEY. We are very strongly for the program, Mr. Staggers. I am afraid I did not understand the second part of your question.

Mr. STAGGERS. Well, I think the essence of the hearings is how it shall be instituted and how the regulation and control of the program shall be carried on.

Mr. FARLEY. Yes. This is also a matter in which we are very much interested.

Mr. STAGGERS. I would like to ask your views on this.

After the system is set up, would all nations, according to your view or the State Department's view, have the means of broadcasting and sending messages on the system the same—would they have the right, the same as the United States?

Mr. FARLEY. Well, this is, to some extent, a practical question since it would be necessary for other countries, to make use of the system, to construct facilities and to enter into arrangements with the operators of the system for leasing or on a participating basis to have access to its services.

That is, perhaps, the economic, commercial side.

There are, of course, political problems, too, of the extent to which the system is extended on the potential worldwide basis.

We do believe it is important in the initial technical plannng to design a system which will make it possible for all countries, which are interested in the operating conditions, to have access to it.

Mr. STAGGERS. Well now, that will take in all of the free nations and Communist nations as well?

Mr. FARLEY. We see real advantages to meeting world communications needs on a basis which would include even the Soviet Union, for example, if it would negotiate fairly with us here.

Mr. STAGGERS. In light of that, will it be necessary for the United States to sort of keep control of the information or the type of programs that go on the system?

Mr. FARLEY. I think we view this, sir, as a service which is a system to provide means of transmitting information from one ground facility to another.

We would not envisage maintaining control of what goes over the satellite relay links.

Of course, at the end, in any country, a country has control over what comes into its ground facility, but we do not at present, as I recall, envisage direct broadcast where the satellites, for example, go over the United States and broadcast to individual sets.

That would pose real problems of control.

Mr. STAGGERS. I want to ask you this: Do you know whether Russia is working on a similar system?

Mr. FARLEY. We have no indications that it is.

Mr. FRIEDEL. Will the gentleman yield?

Mr. STAGGERS. Yes.

Mr. FRIEDEL. I understand that all the information we get we report it to the ITU, as an arm of the United Nations, and we are going to make all of our facts known to the United Nations.

Is that true?

Mr. FARLEY. Well——

Mr. FRIEDEL. Our information is that we are going to learn from the satellite, learn the know-how.

Mr. FARLEY. Well, the basic technology in this field is unclassified. Within the limits of classification and any proprietary rights, we would favor making the information broadly available. But there are those limitations.

Mr. FRIEDEL. What I am referring to is, I remember, during the International Geophysical Year in the Antarctica, we were receiving 100 percent cooperation from the Russians as far as weather meteorolo-

gists were concerned. We had Americans at their bases and Russians at American bases.

Are we getting the same cooperation on the communications satellite from the Russians?

Mr. FARLEY. No. There is no effective cooperation in this field and, as I indicated to Mr. Staggers, we have no knowledge at present of any Soviet effort in this particular space application.

They have expressed some interest in proceeding with work on meteorological satellites, but we have not seen any indication of interest in this field, and we do not have established the kind of scientific exchanges in this field that you refer to in the IGY.

The Soviets are members, as we are, of an organization called COSPAR which, in space science, is the successor, so to speak, of the IGY. And there is a fairly good exchange of basic space science information.

But it does not at present extend to this kind of practical application.

Mr. FRIEDEL. Well, I think any information we get that way we ought to be sure——

Mr. FARLEY. We would want it to be on cooperative and reciprocal basis, I agree.

Mr. FRIEDEL. That is all.

Mr. STAGGERS. That is all.

The CHAIRMAN. Well, I do not think there should be any indication or implied indication, from your answers to Mr. Staggers' questions, that you have any assurances or other indications of complete cooperation by all nations in this program thus far.

Mr. FARLEY. That is quite correct, Mr. Chairman.

The specific discussions that we have had with other nations have been fairly limited. As the committee is well aware, our own planning in this field is really just beginning to approach the point where we have the outlines of an operational system in mind, so we have had no such broad approach as you are referring to.

The CHAIRMAN. Whether we will develop a system in cooperation with other nations, maybe a few nations, and as to whether some other nation will develop its own system is yet to be resolved?

Mr. FARLEY. That is correct.

The CHAIRMAN. Mr. Springer?

Mr. SPRINGER. No questions.

The CHAIRMAN. Mr. Rogers?

Mr. ROGERS of Texas. Mr. Farley, with relation to the ownership and operation of the satellite, what is the State Department's position as to who ought to own it or control it, whether it ought to be owned by the Government or whether it ought to be owned by free enterprise?

Mr. FARLEY. Our position which, of course, is reflected in the statement issued by the White House earlier this week is that we would favor the U.S. portion of the system being owned and operated by private enterprise, if it can fully meet the public interest.

And so it is on that basis that planning is now proceeding.

Mr. ROGERS of Texas. Now, that is the point, if it could meet the public interest.

That seems to be a thing that has been in conflict, the meaning of "public interest."

Now, if it was owned by the Government as such, it would be easier insofar as the State Department is concerned for them to work with other countries, would it not?

Mr. FARLEY. Oh, somewhat. I do not think that is a major consideration since there is considerable background of effective international dealings in the communications field where we do have private instrumentalities now.

So there is a Government-private industry relationship, which we believe can work, if there is private ownership and operation of this system.

Mr. ROGERS of Texas. Well, what I am getting at, though, is this: That insofar as the other countries that are concerned, their interest in it is expressed as a matter of policy of that government because they will be government owned, will they not?

Mr. FARLEY. That is predominantly the case in other countries. That is correct.

Mr. ROGERS of Texas. In other words, it is very similar to the airlines situation, where the airlines are owned by government and ours are privately owned.

We are at somewhat a disadvantage insofar as trading is concerned, because we have to come back and go through the democratic processes, which rightfully we should.

Now, do you think that you would be hampered in any way or that the United States would be hampered in any way because of that insofar as the satellite operation is concerned?

Mr. FARLEY. I think if we did not have clearly understood at the outset what the ground rules are and what are the public interest requirements that will be applied, then we could have a difficult situation.

I believe that operating, as we are operating, having it clearly understood within the Government and by the private firms that develop a proposal, what the arrangements must be, I believe that this can be made to work satisfactorily.

Mr. ROGERS of Texas. But when you say the "ground rules" you are referring to the ground rules being understood by the participants inside this country?

Mr. FARLEY. That is correct; yes.

Mr. ROGERS of Texas. And, of course, the ground rules that you work out there will determine the Government's position insofar as working out the ground rules with other countries?

Mr. FARLEY. That is correct.

Mr. ROGERS of Texas. And you feel that the State Department will not be hindered if that policy is carried out in that manner?

Mr. FARLEY. That is our judgment, sir.

Mr. ROGERS of Texas. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Hemphill?

Mr. HEMPHILL. I was interested in that portion of your testimony concerning behind the Iron Curtain or the Bamboo Curtain countries, their participating.

If we pioneer in this field, of course, they are going to claim it and steal everything they can and get us to enter into any agreement they can and take advantage of us whenever they can.

Has that been your experience?

Mr. FARLEY. That is the kind of grim background against which you have to approach a problem like this. That is correct.

Mr. HEMPHILL. I am just wondering if we are not a little naive in our thinking, to think that people who say they are going to destroy us and who, apparently, are dedicated along that particular road, to the destruction of freedom, as we know it, could ever do anything except for their own advantage.

Is there any realization of that philosophy down at the State Department?

Mr. FARLEY. I believe there is. I might describe our attitude in these terms:

That we do find that in the communications field there is some precedent for cooperation because of the very strong mutual interest that is involved.

If there is not a minimum of cooperation you have an impossible situation on interference, conflict in the use of the frequencies, and there is, correspondingly, a practical interest in trying to get some kind of live and let live basis.

Now, if you look at the communications satellite itself, with the volume or capacity that it has, it does appear that the best way would be if there could be worked out an understanding which would be fair to our interests, which would provide one system of meeting the communications requirements.

We are not, of course, in any way going into this thing with our hands tied. If we cannot work out a fair arrangement it is completely within our power to go ahead on our own with our friends in the other countries who will proceed on the basis we choose.

But we do see some advantage in trying, at least initially, to see if it can be done without competing and, perhaps, interfering systems.

Mr. HEMPHILL. Well, I certainly thank you for your information.

The thought occurs to me that if this communications satellite will employ, which it will employ, the principle of radar you have got the consideration of the spectrum about which the Russians will know, if they read the testimony before this committee, and then there is the possibility that they can jam any communications, is it not?

Mr. FARLEY. That is correct. It is our understanding, and I am sure you will have more expert witnesses on points like this, that we will not significantly increase the likelihood or the ability to jam by an effort of this kind to see if it is possible to work out their participation in a system.

Mr. HEMPHILL. Yes, but as soon as we start handing them the information, they are going to start building some sort of instrumentation to jam it that day, would you not imagine?

Mr. FARLEY. Well, I think—all I can say is that I understand that that is within their capability wherever they can get access with their jamming machines, and they will not be dependent on participating in the system to get what they need to know about its frequencies and operating characteristics.

That, they can do anyway.

Mr. HEMPHILL. Because none of the information is classified.

Is that right?

Mr. FARLEY. By the time it is in operation it will not be. We would have to operate on assigned frequencies in any case.

Mr. HEMPHILL. I assume that they classify their information or we would know whether or not they were engaged in this mission, would we not?

Mr. FARLEY. If they came into participation we would know a little more, but they will not tell any more than they decide to.

Mr. HEMPHILL. But at the present time we do not know whether they are engaged in a mission of this kind or not, do we?

Mr. FARLEY. That is correct.

Mr. HEMPHILL. So that we are dealing sort of like the good old lady who is dealing with the murderer who comes into her house to kill her. He is going to do it anyway. She may think that if she smiles she is going to get off a little lighter.

And that has been sort of our philosophy about communism, as I see it develop in your Department.

They do not give us any information. We give them everything.

Are we going to continue that philosophy in this particular program?

Mr. FARLEY. In this case, if we go into a negotiation with them it would have to be on the basis of exchange of information. In this case, the cards are on the table.

We enter it, of course, against that background, for our part. Much of the information is made public whether or not we negotiate with them.

As you point out, that is the way in which we operate. So the only basis on which we have any leverage, to get information on what they are doing, some information on their activities, is if there is an attempt to make a bargain where they have some practical interest in carrying it out, too.

Mr. HEMPHILL. So our policy then would be of giving everything, begging a lot and getting nothing?

Mr. FARLEY. I would hope that our policy would be to bargain.

If we get something in return, which is worth what we give up, then it would be in our interest to take it.

Mr. HEMPHILL. Well, I would share your hope but the realities of the situation certainly dim those hopes in the light of what has happened in the past.

If you heard any part of the speech Mr. Castro made last night, perhaps you people down at the State Department now know that the Russians are not our friends and neither is Castro.

And that is what is worrying me about our philosophy, and yet we give them everything, and I am opposed to it.

Thank you.

The CHAIRMAN. Mr. Younger?

Mr. YOUNGER. I would like to propound this question:

Just where does the State Department feel it comes into the regulatory part of the satellite communications system?

Mr. FARLEY. I would like to give you an answer and then, if I may, ask Mr. deWolf whether he has anything to add to it, since he has the longer experience in dealing with FCC than I do.

It is my understanding that our role would come, really, in two places: One, in the process which has recently been going on of trying to define what the public interest requirements are which must be met by the private venture that will undertake this activity.

So that in the invitation which the FCC issued earlier this week to certain companies to develop proposals, they take account of the views of the State Department as to what the criteria are for an acceptable proposal.

In the second place, we are involved both in international negotiations and in the implementation of them as it affects allocation of radio-frequencies, since that is a matter of international agreement.

So those are the two principal respects as far as regulation is concerned.

I do not know whether Mr. deWolf would like to correct or add to that. I believe that would be the answer we would give you, sir.

Mr. YOUNGER. Well, what I am concerned about is the State Department stepping into this picture and possibly doing a job like they have done in connection with the international air carriers which, to my mind, has been much to the disfavor of our own carriers.

Now, I am quite concerned that the same thing will exist here, that the State Department apparently, as it does, cares more about the international situation than our people, and we will come out on the small end of the stick.

Mr. FARLEY. Well, sir, I would hope that what we are interested in is the broad international interest of the United States.

Mr. deWolf tells me that he can comment more specifically on your question.

Mr. DEWOLF. The way I want to comment, sir, is this: that presently, under existing situations, the FCC licenses, let us say, RCA——

Mr. YOUNGER. I can hardly hear you.

Mr. DEWOLF. The FCC now, we will say, licenses RCA to establish a circuit between New York and London, but the negotiations are always conducted by the company here with the foreign administration.

Any circuits, radio circuits, established between this country and a foreign country are first established and negotiated by private American companies. That is the present system, you see.

And the role of the FCC is to license the American company to establish that circuit after it has entered into negotiations with the foreign country.

When you come to cables, you have a somewhat similar situation with a little difference. If, for instance, the A.T. & T. wants to establish a cable between the United States and Great Britain, the A.T. & T. will negotiate with the British Post Office, and then the FCC, under the law, will have to license the landing of that cable.

And, under the law, the FCC has to consult and get the approval of the Secretary of State for issuing that license to land a cable.

And they can also request the views of other agencies of the Government that are interested in this cable. And if the State Department and other Government agencies say there is no objection, then the FCC licenses—gives a landing license for that cable.

Now, in the new picture of outer space communications the question has not been resolved whether or not the private American entities would enter into negotiations with all the other countries involved or whether the Department would enter into the negotiations.

It becomes a much more complicated picture because it involves, of course, a whole new system that may have very important effects on existing communications.

And in the past there has been no global strategy for establishing communications with all the rest of the world. And that is an area, I think, Mr. Farley referred to when he stated that there would have to be novel arrangements for a novel situation.

Mr. YOUNGER. Well, I think you are familiar with the situation with relation to the State Department in granting routes for foreign carriers. There, the President has the last word.

Now, is it your anticipation that, in settling this, that the State Department is going to control eventually the allocation of the spectrum or is it going to be FCC or where is the authority going to lie?

Mr. DE WOLF. Not under existing law, sir. The FCC is a regulatory body.

It can ask, and frequently does ask, whether the State Department has any views in the matter but ultimately the power is in the FCC.

Mr. YOUNGER. Well, the power also is in the CAB but the State Department and the President have the overriding authority in the other case.

Now, you going to follow the same pattern? That is the question which concerns me in connection with this new international satellite communications system.

Mr. DEWOLF. Well, as I say, it is an entire different pattern with aviation.

Now, I will ask Mr. Farley whether he has any views on that or not.

Mr. FARLEY. I cannot see that there is a comparable arrangement here since I do not see where the element of competition comes in that leads to the kinds of situation you are referring to, so I would not anticipate that situation arising here. That is about as far as one can see ahead now, but as one looks at the regulatory responsibilities that Mr. deWolf has outlined, the difference between establishing a single communication link between two countries and the question of which one or more of different air carriers shall have rights to land—it is quite a different situation.

Mr. YOUNGER. But can we rely on the State Department for the protection of our own people who are interested in this satellite communications system?

Mr. FARLEY. That is very much a part of our interest.

Mr. YOUNGER. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Thomson.

Mr. THOMSON. Well, Mr. Chairman, I had the impression that private international carriers were already negotiating with foreign countries to participate in this program.

Is that correct?

Mr. FARLEY. We have been in touch with other countries with regard, and in particular, to an experiment which American Telephone & Telegraph expects to conduct next year.

Mr. THOMSON. Well——

Mr. FARLEY. I am sure those have involved exploratory discussion.

Mr. THOMSON. And does the State Department approve or disapprove of those when they are negotiated?

Mr. FARLEY. Under the policy, which was just announced, we would expect to have an opportunity to review those, yes.

Mr. THOMSON. Can you tell me how many have been negotiated by A.T. & T. with other countries?

Mr. FARLEY. I am sorry. It is not my understanding that there have been any negotiations, let alone agreement, regarding an operational system.

And we had not expected to review the experimental agreements.

The CHAIRMAN. Mr. Dominick?

Mr. DOMINICK. Thank you, Mr. Chairman.

Mr. Farley, do you know how many other nations have the present capability of putting up a satellite at this time?

Mr. FARLEY. Presently, I do not know of any nations other than the Soviet Union and ourselves.

Mr. DOMINICK. Does the Soviet Union at this time then have the capability of doing this?

Mr. FARLEY. We believe they do.

Mr. DOMINICK. Do they have miniaturization equipment, miniature equipment, which is necessary for this kind of a satellite, as I understand it?

Mr. FARLEY. As to miniaturization, we do not know.

As to their capabilities for communicating very great distances, we know they have been able to do that, for example their moon shots, and they do have the basic capability to launch satellites of considerable weight which could make up for any deficiency they might have in miniaturization.

Mr. DOMINICK. Now, within the next 5 years do you foresee any other nation having the capability of doing this?

Mr. FARLEY. It is possible that either the United Kingdom or a group of Western European countries, which are now negotiating for a possible joint venture to produce space boosters, launch vehicles, might achieve this capability.

I believe that is the only one which could now be foreseen.

Mr. DOMINICK. Mr. Farley, this satellite, as I understand it, will be put up either at the expense of American industry or at the expense of American tax-paid dollars.

This would be correct, would it not?

Mr. FARLEY. That is correct, yes.

Mr. DOMINICK. And it is the State Department's position that when we do put it up that all nations should participate in it.

Is that correct? I gathered that from your statement.

Mr. FARLEY. They should have an opportunity on stated terms.

Mr. DOMINICK. Would I be correct in assuming therefore, that this is the administration's position as well as that of the State Department?

Mr. FARLEY. That is correct.

I believe that is fairly clearly reflected in the President's statement on Monday.

Mr. DOMINICK. Now, going further on the same line, Mr. Farley, on page 5 of your statement you say in here, keeping in mind that this whole system is to be put and paid for by the U.S. citizens in one form or another:

> We should not think of this as a U.S.-oriented system but rather as a system that could meet the needs of other countries whether these needs involve communicating with us or communicating with each other.

Now, this is a pretty important sentence, it seems to me, in your statement and it is one of the principles that you say that we should follow through in the preparation of the satellite.

If we should permit the Soviet Union or any other international Communist country to participate in this project, it is the position of the State Department then that not only should they have the capability of communicating with us but they should also be given the capability, at our expense, of communicating with all of the other international Communist countries.

Is that correct?

Mr. FARLEY. The only point which I think I should point out is that this is not to be solely at our expense.

If other countries participate, part of the arrangement for participation must be arrangements for them to meet their fair share of the cost, both of the initial system and of operation.

Otherwise, it is a practical characteristic of the system that if it provides the satellites which are seen between two areas which have ground facilities, they have the capability of using it.

That is inherent in the technology.

Mr. DOMINICK. Would the State Department insist that the fair share of the cost be paid before they have the right to us this?

Mr. FARLEY. I am sure what we would insist on is sound legal commitments.

Whether it is cash on the barrelhead, or amortized over a period of time, would be a matter for negotiation.

Mr. DOMINICK. I am sure you are familiar with the rules of the U.N., Mr. Farley, in which there is a sound legal commitment that any operation conducted by the U.N., which is voted in by a majority of the members, shall be paid for by those members.

And, nevertheless, it happens that the Russians and other Communist nations have simply refused to pay that share.

Is that not correct?

Mr. FARLEY. There are a number of occasions where that has been the case.

Mr. DOMINICK. So we would run the same possibility in this situation?

Mr. FARLEY. Except that this is an operation where someone who does not pay his share is subject to recourse.

Mr. DOMINICK. How are you going to get recourse against them unless we have a war in order to collect some funds, Mr. Farley?

Mr. FARLEY. Well, it is a partial matter but the communications system will involve substantial operating costs.

There will be an interest in all the participants in seeing that people do meet their share, either of the allocated costs or of the use they make of the system.

And someone who does not pay his share is going to find himself unable to communicate as he wishes with the other members.

Mr. DOMINICK. I wish I could share your belief in this, but in view of the history of the U.N. I simply cannot do it.

Let me ask you a couple of more questions on the degree of control.

Who is going to control this satellite? The ITU?

Mr. FARLEY. While this is still a matter to be negotiated, indeed a matter on which we do not as yet have firm proposals, what is envisaged is the kind of international joint venture in which the participating countries, private and public agencies, would have a share of control proportionate to their share of the actual cost of installing and using the system.

Mr. DOMINICK. So——

Mr. FARLEY. We are not—just to make it clearer—we are not envisaging here a specialized agency in the United Nations, for example, but something more nearly comparable to the kind of arrangement that you have now on an international cable where there is ownership of parts of it by different countries.

Mr. DOMINICK. But the international cable by and large goes between two sections of the free world in most cases, does it not?

Mr. FARLEY. In most cases, that is correct.

Mr. DOMINICK. Whereas this would not? This would go over all countries and be available to as many as you could get in on it?

Mr. FARLEY. That is correct.

Mr. DOMINICK. Well, I would like to put myself on record as saying that I can see no point in spending American dollars from American citizens for the purpose of providing better communications between Communist countries.

If we are going ahead and conducting an allout effort to stop international communism, as was expressed by the President himself in his speech just two nights ago, I see little or no point in spending our money to facilitate their efforts instead of trying to impede them.

That is all I have, Mr. Chairman.

The CHAIRMAN. Mr. Farley, you mentioned in your statement that it should be recognized that a dependable and secure communications system can facilitate the defense operations, if these become necessary.

Would you say that we presently have such a dependable and secure communications system?

Mr. FARLEY. It is a matter of degree, Mr. Chairman. We do have excellent communications but these communications are subject to interruption by natural phenomena or in the event of crisis, by hostile action.

And the satellite communications system would be more comprehensive in its coverage, would be less subject to interruption by natural phenomena, would add one additional degree of backup in the event there was a hostile effort to cut out our channels of communications between command centers and deployed forces.

We do have communications but the problem of maintaining them is a very tough one, and there is room for improvement.

The CHAIRMAN. Well, the crux of a successful operation of satellites, as a means of communication, would be the channels that would be available for any given country.

Is that true?

Mr. FARLEY. I am sorry, but I am afraid I do not understand the thrust of your question.

The CHAIRMAN. A satellite, to be used as a means of transmitting the signals, would be successful, depending on the availability of channels to use that satellite?

Mr. FARLEY. That is correct. And, of course, in any kind of a defense situation, such as was discussed here, on the freedom from natural or manmade interference within the available channel.

And it was really to the latter that I was speaking.

The CHAIRMAN. Yes. I understand that.

But a satellite would be worth little unless there were frequencies or channels——

Mr. FARLEY. That is correct.

The CHAIRMAN (continuing). Available for its use?

Mr. FARLEY. That is correct, sir.

The CHAIRMAN. And the big problem in our dealings with foreign countries is the availability of the channels or frequencies for that particular country?

Mr. FARLEY. That is a major problem. That is one of the practical reasons why we believe it is important to take what the President has called the global approach to the design of the system since if we are to get wide acceptance of its usefulness and, in turn, of support for proposals to allocate adequate channels, we must be able to persuade other countries that they have an interest in doing this.

The CHAIRMAN. Now, I understand from your statement, then, that the real problem here is negotiation with other countries as to the use of or the availability of channels.

Mr. FARLEY. That is one of the major problems, Mr. Chairman.

The CHAIRMAN. Have you attended these international conferences?

Mr. FARLEY. I have not. Mr. deWolf has had a great deal of experience with them and, I am sure, could answer questions on those.

The CHAIRMAN. Has there been any substantial progress made, Mr. deWolf, with reference to the utilization of channels?

Mr. DEWOLF. You mean, in the case of outer space, of course?

The CHAIRMAN. Well, in any event, regardless of whether it is outer space or not.

Mr. DEWOLF. Well, in any event, the operations of the ITU have been very successful, because when you go to these conferences it is not a question of countries against countries. It is a question of services against services. The direct service wants as many frequencies as possible, and the maritime service and the aviation services, and they work it out. They have worked out in the past a workable compromise so that it has been possible, with a reasonable degree of success, to have communications all over the world for all kinds of services.

Now, at the radio conference in 1959 there were not very many countries at that time interested in outer-space comunications.

We were the country most interested plus some others like the Soviet Union and Great Britain and France and Germany and Japan.

That is why it is so important, as Mr. Farley stated, to enlist the interest of as many countries as possible in a system of this kind, so that when we go to the 1963 conference, whose job it will be to find frequencies for outer-space services, we will have a lot of countries that are vitally interested in helping us to get this.

The CHAIRMAN. And insofar as commercial operations are concerned, which we are primarily concerned with here, should we not have some authority within this country that is capable of dealing with this subject matter, that is the utilization of the spectrum?

Mr. DEWOLF. Well, of course, here in this country we have the Federal Communications Commission and the IRAC and OCDM, which is represented here by Mr. Alexander, and, together, they work out a mutually satisfactory system as between the Government and the private operating agencies to find enough frequencies to operate the various circuits that are required.

The CHAIRMAN. In other words, that is specifically the point and goes beyond what we are going into here, but that is precisely the point.

Under the present policy they are operating, you might say, on a day-to-day basis. Is that not true?

Mr. DEWOLF. Yes.

The CHAIRMAN. There is no firm policy as to the efficient use of the spectrum now that anybody knows of?

Mr. DEWOLF. Well, you mean by that, that you are referring to frequency management, where one says you could use a cable instead of a radio.

Yes, that is correct.

The CHAIRMAN. That is right. Do you not think we could have a more efficient utilization of this great natural resource if the matter were assigned to some agency or authority to deal with?

Mr. DEWOLF. Probably, yes, sir.

The CHAIRMAN. For 3 years I have been trying to bring about something along that direction with little success.

Mr. DEWOLF. I have nothing to say on that, sir, except I would point out that in Great Britain, for instance, the General Post Office decides ultimately what frequency is to be used both for the services and private companies or quasi-private companies.

And the same thing is true in Canada where the Ministry of Transport has the final say on the use of frequencies. He has advisory committees.

There is a final arbiter there who decides.

The CHAIRMAN. Yes, and they have established authority to deal with this subject matter?

Mr. DEWOLF. That is correct, sir.

The CHAIRMAN. And that authority knows or has information about the entire use of the spectrum so far as they are concerned?

Mr. DEWOLF. That is right, sir.

The CHAIRMAN. But here, we have a procedure that we have been pursuing for some time, where the right hand does not know what the left hand is doing.

Mr. DEWOLF. As I see it, and Mr. Alexander can correct me later if I am wrong, we have a divided authority.

The CHAIRMAN. Yes, and I think that sooner or later something is going to have to be done in that field.

Let me thank you, Mr. Farley, Mr. deWolf, and your associates, for your presentation here this morning.

Mr. FARLEY. It has been a pleasure, Mr. Chairman.

The CHAIRMAN. Let me thank you for helping to make this record, which, I think, is very important.

Mr. FARLEY. If we can be of further help we would like to do so.

The CHAIRMAN. Thank you very much.

## STATEMENT OF FRED C. ALEXANDER, DIRECTOR OF TELECOMMUNICATIONS, OFFICE OF CIVIL AND DEFENSE MOBILIZATION, ACCOMPANIED BY WILLIAM EDWIN PLUMMER, DEPUTY DIRECTOR

The CHAIRMAN. Mr. Fred C. Alexander.

Mr. Alexander, you are the Deputy Assistant Director of Telecommunications, from the Office of Civil and Defense Mobilization?

Mr. ALEXANDER. Sir, since about 6 months ago that was changed to Director of Telecommunications.

The CHAIRMAN. We are glad to have you before the committee.

We recall the very fine contribution you made to this overall problem in the last Congress when we had a discussion in our other hearings.

Mr. ALEXANDER. Thank you, sir. It is a pleasure to be here today.

The CHAIRMAN. You may proceed.

Mr. ALEXANDER. Thank you, Mr. Chairman.

We appreciate this opportunity to present the actions taken and contemplated by the Office of Civil and Defense Mobilization in the field of space communication.

I have with me Mr. William E. Plummer, who is Chairman of the Interdepartment Radio Advisory Committee and also my deputy.

The prepared statement, which was given to the Committee and which appears to be very lengthy, is in reality not so, because it is largely composed of attachments, designed to provide the committee with complete detail regarding the items covered.

At the pleasure of the chairman, I do not propose to read the attachments unless additional detail is desired upon particular points.

The statement is prefaced by a brief outline of our responsibilities in the field of telecommunications, and a review of what OCDM has done regarding the use of the radio spectrum for space communications since 1958.

With your permission, Mr. Plummer and I will proceed with the statement, Mr. Chairman.

The CHAIRMAN. I assume that you would like for the information that you have presented here to be included in the record?

Mr. ALEXANDER. Yes, sir.

The CHAIRMAN. It shall be received.

Mr. ALEXANDER. Thank you, sir.

(The complete statement together with the attachments referred to by Mr. Alexander, follows:)

STATEMENT BY FRED C. ALEXANDER, DIRECTOR OF TELECOMMUNICATIONS, OFFICE OF CIVIL AND DEFENSE MOBILIZATION

Executive Order 10460 of June 16, 1953, assigns telecommunication responsibilities to the Director of the Office of Civil and Defense Mobilization. Section 1 of that order provides that the Director shall assist and advise the President with respect to the following function and such others as he may designate:

(*a*) Coordinating the development of telecommunications policies and standards applying to the executive branch of the Government.

(*b*) Assuring high standards of telecommunication management within the executive branch of the Government.

(*c*) Coordinating the development by the several agencies of the executive branch of telecommunications plans and programs designed to assure maximum security to the United States in time of national emergency with a minimum interference to continuing nongovernmental requirements.

(*d*) Assigning radio frequencies to Government agencies under the provisions of section 305 of the Communications Act of 1934, as amended, and establishing policies and procedures governing such assignments and their continued use.

(*e*) Developing U.S. Government frequency requirements.

Executive Order 10460 further provides that the Interdepartment Radio Advisory Committee shall report to and assist the Director in the performance of his functions as he may request.

A copy of Executive Order 10460 is attached as tab A.

The President in this field of telecommunications has placed upon the Director of the Office of Civil and Defense Mobilization additional responsibilities:

(*a*) For coordinating the implementation of certain classified telecommunication policies approved by the National Security Council and for coordinating any necessary changes to these policies.

(*b*) For developing telecommunication policies, coordinated throughout the Government.

(*c*) For presenting to the President for consideration any policy questions which, from time to time, warrant such action.

(*d*) For executing the President's wartime powers over telecommunications by delegating, on a contingent basis, the President's authority contained in the Communications Act of 1934, as amended.

### INITIAL INVESTIGATIONS INTO UTILIZATION OF ARTIFICIAL SATELLITES

In recognition of the rapid strides then being made in the artificial satellite program, the former Office of Defense Mobilization, in early 1958, requested the Telecommunications Planning Committee, which is advisory to the Director, to give consideration to the matter of space telecommunication as a continuing responsibility. A copy of its terms of reference entitled "Telecommunications Involving Satellites and Space Vehicles" is set forth in tab B. On March 1, 1961, the TPC approved for advance dissemination to Government agencies its report on "Space Telecommunications." There remain the consideration of the recommendations in the report and final approval for general distribution.

### PREPARATORY WORK FOR THE 1959 INTERNATIONAL TELECOMMUNICATION UNION CONFERENCE, GENEVA

Practical application of space telecommunication was conceived decades ago, long before it was possible of accomplishment. A first step was the birth of radio astronomy in the years 1930–32 when Karl Jansky of the Bell Telephone Laboratories at Holmdel, N.J., first heard and identified radio signals coming from the milky way. A major advance was made in 1945 when Lt. Col. John H. DeWitt, Jr., Signal Corps, AUS, bounced a radar signal off the moon. A decade later, Dr. J. R. Pierce, Bell Telephone Laboratories, published the results of his theoretical investigation of transoceanic communication via space relay (J. R. Pierce, "Orbital Radio Relays, Jet Propulsion," vol. 25, pp. 153–157, April 1955).

The United States, in 1957, began preparing for the forthcoming Ordinary Administrative Radio Conference (OARC), scheduled for the latter part of 1959, the first such International Radio Conference since that of Atlantic City, 1947. The Atlantic City radio regulations made no mention of space telecommunication. Under these regulations all experimentation in space had to be conducted under conditions of causing no harmful interference to services operating in accordance with the "Table of Frequency Allocations." This was a serious handicap, both in connection with the International Geophysical Year efforts and with U.S. exploration of space.

During this preparatory work for the 1959 Conference, it was the consensus of the executive branch agencies working in the Interdepartment Radio Advisory Committee (IRAC), with the Federal Communications Commission (FCC) liaison representative to the IRAC, that space radiocommunication should be established as an international radio service with its own frequency allocations. it was felt that the initial effort should be limited to seeking allocations primarily for space research.

Accordingly, the USA proposals to the International Telecommunication Union (ITU) OARC, Geneva, 1959, included provision for the establishment of the earth-space service and the space service and the allocation of nine frequency bands to these services. See tab C. One of these bands was to be an exclusive allocation, the others to be shared with fixed and mobile services, with adequate protection from interference. As the Conference was getting underway, the United States allocated nationally the band 135–136 megacycles to space radiocommunication, and proposed to the Conference the same allocation on an international basis, as well as the band 400–401 megacycles.

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### ITU CONFERENCE, GENEVA 1959

The ITU Conference, Geneva, 1959, after considerable Soviet bloc opposition, established the two new services—space service and earth-space service—and allocated 13 frequency bands for research in those services. See tab D. The allocations became available May 1, 1961, to the countries which have approved the Geneva, 1959, radio regulations. The United States has not yet approved these regulations.

The frequency bands allocated by the Geneva, 1959, Conference were not intended to accommodate the large requirements of earth-satellite relay communication. The 1959 Conference considered that additional information was needed before such allocations could be made. The Conference adopted recommendation No. 36 which recommended that the Administrative Council of the ITU review the situation in 1962 and 1963 to decide whether there is sufficient justification for the convening of an Extraordinary Administrative Radio Conference (EARC) in the latter part of 1963 to consider the allocation of frequency bands for space telecommunication purposes. Mr. Paul D. Miles, executive secretary of the IRAC, and Mr. Arthur Costigan, consultant to OCDM Telecommunications Office, were made available to the U.S. delegation to the Geneva Conference.

### IMPLEMENTATION OF CONFERENCE RESULTS

Shortly after the close of the Geneva Conference, the final acts of the Geneva Radio and Plenipotentiary Conferences were reviewed by the IRAC, under the guidance of this Office, in collaboration with the FCC liaison representative to the IRAC. Actions required by the United States to fulfill its obligations in connection with the implementation of these acts were identified and recommended assignments of responsibility were approved by my office. See tab E. These obligations of the United States have been, or are in the process of being, carried out within the executive branch insofar as it is possible to do so pending ratification of the convention and the completion of FCC rulemaking. Proposed changes in the national table of frequency allocations to bring it into accord with the ITU table are reflected in FCC proposed rulemaking in docket 13928, FR vol. 26, No. 35, February 22, 1961.

### GOVERNMENT REQUIREMENTS FOR SPACE COMMUNICATIONS

Agencies were requested, on August 1, 1960, to review their present and foreseeable uses of the radiospectrum for communication between earth and space, communication between points in space, and communication between points on the earth via space relay. The responses received expressed requirements for frequency space in excess of that available. They have been consolidated, however, and are being used as a guide in our mutual efforts with the FCC in planning for future uses of the radiofrequency spectrum.

A copy of the letter to all Federal agencies dated August 1, 1960, is set forth under tab F.

### EXECUTIVE BRANCH PLANNING FOR THE ACCOMMODATION OF SPACE COMMUNICATION

The August 1960 initial step toward an active and continuing consideration of space telecommunication requirements revealed, of course, substantial needs for space communications. It became clear that if the total estimated requirements of the Government agencies are to be satisfied under today's technical standards, a major revision of Government frequency allocations and possibly relocation of Government radio operations might be necessary. In the absence of sufficient data relative to the use of frequencies required for telecommunication between earth and space, it was felt that the continued regular assignment of frequencies in such bands might well make the eventual frequency problems still more difficult of solution. It was decided, therefore, that an interim process would be necessary whenever assignments of such frequencies are effected.

On November 10, 1960, the Interdepartment Radio Advisory Committee was asked to refer to the Telecommunications Office:

1. Requests for frequencies for space telecommunication use other than in the frequency bands allocated for space research;
2. Requests for frequencies for conventional telecommunication use in the Government fixed and mobile bands above 1000 megacycles.

See tab G for November 10, 1960, letter.

It later developed that there was no compelling need to review requests below 7125 megacycles.

Certain guidelines were developed to assist in reviewing Government requests for frequency assignments above 7125 megacycles. These guidelines, which were disseminated on March 3, 1961, to all Federal agencies as a matter of information, are as follows:

1. Assignments for research and development in the field of space telecommunication will be approved when practicable, due consideration being given to the avoidance of harmful interference to essential services, and contingent upon the selection of areas appropriate for the eventual operation.

2. When assignments of radiofrequencies for satellite relay communication are made, however, they shall include provision for protection against harmful interference from other operations on the same or adjacent frequencies, where required for the achievement of the objective in each case. Assignments for satellite relay communication generally need not afford such protection to others, provided that sound engineering principles are applied.

3. Approval of assignments of radiofrequencies in fixed and mobile bands above 7125 megacycles shall be on a contingent basis until allocations for satellite relay communication have been decided upon, subject to the conditions that—

(*a*) If harmful interference to future space communication operations results from such assignments, the entire matter will be reviwed in order to determine wherein lies the balance of national interest;

(*b*) If the balance is determined to be in favor of the space communication assignments, any approval previously indicated for the nonspace assignments will no longer prevail.

A copy of the March 3, 1961, letter to all Federal agencies and these guidelines is attached as tab H.

The results of the continuing review have indicated the need for an action of this nature if adequate frequency provision is to be made for the accommodation of Government space telecommunication, and if current uses are not to be curtailed. Actions resulting from the review have been cautionary in nature and approvals have been made on a contingent basis, subject to future review if necessary to determine wherein lies the balance of national interest.

### CONTRACTUAL ARRANGEMENTS

In November 1960, there was consummated with the Central Radio Propagation Laboratory of the National Bureau of Standards a 1-year contract whereby the Laboratory will study and obtain radio propagation data for use in the long-range spectrum planning program of the Office of Civil and Defense Mobilization and the Federal Communications Commission. The study and resulting reports will cover the entire usable radiofrequency spectrum for the present and the next 10 to 20 years, serving as a guide to the effective positioning of the radio services within the spectrum. Consideration will be given to technical factors which relate to modes of electromagnetic wave propagation, and to manmade and natural noise and other interference with emphasis upon factors involved in satisfying space frequency needs.

### COORDINATION WITH FCC

Close coordination is maintained between the Telecommunications Office and the IRAC and the FCC in all aspects of preparing for radio conferences, in the implementation of the final acts of such conferences, and in all proposals to make changes in the table of frequency allocations. In practice, the FCC follows its normal procedures for obtaining the views and comments of industry. Meanwhile, the IRAC, working either alone or with the FCC liaison representative to the IRAC, drafts the executive agency views. Differences are then resolved insofar as possible between the IRAC and the FCC liaison representative to the IRAC. The coordinated result, upon approval, is officially transmitted to the Commission. Upon agreement being reached the Commission and this Office make recommendations to the Department of State for projection internationally.

In April 1959, agreement was reached with the Commission on terms of reference for joint FCC/OCDM long-range planning for future U.S. use of the radiofrequency spectrum. Out of this program grew the contractual arrangements with the National Bureau of Standards referred to heretofore. To facilitate

planning for the accommodation of space communication in the radio spectrum, the two offices joined in asking the Bureau to give first emphasis to producing necessary propagation and other information for space radiocommunication.

In the instance of FCC notice of inquiry in docket No. 13522 and the reopening of its docket No. 11866, the Commission invited this Office, and other interested Government agencies, to comment and participate in the Commission proceedings. This Office informed the Commission of its views and the lines along which it was proceeding. See tab I.

The Commission has been kept fully informed of all activities by this office and the IRAC in planning for space radiocommunication. The FCC liaison representative to the IRAC has participated, without prejudice to eventual Commission action, in each meeting of the IRAC and has received copies of all Government documentation. Conversely, the Commission has made available copies of filings in its docket No. 13522 and has, through its liaison representative, made helpful suggestions.

There was transmitted to the Commission on May 12, 1961, the IRAC report "Preliminary Views on U.S. Frequency Allocations for Space Radiocommunication" prepared in collaboration with the FCC liaison representative. See Supplement No. 1 to this statement which is submitted sesparately. The Commission adopted this report May 17 for the purpose of obtaining public comment and/or the views of other countries, and issues it as a notice of inquiry in FCC docket No. 13522 without change except to add radio astronomy in the band 1664.40–1668.40 megacycles per second as suggested by OCDM.

### LONG-RANGE PLANNING AND PRELIMINARY PREPARATION FOR 1963 INTERNATIONAL CONFERENCE

The IRAC, working with the FCC liaison representative to the IRAC, has essentially completed drafting its concept of preliminary views of U.S. frequency allocations for space radiocommunication. Included are definitions (terminology) of the new space services and radio stations, discussions of radio services which may have uses for space radiocommunication, radio wave propagation characteristics, state of the art, amount of spectrum required, factors affecting feasibility of sharing, selection of frequency bands, and conclusions with respect to allocations which should be made to the space services. FCC-OCDM agreement on a final draft, incorporating public comments, must then be accomplished prior to transmission to the Department of State. These preiminary views do not necessarily represent the U.S. position to the proposed 1963 space conference. Rather, the purpose of the document will be to serve as a vehicle by which the ideas and reactions of other countries may be obtained. The views of other countries are of great importance. No one country, or small group of countries, can go it alone. There must be world cooperation.

Present knowledge suggests that, initially at least, the need for frequencies for communication between earth and space will have to be met somewhere in the spectrum between about 1,000 and 10,000 megacycles per second. This part of the spectrum is in intensive and extensive use and is in great demand to meet existing nonspace needs. While sharing between satellite communication systems and terrestrial fixed and mobile systems is considered feasible, the application of the best engineered techniques and reasonable geographical separations will be required.

A

IMMEDIATE RELEASE June 17, 1953

JAMES C. HAGERTY, PRESS SECRETARY TO THE PRESIDENT

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10460
EXECUTIVE ORDER

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PROVIDING FOR THE PERFORMANCE BY THE DIRECTOR OF DEFENSE MOBILIZATION OF CERTAIN FUNCTIONS RELATING TO TELECOMMUNICATIONS

By virtue of the authority vested in me by the Constitution and statutes, and as President of the United States, it is hereby ordered as follows:

Section 1. The Director of Defense Mobilization shall assist and advise the President with respect to the following-described telecommunications functions and such other telecommunications functions as the President may designate:

(a) Coordinating the development of telecommunications policies and standards applying to the executive branch of the Government.

(b) Assuring high standards of telecommunications management within the executive branch of the Government.

(c) Coordinating the development by the several agencies of the executive branch of telecommunications plans and programs designed to assure maximum security to the United States in time of national emergency with a minimum interference to continuing nongovernmental requirements.

(d) Assigning radio frequencies to Government agencies under the provisions of section 305 of the Communications Act of 1934, as amended (47 U.S.C. 305), and establishing policies and procedures governing such assignments and their continued use.

(e) Developing United States Government frequency requirements.

(over)

Section 2. The Director of Defense Mobilization shall, to the maximum extent feasible, perform his functions with the aid, or through the facilities, of appropriate departments and agencies of the Government; and he shall establish such interagency committees and working groups composed of representatives of interested departments and agencies, and consult with such departments and agencies, as may be necessary for the most effective performance of his functions.

Section 3. The Interdepartment Radio Advisory Committee shall report to and assist the Director of Defense Mobilization in the performance of his functions as he may request.

Section 4. Nothing in this order shall be deemed to impair any existing authority or jurisdiction of the Federal Communications Commission. The Director of Defense Mobilization shall cooperate with the Federal Communications Commission on problems of mutual concern.

Section 5. The records, property, personnel, and funds used, held, employed, available, or to be made available in connection with the functions vested in the Telecommunications Advisor to the President by Executive Order No. 10297 of October 9, 1951, entitled "Providing for a Telecommunications Advisor to the President", shall be transferred, consonant with law, to the Office of Defense Mobilization.

Section 6. The said Executive Order No. 10297 is hereby revoked.

DWIGHT D. EISENHOWER

THE WHITE HOUSE

June 16, 1953

B

TERMS OF REFERENCE FOR PROJECT 2.8
TELECOMMUNICATIONS PLANNING COMMITTEE
PANEL II WORK PROGRAM

| Objective | Liaison With | Reporting Date | Remarks |
|---|---|---|---|
| General--To study and evaluate ideas, proposals, projects and other actions involving the use of natural and man-made satellites and space vehicles, single or in multiple for telecommunications, and to report and make appropriate recommendations regarding these in the interest of furthering the telecommunications capabilities. | NASA<br>IRAC | June 1960<br>Sept. 1960<br>Dec. 1960<br>Mar. 1961<br>(per TPC 709/1) | Originally assigned to Panel II on Oct. 15, 1958 per TPC 646/1 |
| Specific Areas | | | |
| 1. Relay of radio communication by a passive reflective process, using a reflecting surface in, or about the satellite. | | | |
| 2. Relay of radio communication by a reception and retransmission process, using powered radio receiver and transmitter equipment in the satellite, including the following special considerations: | | | |
| a) Instantaneous relay, not involving storage of information in the satellite or delay between reception and retransmission of information. | | | |
| b) Delayed relay, involving storage of information in the satellite, and permitting reception and retransmission at separate times. | | | |

| Objective | Liaison With | Reporting Date | Remarks |
|---|---|---|---|
| 3. Transmission of information collected in the satellite as follows: | | | |
| a) Graphic information as derived from wide bandwidth televisual devices. | | | |
| b) Graphic information as derived from narrow bandwidth photograph-facsimile devices. | | | |
| c) Other information of analog or digital nature derived from intelligence and reconnaissance sensory devices associated with satellite. | | | |
| 4. Technical factors involved in minimising interference in frequency and space in connection with the use of satellites in mass communications using: | | | |
| a) Satellites having a period the same as the earth's rotation on its axis (24 hours). | | | |
| b) Satellites having a period differing from that of the earth's rotation on its axis. | | | |
| 5. Communication in support of unmanned and manned vehicles involved in nonorbiting space operations. | | | |

| Objective | Liaison With | Reporting Date | Remarks |
|---|---|---|---|
| Additional Functions | | | |
| 1. To serve as the collection point within the Government for the procedures, facts and techniques involving space telecommunications for increasing our telecommunication capability. | | | Additional functions assigned to Panel II on Oct. 30, 1959 per TPC 660/1. |
| 2. To become the point in Government where coordination between technical and operational facts produced by research and development in space telecommunications on the one hand, and the operational needs and capabilities of the United States on the other, is accomplished. | | | |
| 3. To review and study the coordinated results of 1 and 2 above and submit informational reports and recommendations concerning operational applications of new techniques and procedures which will benefit U.S. telecommunications. | | | |

| Objective | Liaison With | Reporting Date | Remarks |
|---|---|---|---|

NOTE 1: This project extends only to consideration of the technical feasibility of effective operation, and of the configuration and the instrumentation features of the satellite or space vehicle and related ground facilities for telecommunications purposes, and will not embrace matters involving launching vehicle, facilities for launching, priority in the satellite program.

NOTE 2: It should be understood that while this basic paper outlining the project is not classified, further papers on the subject may be, particularly if devoted to details involving phases outlined herein.

OCDM-DC 35236

C

United States Proposals to the Geneva, 1959, Radio Conference for Allocation of Frequencies to the Space and Earth-Space Services

| Frequency Band Mc/s | Allocation to Services | Footnotes |
|---|---|---|
| *25.60 - 25.65 | Earth-Space | |
| 135 - 136 | Earth-Space*<br>Fixed<br>Mobile<br>Radiopositioning<br>Space* | In the band 135 - 136 Mc/s, the fixed, mobile and radiopositioning services shall not cause harmful interference to the earth-space and space services. This band is established primarily for communication with or between earth and space stations. |
| *400 - 401 | Earth-Space<br>Meteorological Aids<br>Space | In the band 400 - 401 Mc/s, the meteorological aids service shall not cause harmful interference to the earth-space and space services. This band is established primarily for communication with or between earth and space stations. |
| 1700 - 1725 | Earth-Space*<br>Fixed<br>Mobile<br>Space* | In the band 1700 - 1725 Mc/s, the fixed and mobile services shall not cause harmful interference to the earth-space and space services. This band is established primarily for communication with, or between, earth and space stations. |
| 1825 - 1850 | Earth-Space*<br>Fixed<br>Mobile<br>Space* | In the band 1825 - 1850 Mc/s, etc. |
| 2275 - 2300 | Earth-Space*<br>Fixed<br>Mobile<br>Space* | In the band 2275 - 2300 Mc/s, etc. |
| 8300 - 8400 | Earth-Space*<br>Fixed<br>Mobile<br>Space* | In the band 8300-8400 Mc/s, etc. |

| Frequency Band Mc/s | Allocation to Services | Footnotes |
|---|---|---|
| 15,150 - 15,250 | Earth-Space*<br>Fixed<br>Mobile<br>Space* | In the band 15,150 - 15,250 Mc/s, etc. |
| 31,500 - 31,800 | Earth-Space*<br>Fixed<br>Mobile<br>Space* | In the band 31,500 - 31,800 Mc/s, etc. |

* The U. S. considers that this allocation should be on a world-wide basis.

OCDM-DC 35243

D

Allocation of Frequencies to the Space and Earth-Space Services Adopted at the Geneva, 1959, Radio Conference

| Frequency Band Mc/s | Allocation to Services | Footnotes |
|---|---|---|
| 9.995 - 10.005 | STANDARD FREQUENCY | 215 The band 10,003 - 10,005 kc/s is also allocated, on a secondary basis, to the space and earth-space services for research purposes. |
| 19.990 - 20.010 | STANDARD FREQUENCY | 221 The band 19,990 - 20,010 kc/s is also allocated, on a secondary basis, to the space and earth-space services for research purposes. |
| 29.7 - 41 | FIXED MOBILE | 235 The band 39,986 - 40,002 Mc/s is also allocated, on a secondary basis, to the space and earth-space services for research purposes. |
| 136 - 137 | SPACE 280 FIXED MOBILE EARTH-SPACE 280 281 | 280 For research purposes. 281 In the band 136-137 Mc/s, the aeronautical mobile (OR) service will be the primary service for as long as it continues to operate in this band. On discontinuation of this service, the space and earth-space services will be the primary services. In Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the USSR, this band is allocated on a primary basis to the aeronautical mobile service. |
| 174 - 216 | FIXED MOBILE BROADCASTING | 294 The band 183.6 Mc/s ± 0.5 Mc/s is also allocated to the space and earth-space services for research purposes subject to causing no harmful interference. |
| 400-401 | METEOROLOGICAL AIDS SPACE 280 EARTH-SPACE 280 | 280 For research purposes. |

| Frequency Band Mc/s | Allocation to Services | Footnotes |
|---|---|---|
| 1427 - 1429 | SPACE 280<br>FIXED<br>MOBILE except aeronautical mobile<br>EARTH-SPACE 280 | 280 For research purposes. |
| 1700 - 1710 | FIXED<br>MOBILE<br>Space 280<br>Earth-Space 280<br>355 | 280 For research purposes.<br>355 In Region 1, the bands 1700-1710 Mc/s and 2290-2300 Mc/s are allocated on a secondary basis to the space and earth-space services subject to causing no harmful interference to the other services to which these bands are allocated. |
| 2290 - 2300 | FIXED<br>MOBILE<br>Space 280<br>Earth-Space 280 | 280 For research purposes.<br>355 See 1700-1710 Mc/s. |
| 5250 - 5255 | RADIOLOCATION<br>Space 280<br>Earth-Space 280 | 280 For research purposes. |
| 8400 - 8500 | FIXED<br>MOBILE<br>Space 280<br>Earth-Space 280<br>394 | 280 For research purposes.<br>394 In Australia and the United Kingdom, the band 8250 - 8500 Mc/s is allocated to the radiolocation service; the band 8400-8500 Mc/s is also allocated, on a secondary basis, to the space and earth-space services for research purposes. |
| 15,150 - 15,250 | SPACE 280<br>EARTH-SPACE 280<br>Fixed<br>Mobile | 280 For research purposes. |

| Frequency Band Mc/s | Allocation to Services | Footnotes |
|---|---|---|
| 31,500 - 31,800 | SPACE 280<br>EARTH-SPACE 280<br>Fixed<br>Mobile | 280 For research purposes. |

Note: Upper case letters indicate a primary allocation.
Lower case letters, underlined, indicate a secondary allocation.
Region 1 includes Europe.
Region 2 includes the Western Hemisphere.
Region 3 includes Asia.

E

FOR INFORMATION

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF CIVIL AND DEFENSE MOBILIZATION
INTERDEPARTMENT RADIO ADVISORY COMMITTEE
Washington 25, D. C.

Doc. 5030/1-5.10.1
Ref: Doc. 5009/1-5.10.1

4 February 1960

MEMORANDUM TO: Members, IRAC

FROM : Executive Secretary

SUBJECT : Implementation of the Final Acts of the Geneva Conferences

The IRAC, at its meeting of 26 January 1960, had under consideration a tabulation of the list of actions required by the U.S. in the implementation of the Final Acts of the Geneva Conferences.

This tabulation is reproduced in the attachment to this memorandum, together with an indication of the agency or agencies to which responsibility was assigned by the Committee for each of the items as indicated.

Paul D. Miles

Paul D. Miles

Attachment

Actions to be taken by the U. S. as a consequence of the ITU Conferences, Geneva, 1959

| Provision | Actions to be Taken by the U.S.A. | Limiting dates established by Final Acts | Steering Member |
|---|---|---|---|
| Conv. Additional Protocol I<br>Conv. Resolution 14 | Inform Secretary General of the classes of contribution chosen by the USA and USA Territories | 1 July 1960 | State |
| Conv. Additional Protocol III | Take into account the 1960 budget ceiling of 9,000,000 Swiss francs. | 1 Jan. 1961 | State |
| Conv. Additional Protocol II | Take into account the budget ceilings for 1961-1965. | 1960-1964 as appropriate | State |
| Conv. Recommendation 4 | Collaborate more closely with the Telecommunications Journal by supplying contributions likely to be of general interest. | ——— | State |
| RR Art. 1<br>RR Art. 2 | Review Definitions and Designation of Emissions and effect modifications as appropriate and desirable to national provisions. | 1 May 1961 | Ex. Sec./FCC |
| RR Art. 5 | Review general provisions and the Table of Frequency Allocations to determine the future position with respect to the national Table. | 1 May 1961 | *SFA |
| RR Art. 9<br>RR App. 1<br>RR Res. 1 | A. Review procedures and forms required for notification of frequency assignments other than broadcasting 5950-26100 kc/s. Develop U.S. procedures to effect notification. | 1 May 1961 | FCC/Ex. Sec. |
| | B. When amending existing entries or submitting notices of new assignments prior to 1 May 1961, the additional basic characteristics required by the Geneva (1959) RR should be furnished. | as and when possible | FCC/Ex. Sec. |
| | C. For assignments above 28 Mc/s, review all MFFR listings and notify (in the new format) all entries desired to be transferred to the Master Register. | 1 Oct. 1960 | FCC/Ex.Sec. |

*Target date: 1 March 1960

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| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| | D. Ensure that U.S. entries to be transferred from MRFR to the Master Register are complete. (Board is to furnish list of incomplete entries by 30 Sept. 1960.) | between 30 Sept. 1960 and 1 May 1961 | FCC/Ex. Sec. |
| | E. For coast telephone assignments not notified on EARC -planned frequencies, notify to Board before 1 May 1961 the adjustments considered necessary for them to retain same relative position to channels in Appendix 25 as they had to channels in EARC Plan. | 1 May 1961 | FCC |
| | F. For ship telephone assignments not notified on EARC planned frequencies, same as for E. above. | 1 May 1961 | FCC |
| | G. For listings between 27.5 & 28 Mc/s, supply additional basic characteristics. | when requested by the Board | FCC/Ex. Sec. |
| RR Art. 10<br>RR App. 2<br>RC Res. 2 | A. Review procedures and forms required for notifications of seasonal schedules for broadcasting 5950-26100 kc/s. Develop U.S. procedures to effect submission. | 1 March 1960 | State -USIA/FCC |
| | B. Submit seasonal high frequency broadcasting schedules for Sept. - Oct. 1960 period. | 1 March 1960 | State-USIA/FCC |
| | C. Submit seasonal high frequency broadcasting schedules for subsequent periods according to Board schedule. | as scheduled by the Board | State-USIA/FCC |
| RR Art. 12<br>RR App. 3<br>RR App. 4<br>RR App. 5 | New provisions:<br>1) Transmitting and receiving equipment should be designed to take into account the technical characteristics of equipment likely to be employed in neighboring parts of the spectrum. | 1 May 1961 | SFA |

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| | 2) To maximum extent possible, AM systems should use single sideband emission having characteristics in accordance with CCIR recommendations. | 1 May 1961 | SFA |
| | 3) Termination date for Class B emission. | 1 Jan. 1966 | SFA |
| | 4) More stringent tolerance (frequency and spurious emission level) requirements affecting some present equipments as early as 1966 and some equipments as early as 1964. | 1 Jan. 1964 and 1 Jan. 1966 | SFA |
| RR Art. 13<br>RR App. 6 | To be reviewed. | 1 May 1961 | FCC |
| RR Art. 14 | New provision:<br>Administrations authorizing frequencies below 10 kc/s shall assure no harmful interference is caused to services to which bands above 10 kc/s are allocated. | 1 May 1961 | SFA |
| RR Art. 15<br>RR App. 8 | New provisions:<br>An interference reporting form is provided. Exercise of goodwill and mutual assistance is essential concerning problems of harmful interference. Due consideration should be given to all factors such as adjustment of frequencies, characteristics of transmitting and receiving antennas, time sharing, change of channels within multi-channel transmissions. | 1 May 1961 | FCC/State |
| RR Art. 16<br>RR App. 7 | No important changes noted. | 1 May 1961 | FCC |
| *(RR Art. 17 | To be reviewed. | 1 May 1961 | J/FCC |
| (RR Art. 18 | To be reviewed. | 1 May 1961 | FCC |
| (RR Art. 19<br>(RR Res. 8 | To be reviewed. | 1 May 1961 | FCC/IRAC |

*Tabled for further consideration.

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| RR Art. 20<br>RR App. 9-12 | Primarily informational concerning service documents published by the Secretary-General. To be reviewed for changes in responsibilities of Administrations. | 1 May 1961 | FCC/Ex. Sec. |
| RR Art. 21-26<br>RR Art. 27-35<br>RR App. 11 | To be reviewed.<br>To be reviewed. | | FCC<br>FCC/IRAC |
| RR Art. 36 | To be reviewed. | 1 May 1961 | FCC/IRAC |
| RR Art. 38-40 | To be reviewed. | 1 May 1961 | FCC |
| RR Art. 41 | Modified provision:<br>For amateur operator qualification, the frequency limit above which Administrations may waive the requirement for proof of Morse code proficiency is lowered from 1000 Mcs to 144 Mc/s. | 1 May 1961 | FCC |
| RR Art. 42 | No change noted. | | Noted |
| RR Art. 43 | New provisions:<br>Where a direction-finding service is provided in bands between 1605 and 2850 kc/s, stations should be able to take bearings on the frequency 2182 kc/s. | 1 May 1961 | FCC/Treas-CG |
| RR Art. 44 | New provisions:<br>The urgency signals may be used to precede radiotelegrams and radiotelephone calls concerning medical advice. A world-wide standard frequency and time signal service is encouraged; IFRB, CCIR and administrations shall work toward that end. Notification of a new frequency in standard frequency bands should not be made till coordination is completed. | 1 May 1961 | FCC/State/CG/N |
| RR Art. 44 | Administrations shall cooperate in reducing interference in standard frequency bands in accordance with recommendations of the CCIR. | | FCC/State/CG/N |

| Provision | Action to be Taken by U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| RR App. 13 | To be reviewed. | 1 May 1961 | User Agencies/ FCC |
| RR App. 14 | | | FCC |
| RR App. 16 | | | User Agencies |
| RR App. 15A | Reassign frequencies to ship radiotelegraph stations | 1 May 1961 | FCC |
| RR App. 15B & 17 | Reassign frequencies to ship phone stations | 1 May 1961 | FCC/N/CG |
| RR App. 18 | Review frequency assignments to maritime mobile stations in band 156-162 Mc/s. | 1 May 1961 | FCC/Treas.-CG |
| RC Res. 3 Recommendation 36 | Make preparation for meeting of Panel of Experts. | 1961 session of Adm. Council | *State/FCC/CCDM |
| | 1) Board will invite Administrations to submit proposals. | | *State/FCC/CCDM |
| | 2) Board to submit report to 1961 session of Council. | | *State/FCC/CCDM |
| | 3) Council to request nominations of experts, select the experts (a total of 7), and set date for meeting. | | *State/FCC/CCDM |
| RC Res. 4 | Review entries in MRTR for non-compliance with new Table and decide upon the action to be taken. | 31 Dec. 1961 | FCC/Ex.Sec. |
| RC Res. 5 | Review arrangements for notifications of U.S. stations on foreign soil and take remedial action where required. | 1 May 1961 | State |
| RC Res. 7 | Study question of providing cessation at appropriate times of emissions from satellites and other space vehicles, and present the results to CCIR. | ——— | State/Mil./NASA |
| RC Res. 10 | Arrange to confine inter-regional amateur contacts at 7 Mc/s to the band 7000-7100 kc/s. | 1 May 1961 | FCC |
| RC Res. 11 | Special Conference within Region 1 re plan for bands 68-73 and 76-87.5 Mc/s. (U. S. may wish to observe.) | 1 May 1960 | State |

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| RC Res. 12 | Establishment by Secretary-General of mobile services manual. Secretary-General may consult U.S. (and others) in connection with its preparation, and will call upon U.S. (and certain others) to approve it. Manual to be available to Administrations before 8/1/60. | When requested by Secretary-General before 1 Aug. 1960 | FCC |
| RC Res. 13 | Review communication requirements of national and international air operations, to determine when new FAFC required to revise App. 26. | In time for EARC to complete its work before next CARC. | State/FCC/CAA/FAA/N |
| RC Res. 14 | Collect data on use of HF aeromobile frequencies and take other indicated actions looking toward increased use of the VHF spectrum for aeromobile (R) communications. | ——— | FCC/FAA |
| RC Rec. 2 | Endeavor to give priority in CCIR work to refine IFRB technical standards. | ——— | State |
| RC Rec. 5 | Administrations to develop monitoring facilities per RR Art. 13, and inform the IFRB of the extent to which they are prepared to cooperate in the monitoring programs requested by the board. | ——— | FCC |
| RC Rec. 8 | Endeavor to adopt gradually the Rationalized M.K.S. System of units in our relations with Union and its permanent organs. | ——— | Noted |
| RC Rec. 9 | Take steps to reduce pressure on Band 7 by adopting new techniques to the maximum extent possible. | ——— | IRAC/FCC/OCDM |
| RC Rec. 10 | Take steps to reduce pressure on band 4000-27500 kc/s by: | ——— | IRAC/FCC/OCDM |
| | 1) effecting where possible a more efficient consolidation of lightly-loaded circuits; | | IRAC/FCC/OCDM |
| | 2) concluding special arrangements where practicable on the common use of existing international radio circuits; | | IRAC/FCC/OCDM |
| | 3) taking into account 1) and 2) above when planning new circuits or extending existing circuits. | | IRAC/FCC/OCDM |

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| RC Rec. 11 | In bands 5350-5460 and 9300-9500 Mc/s: | ——— | SFA/FCC |
| | 1) study whether there is harmful interference between aeronautical and maritime radionavigation services, and if so, its extent; | | SFA/FCC |
| | 2) investigate possibility of reducing such interference if established. | | SFA/FCC |
| RC Rec. 15 | Determine whether the U.S. will respond to this Recommendation which recommends that Administrations study and inform the Secretary-General of actions and information directed against broadcasting on board ships and aircraft outside national territories. | ——— | State |
| RC Rec. 16 | Administrations to adopt recommended standard forms for ship and aircraft station licenses for international use, and as far as possible bring their national licenses into line with standard forms. | ——— | FCC |
| RC Rec. 17 | Submit to next Conference proposals for the amendment of Art. 23 (re operator certificates). | preparatory work for next CARC | FCC |
| RC Rec. 18 | A. Advise IFRB of relevant details of planning re air-ground public correspondence systems. | ——— | FCC |
| | B. Insure that no harmful interference is caused to other countries by the operation of such systems. | ——— | FCC |
| RC Rec. 19 | Pay particular attention to the frequency problems involved in development of aeronautical collision avoidance systems. | ——— | FCC/SFA |
| RC Rec. 21 | Take into account this material on an international radiotelephone code when participating in IMCO and ICAO Conference preparatory work on this subject. | ——— | State/FCC/FAA/Treas-CG/AF |
| RC Rec. 22 | Take into account this material on use of the term "Emergency (Reserve)" when participating in ICAO conference preparatory work on this subject. | ——— | State/FCC/FAA/AF |

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| RC Rec. 25 | Study and submit to next Radio Conference, proposals re reclassification of international public correspondence categories of ship stations. | preparatory work for next OARC | FCC |
| RC Rec. 26 | Study and submit to next Radio Conference proposals re hours of service for ship stations. | preparatory work for next OARC | FCC |
| RC Rec. 27 | SSB by maritime mobile service be introduced as far as operationally required for radiotelephony in Bands 6 and 7. | ——— | FCC |
| RC Rec. 29 | Study of phonetic figure table--supply results to Secretary-General. | well in advance of next OARC | FCC/Treas.-CG/N |
| RC Rec. 30 | Administrations to take all practicable measures to safeguard the standard frequency bands from harmful interference. | ——— | FCC/SFA |
| RC Rec. 31 | A. Administrations, in preparing for next Conference, to consider further the question of frequency allocations for radio astronomy. | preparatory work for next OARC | SFA/FCC |
| | B. Meanwhile specially consider the possibility of making a firm allocation in range 37-41 Mc/s, particularly avoiding 38.0 ± 0.25 Mc/s and 40.68 ± 0.25 Mc/s. | ——— | SFA/FCC |
| | C. As far as practicable, leave free the band 606-614 Mc/s. | ——— | SFA/FCC |
| | D. Notify Secretary-General the locations of the radio-astronomy observatories and those of the allocated bands used by each. | ——— | *FCC/Ex. Sec. |
| RC Rec. 33 | A. Administrations to take into account the possible need of the Red Cross for rapid communication when normal facilities are disrupted. | ——— | FCC |
| | B. Administrations to study possibility of assigning therefor one or more common frequencies at the upper or lower limits of the amateur bands. | ——— | FCC |

*National Academy of Sciences to inform FCC.

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| RC Rec. 34 | All Administrations to make special efforts to cooperate with Administrations in need of special assistance by furnishing monitoring information and technical assistance in obtaining frequency assignments. | when requested by an Administration in need of special assistance | State |
| RC Rec. 35 | To convene in principle an EARC re Space Communications during the latter part of 1963. | before Administrative Council sessions of 1962 and 1963, and in the meantime as appropriate | State/FCC/SPA |
| | 1) Administrative Council to review matter at its 1962 and 1963 sessions and decide if sufficient justification exists to call the Conference. | | |
| RC Rec. | 2) Administrations which launch satellites meanwhile to keep Administrative Council and relevent organs of the Union advised re frequencies used and technical progress achieved. | ——— | State |

Resolutions and Recommendations to the Consultative Committees

| To the CCITT | To the CCIR |
|---|---|
| PC Res. 11 | PC Res. 35 |
| PC Res. 12 | PC Res. 36 |
| PC Res. 35 | PC Rec. 2 |
| PC Res. 36 | RC Res. 7 |
| PC Rec. 2 | RC Rec. 1 |
| | RC Rec. 2 |
| | RC Rec. 3 |
| | RC Rec. 4 |
| | RC Rec. 5 |
| | RC Rec. 6 |
| | RC Rec. 7 |

| Provision | Action to be Taken by the U.S.A. | Limiting Dates established by Final Acts | Steering Member |
|---|---|---|---|
| | **Additional Matters** | **When** | |
| | The United Kingdom Delegation suggested to the U.S. Delegation the desirability of an early meeting between the two Administrations, to assess the results of the Conference and decide upon the steps that should be taken as the consequence thereof. | During 1960 | Tabled |
| | The Canadian Delegation likewise suggested the desirability of an early meeting between the U.S. and Canada, among other things to extend the procedure for the coordination of frequency assignments in the border areas to include the entire frequency range between 27.5 and 960 Mc/s. | before 1 July 1960 | State/IRAC/FCC |
| | The Mexican Delegation requested as a matter of urgency the improvement of the mechanism for the coordination of telecommunication matters between the United States and Mexico, particularly in respect of frequency assignment matters and cases of harmful interference. | during 1960 | State/IRAC/FCC |

F

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF CIVIL AND DEFENSE MOBILIZATION
Washington 25, D. C.

August 1, 1960

MEMORANDUM

To : All Federal Agencies

From : Telecommunications Office, OCDM

Subject: Space Communication Requirements.

The increasing importance of space for scientific and other purposes to the United States and the world in general clearly indicates that requirements for communications traversing or using that medium must receive active and continuing consideration.

Currently all radio spectrum usage is under study in the long-range planning program now being conducted jointly by the Federal Communications Commission on behalf of its licensees and the Federal Government Agencies for the Executive Branch. It is important that all space communication requirements to be satisfied through radio spectrum allocations be identified as soon as practicable and taken into account in our planning. The results of the study will help to establish the United States position to be taken at the international space communications conference projected for 1963.

It is desired that your agency review its present or foreseeable uses of the radio spectrum for communication between earth and space, communication between points in space, and communication between points on the earth via space relay, and inform this office of your probable requirements for circuitry and/or spectrum allocations. Whereas the use of space relay of transmissions between points on earth probably will be of greatest interest to most agencies, it is suggested that your examination encompass all of the aforementioned applications.

In estimating your future needs, please observe the following guidelines:

1. Assume that satellites or other space bodies will be available in space where and when needed, and adequate to support the desired communication circuitry;

2. Consider the time period from today through 1970;

3. Assume a continuation of the normal growth of U. S. conventional means of communication, domestic and international;

4. Consider only those applications which might be expected to dictate the use of the radio spectrum above 500 M/s;

5. Indicate for each circuit whether it would be new, would replace an existing conventional circuit, or would be used to provide additional capability for an existing system, and include:

   a. An approximation of the geography involved; e.g., from the East Coast of the U. S. to Western Europe or to space vehicles;

   b. An indication of bandwidth requirements; e.g., use "narrow band" to designate 4 channel teletype; and use "wide band" to designate anything requiring more spectrum space such as voice or digital-data transmissions.

Compliance by all Federal agencies is requested. Agencies that do not visualize such needs within the indicated time period are requested to indicate that fact.

The information should be presented to this office by October 15, 1960, and may, if necessary, be classified. It will be correlated and referred to the study groups engaged in the planning for the use of the radio spectrum.

Please understand that your response to this inquiry will not preclude your future reconsideration of your estimated requirements.

The information requested is of extreme importance to the process of long-range planning and to achievement of an understanding of the factors involved in the application of the radio spectrum to U.S. space activities. It is necessary to the establishment of a coordinated United States position at the projected international space communication conference.

(Signed)

F. C. Alexander
Deputy Assistant Director
for Telecommunications

OCDM-DC 35222

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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF CIVIL AND DEFENSE MOBILIZATION
Washington 25, D. C.

November 10, 1960

MEMORANDUM

To : All Federal Agencies

From : Telecommunications Office, OCDM

Subject: Space Communication

Considering the importance of space communication to the Nation and the need to exercise extreme caution with respect to the establishment of new or changed allocations of radio spectrum space which might make more difficult the ultimate satisfaction of essential national needs of both conventional and space communication, the attached letter was today addressed to the Interdepartment Radio Advisory Committee (IRAC).

F. C. Alexander
Deputy Assistant Director
for Telecommunications

Attachment

EXECUTIVE OFFICE OF THE PRESIDENT
Office of Civil and Defense Mobilization
Washington 25, D. C.

November 10, 1960

Interdepartment Radio Advisory Committee
Washington 25, D. C.

Attention: Mr. Paul D. Miles
Executive Secretary

Gentlemen:

The increasing importance of space for scientific and other purposes clearly indicates that requirements for telecommunications using that medium must receive active and continuing consideration. Space telecommunication will be of vital importance in expanding worldwide telecommunication systems to meet rapidly increasing needs, in maintaining and expanding national capabilities, and in the furtherance of scientific research.

The most skillful engineering planning and judgment will be necessary to satisfy future needs of both conventional and space telecommunication. Present knowledge suggests that, initially at least, telecommunication needs between earth and space will have to be accommodated somewhere in the radio spectrum above 1,000 Mc/s. As your Committee knows, the usable radio spectrum is in great demand and in intensive and extensive use throughout much of the world.

As an initial approach, this office undertook to obtain, through its memorandum of August 1, 1960, Government agency estimates of their space communication requirements through 1970. The responses so far received indicate that the estimated needs for this purpose are substantial. It is clear that if the total estimated requirements of the Government agencies are to be satisfied somewhere above 1,000 Mc/s under today's technical standards, a major revision of Government frequency allocations and possibly relocation of Government radio operations will be necessary.

In the absence of sufficient data relative to the use of frequencies required for telecommunication between earth and space, the continued regular assignment of frequencies in such bands might well make the eventual frequency problems still more difficult of solution. An interim process is therefore necessary whenever assignments of such frequencies are effected.

Accordingly, it is requested that the IRAC, until further notice, refer the following to this office for review:

1. Requests for frequencies for space telecommunication use other than the frequency bands allocated for space research;

2. Requests for frequencies for conventional telecommunication use in the Government fixed and mobile bands above 1,000 Mc/s.

Please accompany such referrals with your comments and recommendations as appropriate.

The Committee is also urged to forward to this office its recommendations concerning policy and procedures relative to the provision of frequency allocations for space telecommunications as soon as practicable.

Sincerely,

(Signed)

F. C. Alexander
Deputy Assistant Director
for Telecommunications

OCDM-DC 35220

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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF CIVIL AND DEFENSE MOBILIZATION
Washington 25, D. C.

March 3, 1961

MEMORANDUM

To : All Federal Agencies

From : Telecommunications Office, OCDM

Subject: Space Communications

The attached outline of interim criteria will be used by the Office of Civil and Defense Mobilization in the process of reviewing requests for radio frequencies and is presented as a matter of information to all Federal users of radio.

As indicated in the outline, the review at this time will be confined to requests for radio frequency assignments for space communication, as well as for other services within specified portions of the radio spectrum.

The guidelines apply to consideration of specific requests for radio frequency assignments by Federal Government agencies, and are interim in nature. Far more information regarding space communication and the interference patterns that will affect its use must be available before a more definitive approach is possible.

It is recognized that the U. S. space program may, in the future, include space telecommunication systems operated by both Government and non-Government entities. In such event, correlation of Government and non-Government activities will be required in several areas such as financial arrangements, research and development, radio spectrum usage, international aspects, launching controls, satellite controls, operational system control, and system sharing. These matters will require intensive and complete national coordination by all of the entities concerned. However, a sound national (and international) approach to these problems can only be achieved after sufficient additional information has been amassed and evaluated.

Agencies are urged to maintain close coordination between their system planners on the one hand and their frequency allocation people on the other, in order to avoid making costly commitments in parts of the radio spectrum where frequencies may not be available.

The provision of radio spectrum allocations for space telecommunication may require revision of Government frequency allocations and relocation of some Government radio operations. It should therefore be recognized by all concerned that, pending the provision of frequency allocations for space telecommunication, existing and future frequency assignments are subject to possible review and readjustment.

(Signed)

F. C. Alexander
Director of Telecommunications

Attachment

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## INTERIM CRITERIA GOVERNING OCDM REVIEW OF REQUESTS BY GOVERNMENT AGENCIES FOR THE USE OF RADIO FREQUENCIES IN SPACE COMMUNICATION AND THE USE OF RADIO FREQUENCIES IN FIXED AND MOBILE BANDS ABOVE 7125 MC/S FOR OTHER PURPOSES

Recognizing that space communication is vital to the Nation and that suitable frequency bands must be made available for its use, and further recognizing that day-to-day requirements must continue to be met, the Office of Civil and Defense Mobilization indicated some time past that it would be necessary to review:

1. Requests for frequencies for space telecommunication use in other than the frequency bands allocated for space research;

2. Requests for frequencies for conventional (non-space) telecommunication use in the Government fixed and mobile bands above 7125 Mc/s.

The OCDM developed certain interim guidelines to assist in the review of such requests. They are as follows:

1. Assignments for research and development in the field of space telecommunication will be approved when practicable, due consideration being given to the avoidance of harmful interference to essential services, and contingent upon the selection of areas appropriate for the eventual operation.

2. When assignments of radio frequencies for satellite relay communication are made, however, they shall include provision for protection against harmful interference from other operations on the same or adjacent frequencies, where required for the achievement of the objective in each case. Assignment for satellite relay communication generally need not afford such protection to others, provided that sound engineering principles are applied.

3. Approval of assignments of radio frequencies in fixed and mobile bands above 7125 Mc/s shall be on a contingent basis until allocations for satellite relay communication have been decided upon subject to the conditions that:

a. If harmful interference to future space communication operations results from such assignments, the entire matter will be reviewed in order to determine wherein lies the balance of national interest;

b. If the balance is determined to be in favor of the space communication assignments, any approval previously indicated for the non-space assignments will no longer prevail.

March 3, 1961

OCDM-DC 35223

I

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF CIVIL AND DEFENSE MOBILIZATION
Washington 25, D. C.

Office of the Director

July 6, 1960

Honorable Frederick W. Ford
Chairman
Federal Communications Commission
Washington 25, D. C.

Dear Mr. Chairman:

This will refer to your letter to Mr. Alexander dated May 18, 1960, about the reopening of your Docket No. 11866 relative to space communication.

I am of the opinion that space communication will be of vital importance to future activities in space as well as to our radio communication capabilities. I have therefore instructed my staff to exercise extreme caution with respect to the establishment of new or changed allocations of spectrum space above 1000 megacycles pending results of some of the intensive work being performed in both the space and satellite communication fields.

The Executive Branch may be able to work out a process under which new allocations or assignments made above 1000 Mc/s generally would be subject to review and possible change until such time as the needs of space communication are more clearly defined and satisfied. I have asked my staff to study this and attempt to work out coordinated procedures to achieve this objective.

I urge the Commission to join this office in its view that, until space communication needs are known, care should be exercised in satisfying requirements of other radio services to avoid the establishment of new "rights" in the spectrum above 1000 Mc/s which would make more difficult the ultimate satisfaction of vital space communication requirements.

In view of the national importance of spectrum allocation for space communication, we believe that it is highly desirable to coordinate Government and non-Government needs. However, we do not believe the best means of coordination to be the participation of the Federal Government in the proceedings of the Commission.

Honorable Frederick W. Ford

Accordingly, I have directed Mr. Alexander to circularize all Federal users of radio and obtain their best estimated future needs for space communication in an effort to throw additional light upon the matter. This material, when received, will be made available to the Commission and the Executive Branch agencies through the medium of the Subcommittee on Frequency Allocations of the IRAC where both the Commission and the Government views are jointly represented in the long-range planning effort. I urge the Commission to make available to the planning group any pertinent material received as a result of its hearing and thus further long-range planning efforts.

I feel that such an approach will facilitate the earlier establishment of a U. S. position for the projected international conference on space communication through the joint efforts of the Commission, the Department of State, and this office.

Sincerely,

Leo A. Hoegh

OCDM-DC 35234

# SUPPLEMENT NO. 1

TO

STATEMENT

BY

FRED C. ALEXANDER
DIRECTOR OF TELECOMMUNICATIONS
OFFICE OF CIVIL AND DEFENSE MOBILIZATION

EXECUTIVE OFFICE OF THE PRESIDENT
Office of Civil and Defense Mobilization
Washington 25, D. C.

Office of the Director

May 12, 1961

Honorable Newton N. Minow
Chairman
Federal Communications Commission
Washington 25, D. C.

Dear Mr. Chairman:

Enclosed is a copy of a letter dated May 12, 1961, from the Interdepartment Radio Advisory Committee (IRAC) transmitting the results of its study and its recommendations in the matter of frequency allocations for space radiocommunication.

The IRAC report was prepared in collaboration with the FCC Liaison Representative to the IRAC, who participated in each meeting of the IRAC without prejudice to eventual Commission action. Each Government agency represented on the IRAC has concurred in the report and recommendations.

I have approved the IRAC report and recommendations for coordination with the Commission. I believe that the approach taken by the Committee and the FCC Liaison Representative in drafting U.S. preliminary views to serve as a vehicle for obtaining the views of other administrations is excellent. The flexibility provided should assist the U. S. significantly.

As an additional recommendation, I feel that it would be in the national interest to add the Radio Astronomy service to the recommended allocation of the frequency band 1660 - 1670 Mc/s, on an equal status with the Meteorological Satellite Space service, with the Footnote: "In the band 1660 - 1670 Mc/s, the band 1664.40 - 1668.40 Mc/s may be used by the radio astronomy service. The meteorological satellite space service shall not be required to protect the radio astronomy service."

**While the report does not treat astronomy allocations, it is a fact that the inclusion of radio astronomy in the band which includes the OH complex is a natural action that can scarcely encounter objection. If you agree, I suggest you add it to the document for inclusion in your inquiry for public comment.**

**With respect to Enclosure 2 to the report, unless the Commission has other convictions, I propose later to transmit it to the Department of State simply as a recommendation of the IRAC.**

**I have asked Mr. Fred C. Alexander, my Director of Telecommunications, to work with the Commission on this matter.**

**Sincerely,**

**(Signed)**

**Frank B. Ellis**
**Director**

**Enclosure**

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF CIVIL AND DEFENSE MOBILIZATION
INTERDEPARTMENT RADIO ADVISORY COMMITTEE
Washington 25, D.C.

Doc. 5713/5-4.9.1
12 May 1961

Mr. F. C. Alexander
Director of Telecommunications
Office of Civil and Defense Mobilization
Washington 25, D.C.

Dear Mr. Alexander:

Subsequent to the decision of the 1959 Ordinary Administrative Radio Conference (OARC) of the International Telecommunication Union (ITU) to consider the convening of an Extraordinary Administrative Radio Conference (EARC) as early as 1963 to take action with respect to certain space radiocommunication matters, as set forth in Recommendation No. 36 of that Conference, the subject of radio frequency allocations for space radiocommunication has been under active study. The IRAC studies to date, prepared in consultation with the FCC Liaison Representative, are summed up in the enclosed statement entitled "Preliminary Views of the United States of America — Frequency Allocations for Space Radiocommunication", Enclosure 1.

Subject to coordination with the Federal Communications Commission (FCC), Enclosure 1 is intended to be cleared through normal Department of State channels at the earliest practicable date in order that it may be used by U.S. representatives as the basis of discussion with other countries. It is not intended to be a recommended United States position for the proposed 1963 space conference. Rather, its purpose is to serve as the vehicle by which the ideas and reactions of other countries can be obtained.

After evaluation by the United States, these ideas and reactions can then be used as the basis for further refinements of the thinking presently outlined in Enclosure 1. By this process, and by continuing consultation and discussion at the international level, it is expected that the eventual U.S. position for the proposed 1963 space conference may be formulated. During this process, it is anticipated that further U.S. information and ideas also will affect the refinements of the presently formulated preliminary views set forth in Enclosure 1.

It is recommended that you point out to the Department of State that, because of the special problems involved in frequency allocations for space radiocommunication, a major effort should be made to arrange for advance consultation with foreign governments to acquaint them with the U.S. thinking and the reasons therefor. For this purpose the Committee also has prepared a plan of action for the required advance consultation with other countries (Enclosure 2).

It is recommended that, upon completion of coordination with the Commission, Enclosures 1 and 2 be forwarded to the Department of State for prompt and formal consideration. In this connection the IRAC has fully in mind the fact that, purely from a technical standpoint, the United States proposals with respect to frequency support for space radiocommunication are based on the present knowledge of the art and limited operational experience. However, in view of other considerations, it is submitted that prompt release by the U.S. Government of an official statement regarding present thinking on this subject is necessary. Enclosure 1 has been prepared on this basis.

There is also enclosed, for coordination with the FCC but not for transmittal to the Department of State, recommended procedures for the accommodation of space communication in certain of the bands involved in these proposals (Enclosure 3).

The FCC Liaison Representative has advised the Committee that he is prepared to recommend to the Commission that Enclosure 1 be adopted for the purpose of obtaining public comment and/or the views of other administrations.

Very truly yours,

Paul D. Miles

Paul D. Miles
Executive Secretary

# PRELIMINARY VIEWS
# OF THE
# UNITED STATES OF AMERICA

# FREQUENCY ALLOCATIONS
# FOR
# SPACE RADIOCOMMUNICATION

## PRELIMINARY VIEWS OF THE U.S.A. FOR FREQUENCY ALLOCATIONS FOR SPACE RADIOCOMMUNICATION

1. INTRODUCTION - Studies of the world trend in telecommunication requirements and the known plans for expansion of existing telecommunication facilities throughout the world have repeatedly indicated that beginning about 1965 the loading of these facilities will approach saturation in many areas. This is particularly true of such facilities as submarine cables and high-frequency radio circuits. With regard to cables, economic factors will govern the number of cables which will be installed and the location of the terminals which they will serve. The matter of congestion in the high-frequency spectrum has concerned Members of the International Telecommunication Union (ITU) for many years. There is no foreseeable reduction in the use of high frequencies for global communication. On the other hand, expansion of service in the high frequency bands will become increasingly impracticable. Accordingly, it becomes necessary to seek alternative means to satisfy growing telecommunication needs of the peoples of the world, particularly of new or developing countries. These alternative means are needed for growth. Global communication via earth-satellite relays promises to afford such an alternative which will be required beginning about 1965. It is the purpose of this paper to set forth in broad outline certain initial conclusions with regard to frequency allocations for this promising new telecommunication development, and other space radiocommunication needs.

1.1 Since the first demonstration of the practicability of transmitting intelligence from one part of the earth to another by the use of radio waves relayed by artificial satellites, the U.S.A. has been studying the technical parameters which appear to be relevant to eventual frequency allocations for all categories of space radiocommunication, in the context of Recommendation No. 36 of the Ordinary Administrative Radio Conference (OARC), Geneva, 1959.

1.2 The uses of space radiocommunication may be grouped as follows:

a. Aeronautical Mobile.
b. Broadcasting.
c. Meteorological.
d. Navigation.
e. Space Research - guidance, control and associated communications, including tracking and telemetering.
f. Communication relay (both active and passive).

1.3 While radio astronomy is not classified by the ITU as a space service, nevertheless, because of its scientific importance, the matter of radio astronomy allocations is under study.

1.4 An operating world-wide communication satellite space service is probably one of the first areas in which a practical use may be made of satellites, involving high-capacity, reliable information exchange

between points on the earth's surface, including ships, aircraft and aerospacecraft. Relay may be effected by several means — e.g., low or intermediate altitude satellites in random or controlled orbit, high altitude satellites in synchronous orbit, natural or man-made passive reflectors, etc. International standardization of frequency allocations is a prerequisite to the introduction of world-wide operational communication satellite systems.

1.5 Certain relevant radio wave propagation data were made known at the Plenary Assembly of the CCIR at Los Angeles in 1959. Subsequently, the 1959 OARC at Geneva established certain allocations for space research. These allocations, however, were not intended to accommodate the larger bands of frequencies required by satellite communication systems equipped for high-capacity, multi-channel transmission.

2. AERONAUTICAL MOBILE - The advances in the field of air transportation in recent years point to the approaching need to accommodate communications for aircraft and aerospacecraft operating at extremely high speeds and altitudes. Present indications are that the speeds and altitudes of aeronautical operations will increase on an evolutionary basis to speeds many times in excess of that of sound and altitudes beyond 160 kilometers. Further, these operations are unique in that the aircraft or aerospacecraft must operate in the earth's atmosphere during the departure and re-entry phase of the flight and in space or near space during the middle portion of the flight.

2.1 Such flights, when operating in the atmosphere and traveling at high speeds, are expected to require frequency bands much higher than those aviation bands presently allocated due to ion shielding created by thermal friction. For example, present indications are that 5 Gc/s frequencies are the lowest usable order of the spectrum which will satisfy radio communication with vehicles traveling in the atmosphere at 17 times the speed of sound. Until substantially more research and development has been accomplished in this field, however, it is not possible to set forth the entire space radiocommunication needs for the aeronautical mobile services.

2.2 On the other hand, during the earlier stages of aeronautical evolution toward space operations, space radiocommunication techniques will be required. That is to say, aircraft operating at speeds of 2 - 7 times the speed of sound and at altitudes beyond 80 - 100 thousand feet will probably require a constant communication link with ground stations. Flights of this nature can be controlled by a computer and automatic data communications throughout the entire flight. Since constant radiocommunications of this type would be incompatible with the present aviation system of common user frequency deployment, additional spectrum space is required. Accordingly, the U.S. proposes to provide for aeronautical mobile (R) service operation in the band 1540-1660 Mc/s on a shared basis with radionavigation for this mode of aeronautical communications.

3. BROADCASTING - "Broadcasting" as the term is used in the Radio Regulations means transmissions intended for direct reception by the general public. It is probable that communication satellites will be used to relay aural and television broadcast programs. However, the likelihood that the general public will be receiving such transmissions directly from satellites in the near future seems remote. Special receiving stations on the earth's surface may be established to relay programs over conventional communications systems to the broadcasting stations which already serve the general public. The relaying of broadcast programs by means of satellites would not be an operation in the broadcasting service.

4. METEOROLOGICAL - A "universal" meteorological satellite has been the subject of international study in the World Meteorological Organization (WMO). The United States has participated in this planning and is anticipating the ultimate use of meteorological satellites on an operational basis.

4.1 Two types of satellites are under consideration for the operational meteorological satellite system - polar or quasi-polar orbiting satellites and the so-called synchronous orbiting satellites. Three types of transmissions are planned with each of these systems:

a. From Command Data Acquisition station (CDA) to the satellite(s) during periods when the satellite is within line-of-sight of the CDA station.

b. From the satellite to the CDA station on command during the time the satellite is within line-of-sight of the CDA station.

c. Continuous transmission from the satellite.

4.2 Several frequency channels with various bandwidths will be needed to meet these requirements, as follows:

4.2.1 The command frequency requirements can be met in the manner proposed in paragraph 8 below.

4.2.2 Two channels of 90 kc/s bandwidth each will be required for digital and slowed down video transmission from the satellite to the ground. It is proposed to satisfy this requirement in the band 137-138 Mc/s. These transmitters will have up to a possible maximum of 50 watts power output and may operate continuously or on command.

4.2.3 Four channels of 5 Mc/s bandwidth each (includes guard band) will be required for broad-band video transmission from the satellite to the ground. Power output of these transmitters will be up to a possible maximum of 50 watts, and initially will operate only on command and in the vicinity of the CDA stations. The bands 1660-1670 and 1690-1700 Mc/s are proposed for the satisfaction of this requirement.

4.2.4 A 100 Mc/s band is required for satellite weather radar. It is proposed that this requirement for suitable precipitation detection, be met in the radiolocation band 9.8-10.0 Gc/s in the manner indicated in paragraph 8.

4.2.5 A channel of approximately 100 Mc/s bandwidth is required to transmit a large volume of high resolution picture data from the satellite to the CDA station on each orbital pass. It is proposed that this requirement be met in the band 7.2-7.65 Gc/s in the manner indicated in paragraph 8.

4.2.6 One channel of 100 Mc/s bandwidth is required for cloud detection radar. These pulsed radars will have power output as high as 100 kW peak power and operate throughout the orbit. It is proposed that this requirement be met in the band 33.4-36.0 Gc/s.

5. NAVIGATION - At such time as there is available an operational space satellite navigational aid of widespread interest to aviation and shipping, appropriate frequency allocation provision for such a navigational system may be derived from bands available to the radionavigation service. The roles of the International Civil Aviation Organization (ICAO) and the Inter-governmental Maritime Consultative Organization (IMCO) with respect to such aids are recognized in this regard.

6. SPACE RESEARCH - The experience of the U.S.A., to date, with the " space research" bands allocated at the 1959 OARC at Geneva, together with present planning estimates, indicate these should be augmented. At this writing (April 1961) there have been 54 earth satellites launched, all with transmitters on board. There has never been any report of interference to other services from the space service although the space vehicles have experienced interference from these other services. Consequently, the U.S.A. suggests more protection to the space bands as well as some deletions and augmentations. Command frequencies are mentioned for the first time, and these can be accommodated on an area basis, but should be noted in the table. Present use of the 1959 OARC space research bands is summarized in Appendix 1. Recommendations for their augmentation are set forth in Appendix 2.

7. COMMUNICATION SATELLITES - The establishment of frequency allocations for communication satellites requires evaluation of various types of information. The principal factors to be considered can be grouped under the following main headings:

a. Radio wave propagation characteristics.
b. State of the art.
c. Amount of spectrum space required.
d. Feasibility of sharing.
e. Selection of bands.

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7.1 The conclusions which can be drawn after evaluation of these five factors are not in all respects mutually consistent. For example, analysis of some of the parameters involved will lead to a conclusion that the allocation for communication satellites should be established in one part of the spectrum, while analysis of other parameters will indicate a need for a quite different part of the spectrum. The following paragraphs sum up presently available information on each of the factors which appear to be relevant.

7.2 RADIO WAVE PROPAGATION CHARACTERISTICS - Radio wave propagation data now available indicate there are several "windows" in different parts of the radio spectrum through which radio signals may be transmitted from the surface of the earth to points outside the earth's atmosphere, and vice versa. The most significant of these "windows" from the standpoint of the present state of development of the radio art and the limitations presently imposed by space technology, appears to lie roughly between 100 Mc/s and 20 Gc/s. Appendix 3 contains 20 curves depicting the various relevant parameters and their variations under different stated conditions. It is apparent from evaluation of this Appendix that within the general range of frequencies between about 100 Mc/s and 20 Gc/s there are varying degrees of attenuation affecting radio signals transmitted from the earth's surface to a satellite in space, or vice versa. The choice of frequency bands within the broad area represented by the "window" between about 100 Mc/s and 20 Gc/s must necessarily take into account considerations other than the absorption and attenuation factors set forth in Appendix 3. Consideration of bandwidth and state of the art indicate the desirability of employing bands above 4 Gc/s. Satellite-to-satellite relaying can be performed above 20 Gc/s without interference to or from earthbound radio services.

7.3 STATE OF THE ART - Provision of spectrum space by the ITU for communication satellites, when effected, should serve to guide Administrations for some years to come. It therefore appears necessary to take into account both the present state of the radio art and the anticipated developments for the next several years. From available information it would appear that the present state of the art lends itself to the inauguration of the communication satellite space service only in those frequency bands below about 10 Gc/s. This is because the available receiver input power, with practical systems which can be built at the present time, will not overcome the various absorption and attenuation factors sufficiently to provide continuous, reliable communication, under practical operating conditions, at frequencies much above 10 Gc/s. This situation may be seen from Figures 17 through 20 in Appendix 3, when account is taken of the fact that satellite powers of the order of only a few watts are presently available. The intensive research and development programs now under way will, however, lead to various improvements in the state of the art, including much greater satellite transmitter power and supporting energy sources therefor, and it may be expected that frequencies up to about 16 Gc/s may become usable for practical satellite systems.

7.4 AMOUNT OF SPECTRUM SPACE REQUIRED - An appreciation of the amount of spectrum space required for allocation to communication satellite systems of the future requires taking into account the present and foreseeable capacities of other communication systems and the anticipated growth and demand for service, at least until about 1970. The existing systems include transoceanic cables, conventional microwave radio relay systems, tropospheric scatter systems, ionospheric scatter systems, land line circuits and high-frequency fixed radio circuits.

7.4.1 The requirements of the peoples of the world to communicate are not susceptible to exact mathematical prediction. It has been well established over the years, however, that given a new communication facility, the requirements to use it are seldom lacking. If a large number of new international communication facilities of any type could be made available at once, there is little doubt that they would soon be in regular use.

7.4.2 An important consideration is that the financial costs involved in building and launching communication satellites are such that a large number of communication channels will have to be provided if the satellites are to prove economically feasible.

7.4.3 Compared with conventional communication techniques, a relatively small number of communication satellite channels can presently be derived from a given amount of spectrum space. This is due to modulation techniques presently employed which are chosen because of the relatively low orders of power presently realizeable in satellite transmitters. As advances in the state of the art are made it can be expected that the number of actual communication satellite channels that can be derived from a given amount of spectrum space will progressively increase. Nevertheless, the efficiency (ratio of intelligence bandwidth to radio frequency bandwidth), at the present time, is of the order of 10-15%. This consideration is influential in estimates of the amount of spectrum space to be allocated initially for communication satellites. Moreover, the expected increase in channel efficiency should serve to offset future growth requirements as communication satellite uses expand and the demands placed on them increase. A further consideration is that the available channels in a given satellite must, in effect, be divided among the various (earth) satellite terminal stations in simultaneous communication with that satellite.

7.5 FEASIBILITY OF SHARING - On the basis of information currently available, there is little doubt that it is feasible for a communication satellite space service to share frequency bands with fixed and mobile services to which these bands are now allocated, provided reasonable engineering care is exercised by each of the sharing services. Because of the low transmitting power capability of satellites expected to be used during the next several years, it appears necessary to employ wideband modulation techniques on board the satellites to improve the signal-to-noise ratios to a usable level at the earth receiving terminal, even when using high gain antennas and parametric or maser amplifier techniques. As a result, the satellites' signals at the earth's surface will not be detectable by

receivers in the fixed and mobile services. Satellite-to-earth signals can thus be discounted as potential interference sources for several years to come, despite probable improvements in both microwave and satellite techniques, within reasonable limits. Conversely, the likelihood of harmful interference to the reception on board satellites which might be caused by terrestial fixed and mobile stations also appears to be negligible. The problem remaining then becomes one of preventing mutual interference between the receiving and transmitting earth terminals of the space system and stations of the services with which sharing is desired. Factors to be considered in preventing this interference are: geographical separation, minimum permissible antenna elevation angles for earth terminals, transmitter powers, antenna orientation, local terrain, and receiver noise figures. However, mobile requirements are foreseen which dictate the need for minimal allocation provisions on an exclusive basis.

7.5.1 Sharing criteria applicable to the above problem are currently under study in U.S. CCIR Study Group IV. Based on information currently under development for introduction into that Study Group, it appears that 75 miles separation between earth stations will provide adequate protection from mutual interference. This assumes that earth station antennas will not be depressed below $7\frac{1}{2}^{o}$ and a mean power of 1 kW into the earth station antenna. This also assumes a smooth earth condition, and that the antennas are separated in azimuth by at least $10^{o}$. The separation criteria, of course, will vary with powers and topography.

7.6 SELECTION OF BANDS - The U.S.A. estimates that a total of about 3000 Mc/s of spectrum space should be allocated at this time to meet foreseeable requirements until about 1970. Between 3700 and 8400 Mc/s, the existing fixed and mobile space should be designated in the Table of Frequency Allocations as follows:

| | | |
|---|---|---|
| 3.7-4.2 | Gc/s | COMMUNICATION SATELLITE SPACE (Space stations)<br>FIXED<br>MOBILE |
| 5.925-6.425 | Gc/s | COMMUNICATION SATELLITE SPACE (Earth stations)<br>FIXED<br>MOBILE |
| 6.425-7.2 | Gc/s | COMMUNICATION SATELLITE SPACE (Earth and Space stations)<br>FIXED<br>MOBILE |
| 7.2-7.65 | Gc/s | COMMUNICATION SATELLITE SPACE (Space stations)<br>FIXED<br>METEOROLOGICAL SATELLITE SPACE (100 Mc/s)<br>MOBILE |
| 7.65-7.7 | Gc/s | COMMUNICATION SATELLITE SPACE (Space stations) |

| | | | |
|---|---|---|---|
| 7.7-7.9 | Gc/s | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | (Earth and Space stations) |
| 7.9-8.35 | Gc/s | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | (Earth stations) |
| 8.35-8.4 | Gc/s | COMMUNICATION SATELLITE SPACE | (Earth stations) |

This arrangement of bands provides:

a) A total of 1000 Mc/s for satellite-to-earth transmissions of which 50 Mc/s (7.65-7.7 Gc/s) is exclusively for that purpose and the remaining 950 Mc/s shared with the fixed and mobile services.

b) A total of 1000 Mc/s for earth-to-satellite transmissions of which 50 Mc/s (8.35-8.4 Gc/s) is exclusively for that purpose, and the remaining 950 Mc/s shared with the fixed and mobile services.

c) Two bands, shared with fixed and mobile services, not designated at this time, either for earth stations only or satellite stations only. These two bands (6.425-7.2 and 7.7-7.9 Gc/s) are so placed as to permit later adjustment as needed dependent upon the nature and magnitude of requirements and advancements in the state of the radio art.

d) A total of 2975 Mc/s for the communication satellite space service.

8. CONCLUSIONS - The U.S.A. has concluded that, in order to:

a. Accommodate aerospacecraft,

b. Accommodate meteorological satellites,

c. Augment the Space and Earth-Space (space research) bands contained in the Geneva Radio Regulations, and

d. Provide frequency allocations in the immediate future for the reliable exchange, via communication satellite relay, of high-capacity information between points on the earth's surface, including ships, aircraft and aerospacecraft,

the Table of Frequency Allocations should be amended as follows:

| BAND (Mc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 136-137 | SPACE RESEARCH | |
| 137-138 | METEOROLOGICAL SATELLITE SPACE<br>SPACE RESEARCH<br>SPACE (tracking) | |
| 138-144 | FIXED<br>MOBILE<br>Radiolocation* | The frequencies 144.0 and 148.0 Mc/s, with a maximum bandwidth of 20 kc/s, may be used for satellite command purposes subject to agreement between administrations concerned and those whose services, operating in accordance with the Table, may be affected.<br><br>287** |
| 144-148 | AMATEUR | |
| 148-174 | FIXED<br>MOBILE | |
| 400-401 | METEOROLOGICAL AIDS<br>SPACE RESEARCH | |
| 406-420 | FIXED<br>MOBILE except aeronautical mobile | The frequencies 420.0 and 450.0 Mc/s, with a maximum bandwidth of 25 kc/s, may be used for satellite command purposes subject to agreement between administrations concerned and those whose services, operating in accordance with the Table, may be affected.<br><br>317**<br>318** |
| 420-450 | RADIOLOCATION<br>Amateur | |
| 450-470 | FIXED<br>MOBILE | |
| 1427-1525 | FIXED<br>MOBILE | |
| 1525-1540 | SPACE | In the band 1525-1535 Mc/s, telemetry only; in the band 1535-1540 Mc/s, command only. |

* Permitted service.
** Footnote as contained in Geneva Radio Regulations.

| BAND (Mc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 1540-1660 | AERONAUTICAL MOBILE (R)<br>AERONAUTICAL RADIONAVIGATION | The use of the band 1540-1660 Mc/s by the aeronautical mobile (R) service is limited to radiocommunications along civil routes for flights utilizing space radiocommunication techniques and which may be operating in the space environment.<br><br>In the band 1600-1660 Mc/s the aeronautical radionavigation service will be protected from harmful interference from the aeronautical mobile (R) service for an unspecified period of time.<br><br>341** |
| 1660-1670 | METEOROLOGICAL SATELLITE SPACE | |
| 1670-1690 | METEOROLOGICAL AIDS (Radiosonde) | |
| 1690-1700 | METEOROLOGICAL SATELLITE SPACE | |
| 1700-1710 | SPACE RESEARCH | |
| 1710-2290 | FIXED<br>MOBILE | The band 2110-2120 Mc/s may be used for command of spacecraft engaged in deep space research, subject to agreement between administrations concerned and those whose services, operating in accordance with the Table, may be affected. |
| 2290-2300 | SPACE RESEARCH | For deep space research only. |

** Footnote as contained in Geneva Radio Regulations, but with the limits of the appropriate band changed to read: 1540-1660 Mc/s.

| BAND (Gc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 3.7-4.2 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | For transmission only by communication satellite stations whose field strength at the earth's surface is below that detectable by receivers in the fixed and mobile services. |
| 5.925-6.425 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | For transmission only by earth stations, subject to agreement between administrations affected. |
| 6.425-7.2 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | Transmission by earth stations in this band is subject to agreement between administrations affected. When used for communication satellite stations, the field strength at the earth's surface shall be below that detectable by receivers in the fixed and mobile services.<br><br>The band 7.12-7.13 Gc/s may be used for command of spacecraft subject to agreement between administrations affected. |
| 7.2-7.65 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>METEOROLOGICAL SATELLITE SPACE<br>MOBILE | For transmission only by communication satellite and meteorological satellite stations whose field strength at the earth's surface is below that detectable by receivers in the fixed and mobile services.<br><br>Meteorological satellite stations share 100 Mc/s of this band. |
| 7.65-7.7 | COMMUNICATION SATELLITE SPACE | For transmission only by communication satellite stations. |
| 7.7-7.9 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | Transmission by earth stations in this band is subject to agreement between the administrations affected.<br><br>When used for communication satellite stations, the field strength at the earth's surface shall be below that detectable by receivers in the fixed and mobile services. |

| BAND (Gc/s) | ALLOCATION | FOOTNOTES |
|---|---|---|
| 7.9-8.35 | COMMUNICATION SATELLITE SPACE<br>FIXED<br>MOBILE | For transmission only by earth stations and subject to agreement between administrations affected. |
| 8.35-8.4 | COMMUNICATION SATELLITE SPACE | For transmission only by earth stations. |
| 8.4-8.5 | SPACE RESEARCH | |
| 9.8-10.0 | RADIOLOCATION | The band 9.9-10.0 Gc/s may be used for satellite weather radar for precipitation detection. |
| 15.15-15.25 | SPACE RESEARCH | |
| 31.5-31.8 | SPACE RESEARCH | |
| 33.4-36.0 | RADIOLOCATION | Satellite weather radars for cloud detection share 100 Mc/s of this band. |

9. Certain proposed consequential changes to the Geneva Radio Regulations are indicated in Appendix 4.

10. These preliminary views of the U.S.A. are put forth at this time for informal discussion in the hope that such discussions, together with additional experience and subsequent developments in the state of the art, will lead to firm conclusions which can become the basis of action in whatever administrative radio conference takes up the question referred to in Recommendation No. 36 of the 1959 CARC, Geneva.

Appendices 1 through 4

## APPENDIX 1

### GUIDE FOR USE OF THE 1959 I.T.U. SPACE AND EARTH-SPACE RESEARCH BANDS

| BAND, Mc/s | PRIMARY USE | REASON | SECONDARY USE |
|---|---|---|---|
| 10.003-10.005 | Ionosphere research. | Marked propagation effect; can be used world-wide with standard receivers and antennas. | Ultra-range telemetry, low altitude satellite. |
| 136-137 | Tracking in center-third of the band; telemetering in the other two-thirds. | Replaces the IGY 108 Mc/s; minimum noise area for tube receivers. World-wide tracking net is available. | Ionospheric measurements in association with the above band. Narrow band telemetering. |
| 183.1-184.1 | No planned use. | | |
| 400-401 | Telemetering; low scan rate TV for geophysical and astronomical satellites; navigation satellites. | Conventional transistors are practical. | Deep space research with very large antennas. |
| 1427-1429 | Telemetering; narrow-band TV; deep space; development of precision minitrack. | Excellent for deep space with very large antennas. Very low propagation effects. | |
| 1700-1710 | Wide-band TV for meteorological satellites. | For meteorological and data transmission where wide-band is needed; likewise for radio-relay. | Planet radar. |
| 2290-2300 | Primary telemetering and tracking band for deep space research. | Nearly the ideal frequency area for 85 foot parabolic reflector antennas. Very low cosmic noise. | "Double-doppler" cross-band velocity measurements. |

## APPENDIX 1

| BAND, Gc/s | PRIMARY USE | REASON | SECONDARY USE |
|---|---|---|---|
| 5.25-5.255 | No planned use. | | |
| 8.4-8.5 | Communication satellite research - earth-to-earth relay experiments. Deep space probes. | The 100 Mc/s bandwidth here permits wide-band communications relay. | Space navigation application; planet radar; meteorology (with 15.15 and 31.5 Gc/s bands). |
| 15.15-15.25 | Space relay. | High directivity. | Meteorology (used with 8.4 and 31.5 Gc/s bands). |
| 31.5-31.8 | Space relay; re-entry telemetering. | High directivity - small antennas. Penetration of plasma layer. | Meteorology (used with 8.4 and 15.15 Gc/s bands). |

## APPENDIX 2a

### SUMMARY OF CHANGES IN AND ADDITIONS TO THE 1959 ITU SPACE RESEARCH BANDS - SPACE RESEARCH REQUIREMENTS TO 1967

| Present Space Band Mc/s | Changes Required | New Band Limits Mc/s | Remarks |
|---|---|---|---|
| 10.003-10.005 | No change | Same | Being used for ionospheric research |
| 19.99-20.01 | No change | Same | Being used for ionospheric research |
| 39.986-40.002 | No change | Same | Being used for ionospheric research |
| 136-137 | Add 1 Mc/s | 136-138 | Principal tracking and telemetry band, earth-satellites. The additional megacycle required by 1965. |
| 183.1-184.1 | - | - | No planned use. |
| 400-401 | For space research, no change | Same | |
| 1427-1429 | Delete | Add: 1525-1535 | Exclusive for space research. |
| 1700-1710 | Make exclusive | Same | To be used for presently scheduled meteorological research satellite. |
| 2290-2300 | See remarks (Change of priority) | Same | Being activated for deep space research - Should be exclusive for this purpose only. |

APPENDIX 2a
(Cont'd)

| Present ITU Space Band Gc/s | Changes Required | New Band Limits (Gc/s) | Remarks |
|---|---|---|---|
| 5.25-5.255 | - | - | No planned use. |
| 8.4-8.5 | No change | Same | To be used for communication satellite research. |
| 15.15-15.25 | No change | - | |
| 31.5-31.8 | No change | - | |

APPENDIX 2b

PROPOSED NEW INTERNATIONAL SPACE RESEARCH BANDS

| In ITU Bands: | Need: | Remarks: |
|---|---|---|
| 137-174 Mc/s | Two frequencies for earth-to-space satellite command purposes. One should be at 144 Mc/s and the other at 148 Mc/s, each 20 kc/s bandwidth. | The selection of these band-edge frequencies, 144 and 148 Mc/s, would produce the minimum impact on existing services — a "command" is usually a single pulse of less than one second duration — adjacent services will not be aware of its presence. |
| 406-470 Mc/s | Two frequencies for earth-to-space satellite command purposes. One should be at 420 Mc/s and the other at 450 Mc/s. The bandwidth should be 25 kc/s. | The selection of these band-edge frequencies, 420 and 450 Mc/s, should produce a minimum impact on the existing services, reasoning as above. |
| 1435-1660 Mc/s | The band 1525-1540 Mc/s for space use, for both telemetering and command purposes. | The too-narrow band 1427-1429 Mc/s should be deleted. The band 1525-1535 Mc/s would be used for space-to-earth telemetering, and the band 1535-1540 Mc/s for earth-to-space services, such as command, interrogation and control of the space vehicle. |
| 1700-2300 Mc/s | The band 2110-2120 Mc/s for deep space command, footnote status. | Suggested footnote: The band 2110-2120 Mc/s may be used for earth-to-space-probe command purposes subject to agreement between administrations concerned and affected. This band would be paired with the 2290-2300 Mc/s deep-space research band for command purposes. |
| 5.925-8.4 Gc/s | A command band 7.12-7.13 Gc/s for command of research satellites using the 8.4-8.5 Gc/s space research band, footnote status. | Suggested footnote: The band 7.12-7.13 Gc/s may be used for command of spacecraft subject to agreement between administrations concerned and affected. This band is paired with the 8.4-8.5 Gc/s space research band for command, interrogation and control purposes. |

## APPENDIX 3

### TECHNICAL FACTORS INFLUENCING THE SELECTION OF FREQUENCIES FOR SPACE COMMUNICATIONS

Adequate signal to noise ratio is a major factor in the satisfactory operation of any communication system. In this appendix available signal to noise ratio is assumed to be suitable criteria for selecting frequencies for space communication. Factors influencing the upper frequency limit in the range 1000 Mc/s to 40 Gc/s are emphasized. Transmissions are assumed to be from the satellite to the earth terminal. However, propagation may be assumed to be reciprocal and the available signals shown will apply to transmission in either direction.

Three major factors influence the available signal to noise ratio in a space communication: (1) The signal power available under free space propagation conditions (2) The absorption in the atmosphere and (3) The radio noise level.

Free Space Signals:

Figure 1 illustrates the frequency dependence of available power at the receiver when isotropic antennas are used at both the transmitting and receiving terminals. Note the available power decreases as frequency increases.

Figure 2 shows how antenna gain increases as either antenna physical size or operating frequency is increased. If a directive antenna is used at either the transmitting or receiving terminal or both, the gain from this chart may be combined with the values of Figure 1 to estimate available signal power when directive antennas are used.

Figure 3 illustrates the decrease in antenna beamwidth as operating frequency or antenna size increase.

Figure 4 illustrates the lack of frequency dependence when a directive antenna is used at the earth terminal and an isotropic antenna in the satellite. Note that available power increases with antenna physical size but that the antenna's beamwidth becomes increasingly narrow.

Figure 5 is a portion of Figure 4 illustrating that available signal remains constant to the higher frequencies if ability to use narrow beamwidth improves. The chart assumes physical size of the antenna is limited.

Figure 6 is also a portion of Figure 4, illustrating that increasing the physical size of the antenna offers an advantage only at the lower frequencies if operational or other requirements establish a minimum beamwidth.

Figure 7 illustrates the frequency dependence of available signal power if directive antennas are used at both terminals. Note that available power increases with frequency.

Figure 8 illustrates the leveling off of available signal power at lower and lower frequencies as physical size of the earth terminal antenna increases with an operational or other limitation of antenna beamwidth.

Figure 9 illustrates that available signal power levels off at higher and higher frequencies as operational or other factors decrease the required or available beamwidth for an antenna of fixed physical size.

Figure 10 illustrates that a plateau in the frequency range develops if both terminals have maximum antenna size and minimum antenna beamwidth limitations. Note that for fixed minimum beamwidth limitations the plateau shifts to lower frequencies as antenna sizes increase. Antenna sizes and beamwidths may be selected to narrow the plateau until available signal power is maximum at a discrete frequency.

Figure 11 illustrates shift of the plateau to the higher frequencies if antenna physical sizes are fixed and beamwidth limitations are reduced.

Signal Absorption In The Atmosphere:

Figure 12 is a nomogram to estimate atmospheric absorption of the signal as a function of frequency, terminal elevation and vertical reception angle. The nomogram is based on theoretical absorption in an atmosphere typical of Washington, D. C. in August. Values from this chart can be combined with chart 1 and charts 4 through 11 to estimate available signal power in the absence of rainfall. Additional theoretical and experimental work are necessary to more completely determine atmospheric absorption. This chart is a first approximation.

Figure 13 is a nomogram to estimate signal absorption due to rainfall. These values should be added to those of Figure 12 to estimate total absorption during rainfall. The total absorption may be further combined with the free space available signal power from chart 1 and charts 4 through 11 to estimate available signal during rainfall. Estimation of absorption due to rainfall is complicated by variation of drop size distributions for the same rainfall rate and by turbulence which may produce a different water content in the air than indicated by surface measurements. Figure 13 applies to a typical drop size distribution in steady rainfall.

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Vertical Angle to a "Stationary" Equatorial Satellite

Figure 14 is a diagram of vertical reception angles, measured above the ground, to an equatorial stationary satellite at 105° west longitude.

Radio Noise:

Figure 15 is a nomogram to estimate noise power at the receiver. If effective antenna temperature is known enter with this temperature and bandwidth. If effective temperature is not known it can be estimated from frequency and vertical reception angle in the left hand portion of the nomogram.

Signal to Noise Ratios:

Figure 16 combines the data of the previous charts to illustrate the frequency dependence of available signals and noise in a simple satellite system. The orbit is 1000 kilometers from the earth, the earth terminal has a sea level location, the satellite has an isotropic antenna, the antenna at the earth terminal is limited to 20 meters in diameter and the minimum beamwidth is 0.2 degrees. Note the available signal starts to decrease between 5 and 6 Gc/s at all vertical angles and at the lower vertical angles starts to decrease at even lower frequencies during heavy rainfall. The same general shape of the curve holds for a broad fixed beamwidth antenna on the satellite, e.g. 20 degree beamwidth for antennas one meter in diameter or larger. Available power will increase but frequency dependence is not altered.

Figure 17 illustrates available signal to noise in a more sophisticated satellite system using highly directive antennas in a 6000 kilometer orbit. Note that adequate signal power is extended to higher frequencies especially in absence of rainfall.

Figure 18 illustrates slightly different assumptions than those reflected in Figure 17.

Figure 19 illustrates available signal power in an even more sophisticated satellite system using "stationary" orbit and extremely directive antennas. Note that available signal power remains adequate at even higher frequencies especially at vertical angles exceeding 5 degrees.

Figure 20 is the same as Figure 19 except the system has been further improved by the elevation of the earth terminal and its location in an area of "moderate" rainfall.

Conclusions:

(1) For all-weather unstabilized satellite communication systems, available signal to noise will decrease as frequency is increased above about 6 Gc/s. The exact frequency is dependent upon maximum antenna size and minimum beamwidth limitations at the earth terminal.

(2) As systems become more sophisticated through stabilized satellites and ability to use narrow beam antennas the upper frequency limit increases.

(3) The upper frequency limit may extend to above 15 Gc/s for sophisticated systems if reception is not required at very low angles.

(4) Theoretical disadvantages at the higher frequencies estimated on the basis of clear channel operation may be offset by the increased likelihood of successful frequency sharing at these frequencies since:

(a) Sharper antenna directivity tends to reduce the vertical angle at which interference or noise from the earth will dominate the signal from the space vehicle;

(b) Sharper antenna directivity reduces the degrees in azimuth from which interference is likely;

(c) Wider bandwidths available at the higher frequencies permit "spread spectrum" modulation techniques which promise gains in immunity to interference;

(d) Atmospheric absorption tends to reduce low angle interfering signals relative to the higher angle satellite signals.

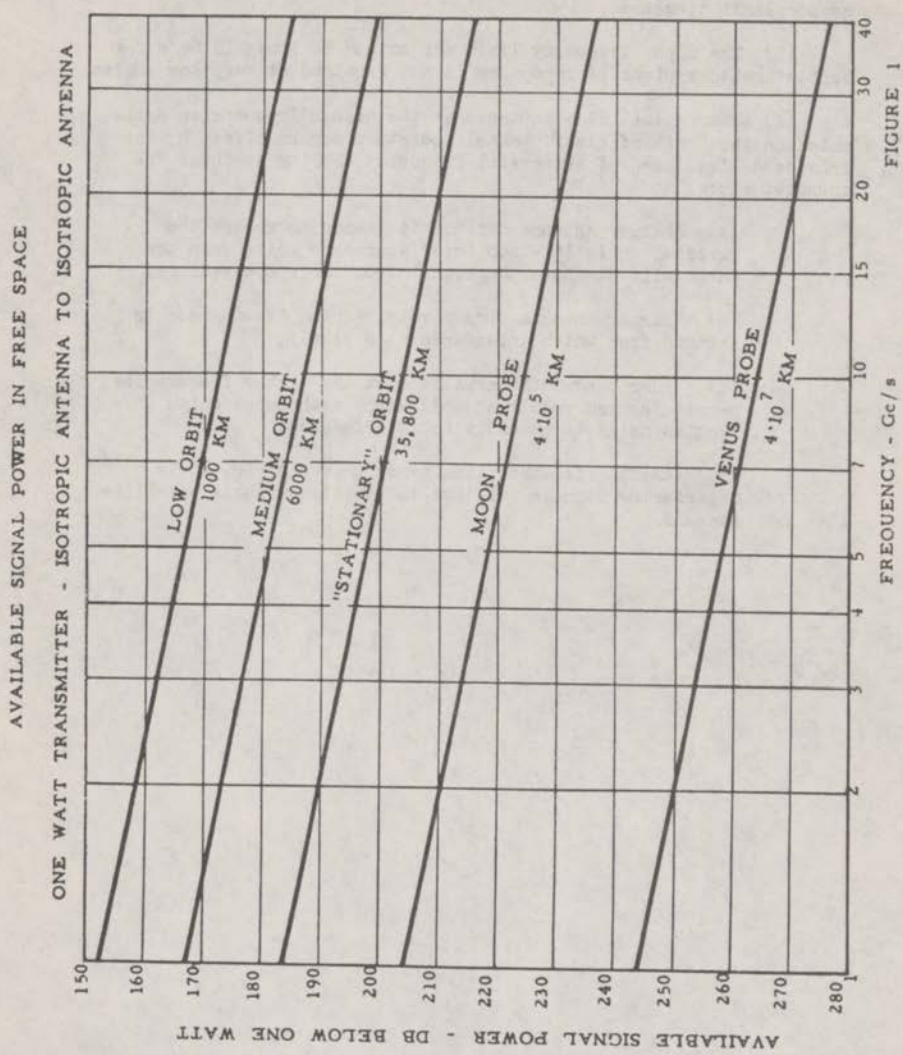
AVAILABLE SIGNAL POWER IN FREE SPACE
ONE WATT TRANSMITTER - ISOTROPIC ANTENNA TO ISOTROPIC ANTENNA
LOW ORBIT
1000 KM
MEDIUM ORBIT
6000 KM
"STATIONARY" ORBIT
35,800 KM
MOON PROBE
4·10^5 KM
VENUS PROBE
4·10^7 KM
150
160
170
180
190
200
210
220
230
240
250
260
270
280
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
1
2
3
4
5
7
10
15
20
30
40
FREQUENCY - Gc/s

FIGURE 1

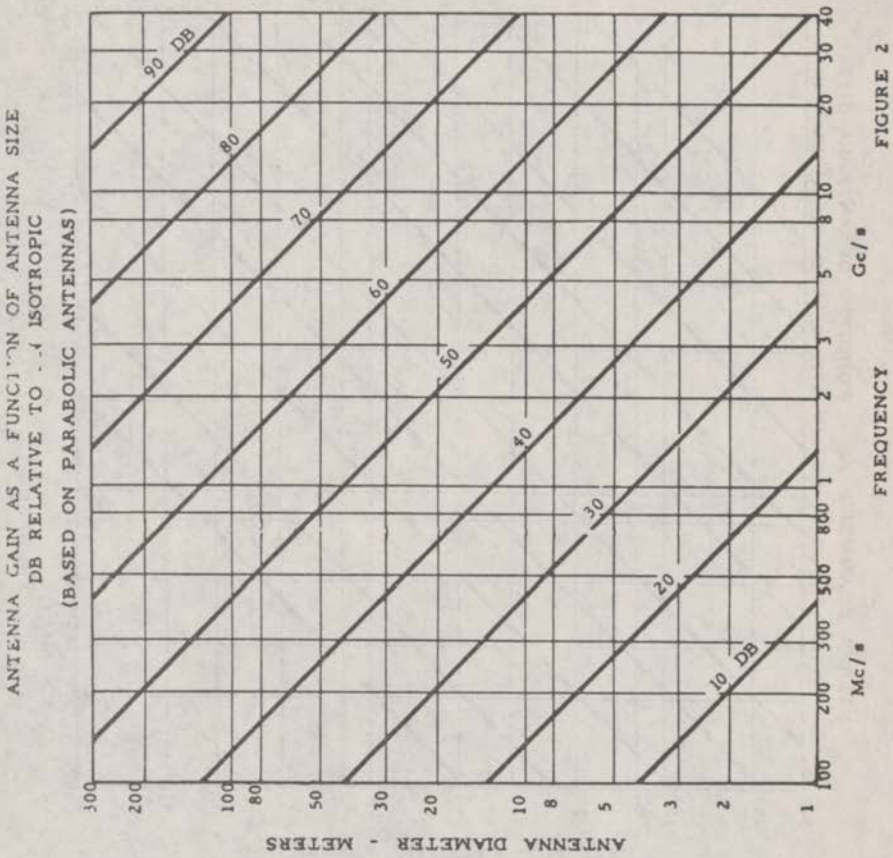
ANTENNA GAIN AS A FUNCTION OF ANTENNA SIZE
DB RELATIVE TO A ISOTROPIC
(BASED ON PARABOLIC ANTENNAS)
90 DB
80
70
60
50
40
30
20
10 DB
ANTENNA DIAMETER - METERS
300
200
100
80
50
30
20
10
8
5
3
2
1
FREQUENCY
Mc/s
100
200
300
500
800
1
2
3
5
8
10
20
30
40
Gc/s

FIGURE 2

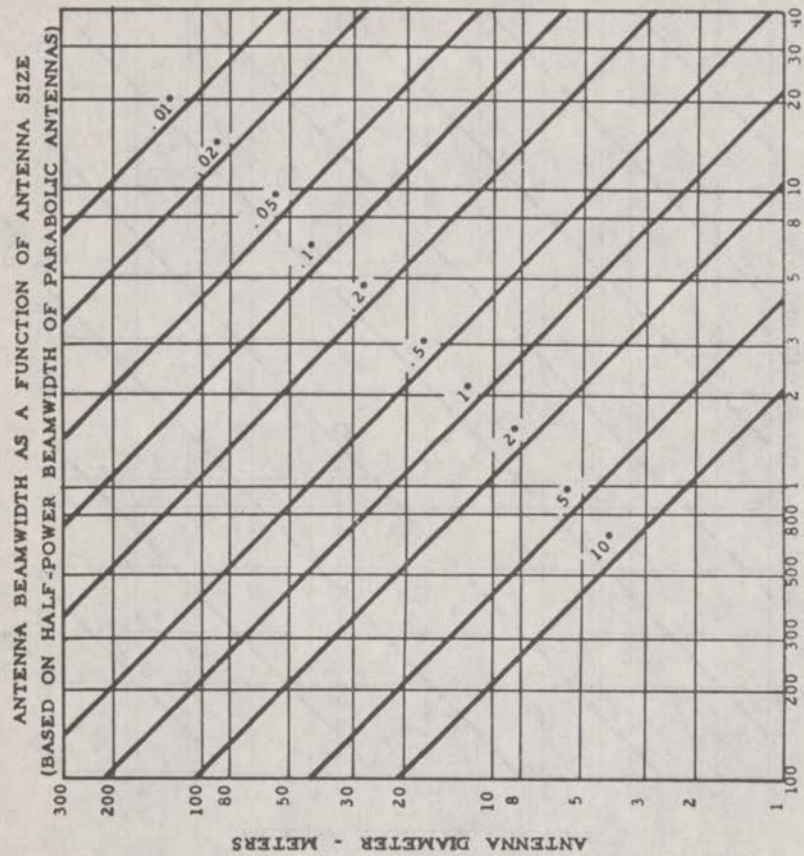
ANTENNA BEAMWIDTH AS A FUNCTION OF ANTENNA SIZE
(BASED ON HALF-POWER BEAMWIDTH OF PARABOLIC ANTENNAS)
.01°
.02°
.05°
.1°
.2°
.5°
1°
2°
5°
10°
ANTENNA DIAMETER - METERS
300
200
100
80
50
30
20
10
8
5
3
2
1
FREQUENCY
Mc/s
100
200
300
500
800
1
2
3
5
8
10
20
30
40
Gc/s

FIGURE 3

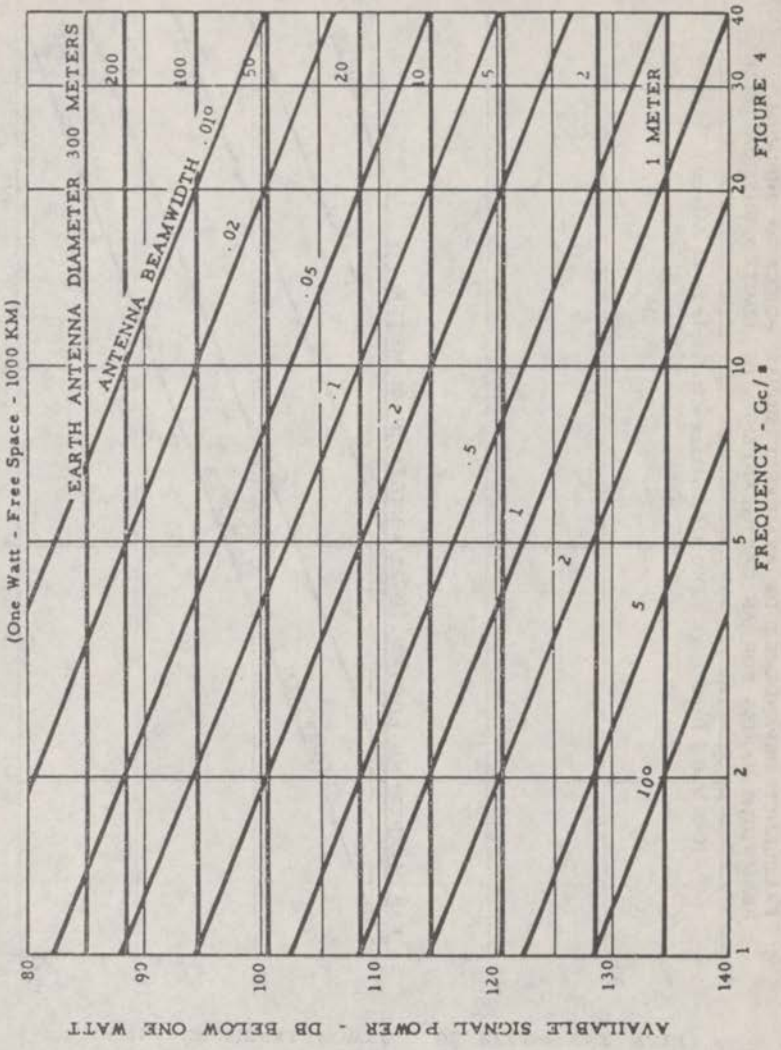
AVAILABLE SIGNAL POWER
ISOTROPIC SPACE ANTENNA TO VARIOUS SIZE EARTH ANTENNAS
(One Watt - Free Space - 1000 KM)
EARTH ANTENNA DIAMETER 300 METERS
200
100
50
20
10
5
2
1 METER
ANTENNA BEAMWIDTH
.010
.02
.05
.1
.2
.5
1
2
5
10
80
90
100
110
120
130
140
1
2
5
10
20
30
40
FREQUENCY - Gc/s
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT

FIGURE 4

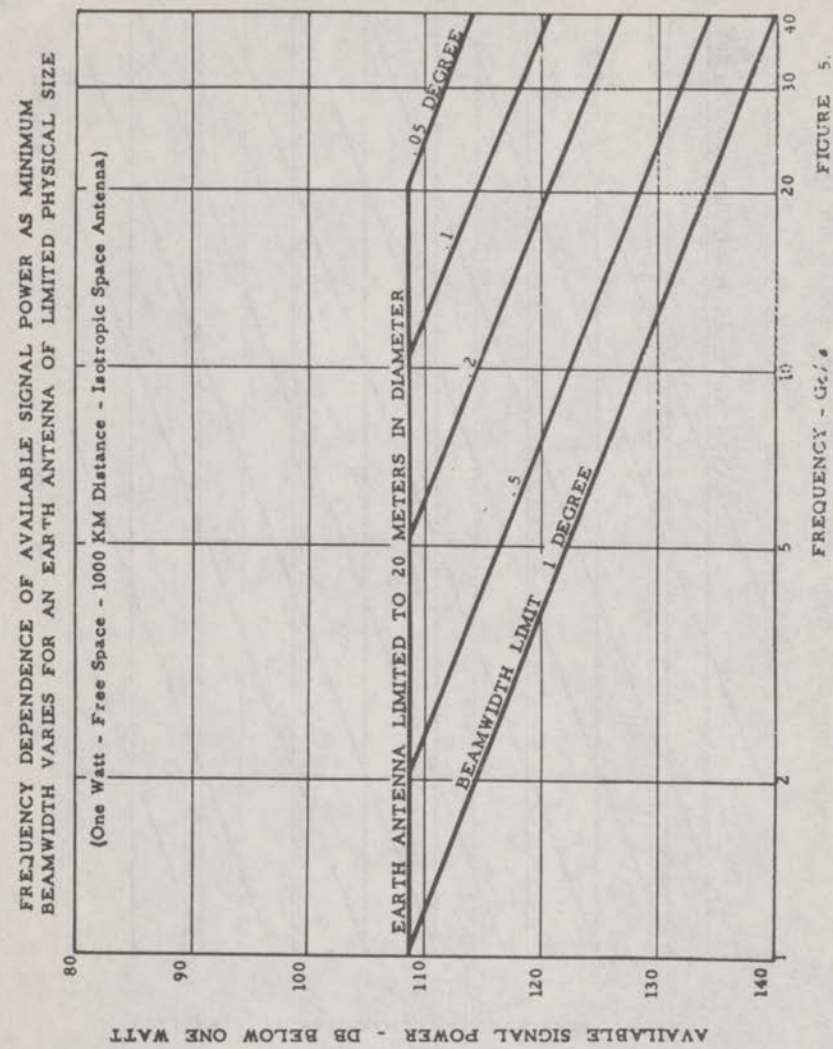
FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MINIMUM BEAMWIDTH VARIES FOR AN EARTH ANTENNA OF LIMITED PHYSICAL SIZE
(One Watt - Free Space - 1000 KM Distance - Isotropic Space Antenna)
EARTH ANTENNA LIMITED TO 20 METERS IN DIAMETER
BEAMWIDTH LIMIT
.05 DEGREE
.1
.2
.5
1 DEGREE
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
80
90
100
110
120
130
140
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 5.

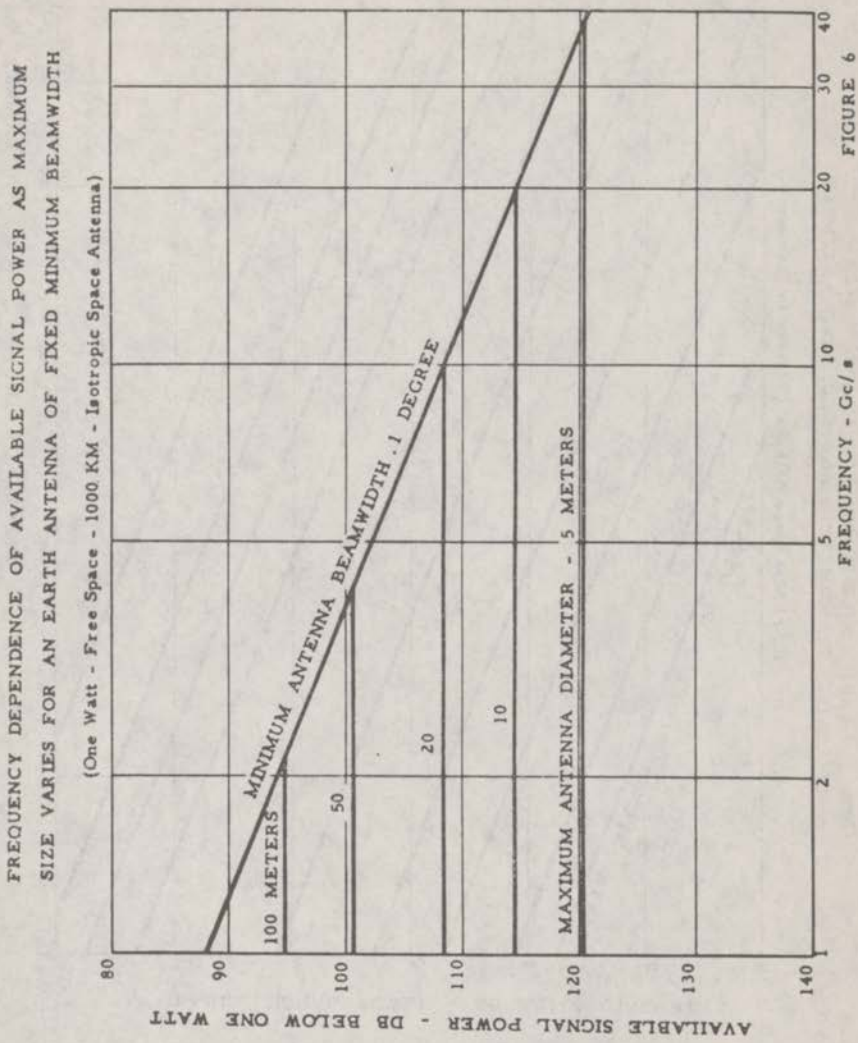
FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MAXIMUM
SIZE VARIES FOR AN EARTH ANTENNA OF FIXED MINIMUM BEAMWIDTH
(One Watt - Free Space - 1000 KM - Isotropic Space Antenna)
MINIMUM ANTENNA BEAMWIDTH .1 DEGREE
100 METERS
50
20
10
MAXIMUM ANTENNA DIAMETER - 5 METERS
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
80
90
100
110
120
130
140
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 6

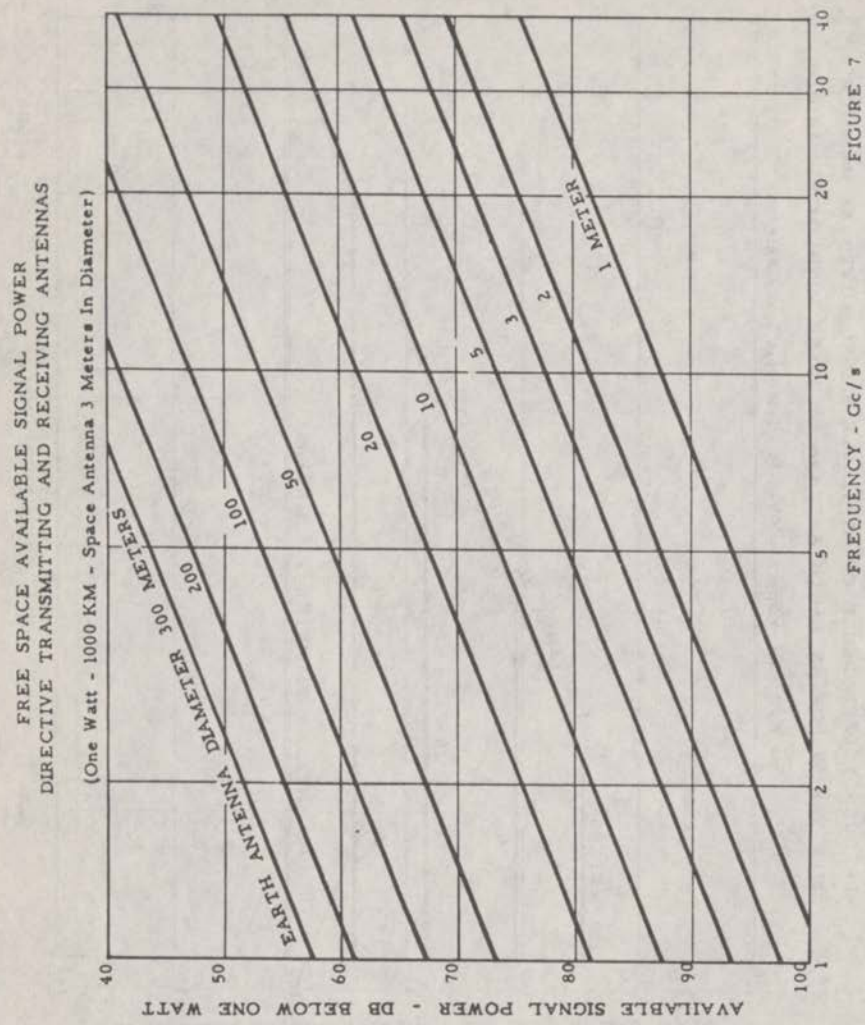
FREE SPACE AVAILABLE SIGNAL POWER
DIRECTIVE TRANSMITTING AND RECEIVING ANTENNAS
(One Watt - 1000 KM - Space Antenna 3 Meters In Diameter)
EARTH ANTENNA DIAMETER
300 METERS
200
100
50
20
10
5
3
2
1 METER
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 7

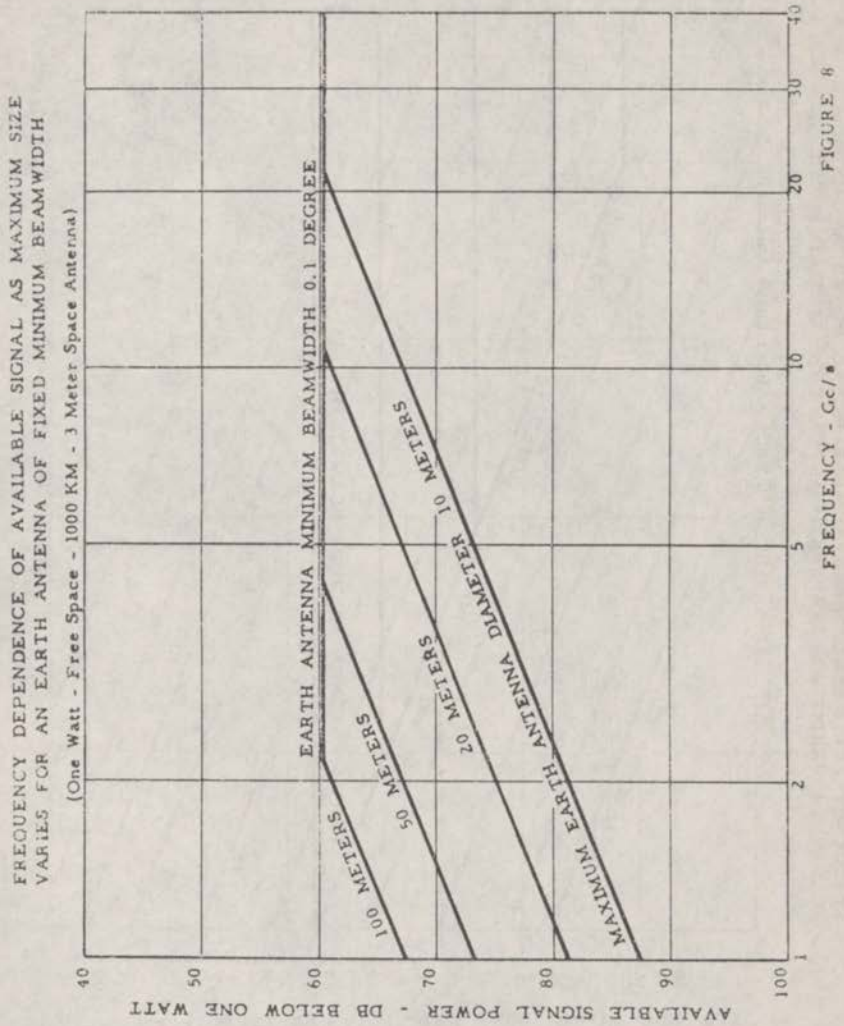
FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL AS MAXIMUM SIZE
VARIES FOR AN EARTH ANTENNA OF FIXED MINIMUM BEAMWIDTH
(One Watt - Free Space - 1000 KM - 3 Meter Space Antenna)
EARTH ANTENNA MINIMUM BEAMWIDTH 0.1 DEGREE
100 METERS
50 METERS
20 METERS
10 METERS
MAXIMUM EARTH ANTENNA DIAMETER
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 8

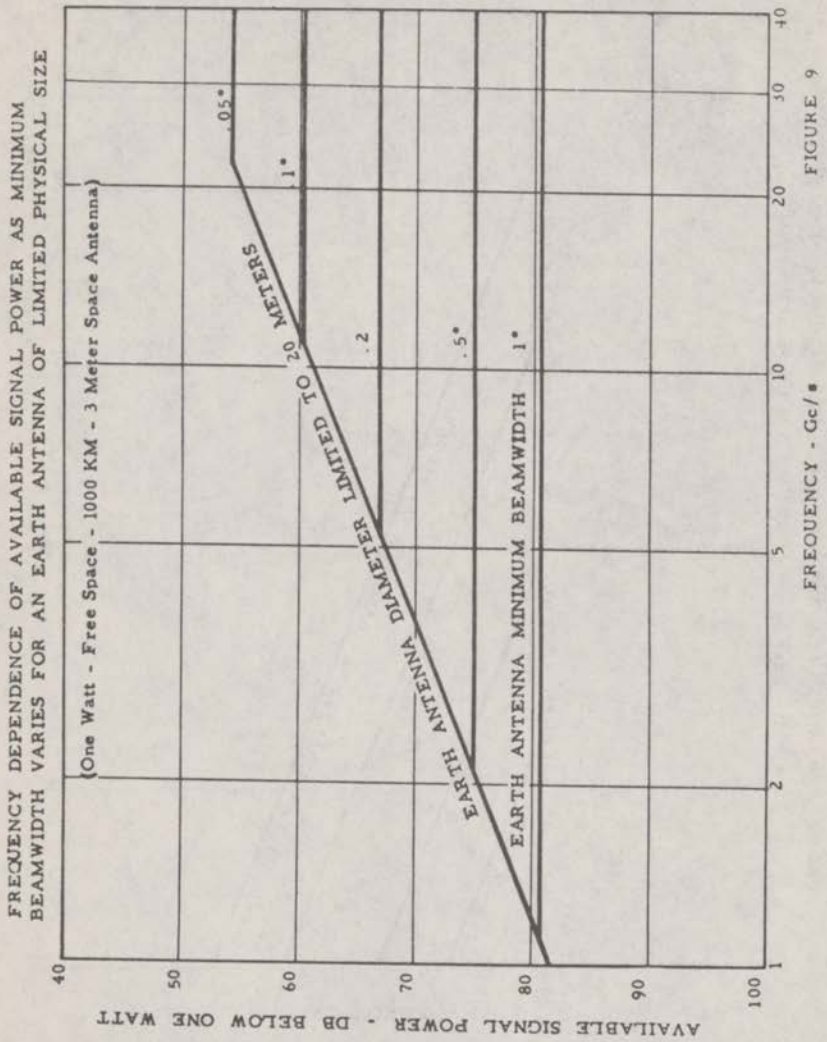
FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MINIMUM
BEAMWIDTH VARIES FOR AN EARTH ANTENNA OF LIMITED PHYSICAL SIZE
(One Watt - Free Space - 1000 KM - 3 Meter Space Antenna)
EARTH ANTENNA DIAMETER LIMITED TO .02 METERS
EARTH ANTENNA MINIMUM BEAMWIDTH
.05°
.1°
.2
.5°
1°
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 9

FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS ANTENNA PHYSICAL SIZE LIMITATIONS CHANGE WITH FIXED MINIMUM BEAMWIDTH REQUIREMENTS

(One Watt - Free Space - 1000 KM)

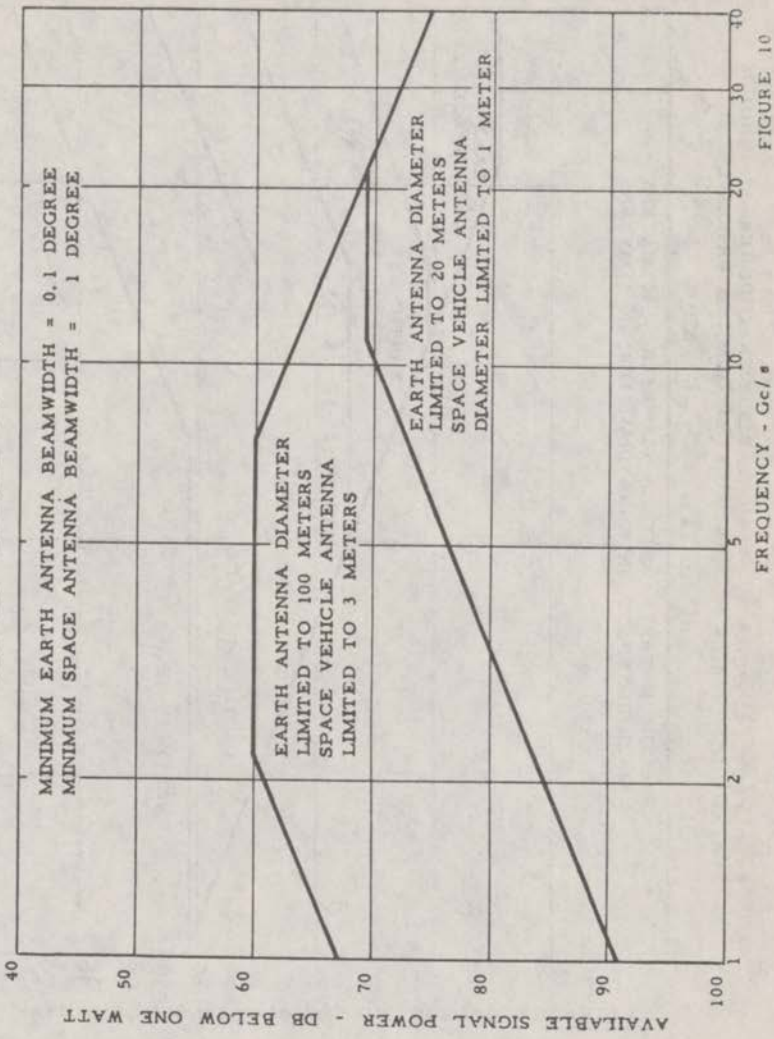


FIGURE 10

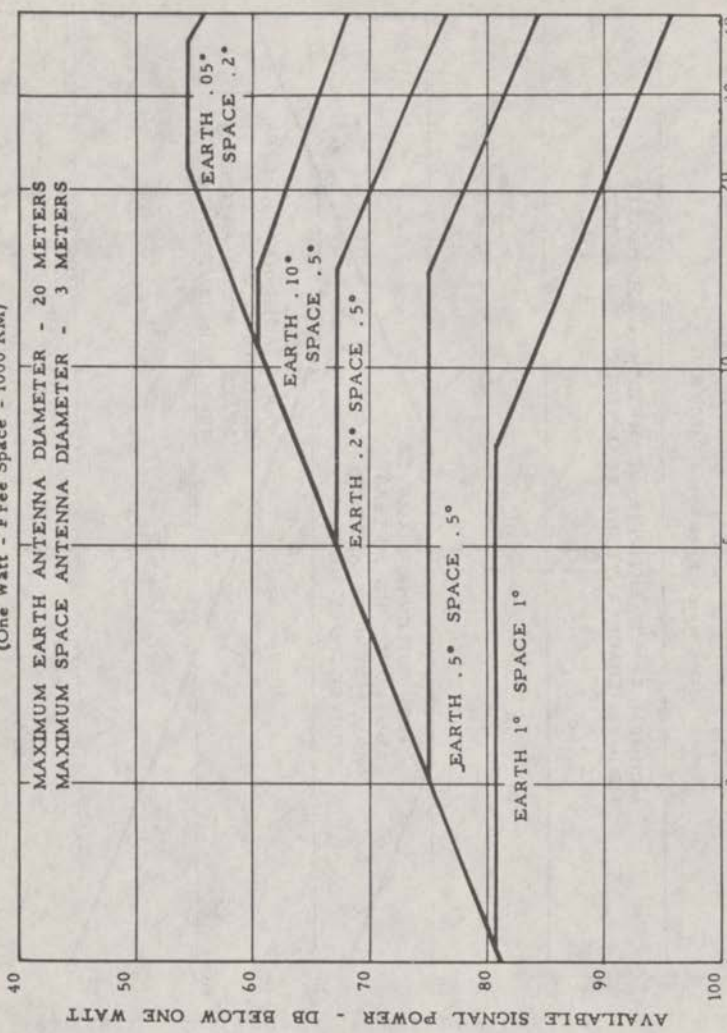
FREQUENCY DEPENDENCE OF AVAILABLE SIGNAL POWER AS MINIMUM BEAMWIDTH VARIES FOR ANTENNAS OF LIMITED PHYSCIAL SIZE
(One Watt - Free Space - 1000 KM)
MAXIMUM EARTH ANTENNA DIAMETER - 20 METERS
MAXIMUM SPACE ANTENNA DIAMETER - 3 METERS
EARTH .05° SPACE .2°
EARTH .10° SPACE .5°
EARTH .2° SPACE .5°
EARTH .5° SPACE .5°
EARTH 1° SPACE 1°
AVAILABLE SIGNAL POWER - DB BELOW ONE WATT
40
50
60
70
80
90
100
FREQUENCY - Gc/s
1
2
5
10
20
30
40

FIGURE 11

CHART TO ESTIMATE ATMOSPHERIC ABSORPTION AS A FUNCTION OF TERMINAL ELEVATION AND VERTICAL ANGLE

(Atmosphere Typical Of Washington D. C. In August)

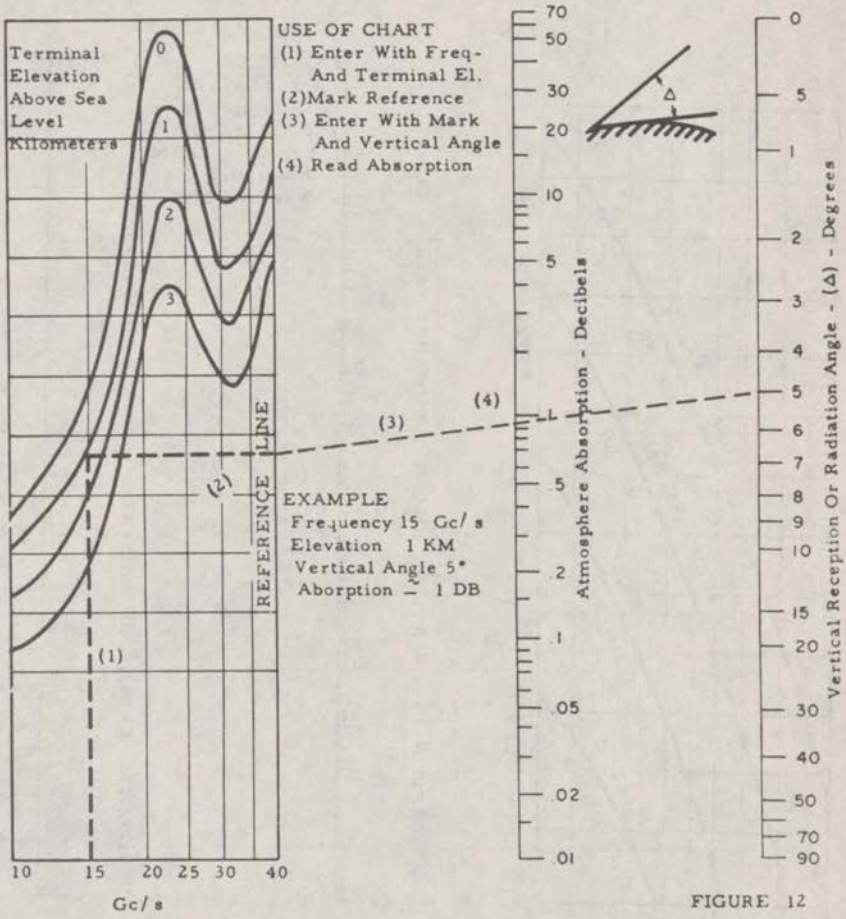


FIGURE 12

CHART TO ESTIMATE ABSORPTION BY RAINFALL

(1) Enter With Freq And Rainfall Rate
(2) Mark Reference Line
(3) Enter With Mark And (Δ)
(4) Read Absorption
(5) Enter With Mark And (H)
(6) Read Absorption
(7) Multiply Lower Of (4) Or (6) By Vertical Depth Of Rainfall

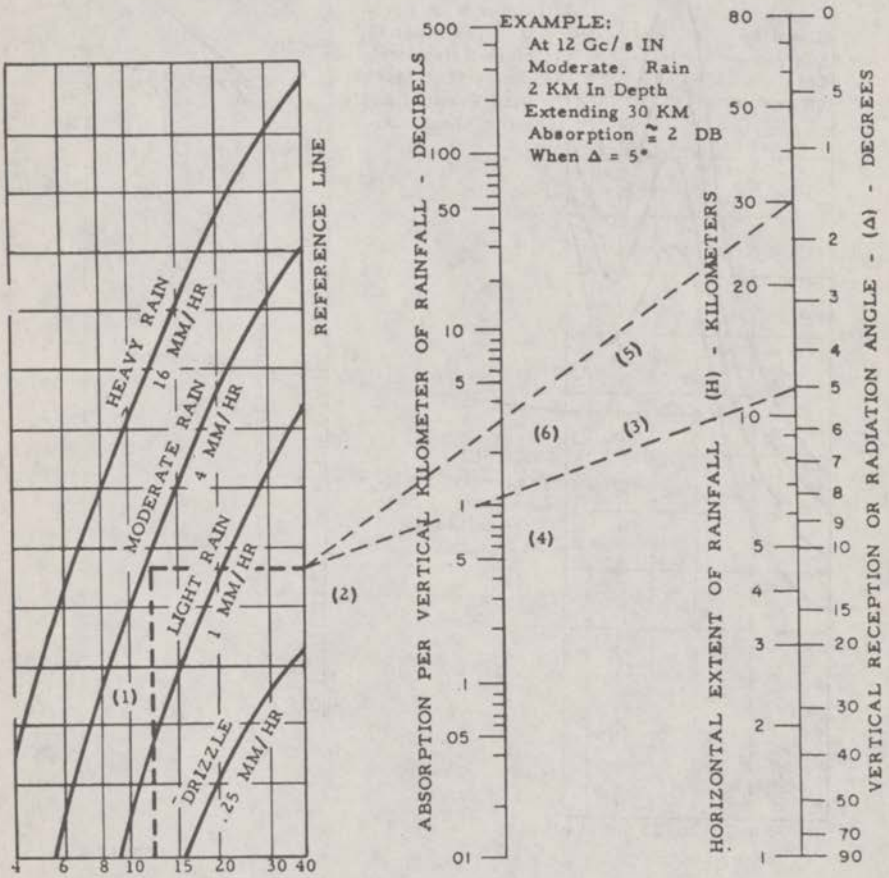


FIGURE 13

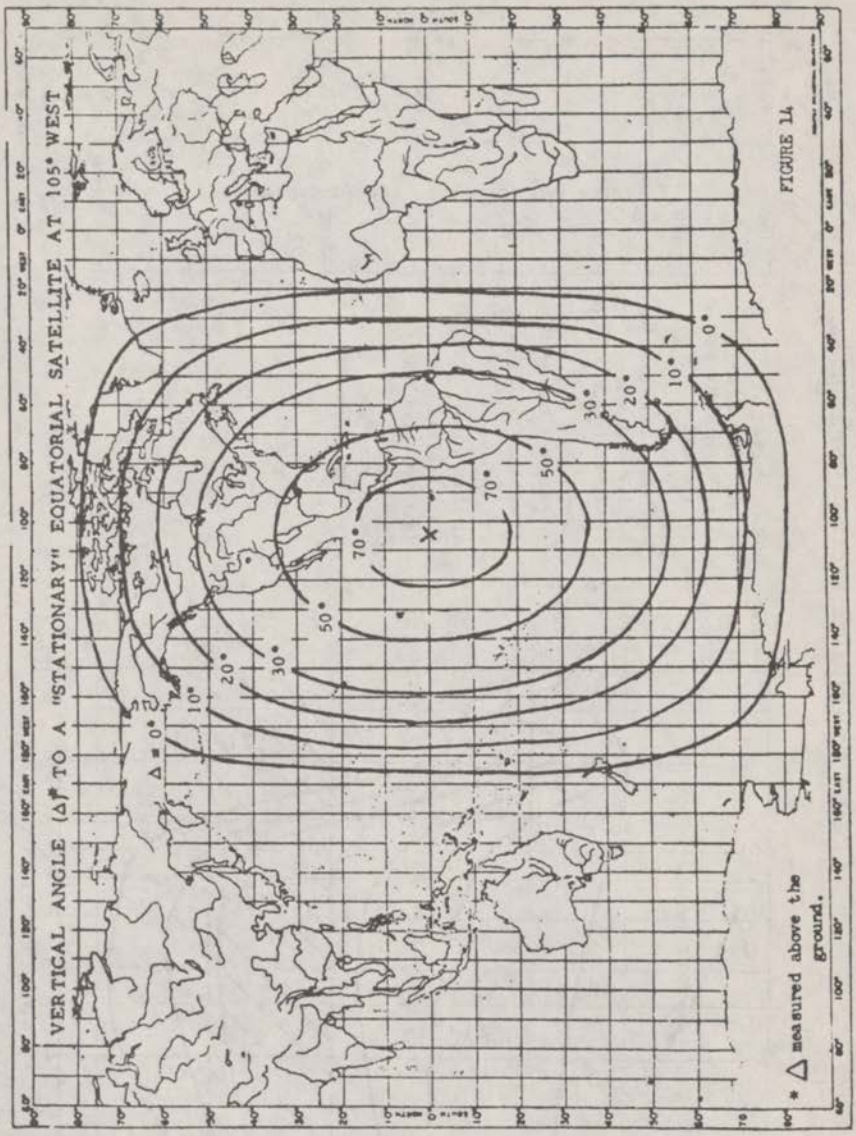


FIGURE 14

80559 O - 62 - 18

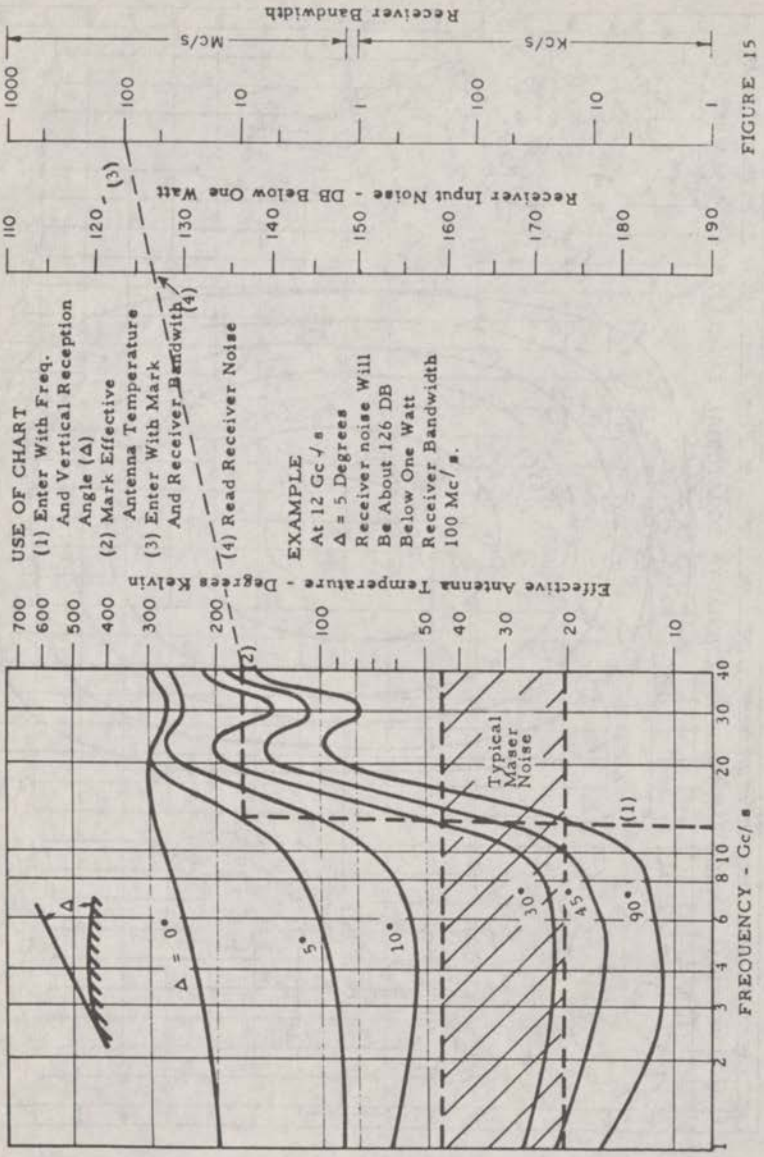
CHART TO ESTIMATE RECEIVER INPUT NOISE
USE OF CHART
(1) Enter With Freq. And Vertical Reception Angle (Δ)
(2) Mark Effective Antenna Temperature
(3) Enter With Mark And Receiver Bandwith
(4) Read Receiver Noise
EXAMPLE
At 12 Gc/s
Δ = 5 Degrees
Receiver noise Will Be About 126 DB Below One Watt
Receiver Bandwidth 100 Mc/s.
Effective Antenna Temperature - Degrees Kelvin
Receiver Input Noise - DB Below One Watt
Receiver Bandwidth
Kc/s
Mc/s
FREQUENCY - Gc/s
Typical Maser Noise
Δ = 0°
5°
10°
30°
45°
90°
(1)
(2)
(3)
(4)

FIGURE 15

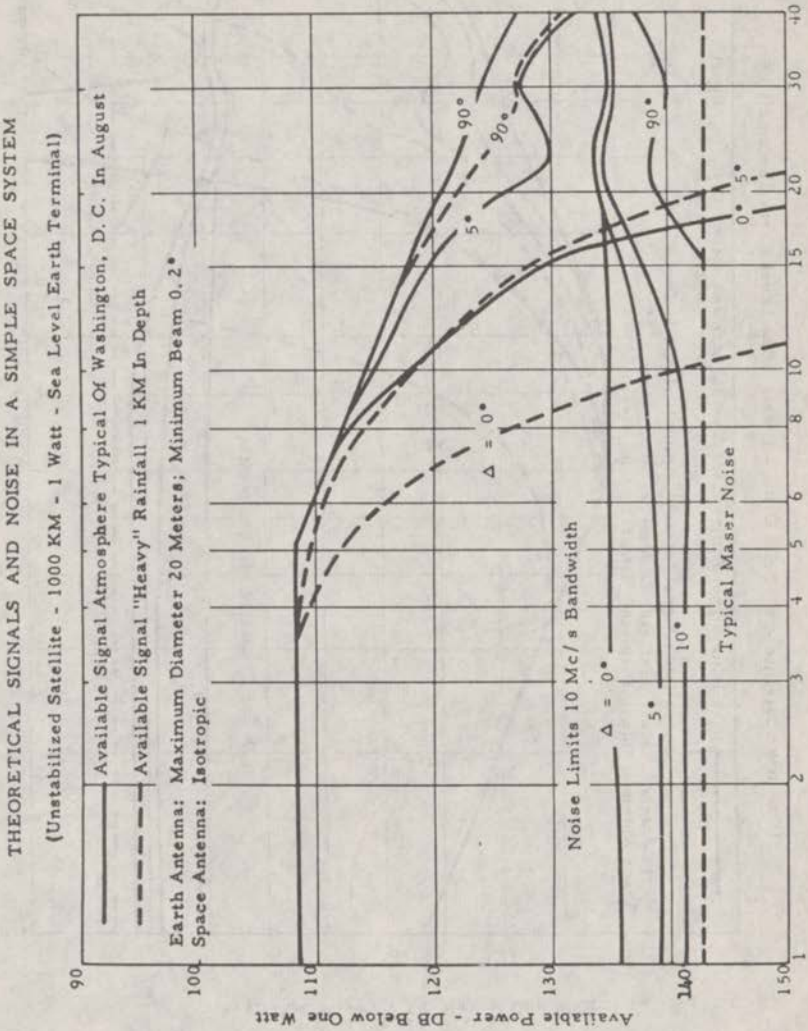
THEORETICAL SIGNALS AND NOISE IN A SIMPLE SPACE SYSTEM
(Unstabilized Satellite - 1000 KM - 1 Watt - Sea Level Earth Terminal)
Available Signal Atmosphere Typical Of Washington, D.C. In August
Available Signal "Heavy" Rainfall 1 KM In Depth
Earth Antenna: Maximum Diameter 20 Meters; Minimum Beam 0.2°
Space Antenna: Isotropic
Noise Limits 10 Mc/s Bandwidth
Typical Maser Noise
Δ = 0°
5°
10°
90°
Available Power - DB Below One Watt
FREQUENCY - Gc/s
90
100
110
120
130
140
150
1
2
3
4
5
6
8
10
15
20
30
40

FIGURE 16

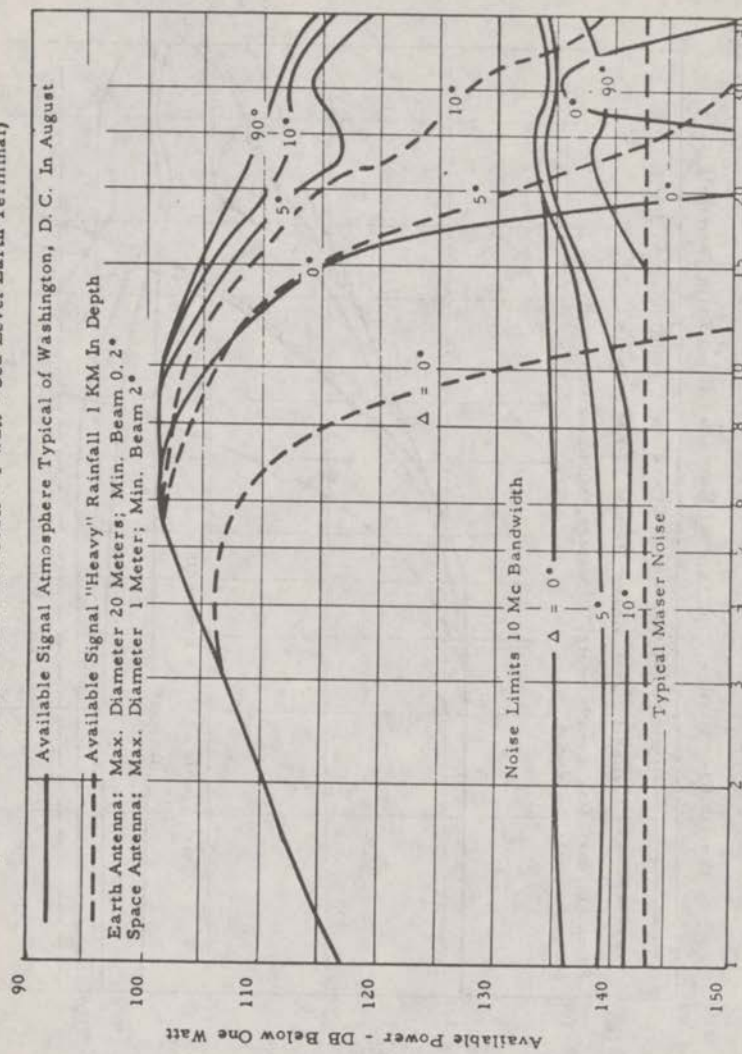
HEORETICAL SIGNALS AND NOISE N A "TYPICAL" SPACE SYSTEM
(Stabilized Satellite - 6000 KM Orbit - 1 Watt - Sea Level Earth Terminal)
Available Signal Atmosphere Typical of Washington, D. C. In August
Available Signal "Heavy" Rainfall 1 KM In Depth
Earth Antenna: Max. Diameter 20 Meters; Min. Beam 0.2°
Space Antenna: Max. Diameter 1 Meter; Min. Beam 2°
Noise Limits 10 Mc Bandwidth
Δ = 0°
5°
10°
90°
Typical Maser Noise
Available Power - DB Below One Watt
90
100
110
120
130
140
150
FREQUENCY - Gc/s
2
3
4
6
8
10
15
20
30
40

FIGURE 17

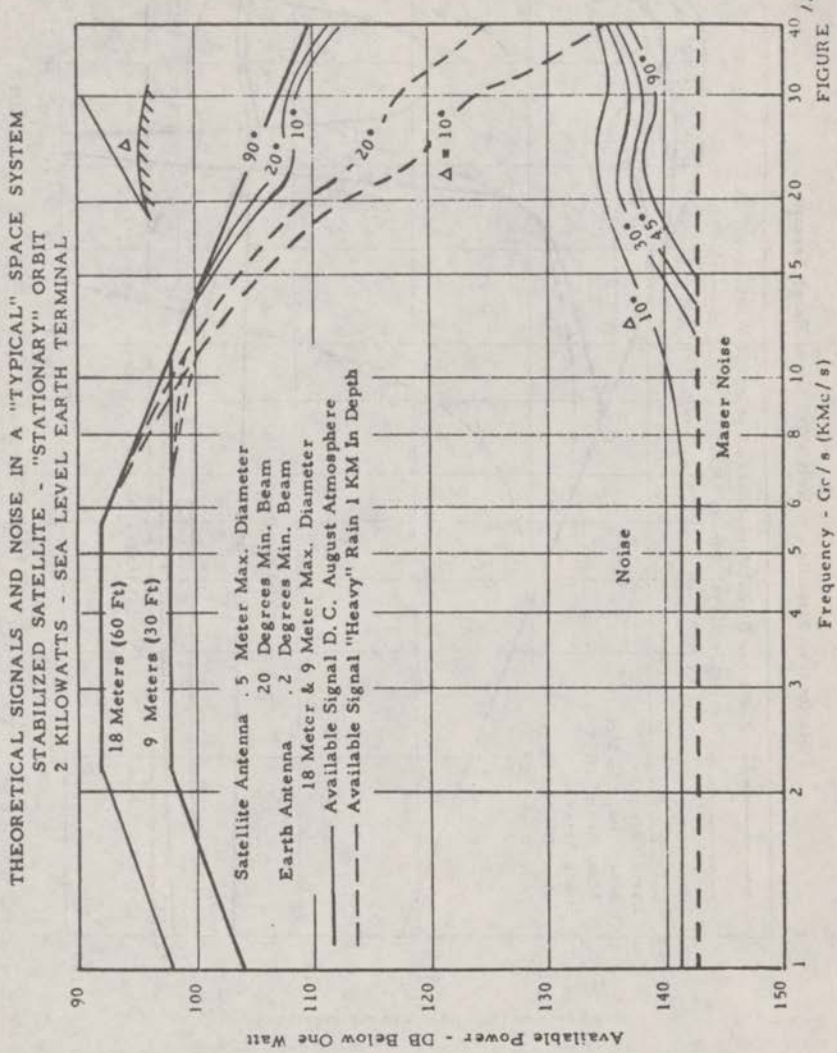
THEORETICAL SIGNALS AND NOISE IN A "TYPICAL" SPACE SYSTEM
STABILIZED SATELLITE - "STATIONARY" ORBIT
2 KILOWATTS - SEA LEVEL EARTH TERMINAL
18 Meters (60 Ft)
9 Meters (30 Ft)
Satellite Antenna .5 Meter Max. Diameter
20 Degrees Min. Beam
Earth Antenna .2 Degrees Min. Beam
18 Meter & 9 Meter Max. Diameter
Available Signal D.C. August Atmosphere
Available Signal "Heavy" Rain 1 KM In Depth
Δ
90°
20°
10°
Δ = 10°
Noise
Maser Noise
Available Power - DB Below One Watt
Frequency - Gc/s (KMc/s)
90
100
110
120
130
140
150
1
2
3
4
5
6
8
10
15
20
30
40

FIGURE 18

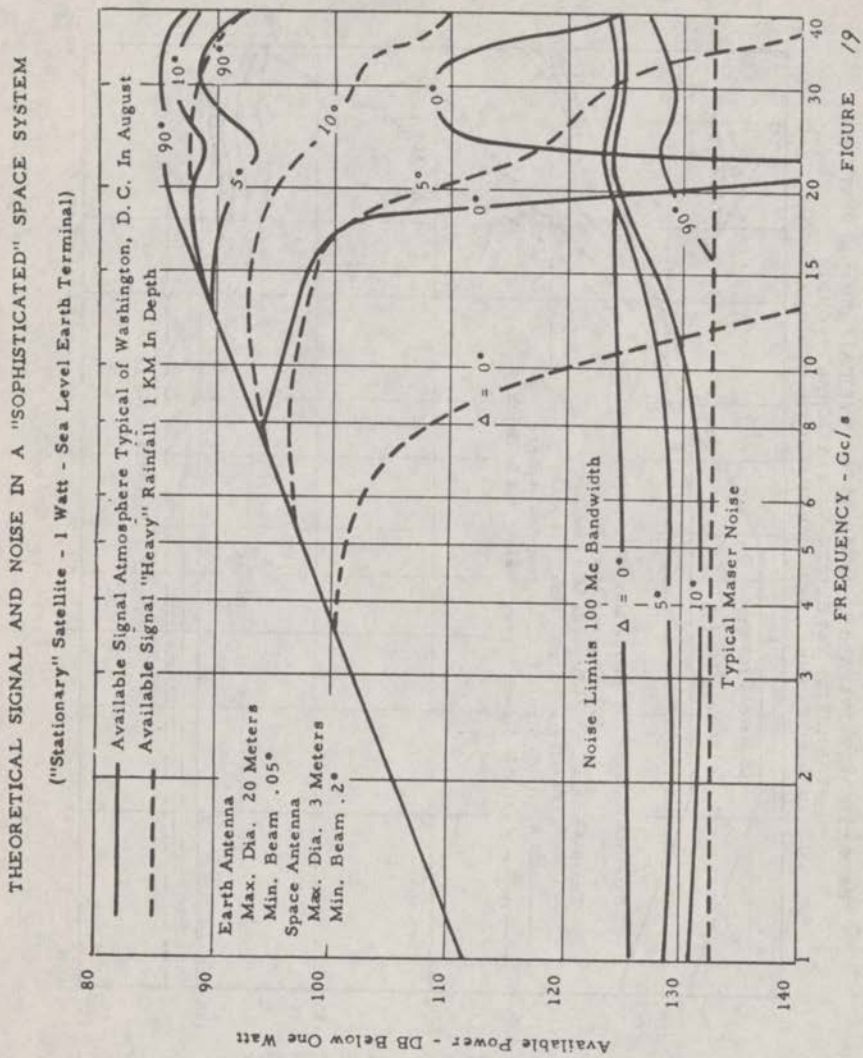
THEORETICAL SIGNAL AND NOISE IN A "SOPHISTICATED" SPACE SYSTEM
("Stationary" Satellite - 1 Watt - Sea Level Earth Terminal)
Available Signal Atmosphere Typical of Washington, D. C. In August
Available Signal "Heavy" Rainfall 1 KM In Depth
Earth Antenna
Max. Dia. 20 Meters
Min. Beam .05°
Space Antenna
Max. Dia. 3 Meters
Min. Beam .2°
Noise Limits 100 Mc Bandwidth
Δ = 0°
5°
10°
Typical Maser Noise
90°
0°
Available Power - DB Below One Watt
80
90
100
110
120
130
140
FREQUENCY - Gc/s
1
2
3
4
5
6
8
10
15
20
30
40

FIGURE 19

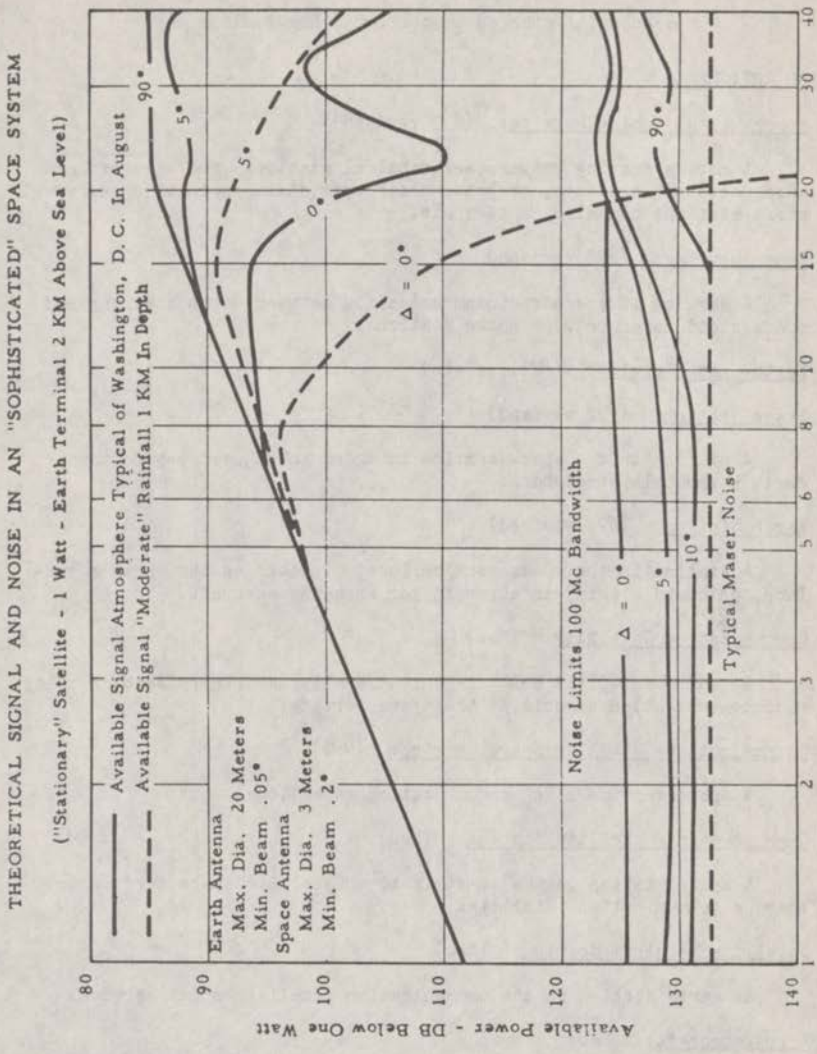
THEORETICAL SIGNAL AND NOISE IN AN "SOPHISTICATED" SPACE SYSTEM
("Stationary" Satellite - 1 Watt - Earth Terminal 2 KM Above Sea Level)
Available Signal Atmosphere Typical of Washington, D. C. In August
Available Signal "Moderate" Rainfall 1 KM In Depth
Earth Antenna
Max. Dia. 20 Meters
Min. Beam .05°
Space Antenna
Max. Dia. 3 Meters
Min. Beam .2°
Noise Limits 100 Mc Bandwidth
Typical Maser Noise
Δ = 0°
5°
10°
90°
Available Power - DB Below One Watt
FREQUENCY - Gc/s
80
90
100
110
120
130
140
1
2
3
5
6
8
10
15
20
30
40

FIGURE 2.

## APPENDIX 4

Consequential changes to the Radio Regulations

### I. RR ARTICLE 1

Aeronautical Mobile Service: (#33 revised)

A mobile service between aeronautical stations and aircraft or aerospacecraft stations, or between aircraft stations, in which survival craft stations may also participate.

Space Service: (#70 revised)

A service of space radiocommunication between earth stations and space stations, or between space stations.

Earth-Space Service: (#71, delete)

Space Station: (#72 revised)

A station in the space service intended to be used beyond the earth's sensible atmosphere.

Earth Station: (#73 revised)

A station in the space service located either on the earth's surface, on board a ship, an aircraft, or an aerospacecraft.

Communication Satellite: (New)

An earth-satellite which is intentionally used to reflect or relay radiocommunication signals in the space service.

Communication Satellite Space Service: (New)

A space service using communication satellites.

Communication Satellite Station: (New)

A space station in the communication satellite space service on board a communication satellite.

Satellite Terminal Station: (New)

An earth station in the communication satellite space service.

Aerospacecraft: (New)

A vehicle capable of traveling both within and beyond the earth's sensible atmosphere.

Meteorological Satellite Space Service: (New)

A space service providing for the one-way transmission of meteorological information from meteorological satellite stations to earth stations.

Meteorological Satellite Station: (New)

A space station in the meteorological satellite service.

Space Research Service: (New)

A space service providing for the acquisition and transmission to earth stations, or between space stations, of scientific and technological information acquired by or pertaining to earth satellites or spacecraft.

II. RR ARTICLE 7

Amend No. 429 to read:

"Frequencies in any band allocated to the aeronautical mobile (R) service are reserved for communications between any aircraft or aerospacecraft and those aeronautical stations primarily concerned with the safety and regularity of flight along national or international civil air routes."

Amend No. 430 to read:

"Frequencies in any band allocated to the aeronautical mobile (OR) service are reserved for communications between any aircraft or aerospacecraft and aeronautical stations other than those primarily concerned with flight along national or international civil air routes."

Mr. ALEXANDER. Executive Order 10460 of June 16, 1953, assigns telecommunication responsibilities to the Director of the Office of Civil and Defense Mobilization. Section I of that order provides that the Director shall assist and advise the President with respect to the following functions and such others as he may designate:

(*a*) Coordinating the development of telecommunications policies and standards applying to the executive branch of the Government.

(*b*) Assuring high standards of telecommunication management within the executive branch of the Government.

(*c*) Coordinating the development by the several agencies of the executive branch of telecommunications plans and programs designed to assure maximum security to the United States in time of national emergency with a minimum of interference to continuing nongovernmental requirements.

(*d*) Assigning radio frequencies to Government agencies under the provisions of section 305 of the Communications Act of 1934, as amended, and establishing policies and procedures governing such assignments and their continued use.

(*e*) Developing U.S. Government frequency requirements.

Executive Order 10460 further provides that the Interdepartment Radio Advisory Committee shall report to and assist the Director in the performance of his functions as he may request.

A copy of Executive Order 10460 is attached as A.

The President in this field of telecommunications has placed upon the Director of the Office of Civil and Defense Mobilization additional responsibilities:

(*a*) For coordinating the implementation of certain classified telecommunication policies approved by the National Security Council and for coordinating any necessary changes to these policies.

(*b*) For developing telecommunication policies, coordinated throughout the Government.

(*c*) For presenting to the President for consideration any policy questions which, from time to time, warrant such action.

(*d*) For executing the President's wartime powers over telecommunications by delegating, on a contingent basis, the President's authority contained in the Communications Act of 1934, as amended.

### INITIAL INVESTIGATIONS INTO UTILIZATION OF ARTIFICIAL SATELLITES

In recognition of the rapid strides then being made in the artificial satellite program, the former Office of Defense Mobilization, in early 1958, requested the Telecommunications Planning Committee, which is advisory to the Director, to give consideration to the matter of space telecommunication as a continuing responsibility. A copy of its terms of reference entitled "Telecommunications Involving Satellites and Space Vehicles" is set forth in B. On March 1, 1961, the TPC approved for advance dissemination to Government agencies its report on space telecommunications. There remains the consideration of the recommendations in the report and final approval for general distribution.

### PREPARATORY WORK FOR THE 1959 INTERNATIONAL TELECOMMUNICATION UNION CONFERENCE, GENEVA

Practical application of space telecommunication was conceived decades ago, long before it was possible of accomplishment. A first step was the birth of radio astronomy in the years 1930–32 when Karl Jansky of the Bell Telephone Laboratories of Holmdel, N.J., first heard and identified radio signals coming from the "Milky Way."

A major advance was made in 1945 when Lt. Col. John H. De Witt, Jr., Signal Corps, AUS, bounced a radar signal off the moon. A decade later, Dr. J. R. Pierce, Bell Telephone Laboratories, published the results of his theoretical investigation of transoceanic communication via space relay (J. R. Pierce, Orbital Radio Relays, Jet Propulsion, vol. 25, pp. 153–157, April 1955).

The United States, in 1957, began preparing for the forthcoming Ordinary Administrative Radio Conference (OARC), scheduled for the latter part of 1959, the first such International Radio Conference since that of Atlantic City, 1947. The Atlantic City Radio Regulations made no mention of space telecommunication.

Under these regulations all experimentation in space had to be conducted under conditions of causing no harmful interference to services operating in accordance with the table of frequency allocations. This was a serious handicap, both in connection with the International Geophysical Year efforts and with U.S. exploration of space.

During this preparatory work for the 1959 Conference, it was the consensus of the executive branch agencies working in the Interdepartment Radio Advisory Committee (IRAC), with the Federal Communications Commission (FCC) liaison representative to the IRAC, that space radiocommunication should be established as an international radio service with its own frequency allocations. It was felt that the initial effort should be limited to seeking allocations primarily for space research.

Accordingly, the U.S. proposals to the International Telecommunication Union (ITU) OARC, Geneva, 1959, included provision for the establishment of the earth-space service and the space service and the allocation of nine frequency bands to these services. See C. One of these bands was to be an exclusive allocation, the others to be shared with fixed and mobile services, with adequate protection from interference. As the Conference was getting underway, the United States allocated nationally the band 135–36 megacycles to space radiocommunications, and proposed to the Conference the same allocation on an international basis, as well as the band 400–401 megacycles.

### ITU CONFERENCE, GENEVA 1959

The ITU Conference, Geneva, 1959, after considerable Soviet bloc opposition, established the two new services—space service and earth space service—and allocated 13 frequency bands for research in those services. See D. The allocations became available May 1, 1961, to the countries which have approved the Geneva, 1959, radio regulations. The United States has not yet approved these regulations.

The frequency bands allocated by the Geneva, 1959 Conference were not intended to accommodate the large requirements of earth satellite relay communication. The 1959 Conference considered that additional information was needed before such allocations could be made. The Conference adopted recommendation No. 36 which recommended that the administrative council of the ITU review the situation in 1962 and 1963 to decide whether there is sufficient justification for the convening of an Extraordinary Administrative Radio Conference (EARC) in the latter part of 1963 to consider the allocation of frequency bands for space telecommunication purposes. Mr. Paul D. Miles, executive secretary of the IRAC, and Mr. Arthur Costigan, consultant to OCDM Telecommunications Office, were made available to the U.S. delegation to the Geneva Conference.

### IMPLEMENTATION OF CONFERENCE RESULTS

Shortly after the close of the Geneva Conference, the final acts of the Geneva Radio and Plenipotentiary Conferences were reviewed by the IRAC, under the guidance of this office, in collaboration with the FCC liaison representative to the IRAC. Actions required by the United States to fulfill its obligations in connection with the implementation of these acts were identified and recommended assignments of responsibility were approved by my office.

I might interpose there, Mr. Chairman, to say that this was the first time, to my knowledge, that this has ever been done in the United States at the conclusion of a conference.

As communications grow in the world and the use of the spectrum becomes more complex, you have at the close of each succeeding conference a more complicated, extensive list of things that need to be done in order to carry out the implementations of the treaty to which the United States or any particular country has acceded.

We feel that this is a worthwhile task, and we propose that any future conferences, insofar as we are able, continue this work. See E.

These obligations of the United States have been, or are in the process of being, carried out within the executive branch insofar as it is possible to do so pending ratification of the convention and the completion of FCC rulemaking. Proposed changes in the national table of frequency allocations to bring it into accord with the ITU table are reflected in FCC proposed rulemaking in docket 13928, FR vol. 26, No. 35, February 22, 1961.

### GOVERNMENT REQUIREMENTS FOR SPACE COMMUNICATIONS

Agencies were requested, on August 1, 1960, to review their present and foreseeable uses of the radiospectrum for communication between earth and space, communication between points in space, and communication between points on the earth via space relay.

The responses received expressed requirements for frequency space in excess of that available. They have been consolidated, however, and are being used as a guide in our mutual efforts with the FCC in planning for future uses of the radiofrequency spectrum.

A copy of the letter to all Federal agencies dated August 1, 1960, is set forth under F.

I might enlarge upon that to the extent of indicating, Mr. Chairman, that the responses without consolidation came to something like 25,000 megacycles; whereas, the window that we are today aware of through which space communication may be conducted, insofar as satellites are concerned, is about 9000 megacycles wide, from 1000 to 10,000 megacycles.

It was quite a response that we received.

### EXECUTIVE BRANCH PLANNING FOR THE ACCOMMODATION OF SPACE COMMUNICATION

The August 1960 initial step toward an active and continuing consideration of space telecommunication requirements revealed, of course, substantial needs for space communications. It became clear that if the total estimated requirements of the Government agencies are to be satisfied under today's technical standards, a major revision of Government frequency allocations and possibly relocation of Government radio operations might be necessary. In the absence of sufficient data relative to the use of frequencies required for telecommunication between earth and space, it was felt that the continued regular assignment of frequencies in such bands might well make the eventual frequency problems still more difficult of solution. It was decided, therefore, that an interim process would be necessary whenever assignments of such frequencies are effected.

On November 10, 1960, the Interdepartment Radio Advisory Committee was asked to refer to the Telecommunications Office:

1. Requests for frequencies for space telecommunication use other than in the frequency bands allocated for space research;

2. Requests for frequencies for conventional telecommunication use in the Government fixed and mobile bands above 1000 megacycles.

See G for November 10, 1960, letter.

It was later developed that there was no compelling need to review requests below 7125 mc/s.

Certain guidelines were developed to assist in reviewing Government requests for frequency assignments above 7125 mc/s. These guidelines, which were disseminated on March 3, 1961, to all Federal agencies as a matter of information, are as follows: And I might interpolate, for a better understanding for the need of these, that if it developed that space were to be accommodated above 1000 megacycles and as it later developed, above 7000 megacycles and sharing were not possible, then you would be faced with millions of dollars of cost, perhaps, in attempting to relocate these subsequent assignments.

And this is what disturbed us, sir.

Then follows the criteria that we laid down as guidelines.

1. Assignments for research and development in the field of space telecommunication will be approved when practicable, due consideration being given to the avoidance of harmful interference to essential services, and contingent upon the selection of areas appropriate for the eventual operation.

2. When assignments of radiofrequencies for satellite relay communication are made, however, they shall include provision for protection against harmful interference from other operations on the same or adjacent frequencies, where required for the achievement of the ob-

jective in each case. Assignments for satellite relay communication generally need not afford such protection to others, provided that sound engineering principles are applied.

3. Approval of assignments of radiofrequencies in fixed and mobile bands above 7125 megacycles shall be on a contingent basis until allocations for satellite relay communication have been deceided upon, subject to the conditions that—

(*a*) If harmful interference to future space communication operations results from such assignments, the entire matter will be reviewed in order to determine wherein lies the balance of national interest;

(*b*) If the balance is determined to be in favor of the space communication assignments, any aproval previously indicated for the nonspace assignments will no longer prevail.

A copy of the March 3, 1961, letter to all Federal agencies and these guidelines is attached as H.

The results of the continuing review have indicated the need for an action of this nature if adequate frequency provision is to be made for the accommodation of Government space telecommunication, and if current uses are not to be curtailed. Actions resulting from the review have been cautionary in nature and approvals have been made on a contingent basis, subject to future review if necessary to determine wherein lies the balance of national interest.

### CONTRACTUAL ARRANGEMENTS

In November 1960, there was consummated with the Central Radio Propagation Laboratory of the National Bureau of Standards a 1-year contract whereby the Laboratory will study and obtain radio propagation data for use in the long-range spectrum planning program of the Office of Civil and Defense Mobilization and the Federal Communications Commission. The study and resulting reports will cover the entire usable radiofrequency spectrum for the present and the next 10 to 20 years, serving as a guide to the effective positioning of the radio services within the spectrum. Consideration will be given to technical factors which relate to modes of electromagnetic wave propagation, and to manmade and natural noise and other interference with emphasis upon factors involved in satisfying space frequency needs.

### COORDINATION WITH FCC

Close coordination is maintained between the Telecommunications Office and the IRAC and the FCC in all aspects of preparing for radio conferences, in the implementation of the final acts of such conferences, and in all proposals to make changes in the table of frequency allocations.

In practice, the FCC follows its normal procedures for obtaining the views and comments of industry. Meanwhile, the IRAC, working either alone or with the FCC liaison representative to the IRAC, drafts the executive agency views.

Differences are then resolved insofar as possible between the IRAC and the FCC liaison representative to the IRAC. The coordinated result, upon approval, is officially transmitted to the Commission. Upon agreement being reached the Commission and this office make

recommendations to the Department of State for projection internationally.

In April 1959, agreement was reached with the Commission on terms of reference for joint FCC/OCDM long-range planning for future U.S. use of the radio frequency spectrum. Out of this program grew the contractual arrangements with the National Bureau of Standards referred to heretofore.

To facilitate planning for the accommodation of space communication in the radio spectrum, the two offices joined in asking the Bureau to give first emphasis to producing necessary propagation and other information for space radio communication.

In the instance of FCC notice of inquiry in docket No. 13522 and the reopening of its docket No. 11866, the Commission invited this office, and other interested Government agencies, to comment and participate in the Commission proceedings. This office informed the Commission of its views and the lines along which it was proceeding. See I.

The Commission has been kept fully informed of all activities by this office and the IRAC in planning for space radio communication. The FCC liaison representative to the IRAC has participated, with out prejudice to eventual Commission action, in each meeting of the IRAC and has received copies of all Government documentation.

Conversely, the Commission has made available copies of filings in its docket No. 13522 and has, through its liaison representative, made helpful suggestions.

There was transmitted to the Commission on May 12, 1961, the IRAC report "Preliminary Views on USA Frequency Allocations for Space Radio Communication" prepared in collaboration with the FCC liaison representative. See supplement No. 1 to this statement which is submitted separately.

The Commission adopted this report May 17 for the purpose of obtaining public comment and/or the views of other countries, and issued it as a notice of inquiry in FCC docket No. 13522 without change except to add radio astronomy in the band 1664.40–1668.40 mc/s as suggested by OCDM.

I might add there, Mr. Chairman, that we consider the art of radio astronomy to be of vital importance to the United States and, of course, to the world, because it is the means by which we will obtain vital information regarding space itself.

We know very little regarding space today. And a review of the physical capability to traverse space and the nearest, presumably, habitable planets indicates it is very limited.

Therefore, the importance of providing sufficient frequencies to radio astronomy which uses them in reverse—they use them without using them and, therefore, they must have no interference in the using of them—is considered by us to be of vital importance to the United States and we are shaping our actions accordingly.

### LONG-RANGE PLANNING AND PRELIMINARY PREPARATION FOR 1963 INTERNATIONAL CONFERENCE

The IRAC, working with the FCC liaison representative to the IRAC, has essentially completed drafting its concept of preliminary views of USA frequency allocations for space radiocommunication.

Included are definitions (terminology) of the new space services and radio stations, discussions of radio services which may have uses for space radio communication, radio wave propagation characteristics, state of the art, amount of spectrum required, factors affecting feasibility of sharing, selection of frequency bands, and conclusions with respect to allocations which should be made to the space services.

FCC/OCDM agreement on a final draft, incorporating public comments, must then be accomplished prior to transmission to the Department of State. These preliminary views do not necessarily represent the U.S. position to the proposed 1963 space conference. Rather, the purpose of the document will be to serve as a vehicle by which the ideas and reactions of other countries may be obtained.

The views of other countries are of great importance. No one country, or small group of countries, can go it alone. There must be world cooperation.

Present knowledge suggests that, initially, at least, the need for frequencies for communication between earth and space will have to be met somewhere in the spectrum between about 1,000 and 10,000 mc/s.

This part of the spectrum is in intensive and extensive use and is in great demand to meet existing nonspace needs. While sharing between satellite communication systems and terrestrial fixed and mobile systems is considered feasible, the application of the best engineered techniques and reasonable geographical separations will be required.

I have completed the prepared part of the statement, Mr. Chairman, and, as you undoubtedly gathered, we have restricted our statement to the areas in which we have, as an executive branch agency, the greatest responsibility, namely, the radio frequency spectrum.

Thank you, sir.

The CHAIRMAN. Thank you, Mr. Alexander, for a very fine, full, and complete presentation of the actions taken in which you and your office have participated and of the results which have been accomplished thus far.

This is a very comprehensive report which we are very glad to have. It brings everything that has been done together.

We are, of course, now at the point of developing a system of communications satellites, particularly international communications, and there are many problems, of course.

Of course, many questions must be resolved, such as ownership of the system and the commercial operation of it as well as to what extent the system will be developed. It appears that most everyone feels that only one system at this time can be practical.

Who is going to experiment with that system and who is going to own it and control it under regulation of the Government, and who is going to operate it, are some of the other innumerable questions which arise at this time.

I would presume that any comments that you have in that regard would be limited to the statement which was released by the White House the day before yesterday?

Mr. ALEXANDER. Yes, sir, and anything other than that, would, of course, be my personal opinion, sir.

The CHAIRMAN. Mr. Younger, do you have any questions?

Mr. YOUNGER. No, but, Mr. Alexander, I am impressed with this volume of yours.

If the satellite communications system survives all the departments that are interested in it, it certainly will be a very strong organization.

Mr. ALEXANDER. I think you are right, sir.

I might, if I may, Mr. Chairman, indicate at this point that we have the feeling, within this division, within our responsibility of advising the President in the use of the spectrum by the Government agencies, that we will be called upon and we feel that we should be ready to assist in providing additional frequencies for the furtherance of a commercial system.

The CHAIRMAN. Mr. Rogers?

Mr. ROGERS of Florida. I enjoyed your statement very much, Mr. Alexander. It was most comprehensive.

Do you handle the assignment of frequencies for the Department of Defense?

Mr. ALEXANDER. Yes, sir.

Mr. ROGERS of Florida. What will happen under the President's proposed change from the present setup for the Office of Civil and Defense Mobilization, transferring it from its present setup under the Department of Defense?

Will that affect your operations in any way?

Mr. ALEXANDER. Well, I will refer to, first, the Executive order that made that transfer, sir.

It made no mention of our effort. The press release that accompanied the order indicated that the telecommunication coordinating responsibility would remain within the Office of Civil and Defense Mobilization.

It is my understanding that that statement was made merely to indicate that the effort, the responsibility, would not be transferred to Defense, and it is further my understanding that the President and the administration still have this question under study, as to where to put this particular effort or what to do with it.

Mr. ROGERS of Florida. Is it your understanding that there will be a separate office that will not be under the Secretary of Defense or the Office of Civil and Defense Mobilization?

Mr. ALEXANDER. The telecommunications office, the part that has to do with the radio frequency spectrum, will not go to the Department of Defense.

I believe that it is still under study within the White House.

Mr. ROGERS of Florida. What about the assignment of other frequencies for the Government's use?

That would not be transferred?

Mr. ALEXANDER. No, sir.

Mr. ROGERS of Florida. I see. All telecommunications would be held——

Mr. ALEXANDER. With the exception of the FCC's capabilities——

Mr. ROGERS of Florida. Yes. Yes, I understand, because I was concerned about having the Department of Defense in complete control over all of the frequencies used by other governmental agencies as well.

Mr. ALEXANDER. We would share your concern, sir.

Mr. ROGERS of Florida. What about the problem of jamming this satellite system, an international telecommunications system through the satellite?

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Has that been gone into?

Mr. ALEXANDER. Well, I believe it is possible to jam any radio frequency.

With the proper techniques, however, it is possible to alleviate that, and I will ask Mr. Plummer to enlarge upon that point because I think he can give you a more complete answer.

Mr. PLUMMER. Well, there are two ways you can guard against it. One is to use some kind of a coding technique in the satellite, and anyone trying to jam would have to know that code.

That requires equipment and weight. It cuts down the reliability and, normally, that would not be done in a commercial satellite.

We would depend upon the people wanting to use it rather than jamming it.

That is a reason for considering the possibility of a defense or Government system where you could make it more complicated to make it more secure.

Mr. ROGERS of Florida. Yes, because if it is an international setup, which we are now proposing evidently, it seems to me if Russia wanted to, she could jam it very easily?

Mr. PLUMMER. Very easily. There are certain other features.

For example, as the art becomes more sophisticated you could put highly directional antennas aboard the satellite that would be aimed at a particular point on the earth's surface, and there would be considerable rejection to an unwanted signal coming up to the satellite unless they happened to be in the same general line.

There is a matter of power also, but for the foreseeable future we are not going to have too much weight in the satellite. So it would be easy——

Mr. ROGERS of Florida. Is it possible, sir, to put a satellite where we could use international telecommunications from the United States to, say, the Continent of Europe?

Have we developed the art of satellite launching to such a degree that we can place a satellite in areas selected for sending and receiving telecommunications?

Mr. PLUMMER. Well, that involves the techniques of putting up satellites in which I am not skilled.

Mr. ROGERS of Florida. Yes.

Mr. PLUMMER. Given a little bit more time, they could place it in a so-called synchronous orbit over the equator and roughly over the mouth of the Amazon River, and that would then connect the majority of the United States, all except a little bit of the west coast, with Europe.

It would not get the north—it would not get north of about 71° latitude. That is keeping an angle above the horizon of about 10° to keep away from the noise of the earth.

If you use a lower altitude and have, oh, 10 or 12 satellites orbiting you can do the same thing, but you cannot see as far north.

Then you go only about 63° north.

Mr. ROGERS of Florida. Thank you. And then just one last question:

I notice that in your chart E you have put out the information for the implementation of the final action on the Geneva Conference on the part of the United States.

I wonder if you could tell us if the other governments who participated in the Congress have taken the same action to implement the Conference as we have done?

Mr. ALEXANDER. I think by and large they have, sir. We have run into situations where certain countries have, by virtue of insufficient money or, perhaps, insufficient know-how or perhaps for political reasons, such as the Soviets from time to time embark upon, have failed to implement.

But, by and large, when these agreements have been reached, the remainder of the world, the member countries, have participated and acceded very well.

Mr. ROGERS of Florida. So there is no problem of one country holding up the whole system by not carrying out the recommendations of the Conference?

Mr. ALEXANDER. I would say that there are certainly problems there but they are rather isolated and minor in nature.

Mr. ROGERS of Florida. No major problem involved?

Mr. ALEXANDER. No, sir.

Mr. ROGERS of Florida. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Devine?

Mr. DEVINE. No questions.

The CHAIRMAN. Mr. Alexander, when is it contemplated that this Conference in 1963 will be held?

Mr. ALEXANDER. I think in the latter part of 1963 but that still remains to be determined.

I am not sure that it is firm.

The CHAIRMAN. It has not been finalized yet?

Mr. ALEXANDER. No, sir. I think in 1962 the Administrative Council will have a meeting and decide finally whether there should be one.

The CHAIRMAN. Did you attend the 1959 Conference?

Mr. ALEXANDER. No, sir. I was at the 1947 Conference.

The CHAIRMAN. That was held in Atlantic City?

Mr. ALEXANDER. Yes, sir.

The CHAIRMAN. Was there not one prior to that held in Chicago?

Mr. ALEXANDER. I think that was the Aeronautical Conference in Chicago, sir.

The CHAIRMAN. Oh, was it?

Mr. ALEXANDER. Yes, sir. I think the ones before that were in Madrid and Cairo.

The CHAIRMAN. Do you say that it is contemplated that the art will be developed to the point of using directional antennas in the satellite?

Mr. ALEXANDER. Yes, sir.

The CHAIRMAN. Does that mean that the satellite could be stationary after it was launched?

Mr. ALEXANDER. Well, the greatest use could be derived from these directional antennas with an equatorial satellite that would remain stationary in relation to the movement of the earth, so it would always be above the same point by reference to the earth's surface.

The CHAIRMAN. As I understand it, there are two kinds of orbits in which they think satellites can be utilized.

One is in the equatorial region and the other is the polar region.

Is that correct?

Mr. ALEXANDER. I think Mr. Plummer can give you a more complete answer on that, sir.

Mr. PLUMMER. Well, it is possible anywhere between. Around the Equator is considered best by some people but not by others.

As you go to a polar orbit the satellite is moving more rapidly past a given station. You have to follow it with antennas and you will also be picking up the next one that is coming over the horizon.

You never know exactly what the paths are going to be, so it is a little bit complicated.

However, if you want to get the polar regions, the northern Scandinavian countries, you have to go to a polar orbit to reach them.

The CHAIRMAN. When we were at the South Pole in 1957 we were advised by the scientists there that the South Pole was the only stationary spot or location on the each where satellites that were launched could be detected 24 hours out of the day.

Now, that is the way I understood it.

Mr. PLUMMER. That is true, if they are going tover the poles, or even in the Equator, if it is high enough.

The CHAIRMAN. In the other place, certain times of the day they go on the other side——

Mr. PLUMMER. That is right. A given satellite is in view for only about 30 minutes, depending on the altitude and the speed.

The CHAIRMAN. Now, any satellite that is launched in orbit can very likely be detected by anyone else who would have the facilities for such purposes?

Mr. PLUMMER. I would think so; yes, sir.

The CHAIRMAN. Suppose the United States, for example, or any country, or anyone, were to launch the satellite for communication purposes; would there be any way to prevent anyone else from using that satellite once it was located, for the same purpose?

Mr. PLUMMER. Yes, sir, by equipment to turn it off when you have finished with it, until you are ready to have it used again, or by suitable coding.

Just as you dial your telephone to get the number you want, you have to dial the radio signal going up to the satellite to make the satellite amplify it and repeat it.

But that would be very impracticable commercially.

The CHAIRMAN. You mentioned a while ago an experiment where signals were bounced off of the moon.

I suppose anybody could do that who had the know-how?

Mr. PLUMMER. Anyone, or off of Echo, either one.

The CHAIRMAN. That is what I was asking, if it could be bounced off the moon.

Then could it not be bounced off a satellite?

Mr. PLUMMER. Not the type that is normally referred to for relay purposes because it is too small.

You would not get enough energy off of it.

The CHAIRMAN. Well, I do not suppose it would be appropriate to say that it would be grounded if it hit the satellite out in orbit somewhere and go round and round——

Mr. PLUMMER. It would be reflected. It would be so weak that you would not be able to receive it.

The CHAIRMAN. It is anticipated that the satellites would be so constructed that if it were not intended that the signal be transmited, that when it hit, why, it would die or something.

Is that not right?

Mr. PLUMMER. If it involves metal of any kind, the signal would be reflected regardless unless some of this paint they use against radar proved to be effective, but the signal that came back to earth would be too weak to be useful unless you use enormous power on the ground.

On the active type, unless you turned it off by some means you could not prevent it. But the capability of turning it off runs up the weight of the satellite, and the power required to put it into orbit to a very great quantity or great amount.

The CHAIRMAN. Has anyone developed yet how reliable one of these stations would be?

Mr. PLUMMER. I have seen estimates anywhere from 30 days to a couple of years.

The most recent one, I think I saw, was the low-level satellite. They gave it about 2 years, optimistically, I think. And the synchronous, only a year. That will improve as time goes on.

The CHAIRMAN. A low level and what else?

Mr. PLUMMER. A synchronous or a 22,300-mile altitude, about 1 year.

I still do not know what the effect of the radiation in the Van Allen belts would be.

The CHAIRMAN. What belts?

Mr. PLUMMER. The Van Allen belts, V-a-n A-l-l-e-n, Dr. Van-Allen.

The CHAIRMAN. That is the 23,200-mile orbit?

Mr. PLUMMER. No, sir.

Dr. Van Allen is at the University of Iowa, I believe it is, and in one of the early experiments, sending satellites or probes out, he discovered there were bands of radiation encircling the earth somewhat in the shape of a doughnut, a so-called inner belt and outer belt.

There is a considerable supposition that that radiation would make resistors cease to function as they should and condensers cease to function as they should.

In other words, the circuits would not be reliable. They would fail.

A lot more information is needed to know just what the result will be.

The CHAIRMAN. And how far out is that situation?

Mr. PLUMMER. Oh, part of it goes out to about 13,000 miles.

The CHAIRMAN. In other words, if one launch was then 7,000 or 8,000 miles, would it be subject to such interference?

Mr. PLUMMER. No; I think it would be in between the inner and outer belts there.

The CHAIRMAN. And you would have to go 23,000 to get beyond——

Mr. PLUMMER. To get beyond it.

The belt is not particularly strong out near the polar regions. As I say, it is a doughnut shape. It becomes much weaker as you approach the poles.

The CHAIRMAN. Well, it is all very interesting.

Our time is consumed now and we are going to have to go to the House.

We thank you, Mr. Alexander, and you, Mr. Plummer, for your appearance here today and this very important presentation which you have given to the committee.

Mr. ALEXANDER. Thank you, sir; it has been a pleasure.

The CHAIRMAN. We appreciate your cooperation with the committee.

We might say, for your information, the printed record that we made here in the last Congress, in which you participated in the panel discussion on the overall spectrum problem, has been one of the most popular that this committee has ever made.

I think I am safe in saying that we have had requests for copies of it from practically all of the major educational institutions in the country, in addition to people in the commercial and business world, as well as a lot of others.

We have had to have it reprinted in order to meet the demands. So I thought you would like to know that that record that you helped to make and the information that is in it has been distributed rather widely, and a great deal of interest has been manifested by innumerable groups.

Mr. ALEXANDER. Thank you, sir.

It is of further interest, in that connection, if I recall, we tried to indicate the relatively small part of the spectrum that had been in use, and it is of interest to know that today we have increased—how many times, Mr. Plummer?

Mr. PLUMMER. 40,000 megacycles up to about 100,000 in actual equipment being used. That is about 2½ times. And they are working up as high as the visible spectrum now with infrared and ultraviolet, which is about 75,000 times higher.

Mr. ALEXANDER. Which I think is a substantial advance and which speaks well for the technological advances within the use of the spectrum, sir.

The CHAIRMAN. Yes. I recall the chart which you prepared that went all the way across this wall, and then, apparently, from what could be seen at that time actually it would go on indefinitely, so to speak, as far as we know now.

Mr. ALEXANDER. Yes, sir.

The CHAIRMAN. So there have been a lot of people interested in this.

Again, thank you very much. We appreciate your contribution to this important hearing.

The committee will adjourn until 10 o'clock in the morning, at which time the Chairman of the Federal Communications Commission and Commissioner Craven will be here.

I must announce that the appearance of the Defense Department this afternoon has necessarily had to be postponed in view of the legislation on the floor of the House, amendments to the foreign aid bill being considered under the 5-minute rule.

So, therefore, we have already notified the witnesses that they will be given an opportunity to come at a later date which we will try to work out as conveniently to everybody as we can and which will be announced.

Thank you very much.

(Whereupon, at 12:20 p.m., the committee was recessed, to reconvene at 10 a.m., Friday, July 28, 1961.)

# COMMUNICATIONS SATELLITES

FRIDAY, JULY 28, 1961

HOUSE OF REPRESENTATIVES,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
*Washington, D.C.*

The committee met, pursuant to recess, at 10:10 a.m., in room 1334, New House Office Building, Hon. Oren Harris (chairman) presiding.

The CHAIRMAN. Let the committee come to order.

This morning, as we resume hearings, the Chairman of the Federal Communications Commission, Mr. Minow, and Commissioner Craven, have returned for further interrogation by members of the committee who did not reach their turn when we adjourned a few days ago.

I think perhaps I might make this statement. I have just been advised—and you may know about it, Mr. Chairman—that NASA at 10 o'clock released information announcing the signing of a contract with A.T. & T. for the development of two, and probably as many as four, active communications satellites during 1962.

This announcement, I believe, is being made, and they were courteous enough to extend an invitation; however, I did not get to go.

At any rate, they are announcing that A.T. & T. will build satellites at its own expense and will reimburse NASA for the cost of facilities and services to include Thor-Delta launching and tracking facilities and range and launching crew services from Cape Canaveral, Fla.

NASA will provide A.T. & T. with telemetering and spacecraft acquisition information. That is the information that I received just a few minutes ago.

Mr. Chairman, did you have any further statement that you care to make?

## STATEMENT OF HON. NEWTON N. MINOW, CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION; ACCOMPANIED BY T. A. M. CRAVEN, COMMISSIONER; BERNARD STRASSBURG, ASSISTANT CHIEF, COMMON CARRIER BUREAU; AND MAX D. PAGLIN, GENERAL COUNSEL—Resumed

Mr. MINOW. Mr. Chairman, I know that our subject today is space communications, but I would ask your indulgence, and the committee's, to discuss one other matter for a moment regarding some space taken in the Congressional Record with reference to me yesterday.

Yesterday's Congressional Record contains a charge by Congressman Michel, regarding my vote in a Moline, Ill., television case before the Federal Communications Commission. Since these charges ap-

pear in the Congressional Record and since I am testifying this morning before this distinguished committee, I take this opportunity to set the record straight.

I did not vote in that case, and in view of the seriousness of the charge, my fellow Commissioners have authorized me this morning to make public the minutes taken when the vote was cast.

I would like to read them into the record.

Our minutes, the official Commission minutes of June 28th, 3:10 p.m.; present: Commissioners Minow (Chairman), Hyde, Bartley, Lee, Craven and Cross.

Item No. 2:

Staff instructed to prepare an appropriate document looking toward a grant of the application of Moline Television Corp. Commissioners Minow (Chairman) and Craven not participating. Commissioner Cross voting to affirm the examiner's initial decision.

Mr. HEMPHILL. Will you talk a little louder, please? I cannot hear you.

Mr. MINOW. I will read that again.

Mr. HEMPHILL. I heard that part of it.

Mr. MINOW. Mr. Chairman, I decided after attending the oral argument not to vote in the case, nor to participate in the deliberations about it, because I knew one of the applicants and had worked in his behalf when he was a candidate for public office. For that reason, I stayed out of the case. On behalf of the Commission and myself, I resent this type of careless accusation.

We make every effort to decide each case fairly and squarely and that is the only way to conduct the important work before the Commission.

Are there any questions about that? I would be happy to answer them.

The CHAIRMAN. I think, since you brought it up, I did notice the news item myself this morning, as I assume many other people did. So the record might be a little more complete, and we do not want to take up a lot of time, I assume the matter, whether an application or not—was it a license or permit application?

Mr. MINOW. This was a comparative case, Mr. Chairman.

The CHAIRMAN. I assume it started a long time before you arrived at the Commission.

Mr. MINOW. It has been there for years.

The CHAIRMAN. And I assume the hearing examiner made his recommendation before you came to Washington.

Mr. MINOW. I believe that is right, sir.

The CHAIRMAN. Do you know the date that that recommendation was made?

Mr. MINOW. No, but under our normal docket that certainly would have been right because there was a month's interval there between the time of an examiner—I would be sure——

The CHAIRMAN. Would you supply that information?

Mr. MINOW. I would be glad to, sir. April 28, 1960.

The CHAIRMAN. The hearing examiner's report was April 28, 1960? When did you come to Washington?

Mr. MINOW. I began here the 2d of March 1961.

The CHAIRMAN. Do you know whether the matter was already docketed then, on the agenda for the Commission?

Mr. MINOW. I believe it was. I think that the argument originally was scheduled, I think, about the time that I arrived; somewhere in there.

The CHAIRMAN. In other words, the facts are that the matter was practically—that is, the record in the matter was—consummated before you became a member or Chairman of the Commission, and it was concluded all except the final vote, you might say, and you did not participate in that vote?

Mr. MINOW. That is right.

I heard the argument, Mr. Chairman, and I concluded at that time that I should not participate and did not. And it is precisely, it seems to me, to avoid this kind of criticism that I have taken this attitude, and I resent that kind of careless charge.

The CHAIRMAN. Mr. Moss?

Mr. MOSS. Mr. Chairman, I have had a very interesting few weeks in trying to prepare myself for these hearings on a subject which, the further I inquire, becomes increasingly important.

I think the decisions being made now in the Government are of the utmost importance.

While I recognize the high priority which properly should be assigned to the establishment of a space satellite communication system, I am also cognizant of the fact that haste in some directions at this point migh well prejudice the type of system which is ultimately developed.

I am concerned that in the process of developing both the system and the entity which will operate and own, that we avail ourselves of the most expert knowledge which forms an important asset to this Nation and, if we are successsful, a most important international asset.

I find myself deeply concerned over the action of the Commission in creating the ad hoc committee. It is my judgment that while the Commission has stated quite clearly that it, in dismissing other matters, did so without prejudice, that the creation of the ad hoc committee, the limitation of membership to the international common carriers, has, in fact, created prejudice.

And I would like to ask at this time some questions which, I hope, will clarify the situation existing at the moment.

Mr. Chairman, is it a fact that the contemplated space communications system is different in major respects from the conventional common carrier type of international operation in view of the fact that the space system's success will depend in major part on space research, development and equipment?

Mr. MINOW. Let me begin, Mr. Moss, by saying that in behalf of the Commission we would agree with you that the issues here are, I think, the most fundamental and important matter before the Commission.

I do not think that we have reached any judgments here that are not subject to the most careful, searching reexamination, and I do not think anything here is foreclosed. I would say that in the beginning.

The CHAIRMAN. You do not think any what?

Mr. MINOW. Any further development here or changes in our minds—nothing is foreclosed. All we have done to date is to embark on an exploration of one—one possible plan, and in our order we have emphasized the necessity for drawing on the best technical and scientific minds available to contribute to the success of the venture.

And, further, the arguments of those who are not carriers are all going to be heard before us, so I would say that in the beginning.

Now, in reply to your question, the principles, I think, of space communication are something that we have never had before. We are embarking in an entirely new adventure. No one knows that much about it, and I do not think that we could say at the present time that all the conventional theories are still applicable.

Commissioner Craven might want to answer that, too.

Mr. CRAVEN. I think I testified before that the basic principles of communications are the same. You use the telephone, for example, from your home over the exchange system, over the landline system in this country into the space communication, the ground system to the satellite relay down to the foreign country ground system, and right straight to the foreign home or office.

That is exactly what we do today in radio. We even have automatic relays on the Equator and so forth. The only difference, as I see it, insofar as the basic principle of communications are concerned, the automatic ground relay which now exists is put several thousand miles up into space.

Now, I do agree with Congressman Moss that there is a new technique. The great difference is that it involves the use of space science, the launching facilities, and things of that character.

Mr. MOSS. And at this point in the development of such a system, Mr. Commissioner, is it not true that the space science is of greater significance in assuring its success than the experience which might be brought to bear in past operations of international communications?

Mr. CRAVEN. Can you read that again?

(The question was read.)

Mr. CRAVEN. Yes, certainly.

Mr. MOSS. And now the Commission has called upon nine international common carriers to organize an ad hoc committee to advise the FCC and to present a plan for the development, construction, ownership, and operation of the space communications system.

This is your order of July 25.

Will you tell this committee what expertise in the space technology field the South Puerto Rico Sugar Co. has?

Mr. MINOW. I would doubt that it has very much, Mr. Moss.

Mr. MOSS. Will you tell the committee what expertise in the field of space communications the Tropical Radio Telegraph Co. has?

Mr. MINOW. I would doubt that it has very much, Mr. Moss.

Mr. MOSS. And what space expertise does the Hawaiian Telephone Co. have?

Mr. MINOW. I would answer the same. I doubt that it has very much.

Mr. MOSS. Do you feel the U.S. Liberia Radio Co. has any expertness in space communications?

Mr. MINOW. I would doubt it. I am not sure. All these companies are carriers in the conventional sense today, using the existing technology for international communication.

Mr. MOSS. But they have been selected as members of this ad hoc committee which is to make or to give advice to the Commission and to make proposals in a most important area.

Mr. MINOW. That is correct. And the reason that they have been included is that they are presently licensed international carriers.

Mr. MOSS. Would you say that any of the international common carriers I have named above have as much expertness in the space field as, for example, Lockheed, General Electric, General Telephone, Westinghouse, or Bendix?

Mr. MINOW. I think you have to distinguish between expertise in the space field in the manufacture and launching of satellites and so on, and in the field of communications. I have no doubt that the companies you have mentioned are much more expert in the technology of space. I have no doubt about it.

Mr. MOSS. Mr. Dingell has asked that I yield to him at this point.

Mr. DINGELL. If that is true, then why is it that the Department of Defense and other Government agencies chose Bendix and RCA, both of whom are not licensed carriers, to develop similar satellite programs? It would appear, if you are right, then the other departments of Government are wrong. If they are right in this, then you are wrong.

Mr. MINOW. Well, I think not, because I think, when the Department of Defense has chosen contractors, what they are doing there is choosing someone to build or manufacture a piece of equipment which the Government is going to operate. They are the operating people; the people who do the day-to-day communications services are the Government.

Mr. MOSS. Of course, Mr. Chairman, again I go back to the order of the 25th, where they are charged with recommending and proposing and development, construction, ownership and operation.

Mr. MINOW. That is correct, except, I think, in another part of that order we specifically directed the committee to call in anyone who can make a contribution to the technological of scientific parts of this, and we have also taken pains to assure that in the purchase of any equipment, that everyone will have a fair chance at it.

Mr. MOSS. Would you agree with me, Mr. Chairman, that if you are more or less on the inside and have the determination, the power to determine which companies might made the contribution, that you have an advantage, and if you can write the plans or the specifications, that you have an additional advantage?

Mr. MINOW. I would agree with you and that is why we have. I believe, seen to it that anyone who is involved in this field can participate at that stage.

Mr. MOSS. How, by being selected by the ad hoc committee?

Mr. MINOW. No.

First of all, by being consulted in the ad committee's deliberations before these decisions are made. Second, by the opening up of any purchase of equipment to the entire field.

I would like to read at this time the objective of paragraph (f) of our supplemental notice of inquiry, (8) (f), which appears at page 3 of our supplemental notice:

> The plan of organization and operation of any joint venture shall make adequate and effective provision such as competitive bidding to insure that there will be no favoritism in the procurement of communications equipment required for the construction, operation and maintenance of the satellite system and to foster opportunity for continued research and development activity by all enterprises seeking to compete in furnishing such equipment for the satellite system.

Mr. Moss. Do you think that the opportunity to bid competitively—you usually bid upon specifications or standards determined by someone. The determination of the standards and specifications can, in themselves, be a very important limiting factor in the right to compete for equipment; is that not the fact?

Mr. MINOW. It certainly is, sir, and we are very much aware of the danger involved in that.

Mr. Moss. And is it not also true——

Mr. MINOW. Commissioner Craven, I think, would like to add to that.

Mr. CRAVEN. Insofar as the performance specifications of the communications equipment of the entire system in the standardization thereof, that will not be passed upon by the Commission.

Mr. Moss. I recognize that, sir, and that also causes me some rather grave concern because the Commission—and I am reading now from the report of the Committee on the Judiciary of the U.S. Senate, 87th Congress, 1st session, Report 143, April 3, 1961, from page 13, where it says:

> However, the Commission has formally declined to investigate the effect of such rights on the general availability of the specified equipment standards and maintains no staff competent to make such an investigation.

Further, I understand from a statement supplied, again, April 20 of this year to a Senate committee:

> Patent monopoly. Patent misuses are important consideration in determining the adoption of a standard, and the Commission would not consciously show favoritism to any manufacturing group if standards could be adopted that would both encourage competition and provide the best communications service obtainable. However, the Commission has declined—

it goes on—

> upon the ground that it has no staff adequate "to cull out particular items warranting consideration by us in the discharge of our statutory functions."

Are those statements correct?

Has the Commission the staff that is able to undertake this review assignment on the matter of standards?

Mr. MINOW. I, in answer to that, would first call your attention to the last sentence of paragraph 9 of our first report and order in which we said:

> At the same time before approving any specifications we shall examine closely into the relevant patent situation to insure that an undesirable or dominant patent position will not hamper or frustrate the Commission's objectives in this regard.

I would not say that we have the best or most adequate patent staff. I would not take that position at all. However, I think in this field—and Commissioner Craven may correct me—NASA will be the Government agency, I believe, with the essential responsibility of the establishment of standards and the patent policies in this field.

Mr. CRAVEN. Not so far as the Communications Commission is concerned.

Mr. Moss. That would be the responsibility, would it not, Commissioner Craven, of the Federal Communications Commission?

Mr. CRAVEN. Right.

Mr. Moss. You may seek advice from anywhere, but the ultimate responsibility is yours and not NASA's?

Mr. CRAVEN. That is correct.

I might say this:

We have had several occasions in the past to pass upon the standards such as color standards for television, and also the basic standards for FM broacasting, and what is the most recent one, stereo standards.

We went very carefully into the patent situation, and we required, when we adopted the standards, that the patent holders involved would give license rights on a reasonable basis.

Mr. MOSS. Of course, Mr. Commissioner, you would agree with me, would you not, that the Commission has also had some very unhappy experience on standards, and I have in mind the prolonged period of confuson resulting from the orignal adoption of color standards?

Mr. CRAVEN. I do not know whether I could agree with you. I was not there at the time.

Mr. MOSS. Well, was there not an adoption of standards, I believe the CBS standards, which were for a mechanical system that was noncompatible, and after a rather long period the Commission had to review and adopt different standards, I believe the RCA compatible standards?

Mr. CRAVEN. Yes.

But I do not know what that had to do with the patent situation. That is what I am unaware of.

Mr. MOSS. I am talking about both patents and standards.

Mr. CRAVEN. I am not so certain that the CBS patents had not run out; that the patents they used had not run out.

Mr. MOSS. I would not be able to judge on that. I could judge, however, as an interested spectator, in that period of confusion that it did certainly take place.

Mr. MINOW. Mr. Moss, there has been a recent reexamination of the Commission's patent policy. Our general counsel, Mr. Paglin, is fully familiar with it. In fact, we filed comments with a congressional committee about this within the last several days, and if you would like, I would like to have him explain our present rethinking of our patent policy.

Mr. MOSS. I would be interested, because I served for 4 years on the Oversight Subcommittee, and, as you recall, in our report in the 85th Congress, the 2d session, Report No. 2711, we were rather critical.

Mr. MINOW. Right.

Mr. MOSS. Of the Commission's failure.

Mr. MINOW. Right.

Mr. MOSS. To have standards in this.

Mr. MINOW. Well, in response to that we have been going over this. Mr. Paglin, would you want to briefly summarize it?

Mr. PAGLIN. Yes.

Mr. Congressman, with reference to the excerpt of the Senate subcommittee's report which you just read, in the more recent hearings held by this subcommittee on S. 1084 and S. 1176, which were bills dealing with Government patent practices, a statement was submitted on behalf of the Commission in which the Commission's jurisdiction and its practices concerning patent matters was fully set forth, and particularly the Commission made note in its statement of the quotation which you just read and took issue with it on the grounds that it

was our feeling that that statement did not reflect accurately the Commission's position or its statutory authority with reference to patent matters and with reference to the establishment of technical standards.

We pointed out, as we had pointed out earlier in that statement—and if the committee wishes, we would be happy to make available for this record the statement submitted——

Mr. Moss. I would like to have, Mr. Chairman, a copy of that statement submitted for the record at this point.

Mr. Dingell. Without objection, it is so ordered.

Mr. Moss. You would agree with me, would you not, sir, that over a period of a number of years there has been rather critical comment on the standards and policies of the Commission in the field of patents?

Mr. Paglin. With all due respect, I do not know that I can agree. There has been talk about it. I can agree there has been comment and possibly critical. Whether it was justified or not, I think, remains to be seen.

Mr. Moss. It would be helpful, I would ask permission to hold the record at this point and document by appropriate citation the number of instances, if it would be helpful to you, sir.

Mr. Paglin. I have no doubt, and I think I am somewhat familiar with the matters that the Congressman refers to. I think the Commission has attempted in these statements to which I referred, and also with respect to the filing to which the chairman referred, which happens to be our response to the subcommittee's request for comments on their preliminary draft report, in which we point out the manner in which the Commission has been concerned and the actions it has taken with respect to the question of patents and possible patent domination.

As you probably know, our statutory authority derives from section 218 of the act concerning common carriers particularly, and is quite broad; from section 303(e) and 303(g) of the act with respect to radio operations in general. I think what must be made clear in any consideration of the patent matter is that in the promulgation of standards, it is the Commission's function under the directive of Congress to establish certain technical requirements which its licensees must meet, and these requirements may frequently be met by the use of patented equipment.

But these technical standards are specified usually in terms of performance, performance requirements, rather than a specific equipment design, so that the Commission sets up certain specified performance characteristics which may be obtained by the use of certain equipment which may be covered by patents, but, at the same time, it has always been the Commission's objective to so set its performance standards that these standards can be met by the broadest possible base of patented equipment.

Mr. Moss. Of course, that is as it may be, and I think you would concede that there is room for some disagreement as to whether or not the Commission has been as successful in that field as it might like to be.

Mr. Paglin. I do not know as I have any comment.

Mr. Craven. I think that is very diplomatic.

Mr. Minow. I would agree with you we have not been as successful——

Mr. Moss. And we are now going into a very significant new area.

Mr. MINOW. Reexamination.

Mr. Moss. Where this question becomes one of the most fundamental with which we must contend.

Now, Mr. Minow, before the Antitrust Subcommittee of the House Judiciary Committee you testified, and I quote:

> You have got a rational class when you say here are the people who are in the international communications business. This has been their business. We are not saying certain of them are in and certain of them are out. We are saying here you are, all of you are in one rational class. This has been the thinking to date of the Commission subject now to the petition for reconsideration.

My question is:

When you speak of a rational class, is it not actually true that three of the carriers are electric manufacturers; one, the United Fruit Co., is primarily a banana producer; another, the Firestone Co., is a tire manufacturer; the third, Press Wireless, is owned by three news media; and the South Puerto Rico Sugar Co.'s primary business is sugar?

Mr. MINOW. I think all of those statements are true, Mr. Moss. On the other hand, it is also true that these are the only licensed international carriers at the present time. I wish there were more. These are the facts as we find them. These are the entire existing class of international carriers. In our order we made it clear that it was open to existing or future international carriers, saying that anyone who wanted to be a member of that class was free to do so.

Mr. Moss. But the order creating the ad hoc committee limits participation as members of the committee strictly to companies we have been discussing here.

Mr. MINOW. That is correct. Those who are licensed international carriers.

Mr. Moss. And they are instructed to avail themselves, really at their discretion and on the basis of their judgment, of the additional advice and expert knowledge of whoever they might select.

Mr. MINOW. Well, except, I think, there will necessarily be some—shall I use the word "prodding"—from the Commission in the event that they do not do it on their own initiative. We have made it clear in our order what our intention was.

Mr. Moss. We have not too much time for a lot of prodding with an October report back date, have we, sir?

Mr. MINOW. Well, our theory is this: Our whole problem stems from the fact that unfortunately there can only be one system.

Mr. Moss. My concern stems from the same fact.

Mr. MINOW. Right. It is like broadcasting. If there were enough room for everybody, the Government would not have to get involved at all, but, unfortunately, there can only be one system, so you get a very difficult, complex, tortuous question of public policy: Who should be in it?

And we are exploring—and I use the word "exploring" advisedly—one theory, one possibility at the moment, and that is to take the international carriers, the people who are in the business, the people who have the contractual relationships abroad with other countries, the people who have the technical know-how to provide communications service presently, and see what the people who are responsible now

under the law and under the licenses for providing communications service and saying to them:

"You come up with a proposal. If it meets the standards of public interest that we have established here, we will then consider it, and, at the same time, we will consider hearing from all the other people as to what their views are, whether they have objections, whether they have got better ideas."

This is the stage we are at now.

Now, we are confronted with a very deadly time problem. This is one area where the scientists say that we are ahead of the rest of the world, and we do not want to waste a day in maintaining that lead. So that is the road we are trying to walk.

It is difficult, I know, and I can only say to the committee that we are trying to protect the public interest in every way we can, and the fact that the other noncarriers have been left out of the present ad hoc committee should not be taken as our final word on the subject.

Mr. Moss. Of course, I recognize that it is the very sincere desire of the Commission to protect the public interest at this point. I assure you that that is my desire.

Mr. Minow. Surely.

Mr. Moss. I have not a single noninternational carrier represented in my congressional district.

Mr. Minow. You are lucky.

Mr. Moss. In fact, probably the only party involved here at all represented in my congressional district is the American Telephone Co., through its subsidiary the Pacific Telephone Co., and I have great respect for the competence of that organization.

Now, in your release of the 25th, it indicated that nine of the international common carriers serve in this advisory capacity, but is it not a fact, Mr. Minow, that five of these nine carriers have not even indicated a real desire to participate in ownership of a space communications system?

Mr. Minow. I am not sure of the number. I assume that is right. It is either four or five. All want to use it. Some do not want to participate in it.

Mr. Moss. All want to use it?

Mr. Minow. Yes.

Mr. Hemphill. Will the gentleman yield on that point?

Mr. Moss. Yes.

Mr. Hemphill. I would like to know on that point whether or not the inclusion of those five do not have the expertise that we have been discussing here, whether or not they were included in order to avoid the prospects or the potential of a monopoly.

Was that the purpose of it?

Mr. Minow. Well, no. Our theory was, at least in our first order and in our second order, was to take those who were licensed carriers, those who are now by law required to provide service as carriers, and to see what they could come up with, and these five fell into that category, and they all expressed a desire to use the system even though they were not able, some of them, to financially contribute to its ownership. All of them want to use it even though some of them are unable financially to invest in its ownership or participate in ownership.

Mr. HEMPHILL. I do not like to use the word, but did the Commission feel that that would prevent discrimination?

Mr. MINOW. Well, what we did initially was to send out an inquiry, a public inquiry, and all of them responded. All of them responded and said "we would like to be in it" in varying degrees.

One would say, "I want to invest in it"; one would say, "I would like to use it"; and so on. All of them responded and that is the way it developed.

Mr. HEMPHILL. I thank the gentleman from California.

Mr. MOSS. Does this not mean that ownership of the space communications system will, if limited to international carriers, for all practical purposes be in the hands of four companies: namely A.T. & T., I.T. & T., which is the parent company of the American Cable & Radio; and RCA Communications, a subsidiary of RCA; and Western Union?

Mr. MINOW. I think it is really too early, Mr. Moss, to answer that until we see——

Mr. MOSS. We have a supposition that, if limited to international carriers——

Mr. MINOW. Well, I think it depends upon the plan or the entity which these people will come up with. If they come up with such a proposition, which is one possibility, we will have to judge that against the public interest standards we have set out.

They may come up with other alternatives.

Mr. MOSS. Mr. Chairman, I have been greatly impressed by your performance on this Commission since you came to Washington, and I think I have voiced that on a number of occasions.

Mr. MINOW. Thank you.

Mr. MOSS. Now, seriously, do you feel that a committee of common carriers is going to sit down and come up with a recommendation on ownership and operation to include noncommon carriers?

Mr. MINOW. No, I do not think they will do that, but I do not think that they necessarily will come up with one that limits it to those four. There have been a variety of plans that, I know, are under consideration, and I know this:

(1) We are not going to authorize anything that does not meet with the approval of the Department of Justice.

(2) We are not going to authorize anything that does not meet our standards here, so there is going to have to be a lot of pulling and hauling and giving and taking in meeting a public interest arrangement.

What it will be, maybe they will come up with nothing that is acceptable.

Mr. MOSS. Then if the ad hoc committee is for the purpose of expediting, why would it not have been advisable to have had broader participation either on the committee or the creation of two with alternate proposals which could be studied by the Commission?

Mr. MINOW. I can only speak for myself, my own thought processes in going through this, although other Commissioners may differ.

The problem I have with it, I think the ones who are not carriers, basically they are interested in the manufacture and sale of equipment; not in going into the day-to-day business of providing communications services of a carrier.

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Furthermore, it is not just a question of one company or two companies. If we open this up to anyone who wanted to be in it, who is not a carrier, there are today somewhere over 100 electronic manufacturers, and I do not see how we could say to one, "You can be in it and you can't," or, "You can have X percent and you can have Y percent."

I do not know how we could work that out.

Therefore, as a first alternative—as a first alternative we have taken this route to see if this works, if this can come up with a plan that will satisfy the Department of Justice and the public interest standards, and, at the same time, protect the interests of the manufacturers in giving them a fair crack at selling equipment, and research and development.

Now, if we cannot, then we will have to look at some other alternative, but that has been my thinking to date.

Mr. Moss. Of course, there seems to be a great drive on the part of all types of American business to seek the opportunity of diversification, and so should we assume that they are primarily interested in just manufacture rather than participation and operation.

Mr. MINOW. Well, the only way I can look at that is that we say anybody who is or will be a future carrier, wants to be in that business, can do so.

Mr. Moss. But this is a case where you have indicated we are to have one system.

Mr. MINOW. Right.

Mr. Moss. And it is to be owned and operated by a new entity?

Mr. MINOW. Right.

Mr. Moss. Now, the basis of ownership or participation in ownership is a separate question. The operating company which will finally emerge and be the licensee of the Commission——

Mr. MINOW. Right.

Mr. Moss (continuing). In this instance——

Mr. MINOW. Right.

Mr. Moss (continuing). Will be a new international carrier, is that not correct?

Mr. MINOW. Well, not necessarily; not necessarily. Commissioner Craven, I think, could answer that.

Mr. CRAVEN. One of the suggestions is that each of the existing carriers will own its own ground stations. Any joint ownership of equipment will be in the satellite itself, and the ownership of that satellite equipment, inasmuch as we have had to communicate with other nations, we may find that other nations will have ownership in that equipment, also. We may end up with a type of joint venture in which the various carriers have their own ground systems and compete for the traffic as they do now.

Mr. Moss. Well, the ownership of the portion of the system out in space still becomes potentially a very lucrative one, does it not, a very important one?

Mr. CRAVEN. Lucrative?

There is some testimony before one of the committees of the House of Representatives that this business is going to amount to a $100 billion business. I think that is fantastic.

The very best estimates that have been made, that some time in 1980, thye may be breaking even, and at the maximum I think it is a billion dollars worth of business. But that is the total business for the entire world. Now, just take the telephone business alone.

It would take a long time before all of Africa, for example, has as much use of the telephone as we have in this country, and all of Asia, and those are some of the countries we are going to be communicating with.

Mr. Moss. Would you deny, sir, that it has in the long range a potential of being lucrative?

Mr. CRAVEN. I do not know what you mean by "lucrative".

Mr. Moss. Profitable.

Mr. CRAVEN. Well, their profits are going to be regulated by the Communications Commission.

Mr. Moss. Yes, I know that.

Mr. CRAVEN. And they are not going to be out of order.

Mr. Moss. I trust that that is the case, although I would point out that you have had some difficulties in some phases of regulating the international carriers. Would you deny that?

Mr. CRAVEN. I do not know what you mean by "difficulties".

Mr. MINOW. No.

You mean on rates? Not on the international part of it, really. On the domestic parts, sometimes; but the fact is in the oversea telephone business today, in the oversea telegraph business, you have got a couple of carriers that cannot make a go of it at present.

Mr. Moss. Yes.

Mr. MINOW. Another factor, you see, if it takes the course that Commissioner Craven mentioned, which is one possibility, where each own their own ground station, another factor that I think is highly significant is that whatever system develops here has got to be integrated with our own communications system.

It will not do any good to have a satellite communications system unless you can pick up your telephone or use your telegraph service or data processing, whatever it is, to hook into it.

Mr. Moss. Or your television or radio?

Mr. MINOW. Or television or anything else. So whatever develops here has got to be integrated.

Mr. Moss. And that will be done under the standards set down by the Commission?

Mr. MINOW. That is right.

This is another factor, you see, that has been on our minds. I would not want, though, Mr. Moss, by these answers, to leave the impression that: (*a*) We have a closed mind about it; or (*b*) that we think we know everything there is to know about it, because we do not.

We are going into a brandnew adventure here for everybody, and all the wisdom and guidance that we can get, including from this committee, we would welcome very much.

Mr. Moss. I recognize certainly that there is a great need for that, and I am certain the Commission will seek it. My concern is that in this first step it is my judgment that there is a limitation on the type of advice that will be brought into play on this very significant recommendaton from the ad hoc committee, upon which the Com-

mission is undoubtedly going to act and upon which it will place, I would imagine, a considerable reliance.

Mr. MINOW. Well, except you have got to take that in the context of our order where we have made it explicit that at that time everyone will have a chance to come in and be heard; that our own view is that we are not going to do anything here that the Justice Department does not like; and I just do not think we have foreclosed, you see, any——

Mr. MOSS. I am not saying that you have foreclosed, although I say, if I could write the reports of each of the committees on which I serve when we send out legislative recommendations to the House, that I could have a considerable impact upon the actions and judgments of the House in that privileged role.

Mr. MINOW. I understand that.

Mr. MOSS. Now, does not the policy of the Commission differ from the policy of the Department of Defense which uses the aerospace companies in the development particularly in this Advent communications satellite?

Mr. MINOW. I think not, because there, I think, what is happening is that the Department of Defense is contracting with a manufacturer to make a piece of equipment which the Department of Defense then operates.

Mr. MOSS. Yes.

And the Advent is the one, is it not, that is going to project it for the very high altitude system?

Mr. CRAVEN. Yes.

Mr. MOSS. Which in the minds of some at least is the superior system. I am conscious of this lag of time in communicating.

Mr. CRAVEN. I have to be very careful in what I say about Advent. That is not a useful system for a large part of commecial traffic.

Now, when you spoke of the equatorial orbit, that has been proposed here by several of the proponents and, also, at this stage there has been a low level equatorial orbit type of a satellite system, communications system, which has been proposed by one of the proponents, and each of these systems, as well as the polar orbit, have advantages and disadvantages, and there is a disagreement among industry and scientists as to which is the best system for communications. Those things will have to be resolved.

Mr. MOSS. Well, now, Mr. Craven, you said that this was not a very practical system or a good system. I am reading from an article in the July issue of Fortune, and quoting here it says:

> The system nearly all authorities agree would be best, if and when obtainable, is the 22,300-mile orbit or synchronous satellite system which calls for only three high satellites or six for insurance in a fixed equatorial orbit to serve over 90 percent of the globe. This was the scheme proposed with variations in details by RCA, I.T. & T., General Telephone, Lockheed, and Hughes, all of which are engaged in active research on equipment to do the job.

It points out, of course, that there are the disadvantages which you mentioned to the committee on your last appearance here.

Mr. CRAVEN. Well, I can point out one disadvantage to one of the systems in that we cannot get direct communications between New York and London. You have to relay. Now, that may be all right.

There are certain disadvantages, perhaps, with respect to the high equatorial orbit, synchronous orbit, though it appears now to be the ultimate but the furthest off.

Now, when I spoke of the Advent not being available for commercial purposes, I cannot give you the reasons why because of classification.

Mr. Moss. In researching this matter—and I confess that up until about a month ago, I had not done much work on it at all in researching it—but is it not true that perhaps the reason it is a little further off than any of the others is because of decisions we made back in the early 1950's on the type of launching motors we were going to develop, rocket motors, and determined upon less thrust in order to expedite a system, and now it is more difficult for us to place into orbit satellites of this type at this height, the location of our launching pads, and because of decisions made earlier we are faced now with the possibility of limitations?

Mr. CRAVEN. That is true insofar as the timing is concerned, but I think you ought to be aware of the fact that these satellites will have a limited life at the beginning, and you will have to replace them, and I do not believe it is going to be difficult to go from one type of orbiting to another, when they get the launching facilities and the thrust available.

Mr. Moss. I agree with you, sir, and that, again, is part of my concern in this whole problem:

That we not, in our zest for haste, hurry so rapidly that we limit ourselves severely as we might appear to have done in decisions made earlier on the matter of launching devices.

Mr. CRAVEN. With respect to that, sir, I would like to call your attention to the fact that other nations may launch their own satellite system, and there is a very limited number of satellite systems for communications that can be had.

Mr. Moss. That is correct.

Mr. CRAVEN. The first nation that has a system up is the one that is going to have great influence.

Mr. Moss. That is correct, sir, and I know that at your last appearance, when asked about the activity of other nations, you indicated or conveyed to me the feeling that you did not think any other nations were working on the development of a satellite system.

Mr. CRAVEN. In my earlier testimony I said the information that we had from the U.S.S.R. was negative. We have no information that they are actually experimenting with a communications satellite, but they do the thrust, they do have the technological know-how in the field of electronics, and we cannot underestimate their ability to do this.

Mr. Moss. And is it not true that in at least three instances in recent Soviet publications that it appears that their Academy of Science has directed a rather high priority in this field?

Mr. CRAVEN. I was not aware of that publication.

Mr. Moss. I would be very happy to supply these references for the record, because I do have them, and it indicates that they are assigning a priority in this area, and that they are working on it.

(The references mentioned by Mr. Moss follow:)

The following are excerpts from articles which appeared in Soviet literature by very responsible Soviet scientific and technological persons, regarding meteorological and communications satellites:

On January 1, 1960, there appeared an article entitled "A Glance Into the Future of Our Science" by the then president of the Academy of Sciences of the U.S.S.R., Aleksandr Nesmeyanov. In this article, which is a review of what to expect in the development of science for the sixties, he stated: "Soviet science is planning the use of satellite and meteorological service and radio communications."

In another article appearing in the May 1960 issue of Tekhnika Molodezhi, Academician Nesmeyanov further stated that "Soviet scientists were planning to use manmade earth satellites in meteorology and radio communications."

In a still later article dated December 11, 1960, Academician Nesmeyanov, in an article presented for the East German Neues Deutschland, stated "Soviet scientists are working on plans to utilize satellites for meteorological and radio services."

In 1961, a report was made by Academician M. V. Keldysh, who succeeded Academician Nesmeyanov as president of the Academy of Sciences for the U.S.S.R. This report was presented to the All Union Conference of Research Workers in June 1961. In his report he stated that "a priority of the highest importance is assigned to artificial earth satellites as a means for the solution of a number of economic problems. Observations performed with the use of satellites would create a radical improvement in weather forecasting, radio communications, and solar utilization. The use of communications, and satellites, and of satellites for relay services would revolutionize communications and television services."

In summary it is noted that the highest officials of the Academy of Sciences of the U.S.S.R. have repeatedly stated that the Soviets are working on and have plans to use satellites for communications services. In the past, statements made by Nesmeyanov were not usually made for propaganda effect, but rather as a statement of fact. If one searches in the literature to determine the problems designated to the special departments of the Academy of Sciences, it will be further noted that the very highest priority is given to the development of meteorological and communications satellites.

Mr. CRAVEN. Well, I just finished telling you that I would not underestimate them.

Mr. MOSS. No, I would not either. I would not either. That, again, goes to my concern that in our getting together all of these recommendations, that we draw upon not just international——

Mr. CRAVEN. Well, you would agree, sir, that we cannot be wasting our time here in this country.

Mr. MOSS. Oh, I am not urging a waste of time, sir. I am urging steps which would avoid a waste of time.

Mr. CRAVEN. Yes.

Mr. MOSS. The participation on a broader base of those who are going to advise and propose to the Commission.

Mr. DINGELL. Will the gentleman yield to me?

Mr. MOSS. Yes, I would be happy to.

Mr. DINGELL. I would like to ask the function of this ad hoc committee. Is this ad hoc committee going to have anything at all to do with research and development and with types of equipment?

Mr. MINOW. I would think not at this stage, Congressman Dingell. I think what they will do will be to meet and come up with a plan of organization which they will submit to the Commission for its——

Mr. DINGELL. A plan of organization in what regard?

Mr. MINOW. I would think as to financing. Our order, I think, is pretty specific on it.

Mr. DINGELL. Mr. Chairman, would you give us the substance of that very briefly?

Mr. MINOW. Yes.

Mr. DINGELL. As to what this ad hoc committee is going to do?

Mr. MINOW. Yes.

Mr. DINGELL. Very briefly.

Mr. MINOW. We have asked them for a written description and an explanation of the organization and operation of a proposed venture taking into account all the public interest standards that we have set out in the order. We have also asked them to list the capital contribution that it is prepared to make on behalf of each participant, the extent to which it intends to offer any equipment, apparatus, supplies or services to the joint venture, and also a full description of the policies which each participant proposes to apply regarding interconnection.

This is a key element here for the carriers. Basically, that is what we have asked for.

Mr. DINGELL. All right.

Now, I have here a copy of your public notice G, wherein you said:

> The Committee will consider, but not be limited to, the following specified public interest objectives:
>
> A commercially operable communications satellite system will be expected to provide the potential means for global coverage.

Now, does that not mean that there is going to be some scrutiny into equipment, types of equipment which will be utilized within the basic system?

Mr. MINOW. I would think not at this stage, really.

Mr. DINGELL. Can you tell us how this ad hoc committee, in view of your first objective, is going to avoid considering types of equipment which will make possible a feasible system for global coverage?

Mr. MINOW. I think, basically, what we are interested in is the form of entity, the financial and other arrangements. For the technical part of it, my own view is, I think it is going to have to be acceptable to NASA; it is going to have to be——

Mr. DINGELL. You are evading my question, Mr. Chairman. My question just simply is this:

Your order, public notice G, of July 25, said, as follows:

> The Committee will consider, but not be limited to, the following specified public interest objectives.

Mr. MINOW. Right.

Mr. DINGELL. "A commercially operable communications satellite system."

Mr. MINOW. Right.

Mr. DINGELL. "To provide potential means for global coverage."

Mr. MINOW. Right.

Mr. DINGELL. Now, if they are going to do that, can you tell us how they are going to evade and to avoid consideration of types of equipment, at least in a general way, if they are going to comply with your own order to them?

Mr. MINOW. Well, I think there may be a general consideration of that, but that is not what we are interested in at this stage. We are not asking for that.

Mr. DINGELL. But you will concede, then, that they are going to consider types of equipment, are they not, in a general way?

Mr. CRAVEN. I would not agree to the necessity for telling the Commisison what types of equipment they are going to consider, because the types have not been developed, as yet.

Mr. DINGELL. I am not saying you are ordering equipment at all. Let us get away from that, but they are going to have to consider equipment in a general sort of way to determine what will constitute an economically feasible system to be utilized?

Mr. CRAVEN. They will have to give consideration to the broad requirements for global coverage and the broad methods of doing it.

Mr. DINGELL. That is right.

Mr. CRAVEN. And all the broad systems which have been proposed.

Mr. DINGELL. That is right. And that will necessitate certain considerations with regard to equipment, will it not?

Mr. MINOW. I think so, but I would emphasize the word "general." I mean we are not interested in any specifics about this.

Mr. DINGELL. Now, you say they will consider it in at least a general way, types of equipment which will have to be used, is that not a fact?

Mr. CRAVEN. Mr. Congressman, my difficulty is with the words "types of equipment."

Mr. DINGELL. Then let us just say they will have to——

Mr. CRAVEN. When you consider types of equipment, there are two or three—I am assuming there will be two or three different types of equipment that will do the same thing.

Mr. DINGELL. That is correct, and they are going to have to consider types of equipment and systems of equipment which are going to accomplish this end, are they not?

Mr. CRAVEN. Broad performance requirements, that is all they need.

Mr. DINGELL. That is right. And this constitutes necessarily some objective judgments which will have to be made with regard to equipment, types of equipment and equipment systems, does it not?

Mr. CRAVEN. One thing I want to make clear——

Mr. DINGELL. Just a minute. Let us not make anything clear. Let us get an answer to the question.

Mr. CRAVEN. I do not think you are right.

Mr. DINGELL. Am I wrong?

Mr. CRAVEN. I think so.

Mr. DINGELL. Then you are telling this committee right now that there is going to be no consideration at all of equipment or types of equipment systems, am I correct, that are going to be made by this ad hoc committee?

Mr. CRAVEN. When you say "types of equipment," that is the point I cannot agree with.

Mr. DINGELL. Then let us have you tell the committee, Commissioner, if you will, that there are going to be no considerations of equipment or that there is going to be no consideration of equipment systems or that there is going to be no consideration of equipment standards. Are you prepared to sit there and tell us that this morning?

Mr. CRAVEN. I think there is going to be consideration of the broad performance requirements.

Mr. DINGELL. All right.

Now, there is going to be consideration of broad performance requirements. This necessarily considers some objective judgments which will be made with regard to equipment and types of equipment and performance of types of equipment under the conditions that will exist in outer space; am I correct?

Mr. CRAVEN. Some of it has yet to be developed.

Mr. DINGELL. All right, I am aware of this, but it requires certain judgment with reference to equipment, does it not?

Mr. MINOW. Not to argue the point, I am willing to agree with it. This is not what we want from the ad hoc committee.

Mr. DINGELL. But they are going to have to make some judgments with regard to equipment, equipment systems, specifications, types of equipment and systems generally which will operate and which will mesh together into an economically feasible system. Am I correct?

Mr. MINOW. I would say not at this stage, Congressman; no, sir.

Mr. DINGELL. All right, when is this judgment going to be made?

Mr. MINOW. It is going to be made once an entity is established that will be the one to make them. That is the point.

Mr. DINGELL. Now, this entity is going to be dependent in a very serious way on the types of equipment which will be available, because types of equipment are going to have a definite bearing on the nature of the entity which will utilize them; am I correct?

Mr. MINOW. That is correct, sir.

Mr. DINGELL. So now we are coming to a point where we have a question of which comes first, the chicken or the egg; am I right?

Mr. MINOW. That is correct.

Mr. DINGELL. Now, in an operation of this kind, necessarily, then, we have to boil it down to a consideration at least in some regard and at some point to equipment and types of equipment; am I correct or incorrect?

Mr. MINOW. Yes, sir; correct.

Mr. DINGELL. Now, this ad hoc committee, then, is going to have to consider at least in a limited way equipment and types of equipment, is it not?

Mr. MINOW. I do not agree with you, sir.

Mr. DINGELL. Well, does your own order not specify a commercially operable communications satellite system?

Mr. MINOW. Yes.

Mr. DINGELL. All right.

Now, if they are going to consider a commercially operable communications satellite system, how are they going to get away from the question of types of equipment?

Mr. MINOW. I think that what they are going to do, at least what we want them to do and the way I interpret our order, is to come back with a plan of organization. You cannot decide on the equipment until you have somebody who has got the authority to decide on it.

Mr. DINGELL. Now, does it not necessarily follow that before you can decide on how the people are going to decide on equipment and who is going to decide on it, that there is going to have to be some consideration given to the types of equipment that they are going to have to decide on?

Is that not going to play an important part in your determination of who is going to run this operation?

Mr. MINOW. It will at some point.

Mr. DINGELL. All right.

Mr. MINOW. I just do not think we are there yet. That is my answer.

Mr. DINGELL. But is it not very probable that you are going to reach that point in the considerations of this ad hoc committee?

Mr. MINOW. I think not.

Mr. DINGELL. Are you going to tell us, then, that anywhere in the directions which the Federal Communications Commission have issued so far, or which it will issue in the future, that the question of equipment is going to be excluded from the purview of this ad hoc committee?

Mr. MINOW. In the future, yes; in the future, yes. I think not up to date, no.

Mr. DINGELL. At what point do you contemplate that they are going to get into a discussion of equipment?

Mr. MINOW. I think the first thing to do is to decide what the organization, what the entity, is going to be; who is going to be in it; who is going to participate; who is going to own it, and so on and so on.

Then, when that decision is made, then that entity will get into the matter of equipment.

Mr. DINGELL. As a matter of fact, does not your requirement No. 1 simply state that the committee will consider commercially operable communications satellite systems?

Does not your order say that?

Mr. MINOW. Yes.

Mr. DINGELL. Now, how can you have a commercially operable communications satellite system without giving thought to equipment which is going to be utilized?

Mr. MINOW. Well, I think, as Commissioner Craven said, we are obviously going to have to give thought to the broad characteristics and standards, but I do not think we are at this point where we are going to say, take this piece of equipment and not that piece of equipment.

Mr. DINGELL. I am not talking about making judgments on procurements at this point. I am talking about the fact that they are going to have to make judgments with regard to at least types of systems which are going to be feasible. Would you deny that that is true?

Mr. MINOW. I do not think—I would say, and it is my understanding of the Commission's view, this is not what we want the ad hoc committee to do.

Mr. DINGELL. Does not your order——

Mr. MINOW. At this time.

Mr. DINGELL. Does not your order say that they are going to consider, but not be limited to, the following specified public interest objectives:

Consideration of a commercially operable communications satellite system?

Does that not require judgments with regard to at least broad equipment requirements, and at least broad, general systems of equipment?

Mr. MINOW. I think what our order says, if I may read it, which is paragraph 8:

The ad hoc committee should give full regard to the following public-interest objectives.

I think you may be reading from the release; I am not sure. Let me read the order.

Mr. MOSS. Public Notice G, July 25, 1961.

Mr. MINOW. You are reading from the public notice. Let me read the order.

Mr. DINGELL. Are the order and the release different?

Mr. MINOW. I would like to read the release and we will see. This is our document, paragraph 8:

The ad hoc committee should give full regard to the following public-interest objectives which the plan of organization and operation of any joint venture will be expected to satisfy and accommodate:

(*a*) A commercially operable communications satellite system will be expected——

Mr. DINGELL. There you are.

Mr. MINOW (continuing):

to provide the potential means for global coverage.

Mr. DINGELL. That is right.

Mr. MINOW. This is (a) (f) (8).

Mr. DINGELL. If they are going to consider a commercially operable system——

Mr. MINOW. Right.

Mr. DINGELL (continuing). Are they not generally going to make at least broad judgments with regard to what type of systems will be technically feasible and what types will not be technically feasible?

Mr. MINOW. My only point, sir, is they are going to do this at some point.

Mr. DINGELL. That is right.

Mr. MINOW. I do not think they are there yet. That is what I am saying.

Mr. DINGELL. But this ad hoc committee is going to make these judgments at some point, is it not?

Mr. MINOW. Only if they come up with a plan of organization that is acceptable. They may come up with something that the Commission or the Department of Justice will reject, and then we will say that is enough of that.

Mr. DINGELL. I am not talking about what the Department of Justice will reject or accept. The thing I want to get down to very simply, and I think we are finally getting down to the point where you recognize it is there, they are going to have to make judgments at some point with regard to systems of equipment, are they not?

Mr. MINOW. The entity will not, the ad hoc committee; no, sir.

Mr. DINGELL. Then why does your order read as it does?

Mr. MINOW. I do not think it says what you interpret it to mean, I really do not. I think you have got to draw a distinction here between the ad hoc committee and the entity that is finally approved or disapproved by the Commission.

Mr. DINGELL. Your judgments and mine on the language of the Commission, then, are very different.

Mr. MINOW. Well, this is the way I read it. This is the way Commissioner Craven reads it; I believe it is the way the Commission reads it.

Mr. CRAVEN. I would like to add one word here. There have been proposed several broad types of systems. I do not believe there is any proposal yet made as to the final type of equipment we are going to have.

Now, the ultimate technical parameters not only must be acceptable not only to this Commission, but ultimately they must be acceptable to other nations of the world who are going to participate in the system, and the broad, technical characteristics will be passed upon by an international conference.

Second, what we start with today may not be what we end up with 20 years from now. There is going to be technical progress as there has always been in the past, and this matter of standards may be changed as we go along.

There will be improvements in techniques, so that the equipment, the types of equipment, are going to be a changing thing as years go by.

Mr. MOSS. Mr. Chairman, does your order of July 25, 1960, the public notice of that order, correctly reflect the instructions to the ad hoc committee and the sense of the Commission?

Mr. MINOW. I believe so.

The only reason I raise it, I think there was some difference in the language. That is why I read the order.

Mr. MOSS. This is the public notice?

Mr. MINOW. That is right.

Mr. MOSS. This was supplied to me by you when you appeared before us the other day?

Mr. MINOW. Right.

We supplied that together with a copy of our order.

Mr. MOSS. That is correct.

And in reading this: "The Committee will consider"——

Mr. MINOW. Right.

Mr. MOSS (continuing). "But not be limited to, the following specified public interest objectives," and then the one which Mr. Dingell has just discussed with you.

Mr. MINOW. Right.

Mr. MOSS. Page (f) of that notice:

> The Committee's written report is required to describe fully the proposed joint venture—

and so forth. They are also required to report back to you not later than October 13?

Mr. MINOW. Right, sir.

Mr. MOSS. Now, as I read this public notice—and I am going to confine myself strictly to the public notice and not to the order—as I read it, it does not contemplate two reports from the ad hoc committee, but one.

Mr. MINOW. That is right.

Mr. MOSS. And the one will make the recommendations on the feasible system?

Mr. MINOW. No, sir. No, sir. I am very glad to straighten this out.

Mr. Moss (reading):

A commercially operable communications satellite system will be expected to provide the potential means for global coverage.

Mr. MINOW. No, sir. This is not what we have in mind.

Mr. MOSS. Then I would suggest that there be a recasting of the language of that notice.

Mr. MINOW. First, I would answer saying our order is the official document which everybody should be concerned with.

Mr. DINGELL. Then, Mr. Chairman, will you concede to this committee that your public notice is not reflective of your order, or that your order is not reflective of what you and the Commission had in mind at the time that you issued both the order and the public notice?

Mr. MINOW. I think, myself at least, that they are not inconsistent, but if the word "system" is what is causing the difficulty, I would be very happy to change it. We are not interested at this time in deciding on a system. The system is going to take years to develop.

Mr. DINGELL. Will you tell us why that is in here, if that is not what you meant?

Mr. MINOW. I think it is a difference of interpretation. I think apparently you have interpreted this to mean that the ad hoc committee is going to come up with a detailed plan including the technical parts of the system. I can only say to you it is going to be years before that happens, no matter who is on the ad hoc committee and no matter who is on the entity that decides it.

Mr. DINGELL. If this is true, then why all the rush?

Mr. MINOW. You have to have somebody who is going to get started on thinking about this. This is what we are trying to do.

Mr. DINGELL. Let us explore that. You tell you have to have somebody. You said that you would logically limit this to the international carriers.

Mr. MINOW. As members, that is correct.

Mr. DINGELL. As members.

All right, now how many of the equipment manufacturers have expressed interest to you in being on this ad hoc committee?

Mr. MINOW. At one point there were two, and I believe now there all three. Well, Lockheed at one point wanted to be in it, at one point did not want to be in it, and most recently has a qualified interest.

General Electric has consistently wanted to be in it. And General Telephone, which is a domestic carrier and an equipment manufacturer, has expressed an interest in being in it. Now, there are a number of other——

Mr. DINGELL. Who has expressed official interest?

Mr. MINOW. Those three.

Mr. DINGELL. Those are the three?

Mr. MINOW. Right.

Mr. DINGELL. All right.

And those three were requests pending before the Commission at the time this ad hoc committee was formed, am I correct?

Mr. MINOW. That is right.

Mr. DINGELL. That is correct?

Mr. MINOW. Yes.

Mr. DINGELL. So now we come to a situation where you had three persons outside of the common carriers, the international carriers who belong to this ad hoc committee, who wanted to belong to it.

Now, apparently, we would be logical in inferring from this that there has not been any great stampede from the general equipment manufacturing industry to achieve membership in this ad hoc committee, am I correct?

Mr. MINOW. I think that is right, so far as we know.

Mr. DINGELL. Now, if that is so, then why, will you tell us, has the Commission in its wisdom rejected the expertise which these people happen to have with regard to systems, with regard to manufacturing, and with regard to types of equipment?

Mr. MINOW. Apparently, I am not communicating very well here today.

Mr. DINGELL. I think you are communicating excellently.

Mr. MINOW. No, because we have not rejected any expertise. I want to say that over and over again.

Mr. DINGELL. They are not members of this ad hoc committee, are they?

Mr. MINOW. No, but they are going to participate in its deliberations.

Mr. DINGELL. How are they going to participate, if they are not members of the committee?

Mr. MINOW. I can only refer you again to our order.

Mr. DINGELL. Do not refer me to the order, Mr. Chairman. Tell me now.

Mr. MINOW. They are going to be called in for their views, and they are going to be asked to contribute their ideas.

Mr. DINGELL. Which will be accepted or rejected by the committee. In other words, they are going to participate from the outside rather than from the inside, am I correct?

Mr. MINOW. Well, they will be called in, yes.

Mr. DINGELL. Participating?

Mr. MINOW. Yes.

Mr. DINGELL. They will be participating from the outside and not from the inside?

Mr. MINOW. That is right.

Mr. DINGELL. Just as a witness who is called before this committee comes up, presents his views, and they are accepted or rejected, am I correct?

Mr. MINOW. That is right. But then the committee's views are going to have to be submitted to us.

Mr. DINGELL. That is beside the point of the question.

Mr. MINOW. I do not think it is at all.

Mr. DINGELL. We are talking here about whether or not the weight of their opinion, intelligence and experience, engineering ability and so forth, is going to be brought fully and directly to bear on this.

Mr. MINOW. I think it is.

Mr. DINGELL. I think you will concede to me that there is a great difference in utilization of experience, energy, and ability from the inside and from the outside. Is that not a fact?

Mr. MINOW. That is correct, sir.

Mr. DINGELL. In other words, it is a question of acceptance or rejection. So what you have done on the Commission—and this is what distresses me—is that you have, in effect, rejected in a very severe way the utilization to the fullest degree of the experience and expertise of people who wanted to be heard and who wanted to participate in the formulation and development of this.

Mr. MINOW. That is the reason why I say I am apparently not communicating very well, because we have not rejected it. We have taken one initial exploratory step. I cannot seem to make that clear. We have not closed the door to anybody.

Mr. DINGELL. You have made your position eminently clear, Mr. Chairman. You just have not gotten around to seeing my point of view, and that is that you have not permitted these equipment manufacturers, people of great experience to participate.

Mr. MINOW. At this stage as members of the ad hoc committee.

Mr. DINGELL. Are you telling us they are going to be permitted to participate at a later time?

Mr. MINOW. It may well be, sir.

Mr. DINGELL. If you are contemplating participation by these people at a later stage, why not get them in right now so you can have the advantage of their views at this time?

Mr. MINOW. Because we want to see what will come up from the carriers who are licensed now and by law responsible to provide an international communications service. We want to see what they will come up with.

That is a judgment that we have made. It may be wrong.

Mr. DINGELL. I think it is.

Mr. MINOW. It may be wrong, and I am not prepared to say that we know everything about it. But we have left the door open to reexamine this.

Mr. DINGELL. Would you not be better off having these people on the inside of the committee if you want to really get their views?

Mr. MINOW. We reached the other judgment about it. We could argue it all day, but that is the judgment we reached.

The CHAIRMAN. Permit the Chair to say it seems this is an argument that is going on and that is not the purpose of this hearing at all.

I think we should come to some end of the debate that is going on. The Commission has made its position and the Chairman has attempted to explain their position on it. I do not believe it is the prerogative of this committee to argue. Anyone can express their differences of opinion, if they want to, but I think argument would not be in line, so I would suggest you limit your questions here.

Mr. DINGELL. I appreciate that, Mr. Chairman. I state for the record I do not seek to argue; I just seek to explore this matter but I want to explore it very fully.

Mr. MINOW. That is what we are seeking to do—is explore—not decide at this stage.

Mr. MOSS. Mr. Craven, again reading from this article in Fortune, it says:

A space system would operate in an entirely new element where the engineering problems are quite different from those associated with landlines and relay houses. In that new element, some of the astronautical and astroelectronic companies have more experience and know-how than A.T. & T. GE, itself, is

deeply involved and in a number of space projects, and Lockheed, which has put up over half of all Air Force satellites, had had more hours in communication with active satellites than any other company.

Would you say that that is a correct statement?

Mr. CRAVEN. Partially correct.

I do not know that they have more know-how than the RCA who has been participating in the situation—I mean in the electronic part I am talking about only—or that the GE has more know-how than the RCA and the A.T. & T.

Mr. MOSS. RCA was——

Mr. CRAVEN. I believe that each of these, all of the companies, Collins, for example, which is not even interested in this thing, has a substantial know-how electronically, and I believe that the GE has substantial know-how in electronics.

I would not preclude anybody; even a small company has substantial knowledge in the electronic end of the thing, and even a new company could come along with a new invention which will have a terrific bearing on the electronic phases of the system. I would not exclude them in the future.

In other words, I would look to the resources, resourcefulness of our inventors in this country to contribute much in the future.

I do not believe anyone has a monopoly on know-how.

Mr. MOSS. Of course, I was not talking of a monopoly on know-how, Mr. Craven, and I read that to see if you would agree, let us say, that it was substantially correct. There is considerable know-how in this particular field, not in the specific application to space communications, the specific application——

Mr. CRAVEN. I think all of them have contributed much to the knowledge of space communications, and I would not exclude any of the companies such as RCA and A.T. & T. or GE or anyone else.

Mr. MOSS. And you do not regard the ad hoc committee as constituting in any way an exclusion?

Mr. CRAVEN. Mr. Congressman, I am speaking for myself now and I am not a lawyer.

Mr. MOSS. Neither am I, so we are on good grounds.

Mr. CRAVEN. It is my understanding that these companies cannot get together and give us an opinion without having an ad hoc group under the supervision of the Government, and these companies have not expressed any great desire in joining other types of joint ventures, and I wanted to hear from that "what kind of a proposal do you want to make."

And the only way we can get them together is to form an ad hoc group under the auspices of the Government. Otherwise, they would be violating the antitrust statutes.

All we are doing at this time is exploring what would they do.

Then, when they give us their views, if they do, if they can come to an agreement, we will then give consideration to all of the factors.

Mr. MOSS. You propose upon receiving their views to act not only upon theirs, but upon significant proposals from other groups?

Mr. CRAVEN. Yes.

Mr. MINOW. The order says——

Mr. MOSS. I know the order says they have 15 days in which to file their, in effect, exceptions to the recommendations.

Mr. CRAVEN. As far as being one member of the Commission is concerned, I have not foreclosed my mind. I want to do this thing to the very best interests of the public, and I have not taken one point of view at this time.

Mr. MOSS. Let us find out why the domestic common carriers have not been permitted to participate in the ad hoc committee.

Mr. CRAVEN. All right, sir.

Personally, I have three reasons, basic reasons. I am not sure that the Commission, nor anyone else, knows too much about the capacity of the space satellite system and the actual demand for circuits for international use.

I do know that if you have domestic common carriers in here, and this is to be used for domestic traffic, that it has a terrific traffic load.

Now, for the foreseeable future, it is anticipated that the cost of transmission via space satellites will exceed that of the present land line systems.

Third, one of the major problems associated with the space system is a determination as to the extent such a system can share frequencies with terrestrial services.

On the basis of comments by knowledgeable people in this field, it would appear that individual ground station facilities will require protection out as much as 75 miles from cochannel terrestrial services. This is a matter requiring confirmation from experimentation. It is obvious that if a greater number of ground stations are installed to be used for domestic applications, they might seriously impair the ability of land microwave systems to provide the many services presently in use throughout the United States.

It is my best judgment, based on present information, that satellite systems should be restricted to international communications. If future experimental operations indicate that such communications can be accommodated, then certainly consideration would be given to domestic use.

Mr. MOSS. We do not know, do we?

Mr. CRAVEN. I did not understand you.

Mr. MOSS. I said we do not really know, do we?

That is the gist of what you just said?

Mr. CRAVEN. That is exactly what I say.

Mr. MOSS. We do not know.

Mr. CRAVEN. And if we let them in now for domestic purposes, I am fearful that we may create a problem which cannot be unscrambled. But until we find out, we wish to hold back on the domestic use of space sytems.

Mr. MOSS. We have substantial distances in this country on long-distance communications.

Mr. CRAVEN. Perhaps I am not communicating very well with you.

Mr. MOSS. I got what you said. I got your comments on the domestic microwave and the possible interference with those. These were suppositions, and I imagine that there are areas where there is perhaps some scientific disagreement. I think scientists are much like the attorneys you and I are not: that they frequently disagree.

Mr. CRAVEN. I have one other disadvantage; I am an engineer.

Mr. MOSS. Well, you probably find that some of your good colleagues whom you highly respect disagree with you.

Mr. CRAVEN. That is correct. They do very much.

Mr. MOSS. So that this is all supposition, accepting the thinking which parallel our own. We are all prone to do that on occasion.

Mr. CRAVEN. That is right, Congressman.

Now, there is one other fact I think you should know. The domestic facilities that we now have are pretty adequate. The international long-distance communication facilities are not adequate.

Mr. MOSS. Both are growing rather rapidly, are they not, the demands on them?

Mr. CRAVEN. Yes; very much so.

Mr. MOSS. And I think you have some developments in data processing on long-distance lines and many other things that continue to load up. It is conceivable that in the not too many years ahead that we might be seeking supplemental services domestically.

Mr. CRAVEN. Yes. But I think the domestic microwave systems are capable of handling the wide-band data processing. They are doing it now. The international radio circuits——

Mr. MOSS. Do you think they have unlimited capacity?

Mr. CRAVEN. Well, they have not unlimited capacity, but we can construct more, when the demand is there, to meet the demand.

Mr. MOSS. If it is the more feasible method at that time?

Mr. CRAVEN. Yes.

I know of other developments for the use of wide-band transmission which may come in the future which are not either microwaves or radio in the ordinary sense and which may be economically the best one.

Mr. MOSS. But you do not know?

Mr. CRAVEN. I do not know, of course. I cannot predict too much.

Mr. MOSS. That is the interesting thing about this is that none of us really know, and that is why the judgments made now are so very important.

Mr. CRAVEN. I must also state that we cannot wait until we know the ultimate. We have to start.

Mr. MOSS. I would not want to convey at any point in my discussion, sir, the feeling that I am urging delay. I am only urging a different type of haste. That is all the questions I have at the moment, Mr. Chairman.

The CHAIRMAN. Mr. Collier?

Mr. COLLIER. I did have the opportunity, Mr. Chairman, of propounding a couple of questions after the very fine statement of the FCC Chairman the other day, and so I will be very brief. It seems to me in all this discusison that eventually the FCC will be in more or less the position of the third base umpire in calling the plays only at one corner of the diamond, as this international operation expands and begins to move. In the hearings yesterday Mr. Younger asked Mr. Farley of the State Department this rather specific question. He said:

> Just where does the State Department feel it comes into regular authority part of the satellite communications system?

And the answer, or part of the answer, the part that I am concerned with that Mr. Farley offered was this:

> It is my understanding that our role would come in the process which has recently been going on in trying to define what the public interest requirements are which must be met by the private venture that will undertake this activity.

In view of that statement, I would only comment, Mr. Chairman, that it would be my hope that the final determination of public interest would certainly remain in the hands of the FCC, and not be in any sense transferred to the State Department or any part thereof.

Now, it is understandable, of course, that there necessarily must be cooperation because of the international scope of this field of satellite communications, but I would certainly hope, again, that the regulatory process remain with the FCC and that when there is consideration of public interest requirements, that this be looked at in the light of the American public being given priority wherever feasible to perhaps the public of foreign nations in dealing with this overall problem.

In view of the time, Mr. Chairman, that is all that I have.

The CHAIRMAN. Mr. Dingell, do you have further questions?

Mr. DINGELL. Yes, Mr. Chairman, I have several questions I would like to ask, if I might.

Mr. Chairman, recently before the Antitrust Subcommittee of the House you were questioned as to the system proposed by A.T. & T.

Mr. MINOW. Yes, sir.

Mr. DINGELL. And with regard to that system you made certain answers. I will read to you the question propounded to you by Mr. Maletz, which was as follows:

> If only international common carrier systems are allowed to participate in ownership of space satellite systems and if such ownership participation should be predicated on use of the system as proposed by A.T. & T. based on present estimates, what percent ownership control would A.T. & T. have of the satellite communications system?

Would you like to answer that question, sir, again?

Mr. MINOW. I do not recall specifically what I said. It would be very high, because it has a very high percentage of the traffic.

Mr. DINGELL. Your answer was——

Mr. MINOW. My recollection is around 80 or 85 percent, somewhere in that vicinity. I do not recall exactly.

Mr. DINGELL. Your answer at that time was:

> It would be 80 to 90 percent.

Yesterday, Judge Loevinger of the Antitrust Division was before this committee, and I asked him this question. I said:

> Are you telling us that this proposal which would vest in the company 85 percent of the ownership and effective control of the satellite communications system is a violation of the antitrust laws or as raising an antitrust question?

And Judge Loevinger said:

> I would say it raises an antitrust question.

Are you aware of the position of the Department of Justice in this regard?

Mr. MINOW. I certainly am, sir.

Mr. DINGELL. I recall on previous occasions where your agency disregarded warnings by the Antitrust Division of the Department of Justice with regard to antitrust questions, and I recall on one occasion not too long back where the FCC got severely slapped down by the courts for its failure to recall that, and I think Commissioner Craven might well recall that. That was the Boston television grant, I believe it was channel 4.

Mr. CRAVEN. Mr. Congressman, I did not participate in that decision because prior to coming to the Commission, one of the applicants in the Boston proceeding was a client of mine.

Mr. DINGELL. I am not making question as to integrity of any person. I just mentioned that you were aware of the fact that the decision had been made and that you were at that time a member of the Commission.

Mr. CRAVEN. I did not pay very much attention to the processes at the time.

Mr. DINGELL. Yes.

Mr. MINOW. I know there have been such instances in the past, and I hasten to say what I said here the first day, Wednesday: We are not going to authorize anything without the Department of Justice's concurrence. I think it would be foolish for the Government to be going off in different directions.

Mr. DINGELL. Now, let us return to this business of equipment that you and I were discussing a little bit briefly. How is that you and the Commission can justify establishing an ad hoc committee to consider establishment of commercially feasible communications systems and to exclude people who have been assigned the task of putting up similar systems by other agencies and departments of government?

Mr. MINOW. I think, first, (a), we have not excluded it, sir.

Mr. DINGELL. You have excluded them from membership on the ad hoc committee.

Mr. MINOW. On the ad hoc committee which is an exploratory thing only to enable us to find out what the carriers propose. That is No. 1.

So I do not think we have excluded them in any final sense. That is No. 1.

No. 2, the reason we have done this is that we license international carriers and then by law they are obligated to provide service. We want to see what they had in mind. In order to do that, in order to get them in the same room so they can discuss it together, they must have under the antitrust laws some kind of clearance or permission.

Therefore, we have taken this route to find out, to ascertain what their proposal is, and we have done this in this way so that the Department of Justice knows about it, the members of the Commission will be present at the meetings, and we will then evaluate their proposal to see what they come up with.

We will take into account any objections from any other parties, and then we will reach a decision. So I do not think we have done anything final yet.

Mr. DINGELL. Are you telling us, then, that this ad hoc committee is not going to make rather final recommendations?

Mr. MINOW. I think not.

Mr. DINGELL. With regard to this?

Mr. MINOW. It certainly will not.

Mr. DINGELL. Which will be very heavily relied upon by your agency?

Mr. MINOW. It will be listened to, studied, and evaluated. It would not be the final word, no, sir.

Mr. DINGELL. Then it would appear you are not in such a hurry to establish this system as first thought might indicate?

Mr. MINOW. I think there has been some confusion. We are in a hurry to get the discussions going and the proposals developing so that we can make some intelligent decisions. We are in a hurry to do that

Mr. DINGELL. If you are in this hurry, why do you not utilize the expertise of other people in the industry?

Mr. MINOW. I think we are.

Mr. DINGELL. You are utilizing it from the outside?

Mr. MINOW. Right.

Mr. DINGELL. Of your ad hoc committee?

Mr. MINOW. Right, and I think this is the difference in our judgment. This is the judgment we reached and I defend it; I support it.

Mr. DINGELL. You will not deny to the committee this morning that there is a significant difference between having the benefit of the judgment from within the committee and from without, will you?

Mr. MINOW. That may very well be, I will not deny it.

Mr. DINGELL. Is it not true, as a matter of fact, that it is a great deal different?

Mr. MINOW. I think what we have done is perfectly sensible.

Mr. DINGELL. I am just asking you: Is it not a fact that there is a great deal of difference between having these people as members of the committee and having them not as members of the committee?

Mr. MINOW. I think there is a difference. I will tell you, though, it just occurred to me as I am sitting here, if you wanted to get down to a matter of voting, even if we had put those three on any kind of a committee, they would have had a minority position on the committee. I am not so sure we did them any disservice.

Mr. DINGELL. At least they would be members of the committee.

Mr. MINOW. Yes.

Mr. DINGELL. And now they are not. How will companies not parties to the joint venture participate in communications satellite systems research and development contracts?

Mr. MINOW. I did not hear the very beginning of your question.

Mr. DINGELL. How will companies not parties to the joint venture participate in communications satellite systems research and development contracts?

Mr. MINOW. This is a matter which we have asked the ad hoc committee to tell us. This is one of the things they will have to describe, whether they intend to do it through competitive bidding, whether they intend to utilize other devices.

This is one of the matters they are going to come with a specific proposal for us to evaluate.

Mr. DINGELL. Does it not appear to you that fairness would compel that if this question is going to be considered, that equipment manufacturers who desire to belong to this ad hoc committee would be permitted to belong to it?

Mr. MINOW. We think not, sir.

Mr. DINGELL. You do not think that that would be more or less almost a requirement of due process?

Mr. MINOW. No, sir; we do not.

Mr. DINGELL. Or at least basic fairness?

Mr. MINOW. Not at this stage, no, sir.

Mr. DINGELL. Then will you tell us how the Commission can assure competitive bidding, if it does not have a sufficient inhouse engineering capability, knowledge, research and development control, expertise and experience in contracting competitive bidding on this ad hoc committee?

Mr. MINOW. Because I think it is too early now. All we are talking about now is an organization and an entity. We are going to face up to that some day. We are not at that particular stage of thinking yet or development yet.

Mr. DINGELL. Have you accepted the recommendations of the Antitrust Division of the Department of Justice with regard to requirements to be imposed on the ownership and on the various other aspects of this operation?

Mr. MINOW. I believe we have generally done so. All we have done to date, however, is to formulate standards. We have not yet had a specific plan which we could then test against the Department of Justice's position, and that is what we are trying to work to now.

Mr. DINGELL. All right. Now, will you tell us who is going to determine the type of satellite vehicle which is going to put these instrumentalities into orbit?

Mr. CRAVEN. Will you read that?

Mr. DINGELL. I will repeat the question.

Who is going to determine the type of vehicle that is going to put these satellites into orbit? Will the FCC do it or will the space agency do it?

Mr. CRAVEN. "The type of vehicle" is what I do not understand. The Communications Commission will pass upon the electronic parameters in the vehicle. I do not think it makes much difference whether it is a round vehicle or a square vehicle, or anything of that sort.

Mr. DINGELL. I am not talking about "round" or "square." Who is going to determine which rocket system is going to put these up, or, to go a step further, who is going to——

Mr. CRAVEN. "Rocket system," that is what I did not understand.

Mr. DINGELL. That is a vehicle.

Mr. CRAVEN. NASA will determine that.

Mr. DINGELL. Now, who is going to determine which is the best system, whether it is going to be the stationary system at 22,000 feet in an equatorial orbit, or whether it is going to be one of these roughly polar orbits or whether it is going to be another type?

I believe there are three available.

Mr. CRAVEN. There are more than that. We have the passive system being experimented with. We have a Polaris system, and we have two types of equatorial systems: the stationary orbits and the 10-satellite, moving equatorial orbit. And, by the way, I did not mention that the other day in the heat of cross-examination.

I think that that particular system could be utilized; it is technically feasible for that system to communicate from one side of the United States to the other without impinging upon the world traffic.

Now, I think that the ultimate parameters of the system will be determined as a result of experiment and development by the Communications Commission.

Mr. DINGELL. By the Communications Commission?

Mr. CRAVEN. By the Communications Commission.

Mr. DINGELL. And not by NASA?

Mr. CRAVEN. They will give us advice on the thing, but this is the communications aspect of it, you see. NASA, of course, will have a great influence in getting the things up there and determining which is the best way of getting them up. We will have nothing to do with the launching part, and they may have something to say about the type of orbits from the standpoint of control of orbiting.

Mr. DINGELL. Is this going to in any way be considered in determing what a commercially feasible system is?

Mr. CRAVEN. That is part of it.

Mr. DINGELL. This is part of it?

Mr. CRAVEN. Yes, sir.

Mr. DINGELL. Then does not the question of equipment enter into this?

Mr. CRAVEN. Ultimately, yes.

Mr. DINGELL. Does it not enter in pretty soon?

Mr. CRAVEN. Well, for example——

Mr. DINGELL. How can you determine a commercially feasible system if you do not pick out which one of the three or four——

Mr. CRAVEN. I do not think anybody knows today which is the best electronic system. I do not think anyone knows today which is the best type of orbit, and we have to have some experimentation.

Mr. DINGELL. I recognize that, but, in fact, does this not go into determination of what is the best commercially feasible system right now?

Mr. CRAVEN. We cannot make a determination——

Mr. DINGELL. Which one of these three?

Mr. CRAVEN. Of the ultimate 20 years from now.

Mr. DINGELL. I am not talking about 20 years from now. I am talking about determinations this ad hoc committee is going to make.

Mr. MINOW. I can tell you this:

On October 13 we are not going to have an answer to that. I do not know if it will be October 13, 1962, either.

Mr. DINGELL. Do you not think that equipment manufacturers are going to help you come up with an answer to that?

Mr. MINOW. We certainly do.

Mr. DINGELL. Then why do you not make them members of this ad hoc committee?

Mr. MINOW. We have taken what, in our judgment, appeared to be a very sensible step. Your judgment is different. I respect it, but I will tell you this is what we decided and we are going to stand by it now and we are going to see what happens.

Mr. DINGELL. I just want you to remember, if criticism comes up in the future, Mr. Chairman, that this was your judgment.

Mr. MINOW. This was the Commission's judgment, that is right.

Mr. DINGELL. There are others who had rather gravely different judgments.

Mr. MINOW. That is correct.

We have that every day of the week in a hundred cases and we make mistakes, but that is what we are there for. We have to face up to them as best we see them.

Mr. COLLIER. Will the gentleman yield?

Mr. DINGELL. I am going to try to yield the floor. I will be glad to yield to my friend, though.

Mr. COLLIER. Just for one question.

Is it not true, Mr. Minow, that a good part of this equipment—in fact, you might even say a major part of what will subsequently be used in this system—has already been determined by that usage which the military has had experience with in this field?

Mr. MINOW. I will have Commissioner Craven answer that.

Mr. COLLIER. And, therefore, we are actually not in a vacuum, so to speak, but have a pretty good basis, do we not, in some areas by reason of the military experience?

Mr. CRAVEN. We have certain knowledge of the military, and they have contributed much, but I have grave doubts that the military system will be utilized from the commercial phases of the system.

Mr. COLLIER. I think that is 100 percent right. I am not referring so much to the system as to the hardware, to the achievement of research in the general field of satellite communication which the military has already experienced great advance and progress in.

Mr. CRAVEN. I would say that the military from the standpoint of launching and all of that phase has contributed very much to the general knowledge, and that contribution will be utilized in the commercial system.

I was referring only to the electronic phases of the military system which I cannot discuss here except to state that I have grave doubts that it is adaptable for a commercial system.

Mr. COLLIER. Yes.

I was simply attempting to draw on some preliminary questions that Mr. Dingell asked.

Thank you very much.

Mr. DINGELL. No further questions, Mr. Chairman.

Mr. CHAIRMAN. Mr. Thomson?

Mr. THOMSON. Mr. Chairman, I just want to commend the Chairman of the Commission and Mr. Craven for inexhaustible patience.

The CHAIRMAN. Mr. Dominick?

Mr. DOMINICK. Just a few questions.

Mr. Minow, in response to a question from Mr. Moss, you said that no action would be taken without first making sure that you are in agreement with the Justice Department in making sure that the recommendations were in accordance with your own operating principles that you had set out.

Mr. MINOW. Yes, sir.

Mr. DOMINICK. Yesterday we had some testimony from the State Department. Would you throw the State Department into that same category?

Mr. MINOW. I think certainly we would listen to the State Department's views on any matter of international policy. We are not competent in that field.

But if it got involved in the matter of our statutory responsibilities in regulations, we would have our own duty to perform.

Mr. DOMINICK. The reason I ask the question is that on page 5 of the statement, Mr. Farley from the State Department says in part:

> We should not think of this as a U.S. oriented system but, rather, as a system that could meet the needs of other countries whether those needs involve communicating with us or communicating with each other.

I would hope that the FCC at least is looking at this as a U.S. oriented system.

Mr. MINOW. By its very nature, of course, inherently the system is dependent on having two people on both sides that want to communicate, and in the past through our regulation of carriers in the nonsatellite field, through cables and other international methods of communication, we have always been able to work these things out.

And I am very hopeful we will continue to do that. Commissioner Craven has attended a series of international conferences through the years, having to do with the international allocation of frequencies, and we are glad to say that in the past this has always managed to succeed.

Mr. CRAVEN. I would add to that that this is a cooperative effort involving both the Department of State and ourselves. In the past we have always tried to consider the public interest in the international field as part of our duties, and have sought and abided by some of the advice we have received from the Department of State.

Now, when it comes to the Department of Justice, there is a distinction as between our relations there as compared to the Department of State. The law requires us, as I understand it, to abide by the antitrust statutes.

Mr. DOMINICK. Let me ask you a few more questions on this.

How much practical control over a communications satellite would any country have, as far as you know, if this is not classified information?

Mr. CRAVEN. I do not think I understand your question. You mean electronic control?

Mr. DOMINICK. Electronic control.

Mr. CRAVEN. Of course, first, before we establish a communications system, we will have to have an international agreement with respect to the technical parameters of the situation, and we will have to have negotiations with the countries with whom we communicate for traffic arrangements and so forth.

They will have to construct the ground systems in order to make contact with the satellite itself.

Now, each of those countries will have access to it. I am assuming that you mean jamming.

Mr. DOMINICK. I mean jamming and use and so on.

Mr. CRAVEN. Well, there are systems which are supposedly designed to be jam proof, but it is a very costly thing, and I believe that we could have the same amount of jamming—it is more difficult to do—in a future commercial satellite system as we do now.

But you must bear in mind that the jamming up to date has not been in the communications circuits primarily. It has been in international broadcasting. And I have a feeling that if we do not engage in a propaganda war and continue to communicate, that we will not have much of a problem. But, of course, in time of war, why, we will have jamming.

Mr. DOMINICK. Who would be responsible for determining the share of the costs of the satellite which would be paid by other nations which might participate in it?

Mr. CRAVEN. That is a question of negotiation.

Mr. DOMINICK. By whom, this is what I am driving at.

Mr. CRAVEN. The commercial entity and the other nations involved and subject to the approval of the Communications Commission.

Mr. DOMINICK. This is what I am trying to find out. Would you have responsibility for that?

Mr. MINOW. We would supervise it. We have this today, you see, in the field of cables, for example. A new cable system is just now under construction across the Pacific, and it is a matter of negotiation between the Government of Japan, I think, in that case and the American Telephone & Telegraph Co., and each will negotiate and agree on how much money each will put up and how it will share the revenues.

Mr. DOMINICK. But that is a slightly different thing. In this case we are going to be putting a lot of the general taxpayer's money into this.

Mr. MINOW. Yes.

Mr. DOMINICK. As well as private funds.

And, presumably, the whole orientation of the system, how it is going to go up, what type of equipment is going to be used, and so on, will eventually be subject to the approval of the FCC before we put it up.

Mr. MINOW. That is correct.

Mr. DOMINICK. Now, in the process of also putting it up, I gather that we are going to have a share of this used by other countries.

What I am trying to find out is:

Who is going to have the responsibility within the Government to determine what percentage of the cost of this is going to be paid for by other countries or by other foreign users? Is it going to be the State Department, or is it going to be the FCC?

Mr. MINOW. I think it would be handled, unless there is some change, or changes, that we do not know about, the way it has been in the past basically in the nonsatellite field as a matter of negotiation between the carrier and the other partner on the other side which may be the government or a private carrier, and we consult with the State Department, but the final approval of those matters rests with us, because we have to pass upon the rates and the service that is being provided the public.

Mr. COLLIER. Will the gentleman yield at that point?

Mr. DOMINICK. Yes.

Mr. COLLIER. At the present time is it not true that the International Telecommunications Union has been making most of these determinations?

Mr. MINOW. No, I do not think that is right, sir, and Commissioner Craven will answer that in detail because he has gone to a series of their meetings.

Mr. COLLIER. Excuse me.

Let me then elaborate before you answer.

We are talking now about the determination of the establishment of communication systems abroad, even those which are necessarily cooperative, as well as those that are established on an intracountry

or intranation basis, such as is now in progress in Honduras and in South America?

Mr. MINOW. Right.

I will have Commissioner Craven speak to that.

Mr. COLLIER. I thought the determination on all of this was made with the ITU in Geneva.

Mr. CRAVEN. Mr. Congressman, in reading over the transcript of these hearings, I think there has been some misunderstanding between us. The ITU does not have any management or operating functions. It is essentially an international forum wherein member nations of the union, through mutual cooperation, effect agreements necessary to maintain an efficient and economic communications system throughout the world.

To this end, the various members of the union agree to effect allocation of the radio frequency spectrum and registration of frequency assignments to avoid harmful interference between countries, coordinate efforts to eliminate harmful interference between radio stations of different countries, and improve use of the radio frequency spectrum, foster collaboration to establish rates as low as possible, foster the creation, development and improvement of telecommunications equipment and networks in new or developing countries by every means at its disposal, especially its participation in the appropriate programs of the United Nations, promote adoption of measures for safety of life through cooperation of telecommunications services, and undertake studies to formulate recommendations and opinions and publish information concerning telecommunication matters.

The ITU and the United Nations have an agreement under which the UN recognizes the ITU as the specialized agency for taking such action in respect to telecommunications as may be appropriate under its basic instrument.

The agreement contains various provisions to maintain effective liaison between the two organzations.

Mr. COLLIER. Will the gentleman yield further?

Mr. DOMINICK. Yes, sir.

Mr. COLLIER. In substance, that is just about what I said.

When we talk about recommendations, recommendations, to my knowledge, of the ITU have never been overridden, shall we say, and, in fact, do they not determine by their, as we call it, recommendations the specifications for communications systems abroad almost to the point where these are adopted without exception?

Mr. MINOW. I think not. Basically, what it is is a facility to encourage the negotiation of agreements between countries with respect to all these matters. It has been very successful because of the nature of it. I mean you cannot communicate without it. You have got to have some agreement on it.

And in 1959, Commissioner Craven attended the conference, and the United States succeeded there in setting aside a certain band of frequencies for space experimentation via communications satellites as an experimental thing.

In 1963, we are going to go again and hopefully reach a permanent agreement on that particular subject. But what the ITU does is to provide a meeting ground, a forum, for countries to get together to negotiate and then hopefully achieve agreement in a treaty.

Mr. COLLIER. To establish the point, then, can you think of any instance, or Mr. Craven, where a recommendation of the ITU was ever not followed in establishing a program of communications?

Mr. CRAVEN. I am wondering whether or not, sir, you have been really referring to the CCIR.

Mr. COLLIER. No.

I understand the CCIR is nothing more than a technical advisory arm of the ITU.

Mr. CRAVEN. That is correct.

Well, the ITU, itself, comes to an agreement. Here is the agreement we came to the last time, 1959, and these are submitted to each nation for ratification.

And there has been certain—there have been certain nations that have reserved on certain phases of it, but this is based upon the majority vote at the conference.

Mr. COLLIER. In other words, from what you say two nations engaging in a cooperative project may do so as long as that phase of it, assuming it were an American firm, clears with the FCC. They may engage in such a project without sanction or blessing of the ITU?

Mr. CRAVEN. That is correct, provided the nations involved adhere to the technical regulations and performances as to interference and things of that character and use correct frequencies.

Mr. COLLIER. This could be continued on—and I did not mean to impose on the gentleman's time here—to the point where I think I could establish that this is not always the situation; where, in fact, the specifications for communications systems have been guided so thoroughly by the ITU that it has created considerable criticism on the part of certain people in the communications field in the past, and where, in fact, American interests feel that there has been a discrimination in the establishment of communications systems because the specifications were such that they failed those of foreign countries and in one specific instance that I can think of, Sweden.

Mr. CRAVEN. Mr. Congressman, in preparing for these international conferences, the Department of State sets up the preparatory group in which all interested parties participate. The Communications Commission puts out public notices and asks for comments with respect to the various proposals which are to be made to the international conference. We will say, for example, that some company interested in this particular forum of communications, particular method of communications, did not prevail.

He had had his opportunity before the Communications Commission to have his views expressed.

Mr. COLLIER. Can I interrupt just to make it eminently clear this is not my personal criticism. I am simply relating a situation which came to my attention.

Mr. CRAVEN. We do know that there is a great demand on the part of persons for the use of the radio spectrum. There is not enough radio spectrum to go around.

Then, when we go to the international conference, we have to negotiate with the other nations of the world for the use of the radio spectrum. You cannot have all of your views prevail.

I think, however, we were quite successful in having most of our views prevail at the last conference. However, some certain people

are going to be disappointed in the process. But I assure you that they have been given very fair consideration by the Communications Commission.

Mr. DOMINICK. Mr. Chairman, in this statement of Mr. Farley's I call your attention to the fact that he refers to this as a system which would not only meet our needs, but would also involve communicating between foreign countries without any U.S. ground facilities, I would presume. Where you have that situation, and you can take any two countries that you want to think of—and I can think of a lot—who sets the rates on that, on the prices that will be charged for that type of communication?

Mr. MINOW. Those two nations involved.

Mr. DOMINICK. So in those cases the FCC would have nothing to do with it?

Mr. MINOW. No. Unless the United States is involved through one of its licensed carriers, we would have nothing to do with it.

Mr. DOMINICK. The United States is obviously involved because we are paying all the expense of putting this system up.

Mr. MINOW. Right.

Mr. DOMINICK. To begin with, the satellite.

Mr. MINOW. But, as I understand our own jurisdiction, we are limited to a U.S. licensee, is that not correct?

Mr. CRAVEN. Yes.

Mr. DOMINICK. So we could take, for example, Russia and China, and between Moscow and Peiping, which is a long-distance communication, we would be putting a satellite up at our expense and they would be using this satellite for communications between our two major international Communist governments at this point.

Mr. MINOW. Of course, I cannot imagine that the United States would authorize that.

Mr. DOMINICK. How are we going to stop it? This is what I want to find out.

Mr. MINOW. The uses of the satellite where a U.S. licensee is concerned are going to be up to the FCC to supervise. When you get into the matter of other countries using the satellite, I will ask Commissioner Craven.

Mr. CRAVEN. That will be the subject of the international conference in 1963, where we will make certain proposals. I am quite certain the proposals will be circulated among our friendly nations before we go. And we will set up the method by international regulations for the use of the satellite and the methods of payment.

Mr. DOMINICK. Are we reserving a veto right as to what country can use the satellite?

Mr. CRAVEN. There is no veto in the ITU.

Mr. DOMINICK. That is what I was trying to find out.

Mr. CRAVEN. There is no veto.

Mr. DOMINICK. If this is true, the State Department said yesterday it was entirely possible and even probable that this would be used by the Communist countries.

Mr. CRAVEN. That is true.

Mr. DOMINICK. Is this within the contemplation of the FCC, also?

Mr. MINOW. I do not think this is a matter that we really get into because—at least yet. We are only concerned about the United States as part of it.

Mr. DOMINICK. So, to this extent, then, this is up to the State Department?

Mr. CRAVEN. That is right.

Mr. MINOW. I think so.

Mr. DOMINICK. The State Department has already evidenced by testimony yesterday that it was expressing the administration position in favor of letting as many other countries as possible in on it, including the Communist countries.

Mr. MINOW. That may be, but I can only speak for the FCC on that. Our concern is with the U.S. licensee, the U.S. end of it only. After that, it gets out of our bailiwick.

Mr. COLLIER. Will the gentleman yield?

Mr. DOMINICK. Yes.

Mr. COLLIER. In fact, Russia could put up a communications satellite and send it around, send its orbit across the United States. There is no control there at the present time at all, is there, if they choose to do it?

Mr. MINOW. I think that is right. The whole problems of space law and everything are just in their beginning days.

Mr. DOMINICK. This is the next point I wanted to get to and I am glad you brought it up.

We can put a system up, and, as you say, there are only a certain number of radio frequencies available. Suppose the Soviet Union should put up another satellite for the use of their captive countries and for the use of their Communist governments. Would they, of necessity, be using the same frequencies that we would be using on our satellite, and would this constitute an immediate conflict?

Mr. CRAVEN. At the present time the only frequencies that have been allocated internationally by international agreement for space are the research frequencies. However, at the 1959 conference they recognized the necessity of allocating frequencies for space communications on a——

Mr. DOMINICK. Yes, but this is not the question I asked.

Mr. CRAVEN. No. I was going to come to it after I laid the groundwork. So in 1963, there will be an international conference and an agreement will be reached, we hope, with respect to the allocation of frequencies and their use. The U.S.S.R. will be a party to that conference.

If they agree, as they have in the past, to the various things, they will agree to the frequencies to be used and the conditions under which they would be used, there will be a treaty which we will ratify or accept.

Up to now, except for jamming in the broadcast field, they have more or less conformed to the agreements that they have made in the past, and I would expect them to do the same thing in the future.

Mr. DOMINICK. I would not expect them, Mr. Craven, to do the same thing in the future because I have not seen them live up to any treaty that they have agreed to yet.

Mr. MINOW. Well, except——

Mr. DOMINICK. But let me ask you this question which I asked you once before and which, in my opinion, has not been answered.

Suppose they put up another satellite and we have our own satellite in existence and we are using this frequency which has been allocated to us through the ITU—I will go along this far with it.

Would they, of necessity, be interfering in the use of their satellite with the frequencies that we have by agreement?

Mr. CRAVEN. It is entirely possible they would interfere. If they just wanted to disregard all international law, all treaties and so forth, and they intentionally interfered, they could do it.

Mr. MINOW. I would only say the reason why they have, I think agreed in the past is just because of the nature of communications. If you do that, nobody is listening on the other side, you see, and so this is one field where there has been cordination just because people want to communicate with each other.

Mr. DOMINICK. It seems rather obvious to me at least that if we are putting up a system which is of substantial prestige value to the free world and our underdeveloped countries who are our friends, if this is creating any difficulties as far as the Communist countries are concerned, that they have every incentive in the world to simply either jam this thing or put up a competing deal of their own.

Mr. MINOW. They may do that.

Mr. CRAVEN. I wanted to make one thing clear.

The U.S.S.R. desires to communicate with other countries, too. If you are going to have an ether war, there is going to be no communication by radio either by Russia or anybody else, and I think they are fairly practical.

Mr. DOMINICK. All right.

Then when we have been discussing the ad hoc committee, and we have been discussing the system that the FCC has been using in connection with Mr. Moss' questions and Mr. Dingell's, we are referring only, as I gather, to the American interest in this satellite and not to any other country?

Mr. MINOW. Exactly.

Mr. DOMINICK. The degree of use of this satellite—which we will be paying for—by any other country will be determined by the ITU, an international organization, is this correct?

Mr. MINOW. Well, not exactly. It will be determined, first, by negotiation and agreement between the American entity, whatever entity develops, and the foreign government or foreign carrier, as the case may be, and then——

Mr. DOMINICK. I am trying to find out whether we set up the ground rules. This is the thing.

In other words, do we say we can use this 80 percent of the time and the Soviet Union, 20 percent; or do we say we want to use this as much as possible, now you give us whatever share you feel we ought to have?

Mr. MINOW. Well, I can only answer, I think, by saying that it is done by negotiation and these carriers have a way of working them out, depending on traffic, where it originates, and who is using it and so on, and that is one reason why we felt we should explore the carriers first, because they are in this business and because they have relationships with every country and contractual arrangements, and because they have this background, we took this route.

Mr. DOMINICK. How far in the future do you anticipate it will be before this kind of a satellite can be used for data and television transmission?

Mr. CRAVEN. I think the very first system put up is going to be a wide-band system in all the proposals that have been before us. When we finally get agreement as to frequencies and have a system going, we will be transmitting data processing and relaying television.

I think that the experiment that is coming up, proposed by A.T. & T., on which agreement has been reached with NASA to put up in the air, they will have by 1962 a demonstration of data processing and television relay. That is next year.

Now, in that connection, when you say television broadcasting by means of satellites from a studio in this country to the homes of other countries, I think I said the other day that was 20 years off.

Technically it is not 20 years off, but there are many things that have to be solved before you get to that system. For example, the United States has different standards in our own television than many other nations of the world. Our basic electric system is different. We have 60 cycles per second alternating current and they have 50 cycles per second, and that has a bearing on standardization.

For example, in France, they have 800 lines scanned; in England they have 400 and some odd lines; and the whole world would have to come to an agreement on standardization.

Second, whose frequencies are you going to use? It has been suggested by certain of the people in this country that we use VHF channels 7 to 13. However, are we going to give up our system of broadcasting?

In England they have different bands. Is England going to give theirs up?

I say that is a long process, getting international negotiations and everybody in the world agreeing on a set of standards and giving up something to the rest of the world and doing away with their local television systems. That is, as I say, at least 20 years off, if ever.

Mr. DOMINICK. I just want to go over one piece of ground which may be a duplication, but I am not sure I have it in my mind or clearly in the record.

When this becomes an operating system, there will be an American company, as I understand it, which will have certain variation in stock interests among carrier groups or equipment groups, or whatever you decide. I am not interested in that phase of it.

This American company will then be responsible for the operation and maintenace of the satellite and also the ground stations here in this country; is this correct?

Mr. CRAVEN. Not exactly correct. Some of their proposals have been that each of the carriers would own its own ground stations; that the common ownership part is only in the satellite.

Now, some of the companies do not wish to participate in the ground system. They will have to lease facilities from the other carriers.

Mr. DOMINICK. All right, then, let us take the proposal which you just suggested where the only thing that they have control over is the satellite. Presumably, control of that satellite should also give you control of the degree of use of the satellite, should it not?

Mr. CRAVEN. Yes.

Mr. DOMINICK. Then would this company, as such, be the one which would be negotiating with the foreign countries to determine how

often they would be entitled to use it, or would the U.S. Government, as opposed to this company, be doing the negotiation?

Mr. MINOW. I think we would do it, as we understand it, the same way we do it now in the nonsatellite field. The company would negotiate with its opposite number abroad, whether it be a government or a carrier, reach an agreement that is satisfactory to both parties, submit it to us for approval as to the U.S. part of it.

Now, it may be, if this develops into a——

Mr. DOMINICK. Let me ask you right there: Why should they submit it to you for approval?

Mr. MINOW. Well, because it will inevitably involve rates and service and what kind of facilities the public is getting. For example, we pass today on how much it costs to call Europe and what kind of service they have to provide.

Now, it may be—and I cannot really foresee this too far ahead—if this gets to being a truly global system with everybody in it, and we do not have telephone service now to the whole world, that there may be developments along the way that may change some of that. But, for the present, our thinking is to adapt the same principles that we have now to it.

Mr. DOMINICK. Let me ask you this question, then.

If the common ownership company is going to be engaging in the negotiations for this, and they refuse to engage in negotiations with the Communist countries for any share in this use, would the FCC or the State Department or anyone else in this country have the right to tell them that you cannot take that procedure; that you have got to negotiate with them, or else we will cut off your license?

Mr. MINOW. This gets us into a couple of statutory provisions of our act, and, if it is agreeable, I would like to have our General Counsel cite those.

Mr. PAGLIN. This, Mr. Congressman, is, of course, speculative. We would hypothesize, but there are provisions in our act with respect to the obligations of common carriers under which the Commission can in certain circumstances require them to extend their service, and if it were the Commission's—and I am speaking purely of a hypothetical situation—if it were the Commission's judgment that it was in the public convenience, interest, and necessity that communications be carried on with some foreign point, they could very well, after the necessary procedural devices, require a common carrier to communicate with that point.

Mr. DOMINICK. You are talking about communication from this country?

Mr. PAGLIN. To a foreign point.

Mr. DOMINICK. To a foreign country?

Mr. PAGLIN. That is correct.

Mr. DOMINICK. Suppose we are talking about communication from a foreign country to this country?

Mr. PAGLIN. It is a two-way proposition. It is always a two-way——

Mr. DOMINICK. Would this, then, give you the power, in your judgment, to say that the Soviet Union should be entitled to put their own ground facility in the United States so that they can receive from Russia?

Mr. PAGLIN. Oh, no; no. You misunderstand, as I think Commissioner Craven tried to explain.

Insofar as the ground facilities in this country are concerned, they are no different than the transmitting stations which we license now, which we license the carriers to construct and operate.

The transmitting facilities in this country are licensed pursuant to the provisions of the Communications Act. However, the Commission has no jurisdiction over transmission facilities in foreign countries. But communication by the nature of the beast is a two-way system. You must have a transmitter; you must have a receiver.

You send the message; there must be somebody on the other end to receive it. Otherwise, you have no communication.

Mr. DOMINICK. Would you have control over the receiving stations in this country?

Mr. PAGLIN. They do not.

Mr. DOMINICK. I say would you?

Mr PAGLIN. Yes; we do.

Mr. DOMINICK. Now, going still further, taking the powers of the Commission—this is what I am talking about—do you conceive that it is within your power to require the common ownership company to enter into an agreement on this satellite so that one foreign country can communicate with another foreign country?

Mr. MINOW. I would say this gets beyond our statutory jurisdiction. Our only concern is where there is somebody in the United States at one end of the communication, either transmitting or receiving.

Mr. DOMINICK. I appreciate your courtesy and your thoughtful answers, Mr. Minow.

This is a most complicated problem.

Mr. MINOW. Well, it is.

I thought the committee might be interested for the record There was a very comprehensive study of space law which was published as a Senate document earlier this year, March 22, 1961, 1,400 pages, Senate Document 26, and I thought it might be helpful in the record, because this is a new and complex area with very few guidelines, and it might be helpful to have it cited.

Mr. CRAVEN. I might state I tried to read that. I am more confused now than I was before.

Mr. DOMINICK. It is my opinion that the Communist countries have no conception of law, as we think of it, so whatever agreement or anything else that they entered into, I would not have too much confidence in their fulfilling it at this point.

Mr. CRAVEN. But they are anxious to communicate with us apparently. We have circuits now between the United States and Moscow.

Mr. DOMINICK. That is all, Mr. Chairman.

Thank you.

The CHAIRMAN Mr. Chairman, the hour is getting late. I think, however, in view of the questions and the record this morning, I would like to try to also ask one or two questions and try to get clear at least for the record, if I can.

First, let me start out, and I will be brief, by asking this:

The present section 1 of the Communications Act of 1934 sets forth the purposes for which the Federal Communications Commission was established. Among the purposes listed is, and I quote:

> To make available insofar as possible to all the people of the United States a rapid, efficient, nationwide and worldwide wire and radio communications service with adequate facilities at reasonable charges.

Would you say that a communications satellite would be useful in accomplishing this particular purpose?

Mr. MINOW. Unquestionably, sir.

The CHAIRMAN. Would a satellite be useful, also, for additional purposes, as, for example, if proper arrangements could be made, could it be useful for the citizens of India to communicate, as an example, with the citizens of Brazil?

Mr. MINOW. I think so, sir; yes.

The CHAIRMAN. That would necessitate the common use of the satellite?

Mr. MINOW. That is right, or two satellites; that is right.

The CHAIRMAN. Now, to the extent, then, that a satellite would assist foreign nations to communicate with each other, does this particular aspect go beyond the purposes for which the Commission was established?

Mr. MINOW. It is a hard question to answer, Mr. Chairman.

The CHAIRMAN. Yes, I realize it is.

Mr. MINOW. So many parts, you see, of any communications system interconnect with each other and are ingredients, you see, of each other. You may have a system, for example, hooking up the United States with one country.

Part of that same system may then go on to another country. And I am not sure that I could adequately answer it.

Mr. CRAVEN. For example, Mr. Chairman, at the present time we relay through other countries in order to reach, say, a third country.

I am not a lawyer, as you know. I presume the Communications Commission has nothing to do whatsoever with the points beyond the relay.

Mr. MINOW. That is right.

If you call London from the United States, you may then have a hookup from the same point in London on to France, and our concern under the Communications Act, as we understand it, is only that part at one end where the United States has the traffic.

The CHAIRMAN. Under the act, how does the carrier by wire, cable, or telephone, for example, become authorized to do business?

Mr. MINOW. They must obtain from us a certificate which is granted to them pursuant to meeting a number of statutory tests and tests under our practices. They must file tariffs of their rates. They must file specifications of the standards of service that they will provide. And, upon qualifying, they are then issued a certificate and go into the business.

The CHAIRMAN. Is that a part of their certificate of convenience and necessity?

Mr. MINOW. There are also licenses involved for cable and for cable landings and for radio and so on. Then, once they are licensed or once they are granted the certificate, they are under constant supervision, and their rates and periodic reports are required, and so on.

The CHAIRMAN. I wonder if this is an appropriate question, but could list some considerations that must be taken into account in matters of this kind by the Commission in determining whether the granting of the radio station license for common carrier purposes is in the public interest?

Mr. MINOW. Yes. They are basically statutory, Mr. Chairman.

For example, talk about radio. That is our section 308(b). The Commission, by regulation, prescribes the qualifications such as citizenship, character, financial, technical. We want to know who owns the station, where it is going to be located, with whom it is proposed that they will communicate, the purposes of the station, the hours of the day and the time during which it will operate, and we are also entitled by law to ask for any additional information that we think is required.

In the case of the common carriers, then we get into the matter of economic feasibility as well to be sure that there is a sufficient need and traffic and so on to support a common carrier's existence.

The CHAIRMAN. In order to make this record, along with this authority I wonder if it would not be advisable to read section 313(a) and ask you if it would be applicable in considering whether the granting of the radio license is in the public interest?

Mr. MINOW. Yes, 313(a) which deals with the application of the antitrust laws.

It says:

> All laws of the United States relating to unlawful restraints and monopolies and to combinations, contracts, or agreements in restraint of trade are hereby declared to be applicable to the manufacture and sale of, and to trade in, radio apparatus and devices entering into, or affecting, interstate or foreign commerce and interstate or foreign radio communications.

That is why we have taken the position that in considering a joint venture or an entity to go into the communications satellite business, that the antitrust laws apply, and that is why we are consulting with the Antitrust Division of the Department of Justice to be sure that we proceed in accordance with law.

The CHAIRMAN. Your answer is that it would be applicable?

Mr. MINOW. Yes, sir; it would.

The CHAIRMAN. Would section 314 be applicable?

Mr. MINOW. I think it is applicable. This is the section, as you know, Mr. Chairman, that deals with the preservation of competition in commerce.

The CHAIRMAN. That is right.

I think without objection we will let that be included in the record. It is a rather lengthy section, but in order to make the record, we will do that.

Mr. MINOW. It certainly is applicable. It becomes particularly difficult in this instance when we can only talk about one system.

(The document referred to is as follows:)

SECTION 314 OF THE COMMUNICATIONS ACT OF 1934, AS AMENDED

PRESERVATION OF COMPETITION IN COMMERCE

SEC. 314. After the effective date of this Act no person engaged directly, or indirectly through any person directly or indirectly controlling or controlled by, or under direct or indirect common control with, such person, or through an agent, or otherwise, in the business of transmitting and/or receiving for hire energy, communications, or signals by radio in accordance with the terms of the license issued under this Act, shall by purchase, lease, construction, or otherwise, directly or indirectly, acquire, own, control, or operate any cable or wire telegraph or telephone line or system between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other capital share of any interest in the physical property and/or other assets of any such cable, wire, telegraph, or telephone line or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, or unlawfully to create monopoly in any line of commerce; nor shall any person engaged directly, or indirectly through any person directly or indirectly controlling or controlled by, or under direct or indirect common control with, such person, or through an agent, or otherwise, in the business of transmitting and/or receiving for hire messages by any cable, wire, telegraph, or telephone line or system (a) between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any other State, Territory, or possession of the United States; or (b) between any place in any State, Territory, or possession of the United States, or the District of Columbia, and any place in any foreign country, by purchase, lease, construction, or otherwise, directly or indirectly acquire, own, control, or operate any station or the apparatus therein, or any system for transmitting and/or receiving radio communications or signals between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other capital share of any interest in the physical property and/or other assets of any such radio station, apparatus, or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States, or in the District of Columbia, and any place in any foreign country, or unlawfully to create monopoly in any line of commerce.

The CHAIRMAN. Would section 212 be applicable? That has to do with interlocking directorates, and I think we will let that go in the record at this point, too.

(The document referred to is as follows:)

SECTION 212 OF THE COMMUNICATIONS ACT OF 1934, AS AMENDED

INTERLOCKING DIRECTORATES—OFFICIALS DEALING IN SECURITIES

SEC. 212. After sixty days from the enactment of this Act it shall be unlawful for any person to hold the position of officer or director of more than one carrier subject to this Act, unless such holding shall have been authorized by order of the Commission, upon due showing in form and manner prescribed by the Commission, that neither public nor private interests will be adversely affected thereby: *Provided*, That the Commission may authorize persons to hold the position of officer or director in more than one such carrier, without regard to the requirements of this section, where it has found that one of the two or more carriers directly or indirectly owns more than 50 per centum of the stock of the other or others, or that 50 per centum or more of the stock of all such carriers is directly or indirectly owned by the same person. After this section takes effect it shall be unlawful for any officer or director of any carrier subject to this Act to receive for his own benefit directly or indirectly, any money or thing of value in respect of negotiation, hypothecation, or sale of any securities issued

or to be issued by such carriers, or to share in any of the proceeds thereof, or to participate in the making or paying of any dividends of such carriers from any funds properly included in capital account.

Mr. MINOW. Yes, sir, it is applicable.

The CHAIRMAN. That section would be applicable here, too?

Mr. MINOW. Yes, sir.

The CHAIRMAN. Then I suppose that you would agree that sections 212, 313, and 314 constitute an expression of congressional concern with keeping the communications industry competitive?

Mr. MINOW. Yes, sir.

The CHAIRMAN. And that you have that in mind with your standards and the program that you have agreed to?

Mr. MINOW. Very much so, yes, sir.

The CHAIRMAN. Could these considerations be easily applicable in the case of a joint venture?

Mr. MINOW. I think they become more difficult in the case of a joint venture. The inhibiting problem here is the fact that only one system seems to be technically and economically feasible, so I think our problems of maintaining competition become more difficult.

But I think the statutory policy nevertheless applies.

The CHAIRMAN. Would you say today that there is competition in the manufacturing of this kind of equipment that would be used?

Mr. MINOW. Oh, I think there is intense competition, yes, sir.

The CHAIRMAN. Would you say that the companies which are regularly engaged in the manufacture and operation of communications equipment are the only ones which have shown an interest in the manufacturing operation of space equipment?

Mr. MINOW. No. We have also heard, for example, from the Small Business Administration in behalf of small businesses that might be interested in the contracts for equipment. There have also been some other manufacturers who have not officially filed pleadings but who have indicated an interest in this general subject.

The CHAIRMAN. Assuming that for a foreseeable period of time only a single satellite system is practical, would the provisions of the Communications Act authorize the Commission to exclude interested parties from participating in that single system on the grounds that such parties at the present time are not engaged in international communications activities? Do you understand the question?

Mr. MINOW. No. I wish you would repeat it, Mr. Chairman.

The CHAIRMAN. Assuming that for a foreseeable period of time—and I want to ask two or three questions about this in a little different vein in a minute—that only a single satellite system is practicable, would, in your opinion, the provisions of the Communications Act authorize the Commission to exclude interested parties from participating in that single system on the grounds that such parties at the present time are not engaged in international communications activities?

I am asking these questions to the authority that you have——

Mr. MINOW. Right.

The CHAIRMAN (continuing). In the Commission today.

Mr. MINOW. I think that the Commission could reach that judgment provided that its result was also to achieve a competitive system. I think, assuming that the Commission bore in mind the

statutory policies of preserving competition in international communications, I think it could reach that judgment; yes, sir.

The CHAIRMAN. You are satisfied, in your own opinion, that the courts would sustain the Commission's action?

Mr. MINOW. Let me ask my General Counsel.

I might at this time refer to a Department of Justice statement on this specific point, which was filed in our docket in this proceeding. This is at page 16(e), footnote 5. I will correct the record reference for the record.

The CHAIRMAN. All right.

Mr. MINOW. Section 314 would not prevent the Commission approving a plan allowing participation by all interested parties as the purpose of the plan would be to promote competition in the communications industry.

The courts have held that the Commission is entitled to look at the entire communications field and not to confine itself to a part when determining the grant of licenses, citing *FCC* v. *RCA Communications*, decided by the U.S. Supreme Court in 1953.

As long as the Commission is concerned about competition in the communications industry, the business of providing communications service, competition in that part of it, I believe we are on good, sound legal ground; yes, sir.

The CHAIRMAN. I was wondering about the words there, the language in there where it says "all interested parties."

Mr. MINOW. Yes, that is what I was just asking the General Counsel. Would you want to comment on that, Mr. Paglin?

Mr. PAGLIN. The Justice Department was referring here as to whether or not the provisions of the act that you referred to would represent a bar in terms of setting up a monopoly, and I think the principal thrust is, since the criterion of the act itself is in terms of preventing the lessening, the substantial lessening of competition or the restraint of commerce, and, as the Chairman has indicated earlier, if it is the Commission's judgment that the effect of the licensing of this entity would not be to restrain commerce or to lessen competition in the entire communications industry, then it would be permissible.

The CHAIRMAN. I just want to be sure that so far as the record is concerned we are on sound ground, and that this thing moves along. I do not want to see, as was mentioned by Mr. Moss and others, any delay in this thing. I hope there will not be any room for any legal entanglements.

Mr. MINOW. Mr. Chairman, in our initial inquiry, my recollection is that we asked that specific question, invited comment on it, both from industry and the Government, to establish a record of the views that might be held on that point, and it was in response to that that the Department of Justice filed this document.

The CHAIRMAN. I am glad to know that you have gone into it, and have attempted to work it out.

Just one other thing, and I do not want you to feel, when I get through, that it will be a facetious matter or that I speak with tongue in cheek, so to speak. I am very pleased with this record. I think we are developing an excellent record in this field here regarding this entire matter, and at a very important and appropriate time. But it does appear to me that the policy has been agreed to thus far that

this matter is going to proceed with one system—that is, commercially speaking—and that that system will become a joint venture.

Mr. MINOW. Right.

The CHAIRMAN. In other words, then, it has been determined and it is the decision of the Government, in the Space Council, from reading the report of the President, I suppose now, that with respect to the communications in this field, you have set up a chosen instrument procedure, have you not?

Mr. MINOW. I think that is basically right, Mr. Chairman. We would have wished it could be done otherwise, but this is the fact of life.

The CHAIRMAN. I understand.

The reason it is quite amusing to me is that a few years ago I felt insofar as our international aviation was concerned, to be successful and to compete adequately with foreign nations, that such a procedure could be in the best interests of the future of international aviation. And I believe I am correct when I recall the fact that almost every Government agency that we have that had any part or interest in it jumped down my throat in a big way, and has since come along now and adopted the same procedure in an equally important program, in that it seems to be the very best for this country.

I feel that if some 10 or 12 years ago, at least 12 years ago, when our national carriers were in such a bind with reference to competing with foreign nations, if in that situation then we had followed this same procedure in a general way, we would be in a lot stronger position today with our international carriers than we are with the almost daily difficulties they are in. I could not help but note this one item. Of course, you have nothing to do with aviation.

Mr. CRAVEN. May I comment, sir?

The CHAIRMAN. Yes.

Mr. CRAVEN. In the joint venture it is my understanding that these various international carriers that exist now will still be competing for the traffic.

The CHAIRMAN. Yes.

Mr. CRAVEN. Under some proposal each of the companies who desires to have their own ground facilities and the only common point of use is in the satellite itself by all independently will be competing for the traffic. Now, as to the telegraph carriers, I agree with you. I think that perhaps we will be before you again asking for permissive merger.

The CHAIRMAN. Well, that is interesting.

Mr. MINOW. Mr. Chairman——

The CHAIRMAN. I hope we do not have the difficulties in this field that we have had in dealing with mergers in the transportation field.

Mr. MINOW. Before we conclude, and in light of some of the parts of the discussion this morning, I want to make it clear again that the Commission welcomes the advice and wisdom and contributions of all sources, particularly including this committee.

We do not regard ourselves as the source of all wisdom in this matter. We are going into a most fundamental and significant matter for the entire country, and we are not trying to proceed with anything but the highest regard for the public interest.

The CHAIRMAN. Personally, I want to compliment the Commission for the attention and devotion it has given to this matter and the determination to move forward on it. As was said a moment ago, we all make mistakes, particularly where you have to move in a field where there are so many unknown quantities.

I certainly, as one member of the committee, would not put my judgment up against the judgment of the Commission after its long and careful and thoughtful consideration of the problem, so long as you are on sound ground with the authority that you operate in, and, therefore, are proceeding in the best interests of our future.

Let me say I personally think that the Commission has done an outstanding job and has given a thorough analysis of this whole problem, and I want to compliment you for it.

Mr. MINOW. Thank you.

The CHAIRMAN. And I wish you to continue in the field with your responsibilities. You have to deal with so many agencies, organizations, entities, and businesses under our competitive system, I know you have a terrific burden. But I, for one, have confidence that you will be able to deal with it.

Mr. MINOW. Thank you, Mr. Chairman. We are very grateful for that.

The CHAIRMAN. Thank you very much for your appearance here.

The committee will adjourn.

(The following information was submitted for the record:)

STATEMENT OF MAX D. PAGLIN, GENERAL COUNSEL, FEDERAL COMMUNICATIONS COMMISSION, SUBMITTED FOR THE RECORD APRIL 20, 1961

This statement is submitted on behalf of the Commission in order to present its views regarding S. 1084 and S. 1176, bills to establish a national policy with respect to patents growing out of the expenditure of Government funds.

Before turning to these bills, however, I think it would be helpful at the very beginning to set out the relation of patent matters to the Commission's functions.

With respect to common carriers subject to Commission regulation under title II of the Communications Act, section 218 provides as follows:

"SEC. 218. The Commission may inquire into the management of the business of all carriers subject to this Act, and shall keep itself informed as to the manner and method in which the same is conducted and as to technical developments and improvements in wire and radio communication and radio transmission of energy to the end that the benefits of new inventions and developments may be made available to the people of the United States. The Commission may obtain from such carriers and from persons directly or indirectly controlling or controlled by, or under direct or indirect common control with, such carriers full and complete information necessary to enable the Commission to perform the duties and carry out the objects for which it was created."

The Commission has for many years required the principal common carriers, such as American Telephone & Telegraph Co., International Telephone & Telegraph Co., Radio Corp. of America, and Western Union to file semi-annual patent information reports.

With respect to radio communication, section 303(e) of the Communications Act requires the Commission to:

"(e) Regulate the kind of apparatus to be used with respect to the external effects and the purity and sharpness of the emission from such station and from the apparatus therein."

In addition, section 303(g) of the Communications Act requires the Commission to:

"(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest."

The primary function of the Commission is to regulate interstate and foreign commerce in communication by wire and radio so as to make available to the public a rapid, efficient, nationwide, and worldwide wire and radio communication service with adequate facilities at reasonable charges.

To achieve this objective, the Commission from time to time either adopts new technical standards or changes existing technical standards on equipment used in providing such services. For the most part, in adopting those standards, the main concern of the Commission is with technical matters, rather than with the subsidiary question of whether particular patent holders might benefit through promulgation of those standards.

But this is not to say that patent matters are not important. For the Commission has recognized that under certain circumstances, dominant patent holders may become the primary beneficiaries of new or revised technical standards. In this sense, patent information can be, and is, a highly relevant factor in determining whether proposed technical standards should be adopted. For example, in this connection, the Commission insisted on obtaining substantial patent information in the color television hearings in 1949–50 where there were several conflicting systems being prepared.

Similarly, in the current rulemaking proceedings for establishing standards to permit FM broadcast stations to transmit stereophonic programs on a multiplex basis, the Commission has requested the proponents of various systems to supply it with information as to their patents.

However, the difficult problem of whether some patentholder would be in a position of patent domination, must, in our view, remain subordinate to the duty and responsibility of the Commission to adopt technical standards which will result in the securing by the public of the best communication service obtainable.

Moreover, international agreements and treaties lay down basic standards for frequency tolerance and power requirements in international communication. As a signatory to such agreements, the Commission must give effect to such requirements in promulgating its technical standards.

In 1957, the Commission had before it in Dockets 10090 and 11228 the question of whether rules should be adopted which would have required the filing of patent information on a regular reporting basis. At that time, a majority of the Commission decided that patent information should be obtained on an ad hoc basis as it became relevant to a particular proceeding. In declining to adopt the proposed rules, the majority rested its action on the administrative difficulties which would be involved in processing and classifying the raw patent data which would be submitted to it. The majority also felt that overall surveillance of patent matters should be left to other Government departments more directly concerned with the correction of patent abuses.

However, in this connection, let me state that the Commission is currently giving consideration to the matter of a reappraisal of its patent practices and policies. The subcommittee will be kept informed as to any action the Commission may hereafter take regarding this matter.

Turning now to the two bills before your subcommittee, S. 1084 is a bill to establish a national policy for the acquisition and disposition of patents upon inventions made chiefly through the expenditure of public funds and provides that the Federal Government shall have title to all inventions and patents resulting from the performance of any obligation pursuant to a Government contract, grant, or lease, or resulting from a research grant or contract financed by the Federal Government.

S. 1176 would create a new Government agency to administer the Federal Government's patent rights. The United States would have exclusive right and title to any invention of any Federal employee made during working hours or with a contribution by the Government of materials, information, or the services of another Government employee during working hours. In addition, the U.S. Government would have exclusive right and title to any invention made by any person in the performance of a Government contract, lease, or grant.

It is believed that FCC contributions to the group of patents to be administered under the provisions of these bills will be very small. However, if the overall volume and complexity of administering patents held by the Federal Government is sufficient to warrant the establishment of an agency for this purpose, as proposed in S. 1176, there would seem to be no reason why patents arising from FCC activities could not be administered by such an agency. The extent and volume of patents which have been developed by Commission em-

ployees or under Commission research projects were reported to your subcommittee in the Commission's response of April 20, 1960, to your subcommittee's questionnaire. An additional patent not included in that response was issued on September 8, 1959, and covered equipment for a new TV color system. In this case the employee retained title and the Commission was granted a nonexclusive, royalty-free license. Other than the additional work that would be required of the Commission in keeping such records as may be prescribed by the Administrator, the bill, if enacted, would not be burdensome to the Commission.

As a final observation concerning these bills, let me state that whether these bills should be enacted is a matter of legislative policy for determination by the Congress.

Before closing, there are two other matters which I feel deserve attention. The Commission has noted that your subcommittee in its annual report (S. Rept. 143, 87th Cong.) has recognized, at page 14 of the report, that while the Commission seldom engages in direct scientific research, it does promulgate technical standards on which patent rights have a substantial impact. The report then notes that "* * * the Commission has formally declined to estimate the effect of such rights on the general availability of the specified equipment standards and maintains no staff competent to make such an investigation."

In our view, that statement does not reflect accurately the Commission's position or statutory authority with reference to patent matters and the establishmen of technical standards. As already pointed out in the beginning of this statement, the Commission does consider the possible effect of patent domination before it adopts technical standards.

The Commission has also noted that at page 14 of the subcommittee's annual report, it is stated that "Unlike the FCC, the FAA does investigate the impact of such rights on the technical equipment standards it promulgates and makes a positive effort to see that such equipment is equally available to all the carriers it regulates."

To the extent that this statement suggests that the Commission does not take into account, before adopting technical standards, the possible adverse effects which patent domination might have on the public interest, the Commission likewise feels this statement does not accurately reflect its firm determination to assure itself whenever necessary that its technical standards will serve the public interest and not merely the private interests of the patent holders.

Also, in this connection, let me make a final observation; namely, that the Commission knows of no case in which a potential Commission licensee has been unable to operate under our rules because of his inability to obtain a patent license or the use of patent equipment pursuant to a requirement of our rules, or any claim of exorbitant license fees.

Adopted: April 19, 1961.

(Whereupon, at 1 p.m., the committee adjourned subject to the call of the Chair.)

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