Karth hearings

Testimony 12/17

Friday 12/12/69

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

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

Friday 12/12/69

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

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

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

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

Date: December 11, 1969

Subject: Statement before Congressional Committee

To: Director, Bureau of the Budget

Via: George A. Lincoln, Director, OEP

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

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

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

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

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

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

W. E. Plummer
Acting

Attachment

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

*Note: Attached Agenda

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

Hearings of the
Subcommittee on Space Science and Applications

on

ASSESSMENT OF SPACE COMMUNICATIONS TECHNOLOGY

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

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

EXECUTIVE
OFFICE OF THE
PRESIDENT

OFFICE OF TELECOMMUNICATIONS MANAGEMENT

STATEMENT

OF

MR. WILLIAM E. PLUMMER

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

BEFORE THE

SCIENCE AND ASTRONAUTICS COMMITTEE

SUBCOMMITTEE ON SPACE SCIENCE AND APPLICATIONS

HOUSE OF REPRESENTATIVES

December 16, 1969

COORDINATION DRAFT 12/11/69

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

INTRODUCTION

Mr. Chairman and Members of the Committee:

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

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

(HANDOUT)

As the Acting Director of Telecommunications Management, I have been asked to appear today to review activity

relating to commercial communication satellite applications resulting from research and development by the National Aeronautics and Space Administration (NASA). Since you have heard from NASA and expect to hear from Members of Congress and private corporations, I will merely present an overview of the subject as seen from the national policy-making level by the Director of Telecommunications Management (DTM).

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

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

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

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

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

* * *

PROGRESS IN PRACTICAL APPLICATIONS

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

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

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

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

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

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

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

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

(HANDOUT)

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

(HANDOUT)

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

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

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

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

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

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

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

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

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

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

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

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

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

* * *

OPPORTUNITIES FOR ADDITIONAL PRACTICAL APPLICATIONS

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

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

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

Domestic Applications

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

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

Experience in the international global system provides a model for the exploitation of new technology in practical applications. The reason for the success of the new INTELSAT enterprise, in large measure, was brought about by using a systems approach -- emphasizing rigorous engineering and management -- a fundamental principle in the implementation of modern telecommunication systems. The key steps of such a systems approach include the following:

-- Analysis of potential user needs and demands.

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

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

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

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

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

Alaska Applications

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

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

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

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

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

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

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

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

-- Conducting a comprehensive survey of user needs.

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

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

* * *

SUMMARY

In summary

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

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

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

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

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

# # #

HOLD FOR RELEASE UNTIL
PRESENTED BY WITNESS

Statement of

Richard B. Marsten
Director of Communications Programs
Office of Space Science and Applications

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

before the
Subcommittee on Space Science and Applications
Committee on Science and Astronautics
House of Representatives

COMMUNICATIONS PROGRAMS

Mr. Chairman and Members of the Subcommittee:

We welcome this opportunity to review the NASA program in satellite communication for you. In so doing, I will review the history of the program from Echo through ATS-V, progress with ATS-F and G to date, and recent accomplishments in supporting research and technology. I will provide an overview of total program expenditures to date and will conclude with a report on the planned "user experiments." I will pay particular attention to the proposed Alaskan experiment with ATS-I, the planned Indian Instructional Television (ITV) experiment with ATS-F, and the recently approved Corporation for Public Broadcasting (CPB) experiment with ATS-III. These user experiments represent an increasingly important part of our overall program to demonstrate and evaluate new, effective uses for satellite systems in meeting our society's growing needs for communications services.

Our policy objectives as derived from the National Aeronautics and Space Act of 1958, and the Communications Satellite Act of 1962 have been stated. In response to those objectives, we have established a number of steps--a sort of framework--through which we conduct our research and development program. We study the requirements for and technically assess the applicability of satellites to meet future needs. We develop and flight test technology required for future communications, navigation and traffic control, and other useful applications. We develop and conduct flight experiments on promising systems applications. Finally, we provide technical support for U. S. management of frequency and orbit resources.

The Early Program

Let me now briefly review the history of our communications research and development program from the inception of NASA in 1958 to the present. As can be seen from the table (SC70-222), NASA has developed and launched a total of eight communications research satellites in the Echo, Relay and Syncom programs. These research flights were supplemented by two Telstar satellites developed by AT&T and launched by NASA on a reimbursable basis.

Through the research and development program conducted with these satellites, a number of capabilities were developed to serve the nation and the international community. These can be conveniently grouped into three general areas: technology and techniques for the transmission of wide-band signals and multiple voice channels through repeater satellites;

CIVIL COMMUNICATIONS PROGRAMS

SATELLITE FLIGHT SCHEDULE

CY	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
ATS									I	~~II~~ III	~~IV~~	V			F		G
ECHO			~~A-10~~ I				II										
RELAY					I		II										
SYNCOM						~~I~~ II	III										
TELSTAR					I	II											
INTELSAT I								F-1									
II									~~F-1~~	F-2 F-3 F-4							
III											F-1 F-2	F-3 F-4 ~~F-5~~	F-6 F-7 F-8				
IV														F-1 F-2	F-3 F-4		

X LAUNCH FAILURE

NASA SC70-222
12-12-69

the technology required to place and maintain communications satellites in geosynchronous orbit; and the technology required for operational ground stations to work with research and operational satellites.

This early research program resulted in two follow-on programs. One, to capitalize on the technology base developed by NASA and to provide immediate benefits to the nation and its people, was conducted by the Communications Satellite Corporation (COMSAT) on behalf of the International Telecommunications Satellite Consortium (INTELSAT). The other, to develop the more sophisticated and complex multidisciplinary technology required for future applications satellite systems was conducted by NASA: the Applications Technology Satellites or ATS Program.

Another significant but less direct contribution of our early research program has been to the communication satellite systems launched and operated by the U. S. Department of Defense. The Interim Defense Communication Satellite Program (IDCSP), and more directly the Tactical Satellite Communications (TACSATCOM) program, have drawn extensively upon the technology, both satellite and ground station, developed during the Relay and Syncom programs.

Finally, technology initially developed in our early research program has been adapted to support the video data transmission requirements of ERTS-A and B and data transmission requirements of deep space missions.

During the four years from 1965 through 1969, NASA has launched for COMSAT, on a reimbursable basis, a total of ten operational satellites in three serial generations. Eight of the launches were completely successful. Two aborted due to apogee motor or launch vehicle failures. An eleventh satellite is scheduled for launch next month. As already stated, the total operating INTELSAT system of today draws heavily upon the ground station and satellite technology that was developed by NASA in its earlier programs. As a result of the improved facilities developed by COMSAT, new operational services have become available. The improved efficiency through which those services can be performed using satellites has permitted the citizens of this country to see real-time television from around the world, and to communicate with high quality telephone circuits to Europe, Japan, and the Pacific and Asian areas at less cost than prior to the establishment of satellite systems. The INTELSAT system was an integral part of the supporting network for Apollo operations, and, of course, permitted world-wide television coverage of the Apollo 11 and 12 missions.

ATS-I through V

Let me now review for you NASA's research program which built on the same technology base that was developed from Echo through Syncom: the Applications Technology Satellites or ATS program. The ATS project, which was started in 1964, called for five satellite launches: one medium altitude gravity-gradient satellite experiment; two spin-stabilized geosynchronous satellites; and two gravity-gradient stabilized spacecraft in geosynchronous orbit. ATS-I and III were successfully launched in

1966 and 1967, respectively. They are still being operated. Testimony earlier this year before this Subcommittee discussed the launch vehicle failures on the ATS-II and IV flights, and the problems we have experienced with ATS-V.

We have obtained many important results from the wide range of experiments conducted with the successful ATS-I and III satellites. These experiments are providing the technology base for future operational satellite systems.

Generally, the communications technology experiments performed with these satellites can lead to greater capabilities for traditional communications services at reduced rates; capabilities for new services such as TV networking and community educational and instructional television; data collection for expanded environment monitoring systems; specialized information transfer networks to serve unique user groups such as health care services; and more efficient air traffic control systems.

Two of the critical factors in the application of satellites to these new or expanded services is the efficiency with which the satellites can use the limited RF spectrum, and can convert the raw electric power generated on the satellite into radio signals which reach the receiver antenna on the ground.

On the ATS-I and III geosynchronous satellites we proved out the design of both electronically and mechanically despun antennas which permit us to confine the power expended on RF transmission to a beam covering only the Earth's disk with no wasted energy transmitted to space. This results in a 20-fold improvement in transmission efficiency (over the Syncom and early INTELSAT satellites) which can be directly converted into either a reduction in satellite launch weight (and thus cost), or, more importantly into a manyfold reduction in the ground receiving and transmitting station costs.

The practicality of specialized informational networks for education, instruction or health care, or of data collection systems for environmental monitoring services may depend on continued improvements in the efficiency with which we can further narrow our antenna beams and point our satellite antennas toward selected portion of the Earth's disk. Voice and data transmission and position location experiments using these directive antennas have shown that relatively simple and inexpensive ground and aircraft equipment can work with satellites using this technology.

Another important consideration is the extent to which a large number of ground stations can use a single satellite and a single segment of the radio spectrum to communicate with each other. Experiments with ATS-I and III have contributed basic knowledge in this area.

In addition, meteorological cameras, providing both black and white and color pictures of the Earth's disk every twenty minutes during daylight hours, are providing the Environmental Science Services Administration (ESSA) and our research meteorologists with a new look at our atmosphere. Already we have been able to track the short-term behavior of devastating storm systems such as Hurricane Camille far more precisely than with medium altitude weather satellites, and in real-time, permitting more timely and accurate disaster warnings. The improved knowledge of the behavior of these major storm systems, if coupled with improved communications alert systems, could eventually prevent or minimize the shocking loss of life such as occurred in the Appalachian region following Camille. ESSA is now in fact using our ATS-I and III satellites in a quasi-operational fashion to improve weather forecasts, and to develop a better understanding of the way our atmosphere behaves.

While we could not expect to obtain all of the planned experiment results from ATS-V in its spin-stabilized mode, we are obtaining a majority of the planned propagation, digital communicating, and ranging data in the L-band aeronautical frequency region around 1,600 MHz, and in the millimeter wave region. The L-band data are important in evaluating the suitability of this frequency region for conducting aircraft navigation and traffic control operations. The millimeter wave data are important in determining to what extent we may use this higher, yet-uncrowded frequency band to extend satellite communications services without interfering with conventional terrestrial services.

ATS-F and G History

In late 1964 and early 1965, NASA in-house studies were made of the logical extension of the ATS concepts to larger spacecraft, with greater capacity for effective radiated power and pointing precision. These studies indicated that a reasonable next step could be a spacecraft in a stationary orbit, able to radiate to--or view--selected portions of the visible Earth rather than the whole Earth disk. This technology could result in a significant increase in communications, meteorology and Earth resources survey capability, and concomitant improvements in services to the people of this nation--improved TV distribution and community education, safer travel, more accurate weather forecasts, and more effective management of our environment and natural resources.

The studies showed that a relatively large antenna would be required as well as much greater stabilization accuracy than possessed by spacecraft of the previous ATS series. Thirty feet represented the largest practicable antenna size; 0.1 degree stabilization accuracy would be required to provide stable geographic coverage at the higher frequencies that are of interest for many communications applications. This narrow beam antenna will result in a further improvement in transmission efficiency by a factor of some 300 over the whole-Earth coverage patterns of the ATS-I and III satellites. The erection of a thirty-foot antenna in space was identified as the principal technological difficulty.

In May and June of 1966 three aerospace companies received contracts of approximately $150,000 each for six-month feasibility studies. Goddard Space Flight Center (GSFC) conducted its own parallel study. All results indicated that the missions could be accomplished with a 2000 pound satellite launched by a Titan IIIC.

In February 1968, some twenty firms were invited to propose a Phase B/C definition and design study. Fairchild Hiller Corporation and General Electric Corporation were selected in September 1968 to conduct thirteen-month studies which called for specifications and proposals for the Phase-D fabrication effort based on laboratory demonstration of feasibility of critical technologies. The contracts include a sustaining effort until the Phase-D contractor is selected from the two Phase B/C contractors. We expect to select the Phase-D contractor in early 1970.

As currently conceived, the ATS-F and G experimental satellites, scheduled for launch in 1972 and 1974, will prove out technologies which can be ultimately applied to provide a number of benefits. They will provide much of the prerequisite technology base for: mass instruction through TV transmission to inexpensive ground receivers; improved safety, economy, and convenience in air travel through effective air traffic control and communications; continuous contact with satellites in orbit (which is not now possible) through satellite-to-satellite tracking and communications; improved use of the crowded frequency spectrum and synchronous orbit through interference and propagation measurements and experiments; and finally, improved weather prediction through infrared measurements of the Earth's atmosphere.

In February 1968, announcement was made of the experiment opportunities on ATS-F. About sixty experiment proposals were received from over forty organizations. In October, seventeen experiments were selected for ATS-F as follows:

In the area of communications, a number of experiments were selected which relate to the problems of frequency spectrum utilization. One experiment will measure radio frequency interference in the commercial satellite frequency bands to permit us to develop appropriate criteria for sharing these frequencies between space and terrestrial uses. Another experiment will study the basic effects of the atmosphere and ionosphere on very wide-band signals to determine what some of the basic limitations are on transmissions from satellites to Earth stations. We have approved two experiments designed to investigate new, uncrowded, regions of the spectrum, one in the millimeter wave region and the second at laser frequencies. Both of these experiments offer possibilities for wide-band satellite-to-satellite communications in the future.

Two communications experiments were approved for ATS-F which will support continuing studies which relate to more efficient operation of NASA's tracking and data acquisition network which supports NASA's on-going flight missions. One of the experiments will permit tracking of and wide-band data retrieval from the Nimbus-E satellite using ATS-F, and the other would permit similar experiments with one of the Apollo Applications Program dry workshops.

In the area of navigation and air traffic control, we have approved for ATS-F an experiment to determine the absolute and relative accuracy of locating and communicating with moving aircraft as an important input to our navigation satellite studies.

In the area of meteorology, we have approved a very high resolution radiometer experiment, continuing the traditional support that the ATS program has provided to the Earth observations disciplines. In addition to mapping cloud patterns, this sensor will provide experimental information on sea surface temperatures (and thus ocean currents) in cloud-free areas, and will provide estimates of cloud heights as well as areal coverage.

A number of experiments related to basic spacecraft technology and science have also been approved. You will recall that the ATS satellites represent NASA's only opportunity to examine in detail the environment in the geosynchronous orbit.

After we have gathered a majority of the data from these experiments, particularly those that require the active participation of organizations and ground stations in the United States, we will move ATS-F to a position from which it can view the Indian sub-continent. We will then conduct--in conjunction with the Indian Government--the Instructional Television experiment which was the subject of the recent Memorandum of Understanding between NASA and the Indian space agency (Department of Atomic Energy).

Recent Supporting Research & Technology (SR&T)

A number of developments in our recent Supporting Research and Technology program warrant brief mention.

Communications R&D

Two contractual studies on TV broadcast satellites were recently completed. These examined a full range of technical possibilities, problem areas, and cost factors involved in transmitting both monochrome and color television program material either directly to conventional receivers, to augmented home receivers, or to relatively inexpensive community and classrooms.

Potential near-term systems which would require research and development are of interest to NASA to the extent that they might be in the national interest and therefore require flight experimentation. At the present time, one can only generalize and speculate on the possible applications of high power satellites, whether they would be practical, and who the users might be. Meanwhile, further research and development to explore the limits of technical feasibility is essential in order to insure that we are in a position to exercise the option to develop this kind of capability,should it prove desirable in the national interest.

For satellite radio frequency (RF) output powers of 100 watts and above, power level and efficiency of transmitting tubes are the major factors in determining spacecraft size, weight, and cost.

They are the major source of heat to be dissipated into space and consequently RF power output devices are one of the critical components insofar as satellite lifetime is concerned. NASA is conducting research and development studies covering design concepts and experimental verification in the laboratory of the most promising technical approaches to high power tubes and associated componentry.

Navigation/Traffic Control

Based upon in-house studies and recommendations from an interagency committee, we held a competition for an advanced mission study of a satellite system to meet the needs of the civilian aviation and maritime community for improvements in communications, navigation, traffic control and related functions. Twelve aerospace companies responded to our request for proposals and RCA and TRW were selected to conduct the work.

Both companies determined that satellite systems could meet the mid-1970 needs of aircraft and ships for communications and navigation improvements. The Ultra-High Frequency (UHF/L-band) part of the frequency spectrum was recommended by both companies as optimum for the required services, and both recommended a two-satellite ranging system concept for initial experimental work.

In response to a request from the Federal Aviation Administration (FAA) following these studies, a joint NASA/FAA study effort was begun in 1969 to develop plans for a one-ocean, UHF satellite experiment in air traffic control. As mentioned in the recent NASA report to the Space Task Group, we have responded affirmatively to a suggestion by the European Space Research Organization (ESRO) that we examine together the technical basis for a possible experiment that might be conducted cooperatively and on a shared cost basis. In these exploratory talks, NASA has relied on the Department of Transportation/FAA for definition of air traffic control needs in such an exepriment. ESRO is similarly coordinating with the several air traffic control authorities in Europe.

Institutional Support Activities

An important function of our program is to provide technical support to many U. S. Government agencies and to other, outside organizations. We have been called on many times by the Office of Telecommunications Management (OTM) for assistance, particularly on matters of frequency and orbit utilization--most recently in preparation for the 1971 World Administrative Radio Conference (WARC). In continuing support of the frequency utilization activity, we are playing a lead role, with OTM, FCC, and ESSA, in a cooperative, jointly funded program in radio interference and propagation measurements. The initial results will provide added technical support to the U.S. position for the 1971 WARC. Results from our continuing program are intended to provide a technical base for future frequency allocation negotiations as our burgeoning communications needs take us to ever-higher frequency regions in the spectrum.

We have also participated extensively in various Ad Hoc intra-governmental working groups concerned with communications satellite policy and technology, with particular emphasis on domestic satellite possibilities. We provide continuing technical support to the Federal Communications Commission (FCC). Advice and services are also provided to DoD, DoT, State, HEW, and DoC.

We have provided technical support services to COMSAT Corporation on a reimbursable basis. This year, also, we made significant contributions on space systems to the International Telecommunications Union, International Radio Consultative Committee meeting in Geneva by providing the principal papers on orbit utilization and space broadcasting, and to the United Nations Working Group on Space Broadcasting by providing the principal paper on technology and economics.

Program Expenditures to Date:

Now let us look at the resources that have been expended on this program over the past decade. About $250 Million was spent in Fiscal Year 1968 and prior years on projects in the Communications Program, exclusive of ATS-F and G, and exclusive of launch vehicles. The major items making up this total are $36.5 Million in SR&T, $131 Million in ATS-I through V, and $70.5 Million for completed projects, such as Echo, Relay, and Syncom. Adding the $32.8 Million allocated to Communications Projects in Fiscal Yeal 1969, the total through

Fiscal Year 1969 amounts to about $285 Million, including ATS-F and G, but excluding launch vehicles. Through Fiscal Year 1969, $139 Million will have been allocated to the ATS-I through V missions. Of this total about $21.0 Million was for communications experiment effort and about $6.0 Million for navigation experiment effort.

Resources Available for Experimentation:

Recognizing that a large portion of our initial experimental program with ATS-I and III was completed and that their continuing capability to operate represented an important resource to the Nation, NASA held a meeting on June 13, 1969, in which the capabilities and terms of availability of this resource were presented to a broad spectrum of potential experimenters. NASA has established a policy of making the ATS satellites available for worthwhile experimentation by other organizations,after the initial technical experiments on the satellites have been completed,and for as long as the satellites remain operative. Such organizations can include other Government agencies, educational institutions, or private concerns which are potential users of future operational satellite systems. These organizations must be willing to invest in the necessary ground facilities, provide message content, and cover other ground costs. All of the above mentioned classes of organizations were well represented at the meeting.

A great deal of interest in the ATS resource for experimentation was expressed,and a number of specific experiment proposals have subsequently been received.

As an outgrowth of that meeting, NASA and COMSAT jointly developed a draft inventory of communications satellites and associated ground facilities in order to assist the user community to develop meaningful experiment proposals. The inventory consists of the NASA ATS satellites and ground stations, and to a limited extent, those INTELSAT satellites and ground stations where unused capacity is available. In combination, these and the projected ATS-F & G satellites represent a powerful tool for experimental use.

User Experiment Activities:

Let me now turn in more detail to the planned and proposed user experiments: first the proposed Alaskan experiment, then the planned Indian ITV experiment, thirdly the recently approved Corporation for Public Broadcasting experiment, and finally, other proposals from various organizations.

By a letter of November 12, 1969, Governor Keith H. Miller transmitted to NASA copies of the formal Proposal for a Satellite Communications Demonstration for Alaska. We gave guidance to the Governor's Committee in the early stages of their proposal effort by providing them with information on the technical characteristics of the ATS satellites and ground stations, and by telling them what kinds of information their proposal must contain to permit us to evaluate it. I participated in the meeting in Anchorage, Alaska on August 28 and 29, 1969, on this subject. The needs of Alaska for improved communications services were outlined at that meeting. I provided the conference with information on the technical possibilities of experimental use of the ATS satellites in exploring the potential role of satellites in meeting those needs.

In substance, the Alaskan proposal for the use of ATS-I calls for transmission of instructional and other public television programming from Fairbanks to three relatively heavily populated areas, and of educational radio programs to many, more remote areas. Planning and preliminary systems design and site selection have already been started by the State of Alaska.

It is proposed that television programming and the television transmitting station be located in Fairbanks, close to the University of Alaska. Television receiving stations would be located at Kodiak, Nome, and Fort Yukon, representing a variety of geographical areas and population groups. The proposed TV programming would include instructional and pre-school educational programs, public and general informational programs, and medical and public health information.

According to the proposal, VHF radio transmitting stations would be located initially at the University of Alaska, Anchorage, and Juneau. The radio programs could be received in a number of remote areas in addition to the more heavily populated regions, since antenna and receiver costs are much less than for TV reception. The radio programs would be aimed toward educational purposes such as native language training, and health and sanitation practices. Additional two-way radio tests are planned relating to public safety.

According to the proposal, the State of Alaska would bear the cost of development of the programming, the conduct and the evaluation of the experiment. Ground stations would be provided by COMSAT and RCA Global Communications, Inc., with Alaska sharing the cost of installation. NASA would provide the use of the ATS-I satellite, including the normal housekeeping and operations of the satellite.

Planning has already started on the part of the State of Alaska, with a target date of March 1970 for the beginning of radio transmission and October 1970 for the beginning of television transmissions. Proposed transmission schedules would total some seven hours per day, shared between radio and television programs. The proposal calls for the continuation of the experiment throughout a full school year, that is, through the spring of 1971, subject, of course, to continued satisfactory operation of ATS-I.

We anticipate that the technical details of NASA's involvement can be satisfactorily worked out, and that formal NASA approval of the proposal will be forthcoming in the near future.

Turning now to the planned Instructional Television (ITV) experiment with India using ATS-F, I will provide some of the background of that experiment.

The potential ATS-F and G capabilities were discussed within the forum of an international committee on satellite communications experiments which NASA has used since the early experiments with Relay and Telstar. India became particularly interested in the potential for television transmissions to remote areas for instructional purposes, such as methods to increase agricultural output, and for population control. They proposed a joint study of the possibilities of an experiment to test the utility of such techniques in a letter in 1966. Preliminary discussions led to an agreement for a joint study in October of 1967. The focus of this study was on an assessment of the comparative costs and effectiveness of space and non-space systems, a definition of the technical objectives and of the recommended ATS-F experiment, a concise definition of the commitments required of NASA and the Indian Government, and a recommendation of further actions. The joint study was completed this past June.

India is particularly suited for an experiment of the type planned for ATS-F. The population is distributed fairly evenly throughout the country, rather than being concentrated in a few large cities which could be reached easily by terrestrial television distribution methods. There is no existing TV distribution network to be interfered with, and the Indian subcontinent is of a convenient size relative to the antenna pattern of the ATS-F satellite. A ground station suitable for transmission to the ATS-F satellite is already available in Ahmedabad.

Dr. Vikram Sarabhai, Chairman of the Indian Space Research Organization and the Department of Atomic Energy, views the potentialities of the experiment as "truly staggering" for the process of Indian national development programs, as a forerunner of future systems for bringing together all of India with one information and communication system. Most of India's half million villages are severely isolated from each other and from the rest of the world. Despite the high priority of education, the country still has a wide base of illiteracy. Dr. Sarabhai has emphasized the roles of information and the motivation of the farmer, in a society such as India, in making life in smaller communities more meaningful, richer and more livable, and in contributing to national cohesiveness by bringing the culture of the country to every citizen of India.

The key provisions of the more recent agreement signed by both parties on September 18, 1969, can be summarized as follows:

India has accepted responsibility for procuring and installing about 5,000 widely distributed village receiving systems, for all TV programming material, and for obtaining all necessary international frequency clearances. They will transmit TV programs from their Earth station to the satellite. They will assume all costs associated with the ground segment, programming, training, and analysis. They will evaluate the results of the experiment, in quantitative terms where possible, and will report all findings to the international community.

NASA has accepted the responsibility for providing an 80 watt transmitter on ATS-F and positioning the satellite within view of India within one year of launch; providing experiment time of up to six hours per day for a period of approximately one year; and making available training and consultation.

With your permission, I will submit for the record at this point copies of the October 1967 agreement, and the September 1969 agreement.

In summary, NASA is participating at modest cost in a very substantial and significant cooperative communications experiment. The results of this first use of broadcast satellites will contribute to a better understanding of the potential effectiveness of satellite systems in meeting communications, education, and overall economic and social needs throughout the world.

The results will be freely available and will be potentially applicable to many other situations, including future satellite distribution systems--whether for Alaska or the sparsely populated Rocky Mountain region, or for other countries, such as Brazil.

Turning once again to domestic experiments, at the meeting on June 13, 1969, the Corporation for Public Broadcasting submitted experiment proposals. These proposals were discussed with them and a modified proposal, submitted by them, was subsequently approved. The experiment is scheduled to begin this week.

The experiment calls for the transmission on a pilot basis of non-commercial television programs provided by the CPB at NASA's Rosman ground station. The programs will be relayed for three hours each evening from Sunday through Thursday by ATS-I or ATS-III to NASA's Mojave, California ground station. Land lines will carry the signals to Los Angeles, California where they will be broadcast by public television stations on the West Coast. The duration of the experiment will be up to one year, depending on the availability of the ATS satellites, and a supplementary experiment may be added to provide for radio program transmission during daytime hours. We are to coordinate the CPB experiment schedule with those proposed by the Governor of Alaska and the Broadcast Networks, since in some cases the experiments are mutually supporting, and in any event, we must arrange an integrated schedule for the ATS satellites and ground stations.

Rather than cover the balance of the user interest (as expressed by their proposals) in the same detail, let me merely cite the organizations that are involved to show the breadth of the interest that has become crystallized as a result of the announced availability of this experimental resource at the June 13 meeting. These user contacts span the range from mere requests to be kept informed of progress to specific detailed proposals that are currently under review.

We have received proposals from ABC and CBS as well as from two CBS-affiliated stations in Idaho. At the request of CBS we have cooperated in a preliminary test transmission from Rosman through ATS-III to the Hughes Aircraft Company ground stations on the West Coast. We have expressed interest in the types of experiments proposed by the Lister Hill National Center for Biomedical Communications of the National Institutes of Health, National Library of Medicine. We have recently received a proposal from the University of Hawaii covering a broad spectrum of experiment possibilities, both to serve Hawaii and to involve the whole Pacific area.

The Canadian Broadcasting Corporation, the NAVSAT Corporation, Western Union International, and Governor Kirk of Florida have all indicated a greater or lesser degree of interest in the possibilities of experimentation with the ATS satellites. We have also exchanged correspondence with Brazil, prior to the June 13 meeting, regarding the possibility of cooperative experiments using the ATS-F or G satellites.

For these user experiments, NASA is authorized to operate only its own ground stations with the ATS satellites. In the case of user experiments which involve other ground stations, successful proposers must make necessary arrangements with the FCC for licensing.

Concluding Remarks:

The emphasis on user experiments within the communications program demonstrates NASA's awareness of the many potential uses for civil communication satellite systems. User experiments help both to determine operational characteristics for particular uses, and to determine the technical characteristics of satellite systems appropriate to such uses. In order to plan for and implement those technical developments required by newly recognized uses, and in order to perform systems and technology studies necessary for the definition of new communications systems and services, we must maintain a continuing, independent capability in space communications research and development. This capability forms the technical base for identification and satisfaction of future communications needs.

Mr. Chairman, this concludes my prepared statement. Thank you.

NASA
Karth
hearings

STATEMENT BY

UNITED STATES SENATOR MIKE GRAVEL

BEFORE

SUBCOMMITTEE ON SPACE SCIENCES AND APPLICATIONS

OF THE

COMMITTEE ON SCIENCE AND ASTRONAUTICS

HOUSE OF REPRESENTATIVES

WASHINGTON, D. C.

DECEMBER 17, 1969

Chairman Karth, thank you for your kind invitation to testify before this Subcommittee.

Permit me to place in context some of the communications problems affecting my state, the most remote state in the union, which require immediate solution.

Alaska is larger than the combined areas of England, France, West Germany, Poland, Czechoslavakia, and Switzerland. Its area of 586,400 square miles is larger than all of the Eastern seaboard states combined, from Maine to Florida. However, Alaska's population is no larger than that of an average size American community — approximately 270,000 people.

Few Alaska population centers have more than 5,000 persons. Only fourteen communities out of 300 in Alaska have a population of 1,000 or more.

Alaska has the most rugged terrain in North America. It has sea level permafrost in many areas. Temperature varies from -70° F to +100°F. Average annual precipitation varies from 4 inches in the north to 130 inches in the southeast.

Alaska stretches 1,400 miles in one direction; and 2,700 miles in another - about equal to the distance from Florida to Southern California.

We in Alaska have inherited the most backward communications system in the nation.

Many Alaskans have no access at all to radio or television or telephone.

In the population centers, commercial television comes two to three weeks after programs have been shown elsewhere in the United States. Alaska has no live TV.

Telephone costs are so prohibitive many families cannot afford to call outside Alaska except in an emergency.

It is very common to be told in calling to or from Alaska that all circuits are busy — and to have calls delayed for hours. Alaska has no direct dialing capability.

Businessmen pay a heavy premium in time and actual dollar costs for doing business in Alaska as a result of this backwardness.

News media have pony-express type communications, severely limiting the kinds of radio and television news programming and newspaper reports available to the Alaskan public.

And some communications, such as telex, taken for granted by persons outside Alaska, are simply unavailable to Alaskans.

These are problems of those who live in the population centers. They are problems of cost and convenience. Those in rural Alaska have even greater problems.

Tens of thousands of Alaskans, mainly Indians and Eskimos, live in remote villages that have no access to modern communications, save the radio-telephone. This communication's gap reflects itself in many ways, chiefly in education and problems of acculturation.

It is difficult to attract competent teachers for isolated communities and keep them there, out of touch with their teaching colleagues, out of contact with sources of assistance and research, and entertainment.

It is difficult to conduct an adequate educational system where students have no contact with anything beyond their own experience, with only an occasional audio-visual aid requisitioned from a central supply office.

The knowledge gaps that have been bridged in rural America by the media have yet to be successfully challenged in the North country.

Compared to other areas of this nation, my state is in the communications stone age. But, as a result of the technological gains in satellite communications, Alaska's characteristics -- former liabilities -- are now ideally suited to make my state the showcase for Space applications.

In other fields, such as forestry, we have devastating forest fires which reduce hundreds of thousands of acres to ashes. This can be monitored by satellite and warnings issued.

With oil exploration and the need to transport this natural resource to the world's markets, effective anti-pollution systems and controls must be envisioned. Satellite systems could help enormously and ecological protection would result.

Satellites could help locate schools of fish and other forms of marine life which is vital to our national fishing industry.

In addition, new space applications in marine safety and navigational procedures need to be devised if ever the Northwest Passage is to be navigable on a regularly scheduled basis. Satellites can help in flood control warnings as well as advising of ice breakup in the spring.

There are no technical or economic reasons why Alaska cannot reach these long-term goals:-

-Every single community including the smallest village can enjoy television -- educational television, cultural television and commercial television.

-Alaskans everywhere can have access to new biomedical diagnostic assistance.

-Audio-visual programs can be a part of each school's curriculum.

-Telephonic services can now become available to all Alaskans regardless of how remote their community.

Alaska can also have direct outside links through international satellites; and can have a complete internal communications system, using a sensible mix of terrestrial and space facilities.

Last July, I proposed bringing the "Apollo 11" telecast directly to Alaska. This idea initially was scoffed at by authorities who should have known better. However, by insisting that the Department of Defense conduct appropriate military tests, we proved that it could be done.

We employed a double satellite hop, using first a civilian satellite and then a military one to transmit TV for the first time to Anchorage -- live TV. It was the longest live television transmission in history. Alaskans along with their fellow Americans saw Neil Armstrong impress man's footprint on the moon.

Now we are working on another step toward permanent, adequate communications -- a pilot program to bring educational and cultural TV to several Alaskan communities using NASA's ATS-1 satellite. NASA has agreed in principle to the use of the satellite and many communications companies are assisting us.

If the technology exists to do this for Alaskans, why do we not have domestic satellite communications for the entire United States?

Ten countries have or are building domestic or regional satellite communications systems. Many other countries are in the process of formulating similar plans for domestic systems.

How large will our embarrassment be in three years when the greatest power on earth has become second rate to India in the field of communications.

Realizing what I have just said I think you gentlemen like myself would certainly be remiss by not asking why the United States, which financed and pioneered this satellite technology, is falling behind the rest of the world.

The issue has been complicated by a battle of commercial giants. For the last five years or more, commercial communications carriers have locked horns with the Communications Satellite Corporation (COMSAT). The Broadcasters have wrestled with American Telephone and Telegraph Corporation; and the Public Braodcasting interests, siding with educators, have fought the lot of them.

Sitting in the center of this storm has been the Federal Communications Commission. And in the true spirit of submariners who know what to do when a storm is blowing, the FCC dived and bottomed out of sight for five years.

When the FCC surfaced last summer, the White House sat on their hatch, hooded their periscope and told the FCC to do nothing until the new Administration could review the whole issue of a domestic communications satellite system. The White House said it would report in sixty days, October 1, 1969.

The FCC is bobbing along, doing nothing. The White House has yet to release its report. We are now at one hundred and twenty days - and still counting.

Let us review for the moment what pressures are brought on this issue by the various interests involved. COMSAT was authorized primarily to satisfy international communications traffic. Its enabling legislation is clear on that point. Only passing reference is made to domestic applications. Obviously this serves the interest of domestic carriers which sit on COMSAT's Board of Directors. Only after domestic satellite systems were applied for by the American Broadcasting Company and the Ford Foundation did COMSAT bring forward its proposal.

I believe there are two fundamental reasons for COMSAT's lack of real enthusiasm for domestic satellite communications. The first is obvious -- the obvious conflict of interest in having commercial and competing industrial representatives sitting on COMSAT's Board of Directors. Secondly, COMSAT has been consuming all its energies in trying to pursue an international role.

COMSAT is the program manager of the International Satellite consortium called INTELSAT. As such, it operates as its agent. There can be no question that as its agent, COMSAT has found itself in conflicting positions regarding potential domestic applications.

Let me cite an example of this conflict. The U.S. taxpayer is subsidizing foreign interests in INTELSAT by at least $4,000,000. These same interests are attempting to dilute the United States position in world communications.

COMSAT has not been billed for $4,000,000 by NASA for launch services. The reason it has not been billed was to save COMSAT the embarrassment of charging these costs to INTELSAT. This would have placed INTELSAT in the dilemma of paying these costs itself and apportioning them to future launches, or transferring the costs to international satellite users.

The end result of these machinations is that the American taxpayer is supporting a $4,000,000 burden which would be paid for by private users around the world.

While this generosity was occuring, our European partners in INTELSAT met secretly in European capitals, to develop a plan to restructure the voting arrangements in INTELSAT to reduce the United States position from 50% to 5% and to substantially increase their own voting strength to 35% and to increase the voting influence of developing countries to 45%.

I hope that Dr. Charyk, President of COMSAT, who will be following me with his testimony this morning will give us a progress report on the current status of the intelsat negotiations.

Mr. Chairman, I assume we are looking at those agencies expected to participate in executing domestic satellite communications. We have discussed COMSAT and the FCC. Let us briefly look at operations in NASA.

NASA will orbit every communications satellite serving the non-Soviet bloc nations, such as France, Germany and Canada.

Moreover, NASA will develop the most advanced communications satellite, costing more than $40,000,000, for India.

On September 19, 1969, the United States of America and the Government of India signed a Memorandum of Agreement for a bilateral project whose official title is: "THE INDIA/U.S. ITV SATELLITE EXPERIMENT PROJECT."

Gentlemen, consider how well this project fits into a United States system. I personally do not begrudge such a project for India, since we know the desperate need. However, I DO BEGRUDGE THE THINKING THAT EXCLUDES a similar application in the United States, since the American taxpayer is paying the more than $40,000,000 for ATS-F.

At this point it should be recognized by all that the United States is willing to provide satellite communications for India, but unwilling to do it for ourselves.

Mr. Chairman, we can sit here as responsible public officials and deprecate COMSAT management, the perfidy of foreign interests, the generosity of NASA programs, and the lack of aggressiveness of two national administrations in the field of communications.

But the truth is that we in Congress would be less than honest if we left the indictment there.

It was Congress that assigned COMSAT the duty of developing and managing an international communications satellite system. It was also Congress that neglected to clearly assign a similar responsibility to meet our domestic needs. This oversight has resulted in the lack of utilization of communications technology in the United States during the recent decade. In fact, we have been exporting the benefits of our own hard-earned technology without employing those benefits ourselves.

At the risk of being too philosophical, let me say that man's greatest problem is communicating with his fellow man.

I applaud this Committee for addressing itself to this problem... for addressing itself to the opportunity for solving the population problem of India, providing a vehicle for the acculturation of Eskimos in the far reaches of the Arctic, providing our ghetto population with the necessary training and education and bringing to all Americans cultural enrichment far beyond existing horizons.

We now have the opportunity to bring about a greater degree of communications to satisfy all appetites and needs.

The technology exists. What a crime not to use it.

In the wake of our great accomplishment -- putting a man on the moon -- a great deal of reexamination of our priorities is taking place.

This nation has built up a tremendous industrial infrastructure in pursuing our space goals of the sixties. I would hope that this Congress will find the wisdom and develop the policy ... providing Americans as well as others with the vital benefits of better communications.